

NOTES ON MIDDLE AMERICAN *EMPIDONACES*

BY ROBERT T. MOORE

THE Moore Collection contains six hundred and nine recently taken specimens of the genus *Empidonax* representing every indubitable race, except *E. fulvifrons fusciceps*, in Mexico and Central America, as well as several forms not hitherto described. We have no representative of the unique type of *Muscicapa fulvifrons* Giraud, of which as Hellmayr (1927: 220) sagely remarks, the "habitat remains to be discovered." In addition, about one hundred and fifty specimens collected within the past three years by other ornithologists have been made available. Supplemented by more than one thousand older skins in various museums, this enormous series has given the author an extraordinary opportunity to study this difficult genus. Five years ago he realized there was an undescribed race of *E. albigularis* resident in southern Sinaloa, and shortly thereafter that there were other undescribed forms in the high mountains of western Durango, Veracruz and Honduras. He did not care to separate these until an adequate series of freshly taken specimens might be available to make comparisons of real value. During the past fall the author spent two months at the Museum of Comparative Zoölogy, the American Museum of Natural History and the United States National Museum, comparing *all* this fresh material with the old faded series. The results prove to be of sufficient importance to warrant the publication of the new light which has been thrown on almost every race south of the United States border. As more detailed information on the breeding behavior of northwestern *Empidonaces* is imperatively needed and a large amount of fresh, unfaded material is essential to the preparation of an authoritative review of the entire genus, I am not attempting this, but simply giving the results of these studies, as far as they have gone.

The new material has necessarily changed some of the concepts of Ridgway (1907: 546-549), but this early revision remains useful, surprisingly so, when one considers the meager and faded material at his disposal. Since his time, Hellmayr (1927: 211) has suggested a conspecific relationship between *wrighti*, *griseus*, *pulverius*, *fulvipectus*, now known as *affinis affinis*, and *trepidus*. Furthermore, he placed *salvini* and *flavescens* with the *difficilis* group. Dickey and van Rossem (1928) objected to this last action. Later, Griscom (1932: 264) definitely dissociated *flavescens* from *difficilis*. Further-

more, Griscom did not accept Hellmayr's suggestion that *wrighti* is conspecific with the *pulverius-affinis* group, but did accept *griseus* as such. With certain reservations, I find myself in accord with Griscom. The important wing-tail ratio of *griseus* resembles this group, whereas the ratio for *wrighti* is quite different. Were it not for the seemingly authentic breeding female, Moore Collection no. 23436, of *griseus* from Guanajuato, taken in the breeding range of *affinis*, this solution would be welcomed. (See discussion under *griseus*.) If this relationship is accepted, the specific name for the group should apparently be *affinis* (see van Rossem, 1934: 392).

When Ridgway (1907: 546) prepared his key to the genus *Empidonax* he made a major distinction, dividing the genus almost in halves, dependent on whether the "tenth (outermost) primary" was "equal to or longer than the fifth," or the "tenth primary shorter than the fifth." This distinction still serves its purpose for the majority of specimens, but careful examination of more than fifteen hundred individuals proves there is hardly a form in the genus *Empidonax*, which is not variable in this matter over at least a narrow range. In the case of *Empidonax minimus* alone, in which the outermost primary is alleged to be longer than, or at least equal to the fifth, 49 per cent of our specimens have the outer primary shorter, and the same is true of *hammondi* but to a less extent. Sometimes in all races this variability is due to immaturity, the primaries not having attained their full growth, but there are many instances of late-winter specimens, where this cannot be the case. There is a notable tendency in all species, whose races cover a long north-south range, for the outer rectrix to become proportionately shorter as we proceed south. This is especially true of *difficilis*.

Other distinctions of Ridgway are similarly too inclusive and some individual birds simply cannot be dovetailed into this or any other artificial key. For example, the entire group of *albigularis* is misplaced, for the tarsi are not shorter than 14.5 mm. as claimed by Ridgway, but much longer, and this group is closely related to *trailli*! I could cite other cases. This combination of errors in the key and puzzling variability in perhaps the most difficult of bird genera, renders the determination of migrants an exceedingly difficult problem. Nevertheless, it is surprising how our enormous series of freshly taken specimens makes the task easier, as compared with the absolute *impasse*, when dealing with the faded series of the older museums.

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and Mr. Ludlow Griscom, Museum of Comparative Zoölogy; Dr. Frank M. Chapman and Mr. John T. Zimmer, American Museum of Natural History; Dr. Alexander Wetmore and Dr. Herbert Friedmann, United States National Museum, and to Dr. Wetmore for generous permission to examine certain individuals collected by him on his last expedition to Veracruz; Dr. Harry C. Oberholser, the U. S. Biological Survey; Mr. George Willett, Los Angeles Museum; Mr. Adriaan van Rossem and Mrs. Donald R. Dickey, the Dickey Collection; Dr. Pierce Brodkorb, University of Michigan; Stanley G. Jewett for the loan of his unusually fine series of breeding *wrighti* and *hammondi*; and to Ernest S. Booth for information regarding the breeding of these two *Empidonaces* in Washington. These series will not be listed under each form, unless of especial importance. A comparison with Ridgway's 'Color Standards and Color Nomenclature' of the mandibles of all our specimens of adult *Empidonaces* proves that bill coloration is a valuable help toward diagnosis. For the benefit of those who may experience difficulties with this genus, I am appending to this paper a Table of Coloration of Mandibles.

EMPIDONAX FLAVIVENTRIS (Baird)

Specimens examined.—Moore Collection—UNITED STATES: New Jersey: Haddonfield 1 ♂. HONDURAS: Monte El Conejo 1 ♀ (May 20), Catacombas 1 ♂ 3 ♀ (Mar. 21–Apr. 2), Las Peñitas 3 ♂ (Feb. 3–9), Cofradia 1 ♀ (Mar. 14). COSTA RICA: Villa Quesada 1 ♀ (Dec. 14), El General 1 ♂ (Apr. 16). Underwood Collection—HONDURAS: Las Peñitas 4 ♂ (Feb. 4–9), Catacombas 2 ♂ 3 ♀ (Mar. 28–Apr. 4), Cofradia 1 ♀ (Mar. 12).

Distribution.—The Yellow-bellied Flycatcher is a migrant in Mexico, found only in extreme eastern-coast States. We have no specimens from the Central Plateau. It seems to winter from Tamaulipas (J. C. Phillips, 1911: 79; Sutton and Burleigh, 1939: 34), Oaxaca (Bangs and Peters, 1928: 395), Guatemala (Griscom, 1932: 260), south to western Panama (Griscom, 1935: 349). From Honduras, *flaviventris* has been taken previously at Truxillo (Ridgway, 1907: 550) and San Pedro (Sclater and Salvin). One female of the above series, no. 24788 Moore Collection, secured April 2, 1933, at Catacombas, Honduras, has the tenth (outer) primary shorter than the fifth. This bird has *all* the other characters of true *flaviventris*. Just as in other forms of *Empidonax*, this indicates the variability of the primary formula. *E. flaviventris* seems to molt long after arrival in Mexico.

EMPIDONAX VIRESCENS (Vieillot)

Specimens examined.—Moore Collection—HONDURAS: Cofradia 1 ♀ (Mar. 11). COSTA RICA: El Muneco 1 ♀ (Feb. 2).

Distribution.—Merely a migrant in Mexico, the Green-crested Flycatcher has been taken only in the eastern States of Mexico—Tamaulipas and Yucatan (Ridgway, 1907: 553), once in Guatemala (Griscom, 1932: 260), several times on Ruatan Island off the coast of Honduras and rarely in Costa Rica. The prior specimen listed above seems to be the first record for the mainland of Honduras, for recently neither Stone (1932) nor Peters (1929) has recorded it from there. Its scarcity makes us wonder if the States from Mexico to Honduras are part of the main migration route. This Honduras specimen had freshly molted wings and tail in March.

EMPIDONAX TRAILLI BREWSTERI Oberholser

Specimens examined.—MOORE COLLECTION—MEXICO: Sonora: near Cocorit 1 ♀ (June 7); Sinaloa: Guamuchil 1 ♂ (Mar. 19), El Molino 2 ♂ 1 ♀ (May 19–26), Culiacan 1 ♂ 1 ♂ im. 2 ♀ (May 29–June 9), Acapulco 1 ♂ (Nov. 15), Potrerillo 2 ♂ 1 ♀ (May 27–29), Rosario 1 ♂ 1 ♀ (Aug. 29–31), 1 ♂ im. 1 ♀ im. (Sept. 15–Oct. 15), Sierra Palos Dulces 1 ♂ (May 12). HONDURAS: San Lorenzo 4 ♂ (Sept. 26–27). UNDERWOOD COLLECTION—HONDURAS: Cofradia 2 ? (Mar. 5). *E. t. trilli* × *brewsteri*: Sonora: Guirocoba 1 ♂ 1 ♀ (Aug. 3–6); Sinaloa: Potrerillo 1 ♂ (May 23).

Distribution.—The A. O. U. 'Check-list' (1931), apparently relying on Batty's statement (Miller, 1906: 167), lists Traill's Flycatcher as a breeding bird of Durango. Mr. Zimmer at my request looked up Batty's notes and failed to find any supporting data. The facts that Frazar took no specimens in Chihuahua, that we have taken none whatever east of Sinaloa, that *brewsteri* migrates north very late (Griscom, 1932: 261) causing understandable errors on the part of collectors, indicate that this statement is a mistake. However, on the west side of the Sierra Madres *brewsteri* may breed in southern Sonora and northern Sinaloa, as the dates from June 1 to 7 are *decidedly* late. Incubated eggs have been taken as early as May 25 (Willett, 1933: 107) in southern California. The route down the west side over the coastal plains is certainly preferred for migration, and thence through Sinaloa to Guerrero and on to Central America and the Argentine. The specimens from Tamaulipas reported by J. C. Phillips (1911: 79) should be re-examined to determine if they are not true *trilli*, rather than this form.

Thirteen, or more than half of the twenty-one Sinaloa birds, were collected between May 12 and June 9, and four individuals were taken in June. Five proved on dissection to have the sex organs somewhat enlarged and in the male of June 9 considerably enlarged. A single female, Moore Collection no. 9440, taken May 21 at El Molino, Sinaloa, has the sex organs partly enlarged. The intergrades

may have come from some area of intergradation in northern United States. Some of these may represent Oberholser's (1932: 3) new race of *E. t. adastus*, not clearly identifiable in the series.

As indications of the general variability of the genus, two specimens, Moore Collection nos. 9439 and 16639, have the outer primary at least on one wing shorter than the fifth, and the August 6 Guirocoba female has this true of both wings. All of the immatures have the same shortness; so do all of eight immatures from California in the Los Angeles Museum collection. In addition, nearly all of them show the tail double-rounded, instead of rounded as in the adults, the wings short, while under wing-coverts and thighs are deep buff to cinnamon. These are all approaches toward the adult character of the *albigularis* group and indicate relationship. No doubt immatures of true *trailli*, whose adults have short wings and small bills, exhibit these characters too. We may some day have to consider the possibility of a conspecific relationship. Some of our adults seemingly do not reveal the same molting performance, described by van Rossem (1938: 378) for El Salvador migrants. The adult August 29 female from Rosario has new remiges and rectrices, apparently having molted before migrating. The same is true of the San Lorenzo September 21 and 26 birds. Contrariwise, the August 3 and August 6 Guirocoba individuals still show these feathers not molted. If *brewsteri* breeds in Sinaloa, this variation would be understandable.

Miller does not record this race as occurring in Sinaloa. The only record prior to the taking of the above, is one attributed to "Mazatlan" by Grayson (Lawrence, 1874: 287), who gives no data.

EMPIDONAX TRAILLI TRAILLI (Audubon)

Specimens examined.—Moore Collection—MEXICO: Nayarit: near Tepic 1 ♂ (Aug. 10). HONDURAS: Cofradia 1 ? (Mar. 5), San Lorenzo 1 ♀ (= probably ♂ Sept. 21). COSTA RICA: Humo 1 ♂ (Apr. 12). Underwood Collection—HONDURAS: Las Peñitas 1 ♂ (Feb. 1).

Distribution.—A migrant through eastern Mexico, taken neither by Frazar, Batty, nor by ourselves in Durango, nor on the main Central Plateau, nor recorded by Griscom from Guerrero, the Alder Flycatcher migrates down the east coast to Oaxaca (Bangs and Peters, 1928: 394) and through Central America to Ecuador. True *trailli* does not seem to have been taken previously northwest of Oaxaca, where Bangs and Peters (1928: 394) record five specimens.

The Tepic male is apparently nearly pure *trailli*, as it has the greener upper parts, whitish wing bands and medium length for the exposed

culmen. It has some freshly molted body-feathers, but wings and tail are badly worn. It seems to be the first record for northwestern Mexico and is merely a straggler.

