

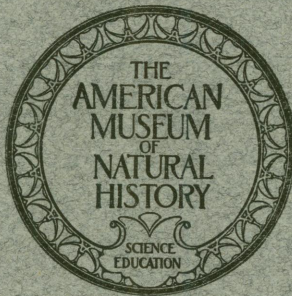
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THE DISTRIBUTION OF THE SWALLOWS OF  
THE GENUS *PYGOCHELIDON*

BY FRANK M. CHAPMAN



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## THE DISTRIBUTION OF THE SWALLOWS OF THE GENUS *PYGOCHELIDON*

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Continued study of our recently acquired collections of South American birds reveals certain facts in regard to the distribution of the blue and white swallows of the genus *Pygochelidon* which seem worthy of independent record.

The range of this genus extends from Costa Rica to Tierra del Fuego. It contains four known forms (of which two are herein described for the first time), the general characteristics and distribution of which are set forth below, following which I present some remarks and conclusions.

I am indebted to Dr. Alexander Wetmore, of the Biological Survey, and Mr. James L. Peters, of the Museum of Comparative Zoology, for information in regard to the distribution of *P. cyanoleuca* and *P. patagonica patagonica* based on their recent explorations in southern South America.

### *Pygochelidon cyanoleuca* (Vieillot)

*Hirundo cyanoleuca* VIEILLOT, 1817, Nouv. Dict. d'Hist. Nat., XIV, p. 509 (Paraguay. One Paraguay specimen examined).

*Hirundo minuta* MAX., 1821, 'Reise Bras.,' II, p. 336 (Rio Janeiro, Brazil. Types and freshly collected material examined).

*H[irundo] melampyga* LICHT., 1823, 'Verz. Doubl.,' p. 57 (Bahia, Brazil. Bahia specimen examined).

*Atticora cyanoleuca* var. *montana* BAIRD, 1865, 'Rev. Am. Bds.,' p. 310 (Barranca, Costa Rica. Costa Rica specimens examined).

**SPECIFIC CHARACTERS.**—Sexes alike in color, tail in the male averaging longer. Adult with rectrices and remiges and their shafts, black or blackish; outer margin of outer rectrix never lighter than the rest of the feather; under wing-coverts and axillars fuscous to chætura-drab; lower tail-coverts wholly black with steel-blue reflections; median area of the feathers of the nuchal region whitish (a character more pronounced in northern than in southern specimens); underparts (except sides and flanks) pure white; back varying from a deep indigo-blue to a greenish blue, the variation partly individual, partly seasonal and apparently occurring throughout the range of the species. For example, a Boruca, Costa Rica, male taken May 10 is blue while a San José male taken April 1 is green. Both blue and green birds were

taken at San Antonio, western Colombia, in January; while of nineteen Bolivian tableland birds twelve, taken in May, June, and July, are green and seven, taken in November, December, and February, are blue.

Immature birds have the wings and tail fuscous, the lower tail-coverts dusky, more or less tipped with grayish, a trace of cinnamon may suffuse the white underparts, but the lower wing-coverts are as in the adult and the outer tail-feather is uniformly colored, the outer margin NEVER being paler than the rest of the feather.

SIZE.—There appears to be no marked latitudinal variation in size among birds from apparently the same altitude. Specimens from near sea-level in Ecuador (Rio de Oro) are the smallest in the series while specimens from the Ecuadorian tableland are larger and near the average size. The tail apparently averages longer in the male, but there is much variation in this respect.

Although recorded from Costa Rica to Paraguay<sup>1</sup> and from western Ecuador to eastern Brazil, *Pygochelidon cyanoleuca* is a bird of the Subtropical, rather than the Tropical, Zone and is restricted largely to mountainous regions. In Costa Rica, Carriker does not record it from a lower altitude than 1000 feet, whence it ranges upward to the Irazu district. It is recorded by Bangs from Chiriqui, western Panama, at an altitude of 10,800 feet, and from "Veragua" by Salvin and Godman. Sharpe and Wyatt ('Mon. Hirund.') state that Salvin and Godman's collection contains three specimens secured by McLeannan in "Panama," presumably south of Colon where this collector worked. There are no Panama specimens in the American Museum, and I know of no other Panama records. In Colombia we found this swallow to be most abundant in the Subtropical Zone, but it ranged from 2000 to 9000 feet. In Ecuador our only record for the coastal region is Rio de Oro, Manaví, whence it ranges upward to the tableland. It has not been found in the Guayaquil region and our most southern Pacific coast region record is Portovelo (alt. 2500 ft.), near Zaruma on the eastern slope of the coast range west of Santa Rosa. It occurs also in eastern Ecuador at Zamora and thence south on eastern, or Amazonian, drainage from Peru (Huanabamba, Perico, La Merced, Perené, Sta. Ana, Torontoy, Santo Domingo) to Bolivia, whence all our specimens are from altitudes of from 7700 to 9400 feet (Depts. Cochabamba, Sucre). In Argentina it extends at least to the Prov. of Tucuman, whence we have a wholly typical adult male taken on the Tafi trail at an altitude of 2000 feet, April 12, 1916.