EMPIDONAX MINIMUS (Baird and Baird)

Specimens examined.—Moore Collection—MEXICO: Sinaloa: El Molino 1 ♀ (Nov. 26); Nayarit: near Tepic 3 ♂ 1 ♀ (Aug. 10–23); Guanajuato: Irapuato 2 ♂ 2 im. ♀ (Sept. 7–Oct. 1); Michoacan: Zacapu 1 ♂ (Aug. 31), Apatzingan 4 ♂ 2 ♀ (Jan. 5–Feb. 6); Morelos: Jiutepec 1 ♂ 1 ♀ (Mar. 16–Apr. 16). HONDURAS: Cofradia 1 ♂ 1 ♀ (Mar. 5–7). Underwood Collection—HONDURAS: Cofradia 1 ♂ 1 ♀ (?) (Mar. 5–11, Las Peñitas 1 ♂ (Feb. 2), San Lorenzo 1 ♂ (Oct. 6). W. W. Brown Collection—Morelos: Jojutla 1 ♂ 2 ♀ (Dec. 29–Jan. 6). Birds with outer (tenth) primary shorter than fifth, otherwise true *minimus*:—Moore Collection—MEXICO: Sinaloa: Los Leones 1 ♀ (Mar. 31), Iguana 1 ♀ (Feb. 20), near Matatan 1 ♀ (Apr. 22), Vado Hondo 1 ♀ (Apr. 3), Agua Caliente 1 ♂ (Apr. 29), Rosario 1 ♀ (Feb. 23); Durango: Tamazula 1 ♀ (Dec. 12); Guanajuato: near Irapuato 1 im. ♂ 1 im. ♀ (Sept. 19–30); Michoacan: Apatzingan 1 ♂ 6 ♀ (Jan. 8–Feb. 2); Morelos: Jiutepec 2 ♂ 1 ♀ (Mar. 16–Apr. 7). Underwood Collection—HONDURAS: Cofradia 1 ♀ (Mar. 11). W. W. Brown Collection—Morelos: Jojutla 1 ♂ 1 ♀ (Jan. 5), Xochitepec 1 ♀ (Nov. 29).

Distribution.—The A. O. U. 'Check-list' (1931: 208) restricts the Least Flycatcher to the eastern portion of Mexico. Our records prove it a common migrant throughout the Central Plateau (Guanajuato to Nayarit), apparently via the eastern section, as it has not been found by Frazar, Batty nor ourselves in Chihuahua or Durango. It is a rare straggler in Sonora and Sinaloa; winters from Morelos (possibly from Tamaulipas), Oaxaca, and Guerrero south to Panama. It does not seem to have been recorded previously from Guanajuato or Michoacan.

The individual variability in length of outer primary is brought out strikingly in this species. Of thirty-seven specimens, eighteen, or forty-nine per cent, differ from the normal! In addition, a number of individuals in eastern museums have the same short outer primaries, among these, the Frazar-collected female in the Museum of Comparative Zoölogy, taken at Alamos, Sonora. Furthermore in both groups there are two other types of individual variability, which makes this one of the most unstable species in the genus. For example, seven individuals have the bill so narrow that the width at the anterior end of the nostril is equal to *less* than half the length of the exposed culmen, which is contrary to the normal. Five of these occur among birds which are otherwise normal and two in the group that have the outer primary shorter than the fifth. In addition, there are three other individuals which do not coincide with the requirements of Ridgway's key (1907: 546), but show the tarsus *less* than 15 mm. Two

of these occur among birds which are otherwise normal. The result of this variability is, that only nineteen of thirty-seven individuals, fifty-one per cent, show sufficiently stable characters to be run down through Ridgway's key to *minimus*, and yet all belong to it in my judgment. All of the ten specimens from Sonora, Sinaloa and Durango are variables, but as we proceed southeast this variability becomes steadily less. The authors of the *Biologia Centrali-Americana* (vol. 2, p. 73) have declared the slightly forked tail to be the best character to distinguish *minimus* from *trailli*. Every one of the above specimens does possess an emarginate tail, except one from Michoacan, but the comparatively great width of the bill, i.e., more than half the length of the exposed culmen, when measured at anterior margin of nostrils, is fairly reliable.

The earliest date of arrival for Sinaloa in the fall is November 26, but this species reached Nayarit by August 12. The latest date for Sinaloa in the spring is April 29, also the latest date for any part of Mexico. This species molts after arrival in Mexico. All our August birds show both remiges and rectrices badly worn.

EMPIDONAX HAMMONDI (Xantus)

Specimens examined.—Moore Collection—MEXICO: Sinaloa: Babizos 1 ♂ 1 ♀ (Dec. 7–9), Rancho Batel 1 ♂ 1 ♀ (Nov. 10–12), Palos Verde Mine 2 im. ♂ (Oct. 26); Chihuahua: near Vasagota 1 ♀ (May 11); Durango: Piedra Gorda 1 ♂ 1 ♀ (Mar. 12–19); Michoacan: Zacapu 2 ♂ 1 ♀ (Aug. 26–Sept. 13); Guanajuato: Puerta de Guadalupe near Ibarra 1 ♀ (May 14), near Irapuato 1 im. ♀ (Sept. 19), Rancho Enmedio, 17 miles northeast of Guanajuato 1 ♂ (Jan. 19), near Xichu 1 ♀ (Apr. 22); Queretaro: El Caracal 1 ♂ (Dec. 19); Veracruz: near Jalapa 1 ♂ (Mar. 20); Mexico: Contreras 1 ♂ (Jan. 12). HONDURAS: Alto Cantoral 1 ♀ (Jan. 17). Underwood Collection—HONDURAS: Cantoral 2 ♂ 3 ♀ (Jan. 12–Feb. 14). Other specimens examined:—all skins in museums mentioned in Introduction; also Jewett Collection:—UNITED STATES: Oregon: Anthony 2 ♂ 1 ♀ (May 8–June 2), Lookout Mt. 1 ♂ 1 ♀ (May 27), Lakeview 1 ♂ (May 21), Beech Creek 1 ♂ (June 4), Ochoco National Forest 1 ♂ (May 13), Sisters 1 ♂ (May 12), Hart Mt. 1 ♂ (Sept. 16), Old Ft. Warner 1 ♂ 1 ♀ (May 24), Krumbo Creek 1 im. ♂ (Sept. 6), Swamp Creek 2 ♀ (June 28), Portland 1 ♀ (June 6), near Bonanza 1 ♀ (May 27), Algoma 1 ♀ (May 17), Wallowa Co. 1 ♀ (June 13), also 96 specimens in Dickey Collection.

Distribution.—The A. O. U. 'Check-list' (1931: 209) declares that Hammond's Flycatcher winters *throughout* Mexico and it is generally believed to be merely a migrant. But *hammondi* does not seem to invade the hot coastal plains of either southern Sonora or Sinaloa. We have one slightly irregular female, which has the outer primary shorter than the fifth, taken on April 5, with the sex organs well developed.

E. hammondi is certainly not very stable in its characters. For example, the exposed culmen seems to be sometimes *longer* than middle toe without claw, sometimes shorter. A discrepancy occurs in Ridgway's key (1907: 547), where there seems to be a printer's error, the exposed culmen being given as *shorter* than middle toe without claw. The actual measurements on page 565 disprove this! On the other hand, about half of all specimens show the exposed culmen *shorter* than the middle toe without claw. Thirteen of my twenty-three individuals have the exposed culmen *less* than the outer toe with claw. Another alleged character, that the outer primary is longer than the fifth, stressed by Ridgway, does not always hold true, as mentioned in the Introduction to this paper. These irregularities acquire some significance when considered in connection with a large series of variable birds from central Mexico, to be discussed under *Empidonax wrighti*.

E. hammondi does not seem to have been recorded previously from Sinaloa, southern Sonora or Guanajuato. All of our seven birds from the former State were taken in the high mountains, most of them above 5000 feet. In migration, this species seems to avoid the coastal plains of southern Sonora and Sinaloa, moving south along the Sierra Madre range and then spreading south and east over the Central Plateau of Mexico. Griscom (1934: 386) reports a female from Guerrero. My specimen, no. 24792, taken January 17, 1934, at Alto Cantoral, Honduras, by C. F. Underwood, seems to be the first record for that country. The latest bird secured in the spring was a female, collected at Vasagota, Chihuahua (6500 feet) May 11, 1934. The sex organs were not enlarged.

The well-forked tail of *hammondi* is invariable in our specimens and one of the best characters to separate it from *minimus*, whose tail is only slightly emarginate. Dickey and van Rossem (1938: 379-380) state that "Hammond's Flycatcher differs materially from the other visiting species of *Empidonax* in that it molts *before* leaving the north." The Moore Collection has three individuals (24541, Zacapu, Michoacan, August 26; 21830, near Tepic, Nayarit, August 20; and 16580, Suratato, Sinaloa, September 7) which have very badly worn rectrices and remiges. The second has no fresh feathers, the first only one or two new body feathers and the last no fresh remiges, but some fresh rectrices. Nevertheless, this species does molt early, but sometimes birds leave the north in August and early September before the rectrices or remiges have been renewed.

EMPIDONAX WRIGHTI Baird

Specimens examined.—Moore Collection—MEXICO: Sonora: Guirojaqui 1 ♂ (Feb. 1); Sinaloa: Huassa 4 ♂ 1 ♀ (Dec. 13–Jan. 1), El Orito 1 ♀ (Mar. 8), Palmar 1 ♂ (Dec. 3), San Ignacio 1 ♂ (Mar. 16), Badiraguato 1 ♀ (Jan. 3), Guayabito 1 ♀ (Jan. 7); Durango: Rancho Guasimal 4 ♂ 4 ♀ (Oct. 26–Nov. 17), Tamazula 1 ♂ (Nov. 28); Guanajuato: Irapuato 3 ♂ 1 ♀ (Sept. 12–Oct. 5); Queretaro: El Caracal 2 ♂ 1 ♀ (Dec. 6–20); Michoacan: San Augustin near Lago de Cuitzeo 2 ♀ (Feb. 19–20); Morelos: Chapultepec 1 ♀ (Mar. 11). Birds with all characters of *wrighti*, except exposed culmen very short, less than 11 mm.:—Michoacan: San Augustin 1 ♀. Other specimens examined:—Texas: El Paso 1 ? (type of *wrighti*); Arizona: San Francisco Mt. 1 ♂ (June 13, type of *oberholseri*). Jewett Collection:—UNITED STATES: Oregon: Anthony 2 ♂ (May 15–27), Lookout Mt. 1 ♂ 1 ♀ (May 27), Steens Mts. 2 ♂ 2 ♀ (May 14–July 11), near Bly 1 ♂ (May 27), Krumbo 1 ♂ (Sept. 6), Sycan Marsh 1 ♀ (June 13), Burns 1 ? (May 25), Bolan Mt. 1 ♀ (Aug. 20), Guano Valley 1 ♀ (May 24), Horse Ridge 1 ♀ (June 14), Tillamook, western Oregon, 1 ♀ (May 24); also 100 specimens in Dickey Collection, including twelve breeding males from Idaho, Washington, Oregon and California and thirteen specimens from Sonora, Mexico.

Allan Phillips (1939: 311–312) examined the type of *wrighti* and declared it a specimen of *griseus*. I have measured the type. It is true this individual has the wing-tail ratio of *griseus*, but, except for a rather slender bill, its other characters are badly obscured apparently by the browning process, often observed in ancient museum specimens. It is quite possible that the identification of this type as *griseus* may be warranted, but in view of its poor condition, the great variability of this species, as proved by the specimens to be discussed on pages 359 and 360, and the existence of known intermediates between *wrighti* and *griseus* possessing some characters of each, I am not now adopting the new names for this paper, for the proposal should be given careful study by the A. O. U. Committee.

Distribution.—Wright's Flycatcher is a migrant throughout Mexico (except on the coastal plains of Sinaloa) and winters there south to Guatemala. Ridgway (1907: 570) shows that its characters differ from *griseus* chiefly in (1) the proportions of wing to tail, the wing decidedly shorter and the tail longer than in *griseus*; (2) the bill averaging shorter and wider; (3) coloration above more brownish olive, less grayish. In addition, I find that in the winter migrants, taken in Mexico, the under parts are distinctly more yellowish in *wrighti* than in *griseus*, the wing bands are slightly more buffy and the outer margin of the outer rectrices is slightly more grayish, but not so gray as in *hammondi*. When saying this, I should add there does not seem to be a true 'yellow'-phase specimen of *griseus* among all our Mexican migrants of this race. This species is perhaps the most variable in its characters of the entire genus. The birds of the Moore Collec-

tion listed above have been carefully selected as the only ones which can be called true *wrighti* in all their characters, but even four of these have the outer margin of the outer rectrices more grayish than most specimens of this species.

We now come to an extraordinary series of birds. When Brewster (1889: 87-88) described *Empidonax griseus*, he called attention to a strange group of variable specimens, some fifty in number, "from various parts of the western United States," having "much variation in coloring and excessive variation of the size and shape of the bill." He writes: "Indeed the material before me furnishes a series, apparently unbroken and very nicely graduated, connecting the largest, grayest specimens of *griseus* on the one hand, with the smallest, most olivaceous examples of *hammondi* on the other, the middle links of the chain being the specimens referable to *obscurus (wrighti)*." A somewhat similar mass of graduated material, but intermediate chiefly between *wrighti* and *hammondi*, exists in the Moore Collection from the Plateau region of eastern, central and northwestern Mexico. It is true there are five specimens which are almost exactly intermediate between *wrighti* and *griseus*, but the greatest variations occur in a series of fifty-three individuals, which cover almost every conceivable intergradation in character between *wrighti* and *hammondi*. I repeat, these do not include the twenty true *hammondi* and thirty seemingly true *wrighti* in the Moore Collection. Of the fifty-three heterogeneous specimens lying between, *every one* has at least one character which excludes it from both *hammondi* and *wrighti*. It is possible to divide these up into fifteen groups, as shown below, Group 1 being nearest to *wrighti* and each successively numbered group losing some character or characters of this species and approaching closer to *hammondi*, until we come to Group 15, which differs from the latter only in having the outer tenth primary shorter than the fifth. A table picturing these characters side by side is essential for a clear understanding.

In the groups to follow, the above-described characters will be indicated by the symbols used above. When the character is intermediate, a '?' precedes the number. Middle toe *without* claw will be called 'middle toe,' outer toe *with* claw, 'outer toe' and exposed culmen 'culmen.'

Moore Collection

Group 1.—Exactly like true *wrighti*, except culmen unusually short, 10.9 mm. or less, but still longer than middle toe. W1-2, ?3, W4-11. (These birds have the exposed culmen much shorter than the mini-

CHARACTERS OF MALES OF *E. hammondi* AND *E. wrighti*

<i>hammondi</i>	<i>wrighti</i>
(H1) Tenth primary longer than fifth.	(W1) Tenth primary shorter than fifth.
(H2) Average wing-tail difference greater = 13.8 mm. (11.8-16.8).	(W2) Average wing-tail difference smaller = 8.4 mm. (6.8-10.7).
(H3) Culmen shorter, average = 9.4 mm. (8.9-10.2)*	(W3) Culmen longer, average = 10.8 mm. (9.7-11.7).*
(H4) Culmen about equal to middle toe.	(W4) Culmen longer than middle toe.
(H5) Culmen usually slightly shorter than outer toe.	(W5) Culmen longer than outer toe.
(H6) Tarsus 17.6 mm. or less, average = 16.2 mm. (15.3-17.6).	(W6) Tarsus 17.5 mm. or more, average = 18.2 mm. (17.5-18.8).
(H7) Upper parts gray, slightly olive.	(W7) Upper parts browner (Citrus Drab). ¹
(H8) Under parts uniform, throat gray.	(W8) Under parts not uniform, throat whitish.
(H9) Belly very pale yellow or whitish, Primrose Yellow in winter plumage.	(W9) Belly yellow, brighter in winter plumage (Colonial Buff to Amber Yellow).
(H10) Outer web of outer rectrix gray or whitish gray.	(W10) Outer web usually white or whitish.
(H11) Mandible blackish, or Fuscous.	(W11) Mandible variable, Fuscous to Straw Color.

mum given by Ridgway.) Sonora: Guirocoba 2 ♀ (Jan. 12-20), Guirojaqui 1 ♂ (Feb. 4); Sinaloa: Huassa 5 ♀ (Dec. 8-29), Palmar 1 ♀ (Dec. 4); Durango: Rancho Guasimal 3 ♂ 3 ♀ (Oct. 25-Nov. 16), Tamazula 1 ♀ (Dec. 10); Jalisco: Atoyac 1 ♀ (Feb. 21); Guanaajuato: Iraquato 1 ♀ (Sept. 12); Queretaro: El Caracal 2 ♀ (Nov. 29-Dec. 11).

Group 2.—Like true *wrighti*, except (1) culmen still shorter than in Group 1, shorter than middle toe. W1-2, H3-4, W5-11. Morelos: Chapultepec 1 ♂ (Feb. 15).

Group 3.—Like true *wrighti* except (1) culmen shorter than outer toe. W1-4, H5, W6-11. Sinaloa: Huassa 1 ♂ 1 ♀ (Nov. 22-Jan. 2); Nayarit: near Tepic 1 ♂ (Aug. 20); Queretaro: El Caracal 1 ♀ (Dec. 2).

Group 4.—True *wrighti* except (1) culmen shorter than (or equal to) middle toe and (2) shorter than outer toe. W1-2, H3-5, W6-11.

* Only in these measurements do the author's figures differ materially from Ridgway's (1907: 565). The measurements of *hammondi* were taken from a California-Oregon-Washington-Idaho series of seventeen males, those of *wrighti* from eighteen males from the same States and in three cases from the same localities.

¹ Names of colors in this paper, when capitalized, are taken from Ridgway's 'Color Standards and Color Nomenclature,' 1912.

Sinaloa: Huassa 1 ♀ (Dec. 8); Durango: Tamazula 1 ♂ (Dec. 7); Queretaro: El Caracal 1 ♂ (Dec. 1).

Group 5.—*E. wrighti* in measurements, but approaching *hammondi* in coloration, in particular grayer on upper parts. W1-6, H7-9, W10-11. Sinaloa: El Orito 1 ♂ 1 ♀ (Mar. 3-8), Los Leones 1 ♀ (April 10), Vado Hondo 1 ♂ (April 1); Jalisco: Atoyac 2 ♂ (Feb. 22, 23); Morelos: Chapultepec 1 ♀ 2 ♂ 1 ♀ (Feb. 11-Mar. 10).

Group 6.—Like Group 5, but mandible more blackish. (One has short tarsus.) W1-6, H7-9, W10, H11. Sinaloa: El Orito 1 ♀ (Mar. 15); Durango: Ojito 1 ♂ 1 im. ♀ (Aug. 24-27); Guanajuato: Rancho Enmedio 1 ♂ 1 ♀ (Jan. 21-Feb. 2), near Irapuato 1 ♀ (Jan. 10); Michoacan: San Augustin 1 ♂ 1 ♀ (Feb. 15-17).

Group 7.—Like Group 6, but outer rectrix grayish like *hammondi* and mandible nearly like *wrighti*. W1-6, H7-10, W11. Durango: Ojito 1 ♀ (Aug. 29); Guanajuato: near Irapuato 1 ♀ (Jan. 7).

Group 8.—Intermediate in wing-tail ratio. In general an intermediate, which cannot be identified as either species. W1, ? 2, W3-6, H7, W8, ? 9, H10-11. Queretaro: El Caracal 1 ♂ (Dec. 18).

Group 9.—Like Group 8, almost an exact intermediate, but some characters interchanged. ? 1, H2, H3, H4, W5, ? 6, H7, W8, W9, H10, ? 11. Sinaloa: Suratato 1 ♀ (Sept. 7).

Group 10.—Wing-tail ratio and short outer primary of *wrighti*, but otherwise nearest *hammondi*. W1, W2, H3, H4, H5, W6, H7-10, W11. Guanajuato: Irapuato 1 ♂ (Sept. 27).

Group 11.—Intermediate as follows: W1, H2, H3, W4, H5-9, W10, H11. Guanajuato: Xichu 1 ♀ (April 25, sex organs well developed).

Group 12.—Intermediate—W1, H2-3, W4-5, H6-8, W9-11. Veracruz: near Jalapa 1 ♀ (Mar. 19).

Group 13.—Nearer *hammondi*, but coloration chiefly *wrighti*. H1-6, W7-9, H10-11. Sonora: El Cobre 1 ♂ (Oct. 2).

Group 14.—Same as Group 13, but upper parts gray. H1-7, W8-9, H10-11. Sinaloa: Rancho Batel 1 ♂ (Nov. 18).

Group 15.—Exactly like *hammondi*, differing only in tenth primary shorter than fifth. The Chapultepec bird has the outer web of outer rectrix white. W1, H2-9, ? 10, H11. Durango: Rancho Guasimal 1 im. ♂ (Nov. 17); Morelos: Chapultepec 1 ♀ (Mar. 10).

It will be noted that *all* of these fifteen groups have the bills shorter than in normal *wrighti*, and the last few groups have the bills very short. The development of this character within the groups is toward a short-billed bird like *hammondi*, not toward a long-, slender-billed one like *griseus*, and the procession of the other characters is in the

same direction. Anyone who follows the above groupings carefully will realize that we have here a complete intergradation of characters from *wrighti* to *hammondi*. I can perceive no method of expressing this peculiar relationship nomenclaturally. Even if we arbitrarily reduce all characters to the three generally accepted as differentiating the two species, eliminating all except the first three on page 359 we will still be unable to place Groups 1, 3, 4, 8, 9, 10, 11, 12, and 15. If we reduce to two characters, we still cannot determine six birds; if to one character, three specimens! Griscom (1934: 387-390) has called attention to somewhat parallel groups of individuals in Guerrero, indicating hybridization between *Myiarchus cinerascens* and *Myiarchus inquietus*. In Sinaloa I have found an even more remarkable series of apparent hybrids between these two species, covering several hundred specimens so that hybridization may not be unexpected in *Empidonax*. It is generally conceded that *wrighti* and *hammondi* breed in the mountains of northwestern America, ranging from the Yukon south. In the geographic sense, there is no true intergradation, because there is no typical intergrading geographic region, so far as we now know, occupied by intergrades, existing between their respective ranges. Taverner (1934: 293-294) states that Wright's Flycatcher breeds below 3000 feet and Hammond's above this altitude. However, Dr. Alden H. Miller tells me they occupy the same zones, but different ecologic niches, Hammond's Flycatcher frequenting dark, heavily forested areas or ravines and Wright's more open, dry areas, either altitudinally above or below *hammondi*. A detailed account of the habitats of the two species by Grinnell, Dixon and Linsdale (1930: 273-280) confirms this. Furthermore in letters to me Messrs. Stanley B. Jewett, Ernest S. Booth and Ian McTaggart Cowan support this conclusion, adding that in Oregon, Washington and British Columbia, respectively, *wrighti* breeds in willow associations, whereas *hammondi* nests in conifers in the same general areas. Therefore, it may not be too chimerical to imagine that somewhere on the boundaries of these habitats they may hybridize. A large number of specimens of true breeding birds, taken at the nest, throughout the ranges of these forms where they meet, is imperatively needed to render any conclusion satisfactory.

If there is a hybridizing area in northwestern America, I do not believe Oregon is a crucial one. An excellent series, including some breeding birds taken in the same localities, proves that the important characters of the tenth-fifth primary and wing-tail ratios are rather stable in this State. However, the culmen-middle toe and culmen-

outer toe ratios fluctuate greatly in about thirty per cent of the specimens, which are, in all other characters, true *hammondi* or true *wrighti*. Only migrants in Mexico, belonging to Groups 2-4 inclusive might have come from this area. Long series of *nesting* birds from the mountains of British Columbia might be more revealing.

In this connection it is interesting to discover that *wrighti* molts rather early like *hammondi*. All specimens taken in Mexico during late September and October show new remiges and rectrices; but individuals collected in early September either have not molted these feathers or are just acquiring some of them. For example, a male, no. 22098 (Moore Collection, Irapuato, Guanajuato, Sept. 12), has all old badly worn remiges and rectrices, while nos. 22092 and 22091, September 10 and 17 birds from the same place, show old remiges, but short new rectrices, while no. 22093, a September 12 female, has all these feathers new and half the body feathers also. I have cited similar instances of *hammondi* under that form.

Another surprising thing is that the single bird of the tenth group, no. 23350, Moore Collection, was sexed carefully by the collector, Chester C. Lamb, and proved to have the ovaries well developed. This is the only member of this entire assemblage of ninety-three individuals which seems to have been breeding. It was taken on April 25, 1939, at Xichu, seven miles northwest of Guanajuato City. Being a female, it is possible that it was nesting and yet no specimen of *hammondi* has heretofore been found breeding in Mexico.

Empidonax wrighti does not seem to have been recorded previously from Sinaloa, although it has been taken at a fairly low altitude in southern Sonora, Tesia and Alamos, neither of them over fifteen hundred feet. It now proves to be a fairly common migrant in the mountains of Sinaloa, entirely above fifteen hundred feet in altitude, for we have taken no specimens on the coastal plains. Like *hammondi*, this species seems to migrate for the most part along the Sierra Madres, not often descending below its lower ranges. The bulk of the migration seems to spread out over the Plateau.

EMPIDONAX GRISEUS Brewster

Specimens examined.—Moore Collection—MEXICO: Sonora: Soyopa 1 ♂ (Oct. 13), Agiabampo 1 ♀ (Apr. 20), Guiricoba 3 ♂ 2 ♀ (Sept. 18–Oct. 5, Jan. 20); Sinaloa: Los Leones 1 ♂ 1 ♀ (Mar. 26–Apr. 4), El Orito 1 ♂ (Mar. 18), Huassa 1 ♂ 1 ♀ (Dec. 29–Jan. 1), Colmoa 2 ♂ (Aug. 27–28), Culiacan 6 ♂ 4 ♀ (Nov. 7–Apr. 16), Guamuchil 2 ♂ (Apr. 4, Oct. 4), Vado Hondo 1 ♂ 1 ♀ (Apr. 3), Palmar 1 ♂ (Nov. 30), Suratato 1 ♂ (Dec. 22), Badiraguato 2 ♀ (Jan. 8), Arroyo Guayabito, 18 miles east of Quila 1 ♂ 1 ♀ (Jan. 4–7), San Batauto 1 ♂ (Feb. 19), Rancho El Padre 1 ♀ (Nov. 26), Rosario; southern Sinaloa 1 ♀ (Feb. 28); Durango: Ojito 2

♂ 1 ♀ (Aug. 27-28), Tamazula 2 ♂ (Nov. 21-Dec. 6); Guanajuato: Irapuato 4 ♂ 4 ♀ (Sept. 14-Jan. 11), Puerto de Guadalupe 1 ♀ (May 11 possibly breeding); Queretaro: El Caracal 4 ♂ 1 ♀ (Nov. 29-Dec. 14); Michoacan: San Augustin southwest end Lago de Cuitzeo 1 ♂ 1 ♀ (Feb. 21). Birds variously intermediate between *griseus* and *wrighti*:—Sinaloa: Badiraguato 1 ♀ (Jan. 3), Rancho El Padre 1 ♀ (Nov. 26); Guanajuato: Irapuato 1 ♀ (Sept. 10), Puerto de Guadalupe 1 ♀ (May 10, possibly breeding); Queretaro: El Caracal 2 ♀ (Dec. 2-20).

Distribution.—A migrant throughout Mexico from Tamaulipas (Sutton, 1939: 34) to Sinaloa, wintering as far south as Puebla, Michoacan and Nayarit. Unlike *wrighti* it is found on the arid coastal plains of Sinaloa.