East of the Andes this swallow appears to be much less common. It is not, for example, recorded from the Orinoco region by Berlepsch

<sup>1</sup>Records from Chile are evidently based on erroneous identification or wrongly labeled specimens. For example, a skin labeled by Rusby "Valparaiso" (doubtless the one referred to by Ridgway in Bull. 50, III, p. 70; see also Allen, 1889, Bull. A. M. N. H., II, p. 80) evidently bears an incorrect locality, as unfortunately do some other specimens in this collection.

and Hartert, or from Cayenne by Berlepsch, and Snethlage gives no definite record from Amazonia, though a specimen from Pará is listed in the British Museum 'Catalogue.' Salvin records it in Guiana only from an altitude of 3500 feet on Mt. Roraima, and a single Guiana specimen is listed from Camacusa. In Venezuela and Brazil it appears to be confined largely to the mountainous and coastal areas. It is apparently not uncommon near the coast of extreme southeastern Brazil, and Wetmore secured specimens at Lazcano, in northeastern Uruguay, the most southern record for the species.

From the interior of South America there appear to be only two records for this species. Smith secured one specimen September 10, 1885, at Chapada, Matto Grosso, during nearly five years' collecting, and a specimen in the U. S. National Museum, No. 35040, was secured by C. Wood of the Page Expedition at Bahia Negra, S. lat. 20° on the Paraguay River, in June, 1859.

Cherrie secured no specimens of this species during two expeditions in southwestern Brazil, and it is evidently rare or wanting in the interior of South America, at least north of subtropical latitudes.

In general, then, *Pygochelidon cyanoleuca* is not, as has been often stated, distributed "throughout" South America, but is largely confined to mountainous areas and to the Subtropical Zone. Furthermore, while not a bird of the forest, it occurs chiefly in forested regions.

#### ***Pygochelidon patagonica patagonica* (d'Orbigny and Lafresnaye)**

*Hirundo patagonica* D'ORBIGNY AND LAFRESNAYE, 1837, 'Syn. Av.,' p. 69 (Patagonia).

*Atticora hemipyga* BURMEISTER, 1861, 'Reis. La Plata,' II, p. 479 (Mendoza, Argentina; one specimen examined).

**SPECIFIC CHARACTERS.**—Sexes alike in color (and in size?); rectrices and remiges and greater wing-coverts fuscous, their shafts brownish; outer margin of outer rectrix narrowly but distinctly EDGED WITH WHITISH; under wing-coverts and axillars mouse-gray; shorter lower tail-coverts white, longer ones sometimes (in more southern specimens) basally white; feathers of the nuchal region basally gray; size larger than *cyanoleuca*.

Immature birds have the wings and tail fuscous as in the adult. The under wing-coverts and axillars are also mouse-gray and the outer margin of the outer tail-feathers is edged with grayish. The longer tail-coverts are fuscous, tipped with grayish, the shorter ones white in young birds from Mendoza and Prov. Tucuman (4000 ft.), but in three specimens in a corresponding state of plumage from Tilcara (8000 ft.), Prov. Jujuy (February 8-12), the longer lower tail-coverts are fuscous tipped with cinnamon, the shorter ones cinnamon. I do not know whether this char-

acter represents a racial or individual variation. An adult female taken February 8, at the same locality, has the under-tail-coverts wholly black. In other respects all four *Tilcara* birds are typical *patagonica*.

This is a migratory species. During the summer it is found throughout the South Temperate Zone, south to Tierra del Fuego and north to Peru over the Andes of northwestern Argentina and (presumably) Puna or Temperate Zone in Peru. It winters chiefly north of S. lat. 30° and (presumably) at the eastern base of the Andes as far north as the Marañon.

On the Pacific coast this swallow is doubtless found from Chiloe to near the Peruvian border where it apparently intergrades with the Peruvian race described below. I have, however, seen specimens only from Temuco to Tofo, sixty miles north of Coquimbo, but it is probable that the birds recorded by Lane<sup>1</sup> from east of Iquique should be referred to this race. According to this writer the species ranges upward to 12,000 feet, in which event it doubtless crosses the Andes at this, or even a greater, altitude.