Ridgway (1907: 570) calls attention to the peculiar proportions of the wing and tail of this species, as compared with *wrighti*, namely, that in *griseus* the wing is "decidedly longer" and the tail shorter. Since that time, most writers have agreed that this ratio of wing to tail is the most important character, particularly for the determination of migrants in Mexico. Griscom (1932: 263) reiterates it. My own studies confirm it. The other characters generally ascribed to *griseus* are the longer more narrow bill, paler upper parts, usually white wing bars and whiter outer margin to outer rectrix. All of the sixty-two specimens listed above, with the exception of the five individuals which are intermediate with *wrighti*, are true *griseus* according to this concept. There are one or two which have bills a little shorter than the minima for male and female given by Ridgway, but these have all the other characters of *griseus*. In spite of these variations, this species is more stable in its characters, so far as our migrants are concerned, than *hammondi* or *wrighti*. Four of the five questionable birds (Moore Coll. nos. 17185, 17451, 24812 and 24820, from Sinaloa and Queretaro) are almost precise intermediates. They have the wing-tail ratios of *wrighti*, but all of the other characters, including long narrow bill and coloration are true *griseus*. Griscom (1934: 386) also noted individuals from Chilpancingo, Guerrero, as "exactly intermediate between *wrighti* and a series of *griseus* in the fall plumage."

One character differs from the original description by Brewster (1889: 88). He terms the lower mandible "flesh color." In my specimens, when not more than four months have elapsed since collecting, it ranges from Mustard Yellow to Straw Color. It fades with great rapidity to dirty grayish white, the extreme tip remaining blackish. This last coloration is remarkably uniform compared with *wrighti*.

Six individuals have been taken in Sinaloa in the month of April, ranging from April 3 to April 20, but I believe that these are all migrants. Out of the entire list only two females, no. 23436 Moore

Collection a true *griseus*, and no. 23467 are intermediate, with the wing-tail ratio of *wrighti*, both taken at Puerto de Guadalupe, five miles west of Ibarra, Guanajuato, Mexico, secured by Chester C. Lamb on May 11, 1939, were sexed by him as having the "ovaries well developed." They were collected in an association of manzanitas and low white oaks, at an elevation of 7200 feet. I realize that several authors have credited this species with breeding in Mexico, particularly Ridgway (1907: 571), but so far I have not seen any records which prove it incontestably. I am not convinced that our two records now prove it. Neither Frazar nor Batty took a breeding individual and these are our only possible ones out of sixty-three specimens! If *griseus* proves to be a breeding bird of the western portions of the Mexican Plateau, the theory that it is conspecific with the *pulverius-affinis* group will be untenable (see Hellmayr, 1927: 211; and Griscom, 1932: 263).

Empidonax griseus does not seem to have been recorded previously from Queretaro, Michoacan or Sinaloa, although Ridgway (1907: 571) mentions it from "near Mazatlan, Sinaloa" without giving the source. Neither Lawrence, Miller nor McLellan record it from this State. Nevertheless, the birds are abundant migrants in Sinaloa and, unlike *hammondi* and *wrighti*, descend to the coastal plain even to sea level in the vicinity of Culiacan and Guamuchil. From this point it ranges up to about three thousand feet at El Orito in northeastern Sinaloa, but strangely enough we have not found it in the higher mountains of this State, and yet on the eastern side of the Sierra Madres we have specimens from as high as 7000 feet at Ojito, Durango, and at various high elevations on the Central Plateau.

Molting takes place at varying dates, but usually after arrival in Mexico. A series of five Irapuato, Guanajuato, birds, taken from September 14 to October 4, are *all* in process of molt, and yet three August 27-28 birds from Ojito, Durango, have completed the molt, at least for remiges and rectrices, and in one specimen for all the body feathers also. The winter and nuptial plumages seem to differ very little, contrasting greatly with the variation of these plumages in *wrighti*.

EMPIDONAX AFFINIS PULVERIUS Brewster

Specimens examined.—Moore Collection—MEXICO: Chihuahua: Laguna Juanota 4 ♂ 1 ♀ 5 ♂ im. 2 ♀ im. (July 16–Aug. 7), east side Mt. Mohinora 4 ♂ 5 ♀ (May 16–29, breeding), San Feliz 1 ♂ (Aug. 26), Los Frailes 3 ♂ (June 23–27, breeding); Sinaloa: Babizos 4 ♂ 3 ♀ (Dec. 3–16), Rancho Bate' 2 ♀ (Nov. 17–22); Durango: Muertocito 3 ♂ 2 ♀ (June 11–17, breeding), Ojito 2 ♂ (Aug. 26–28), Rancho Guasimal 1 ♂ (Oct. 27), near Piedra Gorda 2 ♀ (Mar. 9–20), Nievero 2 ♂ 3 ♀

(Mar. 24-Apr. 2, breeding). Other specimens:—the topotypical series in the Museum of Comparative Zoölogy.

Distribution.—A common breeding bird, probably confined to mixed pine and oak forests of the Transition Zone of Chihuahua, Durango and possibly western Zacatecas, east of the western margin of the Sierra Madres. Winters occasionally on the western side of the range at high altitude in Sinaloa, and south rarely as far as Guerrero and Guatemala.

This splendid series of forty-nine fresh specimens, taken in almost every month of the year and including a large series of May and June breeding birds, many of the females having eggs in the oviducts, makes it possible to analyze the characters of this form better than has been previously possible. This I shall discuss later, as well as examine the relationship with other forms. On first examination I was inclined to agree with Hellmayr (1927: 211, footnote) that at least *E. griseus*, if not *E. wrighti*, might prove to be conspecific with *pulverius*. A careful examination and comparison with all the specimens in the eastern museums, forces me to conclude that, although *fulvipectus* (*affinis affinis*) and *trepidus* are conspecific with *pulverius*, this group is certainly distinct from *wrighti*. It is true, as Griscom (1932: 263) has remarked when referring to the wings, that "proportions tend to be more important than color in this most difficult genus." However, there are other proportions than those of the wing-tail formula, which may negative the conspecific relationship with *griseus*. The wings are much longer in *pulverius* as compared with *griseus*, and the bills are much shorter. *E. affinis affinis* lies between them in wing measurements, but not in those of bill (see measurements, p. 385). In these important categories of wing-tail and wing-bill ratios, *pulverius* is much closer to *hammondi*. Furthermore, both show deeply emarginate tails and uniform throat and breast. I am not asserting a conspecific relation with *hammondi*, although it is not inconceivable, as their breeding ranges probably do not overlap. The great difference in coloration of the bills in adults is bridged over in some immatures of *pulverius*. The difference in the comparative length of outer primary is bridged over by exceptions, some adults of *hammondi* having the outer rectrix shorter than the fifth, whereas an adult breeding male of *pulverius*, no. 18586 Moore Collection, from Mt. Mohinora, has it longer than the fifth. But the possibility that some form of *hammondi*, as suggested above by my specimen from Xichu, may breed in northeastern Guanajuato, would negative such a concept. The *pulverius-affinis* forms, as now

conceived, constitute a well-knit group, having generally similar characters, except for the slightly different wing-tail ratio of *pulverius* (see Table of Measurements). Brewster's description of the coloration of the mandible is inaccurate; in fresh winter specimens it is Colonial Buff but fades rapidly. Another character, not previously noted, is the great difference between the winter and breeding plumages. Whereas these differ very little in *griseus*, the contrast is so great in *pulverius* that at first the two plumages are not recognized as belonging to the same bird. The June breeding plumage resembles *hammondi* very closely, except for coloration of mandibles, whereas the September–November plumages approximate winter *difficilis*! But the latter is much more yellowish on the belly and *much* more yellowish green above. In this winter plumage the wing bars are slightly greenish buff, whereas in the nuptial plumage they are white. There are two curious immature males, with almost entirely blackish-brown mandibles, which cannot be assigned to any other race; both were taken at Laguna Juanota, southwestern Chihuahua. One, no. 19393, July 29, has an enormous wing (76.4 mm.) and a short tail (60.5 mm.), deeply emarginated, and short exposed culmen (10.2). The other, no. 19390, August 3, also has a large wing (73.5) and short tail (61.9) and all the other characters of *pulverius*. In addition, both have more buffy wing bars, which indicate their immaturity, and may account for the black mandibles. Juveniles obtain new remiges and rectrices in the post-natal molt. A complete winter molt has been acquired in all individuals by October. Some of my specimens indicate the possibility of a complete nuptial molt in the spring.

In view of Griscom's records from Guatemala and Guerrero, it seems strange that we have not taken migrants in Michoacan and Guanajuato. The breeding season lasts several months. Sex organs begin to show activity in late March, while some females have eggs in the oviduct during the middle of June and one male shows full enlargement of sex organs on June 27. They may have two broods. The forms of *affinis* seem to breed earlier than those of the *albigularis* group (July–August), for example, our records indicate *pulverius* for May–June, *trepidus* and true *affinis* for late April.

EMPIDONAX AFFINIS TREPIDUS Nelson

Specimens examined.—Moore Collection—MEXICO: Guanajuato: Rancho Enmedio 17 miles northeast of Guanajuato City 1 ♂ 1 ♀ (Apr. 28–30, breeding), 2 ♂ 3 ♀ (Jan. 19–28); Michoacan: Zacapu (western Michoacan) 2 ♀ (Aug. 31–Sept. 11). Other specimens:—type in U. S. National Museum from Hacienda Chancol, Guatemala.

Distribution.—Breeds in a north-south section of the Central Plateau, probably from Coahuila to at least western Guanajuato, wintering south to Guatemala.

As Griscom (1932: 263) has pointed out, this race "is exactly intermediate in color and known breeding range." On the basis of the material listed above, and comparison with the inadequate series in eastern museums, the doubt occurs if a race, representing intermediates between two forms as close as *pulverius* in the northwest and true *affinis* in the east, and so close to the latter, should be recognized. Even the coloration of the mandible is intermediate, but it must be said these intermediate characters seem quite uniform.

The April 30 female from Rancho Enmedio had eggs in the oviduct. This locality is reported by Mr. Lamb to be beside a stream in an arroyo among alders and live oaks with manzanitas on the hillside. Probably this race breeds also in the higher pine-oak association of the Transition Zone, like its conspecific congeners.

EMPIDONAX AFFINIS AFFINIS Swainson

Specimens examined.—Moore Collection—MEXICO: northeastern Guanajuato: near Xichu 1 ♂ 2 ♀ (Apr. 23–26, breeding); Hidalgo: Real del Monte 1 ♂ (Oct. 26); Morelos: Tres Marias 1 ♂ 1 ♀ (Oct. 2–10); Mexico: San Bartolo 1 ♀ (Sept. 21).

Distribution.—Breeds in Transition Zone of eastern Mexico probably from southern Tamaulipas and San Luis Potosi west to at least eastern Guanajuato (Xichu). Winters south to Guatemala.

My October 2 male from Tres Marias is practically identical with male no. 235550 in the Museum of Comparative Zoölogy from Alvarez, San Luis Potosi, a July 20 individual, which is rather surprising, but a July specimen from Tamaulipas in the M. C. Z. collection is grayer as would be expected in birds of this period of the year.

The April 26 female from Xichu had large eggs in the oviduct. According to Mr. Lamb, Xichu is located in an oak-pine association at an altitude of 8000 feet. The breeding birds are brighter green above, more yellowish brown on the breast and seemingly more Mustard Yellow on the mandibles than the series of breeding April birds of *E. a. trepidus* from Rancho Enmedio in western Guanajuato. These birds of northeastern Guanajuato are certainly nearer to true *affinis*. It will be noted in the table (p. 385) that, although the measurements of my individuals of *trepidus* have about the same proportions of wing to tail, these of *affinis* are smaller, the difference averaging only 10.8 mm. as compared with 11.8 mm. for *trepidus* and 13.2 mm. for *pulverius*. None of our specimens of *affinis affinis* or

trepidus has the tenth primary longer than the fifth. The apparent brighter coloration of the bill in this race may be due to rapid post-mortem changes in the species, for some specimens of *a. affinis* have not been taken more than seven months, as compared with two years for *pulverius*. Obviously the color fades rapidly as in *griseus*.

EMPIDONAX DIFFICILIS GROUP

The *Empidonax difficilis* group, although showing some tendencies toward individual variation, is more sharply defined and somewhat more stable than any of the groups hitherto considered. The greatest variation seems to occur in three characters: (1) the tail, generally rounded, is sometimes even and sometimes emarginate; (2) the width of the culmen, generally less than one-half the exposed culmen, is sometimes wider; (3) the tenth outer primary, usually shorter than the fifth, is occasionally longer. These variations occur over the range of the species. In spite of the above, the conspecific group can be determined immediately from all other *Empidonaces* in the Mexican region, as it is the only group which has almost the entire under parts and mandible yellow in all plumages, with the possible exception of *E. flaviventris*, from which it may be distinguished by its longer bill and buffy, compared with yellow wing bars.

As we proceed south from southwestern Canada, we find true *difficilis*, excluding the island form, *insulicola*, maintaining its characters quite constantly as a breeding bird from Oregon to northern Sonora. Some slight changes may be noted in areas west of the Rocky Mountains, but these may be disregarded, until we reach the hot, dry, coastal plains of central Sinaloa. Here we find *difficilis* becoming brighter yellow on the under parts, darker on the breast and smaller in size. A very different development occurs to the east in the Rocky Mountains and their continuation, the Sierra Madres of Mexico. At the 6000–7000-foot elevation in Arizona (Santa Rita Mountains) a race (*immodulatus*) appears, duller both above and below than either *difficilis* to the west or *hellmayri* of Texas to the east. Proceeding south along the crest of the great backbone of the continent, we discover the birds gradually getting darker, instead of lighter, both above and below, until we reach the mountains of southeastern Sinaloa and Nayarit, where we have the dullest *difficilis* of all (*bateli*) (see Moore, 1940). Nevertheless like the bright yellow-bellied birds to the west on the coastal plains of Sinaloa, this bird is considerably smaller than those of the southern Rocky Mountains. But large size is maintained east of the Rocky Mountains, as we move south along the Plateau from Texas to Oaxaca.

In great contrast with the development along the crest of the Sierra Madres, these birds have brighter-yellow bellies, as we go south, but darker buff on the chest and brighter green on the upper parts. Far across Mt. Orizaba in eastern Veracruz, we find a bird with the darkest chest of all, but a comparatively bright yellow belly and very large size.

EMPIDONAX DIFFICILIS CINERITUS (Brewster)

The San Lucas Flycatcher is not represented in the Moore Collection, confirming the accepted belief that it does not migrate across the Gulf of Lower California to Sinaloa or Sonora.

Distribution.—Breeds in the Upper Sonoran Zone of the Cape district, and in the Transition Zone of the Sierra San Pedro Martir; transient over the lowlands and to the south in winter, but not beyond Lower California.

EMPIDONAX DIFFICILIS DIFFICILIS Baird

Specimens examined.—Moore Collection—UNITED STATES: Arizona: Fresno 1 ♀ (June 20). MEXICO: Sonora: Soyopa 1 ♂ (Oct. 11). Migrants:—Sonora: Guirocoba 2 ♀ (Sept. 25). Other specimens examined:—enormous series, particularly of breeding birds from California and Oregon in Dickey Collection, Amer. Mus. Nat. Hist., Mus. Comp. Zool. and U. S. Nat. Mus., including adult type from Fort Tejon, California, and one of original co-types from Shoalwater Bay, Washington; Biological Survey Collection:—Oaxaca: Puerto Angel 1 ♀ (Mar. 13), type of *Empidonax bairdi perplexus* Nelson; and further in Dickey Collection—MEXICO: Sonora: Saric 3 ♂ 7 ♀ (May 15–June 23, breeding), 5 ♂ 2 ♀ (Aug. 15–Sept. 24), Tecoripa 3 ♂ Mar. 10–15), San Javier 1 ♀ (Apr. 23), Tesia 2 ♂ 1 ♀ (Mar. 23, Dec. 15–29).

Distribution.—Breeds in northern Sonora (Saric), probably at medium elevations in the foothills of eastern Sonora; regular migrant throughout Lower California and through Sonora to at least San Ignacio, Sinaloa (lat. 24° N.), less common on east side of Sierra Madres as far as Oaxaca.

We have no specimens from Nayarit. The individuals, recorded by Ridgway (1907: 578) from Colima and Guerrero should be re-examined to determine their status. Griscom (1934) does not record true *difficilis* from Guerrero.

The Western Flycatcher probably breeds regularly in the foothill arroyos and canyons of Sonora, possibly to an elevation of from two to three thousand feet, but since almost all of the systematic collecting in this State has been done at lower altitudes, little is known of the breeding habits of the nominate race. Only at Saric in the extreme north, did J. T. Wright take specimens in breeding condition. In my brief trip to the crest of the Sierra Madres across southern Sonora in May–June 1934, I did not secure any at the middle altitudes, but at the

same time of the year I found a nest of the mountain form, *bateli*, at Rancho Batel, Sinaloa, 275 miles farther south. Individuals of true *difficilis*, taken as far south as Guirocoba in southeastern Sonora, are clearly migrants. Here they intermingle with intergrades between *difficilis* and the unnamed race next to be described.

Empidonax difficilis culiacani subsp. nov.

Sinaloa Flycatcher

Type.—Male adult in full breeding condition, no. 8901, collection of Robert T. Moore; Culiacan, Sinaloa, Mexico, altitude 55 feet, May 31, 1934; collected by Chester C. Lamb.

Specimens examined.—Moore Collection—*culiacani*: Sinaloa: Culiacan 1 ♂ (type, May 31, breeding) 2 ♂ (Dec. 3–28), Reforma 1 ♂ (May 1), Guamuchil 1 ♂ (Sept. 23), El Molino 1 ♂ 1 ♀ (Oct. 27–Nov. 16), Elota 1 ♀ (Mar. 24), Naranjo 1 ♂ (Dec. 6), Vado Hondo 1 ♀ (Apr. 2), Sierra Palos Dulces 1 ♂ 2 ♀ (May 3–17), Matatan 1 ♂ (Apr. 23), Carrizo 1 ♂ 1 ♀ (Apr. 16–19), Palmar 2 ♂ (Dec. 1–2), near Mazatlan 1 ♀ (Apr. 10), Rosario 2 ♂ 3 ♀ (Dec. 23–Feb. 27), Rancho Santa Barbara 2 ♀ (Dec. 18–21), Rancho El Padre 1 ♀ (Nov. 20), Isla las Tunas 1 ♂ (May 12); Durango: Tamazula 3 ♀ 1 im. ♂ (Nov. 28–Dec. 4). Migrants:—Mts. of Sinaloa: Rancho Batel 1 ♀ (Apr. 2, 6200 ft.); Michoacan: near Apatzingan 1 ♂ 1 ♀ (Jan. 16–Feb. 2); Nayarit: Tepic 1 ♀ (Aug. 22). Intergrades *difficilis* × *culiacani*:—Sonora: Chinobampo 1 ♂ (Mar. 12), Guirocoba 1 ♀ (Jan. 15); Sinaloa: Los Leones 2 ♂ 2 ♀ (Mar. 24, Apr. 2–4), El Orito 1 ♂ 1 ♀ (Mar. 8–17), Colmoa 1 ♀ (Aug. 28), Yecorato 1 ♂ (= ♀) (May 5), Huassa 2 ♂ 2 ♀ (Nov. 22–Dec. 15), El Molino 1 ♂ (Nov. 15), Quelite 2 ♂ (Feb. 3–9). Dickey Collection:—Sonora: Guirocoba 4 ♂ 3 ♀ (Apr. 17–June 4, not breeding), Chinobampo 2 ♂ 3 ♀ (Feb. 6). Migrant intergrades, *difficilis* × *culiacani*:—Sinaloa: Reforma 1 ♂ (May 1), Culiacan 2 ♂ (Mar. 7, Nov. 11), Badiraguato 2 ♂ 1 im. ♂ (Jan. 3–11), San Ignacio 1 ♂ (Mar. 13), Iguana 1 ♂ (Feb. 18), Arroyo Guayabito 1 ♂ (Jan. 6), Rancho El Padre 1 ♂ (Nov. 23), Rancho El Fielo 1 ♂ (Jan. 10), Rosario 1 im. ♂ 1 ♀ (Oct. 18, Feb. 26), Rancho Santa Barbara 1 ♂ (Dec. 19), Sierra Palos Dulces 2 ♂ 1 ♀ (May 2–16), Palos Verdes Mine 1 ♂ (Nov. 3); Durango: Rancho Guasimal 1 im. ♂ (Oct. 20), Tamazula 3 ♂ 1 ♀ (Nov. 21–Dec. 10); Nayarit: Rio Las Canas 1 ♂ (Jan. 25); Michoacan: near Apatzingan 4 ♂ 1 ♀ (Jan. 9–Feb. 2). *E. difficilis difficilis*:—all specimens listed previously under that name.

Subspecific characters.—In breeding plumage brightest yellow on throat, belly and under tail-coverts of all the races of *difficilis* and size smallest. Differs in these characters from *difficilis difficilis* of California (May–June breeding birds); in addition has upper parts brighter green, anterior breast browner; bend of wing and under wing-coverts more cinnamon. Differs from *E. d. occidentalis* of southern Mexico in being deeper yellow on throat, considerably brighter on belly, contrasting sharply with brownish breast; duller green (less bronzy yellowish) above; size smaller. Differs from *hellmayri* of southwestern Texas to Durango in the characters separating it from *occidentalis*, but upper parts a trifle more bronzy green, and size much smaller. In winter plumage *culiacani* is brighter, deeper yellow (Citron Yellow) on belly, under tail-coverts and throat than any other race.

Distribution.—Lower Arid Tropical Zone of Sinaloa from sea level to about 3500 feet (Palos Dulces Mts.), probably breeding in the foot-

hills and lower mountains, and occurring as a migrant as far southeast and south as Tamazula and Rancho Guasimal, Durango (5500 feet), to Rio Las Canas, Nayarit, and to low altitudes in Michoacan (Apatzingan, 1000 feet).

Remarks.—*Culiacani* is the only Arid Lower Tropical Zone representative of *difficilis* and seems to be the terminal end of the desert group of this species. For several years the author did not believe it bred in Sinaloa, but the taking of the type specimen with unquestionable fully enlarged sex organs and, more important, the accumulating evidence of differentiating characters, as well as the finding of the nest of the high-mountain race, *bateli*, in extreme southeastern Sinaloa, and the proved breeding of the species as far south as Honduras, compelled reconsideration. *E. culiacani* undoubtedly nests throughout the lower mountains of central Sinaloa, but it is probable it does not on the coastal plains of southern Sinaloa, where it is represented only by migrants. I believe that nests will be found eventually between the one-thousand and two-thousand-foot level, in localities favored by its congener, i. e., in rock niches beside dropping rills.

All of the northern forms of *difficilis*, including *culiacani*, migrate at least a short distance. True *difficilis* overlaps the range of *culiacani* in northern and central Sinaloa, whereas *culiacani* drifts across the range of two other races to the south, being found occasionally both in Nayarit and Michoacan at low altitudes. Furthermore, *culiacani* pushes eastward up the long rivers of eastern Sinaloa into Durango, but only at low altitudes, namely, at Tamazula at 2800 feet. Above this elevation we find a different race.

The extreme southeastern part of Sonora and the extreme northern part of Sinaloa, from the Sonoran boundary south to about the Rio Mocerito (lat. 25° 25'), constitute an area of intergrades, in which some individuals are closer to *culiacani* and others to true *difficilis*.

EMPIDONAX DIFFICILIS HELLMAYRI Brodtkorb

Empidonax difficilis hellmayri Brodtkorb, Occ. Papers Mus. Zool., Univ. of Michigan, no. 306, pp. 1-3, Jan. 30, 1935.

Specimens examined.—Moore Collection—MEXICO: Durango: Rancho Guasimal 1 ♂ (Nov. 13). Other specimens examined:—5 ♂ of topotypical series in University of Michigan; all specimens in the U. S. Nat. Mus. and Biol. Survey Collections including 1 ♀ (Feb. 27) from Chacala, Durango.

Distribution.—"Chisos and Guadalupe Mts., S. W. Texas"; south in the winter at least to Rancho Guasimal and possibly Chacala, Durango.

Remarks.—This seems to be a valid form, chiefly distinguishable from *difficilis* by its unusually large size, brighter upper parts and slightly more-yellow belly. One specimen in the Moore Collection, listed above, is a migrant of this race. Brodkorb lists another female in the Biological Survey Collection from Chacala, Durango, which proves to be an intermediate, having the smaller measurements of *immodulatus*, but the brighter coloration above of *hellmayri*. I have no doubt that this form migrates regularly into eastern and central Chihuahua on the Plateau, but I have not found it in the high mountains of southwestern Chihuahua or Sinaloa.

EMPIDONAX DIFFICILIS IMMODULATUS MOORE

Empidonax difficilis immodulatus Moore, Proc. Biol. Soc. Washington, 53: 23-25, April 19, 1940; east side of Mt. Mohinora peak, southwestern Chihuahua, Mexico, altitude 10,500 feet; collection of Robert T. Moore.

Specimens examined.—MOORE COLLECTION—MEXICO: Chihuahua: Mt. Mohinora 1 ♀ (type, May 12, breeding), San Feliz 1 im. ♂ (Aug. 19); Durango: Muertocito 1 ♂ (June 11, breeding). Migrants:—Sinaloa: Palos Verdes Mine 1 ♂ (Oct. 29), Rancho Batel 1 ♂ (Apr. 15); Nayarit: Tepic 1 ♂ (Aug. 22). Other specimens examined:—Mus. Comp. Zoöl. Collection—Chihuahua: Pinos Altos 5 ♂ 1 ♀ (June 4–July 14), Bravo 6 ♂ 2 ♀ (July 24–Aug. 8), Jesus Maria 1 ♀ (Apr. 24). Dickey Collection:—UNITED STATES: Arizona: Santa Rita Mts. 3 ♂ 2 ♀ (May 7–June 8, breeding).

General subspecific characters.—Only slightly smaller than *E. d. hellmayri* in size, this race is purer duller green (less Buffy Olive) on upper parts and duller and darker on breast and paler on belly, than either *hellmayri* to the east or true *difficilis* to the west. On the other hand, it differs from *E. d. occidentalis* Nelson of southern Mexico, formerly known as *E. d. bairdi*, in having upper parts and breast less brownish, wing bands paler and the bend of wing less cinnamon.

Distribution.—Breeds in the Transition Zone of extreme southwestern Chihuahua (10,500 feet) north through the higher parts of the Sierra Madres, at least to the Upper Sonoran Zone (6000–7000 feet) in the Santa Rita Mts., Arizona. Migrates south along the higher parts of the range at least to the vicinity of Tepic, Nayarit.

Remarks.—I have remarked previously that the southern end of the Rocky Mountains and their continuation through the Sierra Madres of Mexico break up the east-west continuity of the brighter yellow-bellied races of *difficilis*, as we move from true *difficilis* of the western United States and northern Sonora east to *hellmayri* of Texas and Chihuahua.

EMPIDONAX DIFFICILIS BATELI MOORE

Empidonax difficilis bateli Moore, Proc. Biol. Soc. Washington, 53: 25–26, April 19, 1940; Rancho Batel, Mts. of southeastern Sinaloa, Mexico, altitude 6200 feet; collection of Robert T. Moore.

Specimens examined.—Moore Collection—*bateli*: Sinaloa: Rancho Batel 1 ♀ (type, June 4, nesting), 1 ♂ (May 22); Nayarit: near Tepic 3 ♂ (Aug. 20–23). Intergrade, *bateli* × *immodulatus*:—Durango: Muertocito 1 ♀ (June 16).

General subspecific characters.—Nearest to *E. d. immodulatus*, but darker and duller in the greens both above and below and paler yellow on the belly, with bend of wing more buffy and size smaller. It is the darkest and dullest in both yellows and greens of any race of the *difficilis* group.

Distribution.—As a breeder, apparently confined to the narrow belt in the Transition Zone along the tops of the high mountains of western Durango, southeastern Sinaloa and Nayarit, chiefly on the western side of the Sierra Madres; winter range unknown.

Remarks.—It has been said elsewhere (Moore, 1940: 25) that *bateli* and *immodulatus* intergrade in an area of the Sierra Madres about where the States of Chihuahua, Durango and Sinaloa meet, just south of latitude 26°.

On May 22, 1938, I found the first nest of this flycatcher, whose owner became the type. The bird was carrying cocoon-like material to a crevice on a perpendicular cliff beside a tiny waterfall. Later the female had to be shot on the nest. The two fresh eggs were broken. They are white with Hay's Russet spots about the larger end.

EMPIDONAX DIFFICILIS OCCIDENTALIS Nelson

Empidonax bairdi occidentalis Nelson, Auk, 14: 53, Jan. 1897 (Pluma, Oaxaca; coll. U. S. Nat. Mus.).

Specimens examined.—Moore Collection—MEXICO: Guanajuato: Xichu 1 ♂ 1 ♀ (Apr. 20–24, breeding); State of Mexico: Desierto de Leones 1 ♂ 1 ♀ (Apr. 11); Morelos: Chapultepec 1 ♀ (May 23, breeding) 1 ♂ 1 ♀ (Feb. 28), Atzacmulca 1 ♂ (Aug. 30); Guerrero: Cuapongo 1 ♂ (May 30, breeding). Intergrades, *E. d. occidentalis* × *bateli*:—Michoacan: Rancho La Cofradia, 4 miles east of Uruapan, 8 ♂ 3 ♀ (June 7–July 5, breeding). Other specimens examined:—U. S. Biol. Survey Collection:—Oaxaca: Pluma 1 ♂ (Mar. 18, type); Morelos: Cuernavaca 1 ♂ (Jan. 3), Huitzilac 1 ♀ (June 11); Michoacan: Mt. Tancitaro 1 ♂ 1 ♀ (Mar. 1–3); Guerrero: Omilteme 1 ♂ 1 ♀ 1 (? = ♀) (May 22–24). Intergrades, *occidentalis* × *hellmayri*:—Amer. Mus. Nat. Hist. Collection—Nuevo Leon: Boquilla 2 (?) (June); San Luis Potosi: 1 (?) (July). Mus. Comp. Zoöl. Collection:—Tamaulipas: Galindo 4 ♂ 3 ♀ (Mar. 16–22).

General subspecific characters.—In breeding plumage differs from all the races of *difficilis* to the north, in being much browner above; wing bars and margins of primaries more buffy; breast browner (nearer Dresden Brown); and brighter yellow on the belly than either *immodulatus* or *bateli*. Resembles closely *culiacani* on under parts only, but upper parts totally different; size large, only a trifle smaller in wings than *hellmayri*. Winter plumage too poorly represented in American museums and my own collection to characterize positively.

Distribution.—Breeds from at least Xichu in northeastern Guanajuato and possibly somewhat farther north, south over the southern

end of the Mexican Plateau through Morelos, Mexico, Michoacan, possibly to Oaxaca. Winter range unknown, but may extend south to Guatemala.

Remarks.—In a previous paper (Moore, 1940: 28) I suggested the use of Nelson's name *occidentalis* for the bird of southern Mexico, at least until it is proved what the ambiguous type of *salvini* is. I failed to note the only known specimen of the species *difficilis*, taken in Guatemala during the breeding season. It is a July 7 male in the British Museum from the Sierra de las Minas, recorded by Griscom (1935a: 813) as *salvini*. Mr. Griscom writes me he did not compare this specimen with freshly taken breeding birds of southern Mexico. I assume it is different, because my female from Santa Rosa, Chiapas, coming from between the two regions, is not like the southern Mexican bird, but resembles the type of *salvini* which, of course, is not definitive evidence.

The nomenclature of *occidentalis* is intriguing. Nelson (1900: 264) according to his own subsequent statement, intended, when he originally described this race, to differentiate it from *Empidonax bairdi*, but chose the wrong specimen. He actually thought he had selected a representative of *bairdi*. Subsequently, when he discovered the mistake, he redescribed *occidentalis* under the name of *Empidonax bairdi perplexus* and, of course, chose a new type specimen, believing that his original *occidentalis* was purely a synonym of *bairdi*. Now that it is stated (van Rossem, 1934: 392) that *bairdi* is not a *difficilis* at all, and is totally different from Nelson's original type specimen of *occidentalis*, it seems we must resurrect this latter name to represent at least tentatively the group of breeding *difficilis* in southern Mexico.

The female type of *perplexus* proves to be a migrant of true *difficilis*. It has the same coloration and almost identically the same measurements as my average (see Table) of eleven females of true *difficilis* from California and Oregon. It differs from all races breeding in Mexico, in that the breast is almost uniform with throat and belly.

The author has examined carefully the primaries of every individual of all the races of *difficilis*. It seems rather extraordinary, that whereas both females and males of the four northern races have the outer primary shorter than the fifth but usually longer than the fourth, in *occidentalis*, although it is longer than the fourth in the males, it is shorter than the fourth in all of the seven females. Examining the females of the races to the south, the same condition proves to exist, with only one exception. On the other hand, of the three females of

the intergrades from Galindo, Tamaulipas, two show the outer primaries longer than the fourth, like northern races, while one shows it shorter like southern races.

The two specimens from Xichu, Guanajuato, a male and female, both have the sex organs very much enlarged, the female with large eggs in the oviduct. Although these specimens are not quite so brown above as individuals from farther south close to the type locality of *occidentalis*, I consider them nearer to *occidentalis* than to any other race. The birds in the Museum of Comparative Zoölogy from Galindo, Tamaulipas, and three individuals in the American Museum, two from Boquilla, Nuevo Leon, and one from San Luis Potosi, seem to be intermediates between *occidentalis* and *hellmayri* of Texas. The specimens from Rancho La Cofradia, four miles north of Uruapan in extreme western Michoacan, are intergrades between *occidentalis* and *bateli*, slightly nearer the former. Some of the breeding birds from Guerrero, particularly my May 30 male from Cuapongo, are very close to these Michoacan birds, but like them should be classed under *occidentalis*. The series of breeding birds in the Moore Collection is the first adequate representation in American museums of this flycatcher, hitherto rarely represented. There is a small series in the U. S. Biological Survey, including the type.

Empidonax difficilis immemoratus subsp. nov.

Veracruz Flycatcher

Type.—Male adult in full breeding condition, no. 23000, collection of Robert T. Moore; five miles north of Jalapa, Veracruz, Mexico; March 23, 1939; collected by Chester C. Lamb.

Specimens examined.—Moore Collection:—Veracruz: Jalapa 4 ♂ (Mar. 13–23, including type). U. S. Biol. Survey Collection:—Veracruz: Perote 1 ♀ (May 20), Mirador 1 (?). Intermediate, *E. d. immemoratus* × *occidentalis*:—Tlaxcala: El Venerable 1 ♂ (Mar. 31). Mus. Comp. Zoöl. Collection:—"Orizaba, Mexico" 2 ♂.

Subspecific characters.—Nearest to *E. d. occidentalis* of the southern States of Mexico, but darker throughout; much darker above (bronzy brown); pileum slightly darker than back instead of uniform with it; breast darker (more brownish). Compared with *hellmayri* of Texas, it is darker green above, darker on breast, size smaller. In general appearance it more closely resembles *bateli* of the mountains of Sinaloa, but is much darker above, more yellowish on belly and larger in size. It differs from the type of *E. d. salvini* in being darker, less glossy green above, whiter on the throat and more yellow on the belly.

Distribution.—Known only from east-central Veracruz: Jalapa, Perote and Mirador.

The type series came from the oak association in an arroyo at 4450 feet altitude, five miles north of Jalapa. This is in the rain belt in

the "heart of the Temperate Life Zone" (Chapman, 1898: 18) of eastern Veracruz. Chapman describes this region as a "Temperate belt receiving a never failing supply of rain from the moisture laden clouds, which arise from the Gulf and are condensed on the mountain-side." Lamb's description of his camp-site, similar to that of Chapman's a few miles away, pictures the surrounding country as consisting of "rolling hills broken by many arroyos, which are tree-filled with . . . large trees . . . of oak. . . . The country is very green." Lamb was there in late March, the same period as that of Chapman's visit, when the latter states, "Most species were mating, or nest building" As two of the males in the type series have the sex organs fully developed, it is quite possible they were breeding. The breeding range probably extends to a higher altitude, at least to Perote, twenty-five miles to the west, where a female was taken on May 20.

The Jalapa region is altogether different ecologically from that of the El Venerable specimen, an intermediate with *occidentalis*, which was taken in almost solid pine forest at 9000 feet elevation, one hundred miles northwest of Mt. Orizaba on the Mexican Plateau. An intergrading area between the two races may extend eastward to Mt. Orizaba, for the two "Orizaba" specimens without further data in the Museum of Comparative Zoölogy resemble quite closely the El Venerable male, and may have been taken on the western side of the mountain. From the small size of their wings and the excessively buffy wing bars, it is possible that they are not fully adult. Like all the other southern races of *difficilis*, the females of *immemoratus* have the outer primary shorter than the fourth, whereas the males have it longer than the fourth, but shorter than the fifth. *E. d. immemoratus* like *bateli* comes from a heavy-rainfall area, which may account for the similar dark coloration.

Mr. Griscom with his customary courtesy has gone over carefully with me the large series of freshly taken *difficilis* in the Moore Collection. He agrees that *immemoratus* and *seclusus* are valid races; that they re-open the question of the identity of true *salvini* and, that whatever their relation to *occidentalis* may be, the three specimens of *salvini* mentioned in his report on Guatemala (Griscom, 1932: 264), are different at least from the bird of eastern Veracruz, *immemoratus*. It was unfortunate that at the time he prepared his report our series of breeding *occidentalis* from southern Mexico was not available and that the two intermediate specimens from Orizaba without precise data, were the only ones he could use for comparison.

EMPIDONAX DIFFICILIS SALVINI Ridgway

Specimens examined.—Moore Collection—MEXICO: Chiapas: Santa Rosa 1 ♀ (June 9). Other specimens examined:—U. S. Nat. Mus. Collection:—GUATEMALA: Calderas 1 ♂ (Oct. 10, type). Mus. Comp. Zoöl. Collection:—GUATEMALA: Panajachel 1 im. ♂ (Aug. 15), Dueñas 1 ? (= probably ♀).

Subspecific characters.—In a previous paper (Moore, 1940: 27–28) the ambiguous characters of the type were discussed and the possibility that it may be a hybrid was suggested. The glossy green back recalls the *flavescens* group, but the soiled or 'foxed' under parts are *difficilis*.

Distribution.—Guatemala, possibly extending north to Chiapas in Mexico.

Remarks.—In the paper referred to above, I suggested that until a series of positively identified *breeding* birds is taken in Guatemala, it will be impossible to determine the status of this type, or even if the two specimens in the Museum of Comparative Zoölogy, mentioned by Griscom (1932: 264), are winter migrants from the north. The only individuals taken in the breeding season seem to be the one from the Sierra de las Minas (July 7) in the British Museum (Griscom, 1935: 813) and my female from Chiapas. The former has not been compared with the type of *salvini*, but I have compared the Chiapas bird and found it close to the type, so far as the characters are discernible. It differs from *occidentalis* in being darker and brighter green above and darker on the breast-band. Furthermore, it has much buffier wing bars. This one is the only female *difficilis* of a southern race, inspected by me, which has the outer primary longer than the fourth. The M. C. Z. Dueñas bird, probably a female, has it shorter than the third.

EMPIDONAX DIFFICILIS SECLUSUS Moore

Empidonax difficilis seclusus Moore, Proc. Biol. Soc. Washington, 53: 26–29, April 1940; Montaña El Chorro, Province of Ocotopeque, northwestern Honduras, collection of Robert T. Moore.

Specimens examined.—Moore Collection:—11 specimens from Province of Ocotopeque, northwestern HONDURAS, listed in my paper (op. cit.). Mus. Comp. Zoöl. Collection:—HONDURAS: El Durrumbo 1 ♂ 1 ♀ (July 16–22).

General subspecific characters.—Differs from the type of *E. d. salvini* in being duller (less glossy green) and browner above; darker buff (more cinnamon) on bend of wing and wing bars; throat and belly brighter yellow. Differs from *occidentalis* in much darker breast (green instead of brown), greener back and smaller size.

Distribution.—High mountains of northwestern Honduras (Ocotopeque) and also El Durrumbo.

Remarks.—The specimens listed were all taken between June 24 and July 27, including two juveniles just out of the nest. This is

the most southern-known breeding race of *difficilis*. As was true of *occidentalis* and *immemoratus*, every female has the outer primary shorter than the fourth.

EMPIDONAX FLAVESCENS DWIGHTI Dickey and van Rossem

Specimens examined.—Moore Collection—MEXICO: Chiapas: Santa Rosa 2 ♂ 2 ♀ (June 1–16). HONDURAS: Ocotopeque: El Chorro 1 ♂ 1 ♀ (June 22–23), Montana El Chorro 1 ♂ 2 ♀ (June 30–July 3), Montana La Cruz 1 ♂ 1 ♀ (June 25–July 7), Las Ventanas 1 ♂ 1 ♀ (July 27), Monte El Portillo 1 ♀ (May 30), Monte Verde 1 ♀ 1 ? (July 21–24), Alto Cantoral 2 ♂ (Jan. 16–24), Cantoral 1 ♂ 3 ♀ (Apr. 17–18). Amer. Mus. Nat. Hist. Collection:—GUATEMALA: Finca Sepur 1 ♂ (Dec. 29), Volcan San Lucas 2 ♀ (June 1–4), Volcan de Agua 1 ♀ (May 15), Tecpam 1 ♀ (July 21); NICARAGUA: Ocotol 1 ♂ 1 ♀ (May 1–10), San Rafael del Norte 5 ♂ 6 ♀ (Feb. 4–May 10). Mus. Comp. Zool. Collection:—A large series of Guatemalan and Honduras birds. Dickey Collection:—Series of six May and six winter specimens from El Salvador, including male type from Los Esemiles.

General characters.—The important characters which distinguish it from *E. difficilis salvini* and *E. difficilis seclusus* are the brighter, glossy-green coloration, both above and below, and the yellowish-green instead of buffy-cinnamon wing bands.

Distribution.—Breeds from Chiapas, Mexico (Santa Rosa), through Guatemala, El Salvador, Honduras to about Cantoral in south-central Honduras.

Remarks.—Dickey and van Rossem (1938: 380) record it as a resident in the Humid Upper Tropical Zone, El Salvador, between 3500 and 8700 feet. As stated in my paper (1940: 27) the Moore Collection possesses breeding birds both of this race and of *Empidonax difficilis*, taken in the same localities from both Chiapas, Mexico, and Honduras, a total of five localities, proving the contention of Griscom and van Rossem that the *flavescens* and *difficilis* groups are not conspecific.

The American Museum specimens from Nicaragua are intermediates between *dwrighti* and true *flavescens flavescens* from Costa Rica. My Honduras series is much closer to *dwrighti* of El Salvador.

EMPIDONAX FLAVESCENS FLAVESCENS Lawrence

Specimens examined.—Moore Collection—COSTA RICA: Villa Quesada 1 ♂ (Nov. 20), Zarcero 1 ♂ (Sept. 29), El Copey 1 ♀ (Apr. 16). Also all specimens in eastern museums, mentioned previously.

Distribution.—Highlands of Costa Rica and western Panama.

In the *flavescens* group, as in southern races of *difficilis*, all the females which I have examined have the outer primary shorter than the fourth. The same is true of some of the males.

EMPIDONAX ALBIGULARIS GROUP

Ridgway (1907: 548-549) in his key to the genus seems to have fallen into an error in placing the species *albigularis* under the group "d.d. Tarsus not more than 14.5 mm." His own measurements prove this mistake, giving average length of the tarsus of true *albigularis*, males 16.8 mm., females 16.3 mm. and of *timidus*, 16 mm. I have measured more than fifty specimens and have not found one with the tarsus as short as 14.5 mm.! A material change of the relative position of *albigularis* to the vicinity of the *trailli* group of *Empidonax* seems to be indicated.

Griscom (1932: 265) has given us the first lucid analysis of this little-known species. He reduces *timidus* to the synonymy of *albigularis albigularis* of western Guatemala and declares that the individuals, ranging from Durango to western Guatemala, are distinct from the darker eastern birds ranging from Veracruz through eastern Guatemala to western Panama, the latter taking the name *Empidonax albigularis australis* Miller and Griscom. When he wrote, only the unique type of *timidus* was in existence and all together he had before him only a total of "fifteen specimens" of the species.

During the past few years, the Moore Collection has been enriched by the addition of forty-one individuals, nearly doubling the known total in collections. These include thirteen *timidus*, two true *albigularis* from Chiapas, one from Temascaltepec and eleven from the Province of Ocotopeque, northwestern Honduras—almost all breeding birds. Furthermore, nine of these come from southern Sinaloa and obviously represent a new race. This abundant material, of which all except six have been taken within three years, makes it possible to correct several misconceptions. Comparing birds of exactly the same months, we can state that: (1) the type of *timidus* is very little paler than our new Chihuahua series, which is appreciably paler above than the comparable Chiapas birds; (2) the birds of northwestern Honduras are darker on the breast than either and also darker above than the comparable series in the United States National Museum from Veracruz (June 30-July 6); (3) the Sinaloa birds are definitely more olive (greener) above.

In answer to my question, Griscom writes me that when he combined the birds along the eastern coast, from Veracruz to Costa Rica under the name *australis*, he overlooked *Empidonax axillaris* Ridgway, described from a specimen taken at "Orizaba, Veracruz, Mexico." This type, which I examined, seems to be exactly like specimens from Jico, Veracruz, in the collection of the U. S. Biological Survey; never-

theless, not being confident that my birds from Chiapas differ much from those of Veracruz, nor feeling certain of the status of the north-western Honduras individuals, it does not seem wise to disturb Griscom's concept of these races, except to assert definitely the distinctness of *timidus*, and employ the name *axillaris*.

EMPIDONAX ALBIGULARIS TIMIDUS Nelson

Specimens examined.—Moore Collection—MEXICO: southwest Chihuahua: Laguna Juanota 9 ♂ 5 ♀ (July 26–Aug. 11, breeding birds). Other specimens examined:—U. S. Biol. Survey Collection:—Durango: El Salto 1 ♂ (July 17, type). Migrants—Shufeldt Collection:—Oaxaca: Tehuantepec 1 ♀ (Oct. 7). Mus. Comp. Zoöl. Collection:—Guerrero: Coyuca 1 ♂ 2 ♀ (Oct. 27–Jan. 29).

Subspecific characters.—Breeding birds differ from *albigularis albigularis* of western Guatemala and Chiapas, as well as from *E. a. axillaris* of eastern Mexico in having (1) upper parts paler; (2) wing bands less buffy; (3) flanks brighter buffy-yellowish in early-winter plumage; (4) size slightly larger. Winter plumage not positively known.

Distribution.—Breeding in the Transition Zone from southwestern Chihuahua, Laguna Juanota, to at least El Salto, Durango.

Remarks.—Of this fine series, practically all show evidence of enlargement of the sex organs and the Moore Collection female no. 19380 had a large egg in the oviduct. It would seem that the breeding season is very late (July–August). Mr. Lamb's notes indicate that the trees about Laguna Juanota (altitude at least 8000 feet, and shown by him as 10,000) consist mostly of pines, with a few oaks and madrones. This is the first record for Chihuahua and extends the range of the species nearly two hundred miles farther north. The specimen from Tehuantepec is too badly worn to be positively identified, but seems to belong here. The three specimens in the Museum of Comparative Zoölogy from Coyuca, Guerrero, mentioned by Griscom (1934: 387) as true *albigularis*, taken in fall and winter, are probably migrants of this race, as they are very pale and have little buff on the bend of the wing, thus differing from the nominate race.

Although all the characters of this species, as given by Griscom, are present in this race, particularly white margins of the outer rectrices, small size and buffy color of the under wing-coverts and thighs, another differentiating difference is now revealed, in that the bill is proportionately not so wide at the base as southern races, nor does it have so pronounced a convex outline when viewed from below. Neither Griscom (1932: 265) nor Ridgway has mentioned this peculiar convexity. It is very noticeable in most specimens of southern races, but not so much in northern ones. Furthermore, the outer tenth primary is sometimes longer than the fifth in *timidus*, which is in

accordance with the tendency of all northern races of *Empidonax* to have the outer primary proportionately longer than in southern races, a change already noted in females of the *difficilis* group.

In this fine series, consisting almost entirely of adult birds, the body molt begins as early as August 1. An adult female with a large egg in the oviduct on this date has new feathers on the abdomen, lower throat, middle wing-coverts and some on the middle of the back. The old feathers remain elsewhere, particularly on wings and tail. On the other hand, an August 10 adult male has no new feathers, except on the lower throat. There is a remarkable contrast between the appearance of birds which have not molted at all and those which have new feathers, so different that one would judge that the former were decidedly 'foxed,' for they look like ancient specimens in eastern museums. For instance, my specimen no. 19382, has this appearance just as much as the type female of *Empidonax axillaris* taken July 21, 1866. This leads to a doubt if there is so much fading in *albigularis* as has been previously announced.

Empidonax albigularis subtilis subsp. nov.

Type.—Male adult, "post-breeding," no. 6843, collection of Robert T. Moore; Ahome, Sinaloa, Mexico, near sea level; August 22, 1933; collected by Chester C. Lamb.

Subspecific characters.—Nearest to *Empidonax albigularis timidus*, but in worn breeding plumage paler (less buffy) on under parts; more yellow (less buffy) on under tail-coverts; less cinnamon (near buff) on bend of wing, under wing-coverts and axillars; whitish margin to outer rectrix less conspicuous; in comparable August plumage with newly molted body feathers, more olive (greener) above; more yellowish (less buffy) on belly and under tail-coverts. Although there is no specimen of *timidus* in winter plumage, our winter-plumage birds are quite greenish on back (Buffy Olive) and pale below with pale buff on bend of wing, under wing-coverts and thighs; pale yellowish on belly and under tail-coverts, differing markedly from our freshly molted July male of *albigularis* from Chiapas, which is much browner above and much buffier below. A May 27 female resembles quite closely a June 3 female from Chiapas, but upper parts more olive; rump less rusty; abdomen and under tail-coverts paler yellow.

Specimens examined.—Moore Collection—MEXICO: Sinaloa: Ahome 1 ♂ ad. (Aug. 22, type), Colmoa 1 ♀ (Aug. 28), Guamuchil 2 ♂ ad. (Sept. 22–Oct. 10), Potrerillo 1 ♀ (May 27), Rosario 3 ♀ (Sept. 11, Oct. 14, Jan. 2), El Molino 1 ♀ (May 22).

Distribution.—Well distributed throughout Sinaloa from the coastal plains to an altitude of 1000 feet (Potrerillo).

Remarks.—This well-marked form is set apart from all other races of *albigularis* by its olive-greenish cast in all plumages, pale yellowish under parts and by the less conspicuous whitish margin to the outer rectrix. The series has all the other characters of *albigularis*, includ-

ing buffy-colored bend of wing, under wing-coverts and thighs; buffy wing bars of about the same depth of color as in *timidus*, short wings and rather small bill. Griscom, when characterizing the species *albigularis*, mentioned the bill as "very broad, width at base more than three-fourths the length of exposed culmen." Our larger series proves this to be not true of either *timidus* or *subtilis*, which both show it narrower. As in *timidus* and northern races of *Empidonax* generally, a large proportion of the specimens have the outer primary equal to or longer than the fifth, only about half showing it shorter. Nearly half of the individuals have the tail 'double rounded' and the rest show it slightly rounded. It resembles *timidus* in this.

The type was marked by Chester Lamb as "post breeding."

According to Griscom (1932: 265) all breeding records of the species *albigularis* come from "2500 to 5000 feet." We have not taken this new race above 1000 feet and I am inclined to think that, like members of the *trailli* group, to which *albigularis* is closely related, *subtilis* nests at low altitudes, probably in the foothills of Sinaloa. On the other hand, our breeding birds of *timidus* from Laguna Juanota, Chihuahua, come from a much higher altitude than the maximum given by Griscom, namely, at least 8000 feet; in fact Mr. Lamb records it as "10,000."

The Moore Collection contains an unusual specimen, no. 15968, from the altitude of 7500 feet at San Feliz near the Chihuahua-Sinaloa boundary, taken August 11. Were it not for its long wing (67.5 mm.), I would class this as a new high-mountain race of *albigularis*, for it has all of the other characters of this species, including the peculiar short convex-outlined bill, buffy bend of wing, double-rounded tail, outer primary shorter than fifth, whitish throat, and slightly whitish margin to outer rectrix. It is marked by Mr. Lamb as an immature. It is certainly not *timidus*.

EMPIDONAX ALBIGULARIS AXILLARIS Ridgway

Specimens examined.—Moore Collection—MEXICO: Mexico: Temascaltepec 1 ♂ (July 21, breeding). Other specimens examined—U. S. Nat. Mus. Collection:—MEXICO: Veracruz: Orizaba 1 ♀ (July 21, type). U. S. Biol. Survey Collection:—MEXICO: Veracruz 2 ♂ 1 ♀ (June 30–July 6); Mexico: San Nicholas 1 ♂ (June 26), Lerma 1 ♂ (July 6). Amer. Mus. Nat. Hist. Collection:—Veracruz: Jalapa 1 ♂ (Apr. 9), Portrero 1 ♂ (Jan. 25); Puebla: Huexotitla 1 ♀ (Apr. 9); NICARAGUA: San Rafael del Norte 1 ♂ (Apr. 11, type *E. australis*); COSTA RICA: Tejar 1 ♂ (June 17), Agua Caliente 1 ♂ 2 ♀ (May 24–May 31), La Estrella 1 ♂ (June 28), Cartago 1 ♀ (May 28).

Distribution.—See Griscom (1932) for his discussion of ranges.

Remarks.—Griscom (1932: 266) refers to the birds ranging along the east coast of Mexico and Central America as *australis*, which he states is an "utterly inappropriate name," the "characters of which are totally different from those alleged in the original description." If his concept is correct, that all the birds of the east coast belong to one race, Nelson's type of *axillaris* must take priority over the name *australis*. Furthermore, I am inclined to believe that the new material in the Moore Collection confuses the picture still more and may re-open the question if the birds of eastern Guatemala may not be different from those of Veracruz. My specimens from northwestern Honduras, instead of being lighter than the birds of eastern Guatemala and Honduras, are actually slightly darker, even when allowance is made for fading. However, these may represent an undescribed dark race in the cloud forest of Ocotopeque, which may account for their dark coloration. Furthermore, the freshly molted July 9 male from Chiapas, which should be true *albigularis*, is also darker than the bird of Veracruz. The intensity of the cinnamon coloration on the wing bars may indicate immaturity. In spite, therefore, of this abundant new material, we still lack sufficient breeding birds in fresh plumage from western Guatemala to determine if true *albigularis* is like the dark northwestern Honduras and Chiapas birds.

EMPIDONAX ALBIGULARIS ALBIGULARIS Sclater and Salvin

Specimens examined.—Moore Collection—MEXICO: Chiapas: Santa Rosa 1 ♂ 1 ♀ (June 3–July 9); northwestern HONDURAS: Ocotopeque: Plan del Rancho 4 ♂ 3 ♀ 2 ? (May 26–July 3, breeding birds). Amer. Mus. Nat. Hist. Collection.—GUATEMALA: Volcan San Lucas 1 ♂ (June 7, topotype); Pantaleon: Esquintla 1 ♂ (Oct. 18).

Distribution.—See Griscom (1932: 266).

Remarks.—I am listing here tentatively the specimens from Chiapas and northwestern Honduras. Whatever the Chiapas individuals are, they are certainly not *timidus*, for they are much darker above and much smaller birds like those of northwestern Honduras.

EMPIDONAX ATRICEPS Salvin

Specimens examined.—Moore Collection—COSTA RICA: Las Vueltas 1 ♂ 1 ♀ (Apr. 22–May 7).

Distribution.—Highland of Costa Rica and western Panama.

Remarks.—The above-mentioned two individuals seem to be typical examples of the Black-capped Flycatcher.

EMPIDONAX FULVIFRONS PYGMAEUS Coues

Specimens examined.—Moore Collection—southwestern Chihuahua: Laguna Juanota 2 ♂ 2 im. ♂ 3 ♀ (July 16–Aug. 11, not breeding), Los Frailes 4 ♂ 2 juv. ♂ 1

juv. ♀ (June 22–Aug. 21, breeding); Sonora: Guirocoba 2 ♂ 3 ♀ (Sept. 15–Jan. 27); Sinaloa: Huassa 2 ♂ 2 ♀ (Dec. 4–Jan. 1), El Orito 1 ♂ (Mar. 12), Cacalotan 1 ♂ (Feb. 12), Suratato 1 ♂ (Sept. 11), Rancho Batel 1 ♂ (Nov. 9); Durango: Piedra Gorda 3 ♂ 2 ♀ (Mar. 10–21), Tamazula 5 ♂ 1 ♀ (Nov. 22–Dec. 8), Nievero 1 ♂ (Mar. 29), Rancho Guasimal 2 ♂ 1 ♀ (Nov. 3–18). Migrants.—MEXICO: La Venta 1 ♀ (Nov. 20); Morelos: Ocotepéc 1 ♀ (June 19). Other specimens examined:—all series in eastern museums mentioned in Introduction.

Distribution.—Breeds in mountains of southern Arizona, New Mexico, western Chihuahua and western Durango. Migrates west through the higher mountains of Sonora and Sinaloa, occasionally to the coastal plains; also south at least as far as Morelos. Reported by A. O. U. 'Check-list' to winter in "Jalisco, Nayarit . . . and Michoacan."

Remarks.—I have no breeding birds from Sonora or Sinaloa and believe that the Buff-breasted Flycatcher is a migrant in these States, except at very high altitudes. My breeding Los Frailes birds were taken within a few miles of the Sinaloa state-line at 7500 feet altitude. Van Rossem (1931: 265) mentions only a single specimen (December 28) from Sonora, and as all my skins come from extreme southeastern Sonora and from northern Sinaloa near the Fuerte River, I believe this race, which breeds in the high mountains of southern Arizona, does not migrate through northern Sonora, but follows the Sierra Madres to southwestern Chihuahua and then descends *via* the great canyons, particularly the Barranca del Cobre along the Fuerte River, into southern Sonora and northern Sinaloa. Only one of our specimens in these two western States was taken below 1500 feet and that was the male from Cacalotan at 100-foot altitude. The Laguna Juanota birds in southwestern Chihuahua were not nesting, yet in exactly the same period the Los Frailes individuals were all breeding or feeding young. Three are juveniles just out of the nest. It is surprising that Batty secured only one specimen in Durango (April 3), as noted by Miller (1906: 168). On the other hand, Miller records no individuals from Sinaloa, nor does Lawrence nor Mrs. M. E. McLellan. The Sinaloa birds seem to be the first record for that State.

EMPIDONAX FULVIFRONS RUBICUNDUS (Cabanis and Heine)

Specimens examined.—Moore Collection—MEXICO: Nayarit: near Tepic 5 ♂ 1 im. ♂ 1 juv. ♂ 5 ♀ (July 3–Aug. 20, nesting); Guanajuato: Rancho Enmedio 3 ♂ 3 ♀ 1 ? (April 28–May 5, nesting), 1 ♂ 2 ♀ (Jan. 22–28), Puerto de Guadalupe 3 ♂ 1 ♀ (May 17–20, nesting); Michoacan: Rancho La Cofradia 3 ♂ 2 ♀ (June 15–23, nesting), Zacapu 1 ♂ (Sept. 17), 2 im. ♂ 2 im. ♀ (Aug. 20–31), Tzitzio 1 ♀ (Aug. 10); Mexico: Temascaltepec 2 ♀ (July 16–17); Morelos: Ocotepéc 1 ♂ (June 19); Tlaxcala: El Venerable 1 ♂ (Apr. 2).

Distribution.—Breeds, as proved by above records, from Nayarit (Tepic), Michoacan, Guanajuato, to State of Mexico; as shown by

American Museum of Natural History specimens, in Jalisco; as stated by Ridgway (1907: 591), possibly in Guerrero; and, as stated by both Ridgway and Hellmayr (1927: 221), possibly in Oaxaca and Chiapas. Although Ridgway notes it from Guatemala with a questionmark, Griscom (1932) does not record it.

Remarks.—My records prove positively that it breeds in Nayarit (near Tepic), Guanajuato (Rancho Enmedio, Puerto de Guadalupe), Michoacan (La Cofradia), in all of which States we found specimens either nesting or with eggs or with young. The birds of Nayarit are slightly intermediate toward *pygmaeus*, but nearer to *rubicundus*; the birds of Los Frailes are intermediate, but nearer to *pygmaeus* and are listed under that race.

EMPIDONAX FULVIFRONS INEXPECTATUS GRISCOM

Specimens examined.—Moore Collection—HONDURAS: Ocotopeque: Monte Verde 3 ♀ (July 22–29), Plan del Rancho 1 ♀ (July 9), Cantoral 1 ♂ (July 18), El Cantoral 1 ♂ (July 28), Hatillo 1 ♂ (May 4). Other specimens examined:—all series in eastern museums, including type from El Cantoral, Honduras.

Distribution.—From northwestern Honduras (Ocotopeque) south through Honduras.

Remarks.—As my skins were taken in July and birds of the related races were found nesting in this month, undoubtedly it breeds in Honduras.

COMPARATIVE MEASUREMENTS OF ADULT *EMPIDONACES*

		Locality	Wing	Tail	Exposed Culmen	Tarsus	Middle Toe Minus Claw	Outer Toe With Claw	
17	♂	<i>hammondi</i>	N. W. United States	71.1	57.3	10.8	16.2	9.2	9.6
18	♂	<i>wrighti</i>	N. W. United States	69.2	60.8	10.8	18.2	9.8	10.0
28	♂	<i>pulverius</i>	Chihuahua, Durango, Sinaloa	75.4	62.2	10.4	17.0		
3	♂	<i>trepidus</i>	Guanajuato	74.8	63.0	10.8	16.9		
3	♂	<i>a. affinis</i>	Guanajuato—Hidalgo	73.9	63.1	10.7	17.0		
15	♂	<i>culiacani</i>	Sinaloa	62.6	52.7	11.0	16.4		
18	♀	<i>culiacani</i>	Sinaloa	61.1	52.2	10.6	16.1		
16	♂	<i>immodulatus</i>	Chihuahua—Durango	69.5	58.8	11.1	16.5		
4	♂	<i>bateli</i>	Sinaloa	63.6	53.8	10.7	16.2		
4	♂	<i>immemoratus</i>	Veracruz	67.1	56.0	11.1	16.5		
2	♀	<i>immemoratus</i>	Veracruz	64.0	53.4	10.4	15.8		
7	♂	<i>occidentalis</i>	Oaxaca—Morelos—Mexico	69.1	59.2	11.2	17.0		
6	♀	<i>occidentalis</i>	Guerrero—Morelos—Mexico	63.6	55.6	10.4	16.8		
11	♂	<i>timidus</i>	Chihuahua—Durango	62.5	54.6	10.2	16.5		
5	♀	<i>timidus</i>	Chihuahua—Durango	58.7	52.0	10.1	15.8		
3	♂	<i>subtilis</i>	Sinaloa	61.5	52.2	11.0	15.5		
6	♀	<i>subtilis</i>	Sinaloa	62.0	52.8	10.4	16.0		
11	♂	<i>a. albigularis</i>	Guanajuato—Honduras	59.5	49.0	9.5	15.4		
6	♀	<i>a. albigularis</i>	Chiapas—Honduras	55.8	48.9	9.6	15.6		
7	♂	<i>axillaris</i>	Veracruz, Mexico	61.3	53.6	10.3	16.1		
3	♀	<i>axillaris</i>	Veracruz, Puebla, Mexico	59.6	52.6	10.3	15.8		

Measurements are given either of new forms or of those, of which previously only a few specimens have been known, such as the unique type of *E. a. timidus*. In addition, groups of *hammondi* and *wrighti* were chosen from identical localities or areas, where both are known to breed and might hybridize, in order, if possible, to throw light on the large groups of intermediates found as migrants in Mexico. Measurements are made according to those recommended by Baldwin, Oberholser and Worley (1931: 76, 92, 107, 110, 112), "length of closed wing," "length of tail," "length of tarsus," "length of middle toe" and "length of outer toe." For length of exposed culmen I have measured from the tip to a point on the culmen, which the projection of the curve of the tips of the feathers of the forehead, in their natural position, would strike. This seems to me an easier point to determine in *Empidonaces* and more uniform than the customary one (opus cit. p. 11). Furthermore, the older method results in much greater discrepancies with Ridgway's (1907) figure.

COLORATION OF MANDIBLES OF GREEN-COLORED *Empidonaces*

E. flavescens.—Migrants, uniformly Cream Buff after four years; Marguerite Yellow when older.

E. virescens.—Few specimens examined; resembles *flavescens*.

E. t. brewsteri.—Migrants, after four years Fuscous to Deep Olive Buff, darker on tip.

E. t. trailli.—Migrants resemble preceding.

E. minimus.—Migrants, after four years uniformly Fuscous, sometimes Deep Olive Buff at base; fade little later.

E. hammondi.—Migrants, after four months uniformly Fuscous, sometimes paler at base. No fading in six years.

E. wrighti.—Most variable of all, Fuscous to Straw Color, tip usually darker, base more whitish. Five collected four months, uniformly Fuscous, older ones Drab mottled.

E. griseus.—Migrants, after four months Mustard Yellow to Straw Color, later grayish white with blackish tip.

E. a. pulverius.—Breeding birds, uniformly Cartridge Buff to Deep Olive Buff; August immatures slightly darker at tips, sometimes uniformly Fuscous; adults in winter, Colonial Buff, later fading to Deep Olive Buff.

E. a. trepidus.—Breeding and winter birds, Deep Colonial Buff to Olive Ocher.

E. a. affinis.—Breeding birds, Chamois to Mustard Yellow, in winter slightly paler.

E. d. difficilis.—After six years Marguerite Yellow to Olive Buff; no recently taken birds examined.

E. d. culiacani.—After two months, Amber Yellow; older ones like *difficilis*.

E. d. bateli and *immodulatus*.—All specimens, some after one year, Pale Olive Buff.

E. d. occidentalis, *immemoratus*, *seclusus*.—Like *bateli*; one, ten months has vestiges of brighter yellow.

E. f. dwighti.—After two years, similar tone, more whitish than *difficilis*.

E. a. timidus.—After a year and a half, Olive Buff at base, darker at tip.

E. a. subtilis.—After six years, Deep Olive Buff to Pale Olive Buff, tips usually Fuscous.

E. a. albigularis.—After two years, same as *timidus*.

E. a. australis.—After three years, same as *timidus*.

E. atriceps.—After nine years, same as *timidus*.

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