It is found in southern Chile, and doubtless at high altitudes, only during the summer. I have been unable to ascertain the exact limits of its seasonal range in Chile but according to Barros<sup>2</sup> it is found in the Valley of Nilahue (S. lat. 34° 30') only from the end of August to the middle of March. In Argentina it is rarely found in winter south of the latitude of Buenos Aires and Mendoza.<sup>3</sup> On September 10, 1916, I observed it in large numbers near the first-named city, where Dr. Dabbene informed me it had just arrived from the north. The return (postbreeding) migration is concluded by March 15.

Hartert,<sup>4</sup> in recording the breeding of this swallow in the Prov. of Tucuman (no altitude stated) on the authority of Venturi, mentions also specimens from Cosnipata, Yurimaguas, and Nauta, Peru. Hellmayr<sup>5</sup> also refers to the Cosnipata birds, of which one is young and four adult, and confirms Hartert's identification of them. They were collected by H. Whitely, Jr., on September 20, October 5 and 7, 1868, after the date, therefore, on which *patagonica* reaches its breeding grounds south of the latitude of Buenos Aires, and are consequently not likely to have been winter visitants from the South Temperate Zone.

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<sup>1</sup>1897, *Ibis*, p. 15.

<sup>2</sup>1920, *Revista Chilena Hist. Nat.*, XXIV, p. 147.

<sup>3</sup>Reed, 1916, 'Las Aves de la Prov. de Mendoza,' *Mus. Ed. Mendoza*, p. 39

<sup>4</sup>1909, *Nov. Zool.*, XVI, p. 169.

<sup>5</sup>1919, *Arch. für Naturg.*, p. 9.

In traveling from Paucartambo to Cosnipata, Whately passed over bare treeless regions at an altitude of 11,900 feet. We have seen that *patagonica* reaches an altitude of 12,000 feet on northern Chile and it would not be surprising if, like many other South Temperate Zone birds, it should range north on the Andean Temperate, or Puna Zone, whence, assuming that the specimens in question actually came from Cosnipata (alt. about 2350 ft.), it might occasionally visit the lowlands.

I frankly confess that the records from Yurimaguas and Nauta seemed to me to require confirmation. Both localities are in the Tropical Zone and the latter is some 250 miles east of the Andes, but the discovery in our own collection of a wholly typical adult male in fresh (postnuptial ?) plumage taken November 12, 1919, by H. Watkins at La Merced (alt. 2600 ft.) in the Chanchamayo district of eastern Peru, proves to my complete satisfaction that *patagonica* occurs in this region. I cannot, however, believe that a species so characteristic of the South Temperate Zone breeds in the Tropical Zone and, in spite of the fact that it has never been recorded from the Peruvian highlands, I conclude that records from Cosnipata, La Merced, Yurimaguas, and Nauta are based on birds which breed in the Temperate or Puna Zones and migrate or wander to the lowlands.

So far as I am aware no other swallow of the Temperate or Puna Zone has this habit, but no other swallow of these zones is found also in the South Temperate Zone. Possibly *patagonica* in extending its range northward on the Andean tableland has retained the migratory habit which it displays in the South Temperate Zone.

#### RELATIONS of *P. patagonica* with *P. cyanoleuca*

Having described the characters which distinguish *cyanoleuca* and *patagonica* from each other and outlined their known ranges the question arises, are they specifically or subspecifically related? In other words, do they or do they not intergrade? While I have no proof that both forms are actually found together during the breeding season, it is evident that in Uruguay, Paraguay, and northern Argentina the limits of their ranges very closely approach, if they do not actually touch, each other.<sup>1</sup> It is also a fact that throughout its wide range *cyanoleuca* shows no appreciable geographic or racial variation, specimens from Uruguay,

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<sup>1</sup>Until we know the facts in regard to the seasonal distribution of *patagonica* in Peru, we cannot discuss its relationships with *cyanoleuca* in that region.

Paraguay, and northern Argentina, where the species most closely approaches the home of *patagonica*, agreeing with others from Colombia or Costa Rica.

It is further true that, except for a racial differentiation on the coast of Peru and certain variations exhibited by four specimens from Tilcara (8000 ft.) near Tucuman, *patagonica* is everywhere true to type. The Peruvian variation will be returned to later; the Tilcara birds require description here. They were taken February 8-12, 1916. An adult female in worn breeding plumage has the tail, wings, and under wing-coverts wholly black as in *cyanoleuca*. The remaining three specimens are birds of the year in postjuvinal plumage. Like the adult female, their wings, under wing-coverts, and tail are as in *patagonica*, but the longer under tail-coverts are fuscous tipped with cinnamon, while the shorter ones are cinnamon, a character shown by no immature specimen of *cyanoleuca* which I have examined. While the adult specimen might be considered an intermediate between *cyanoleuca* and *patagonica*, the young birds could not properly be so considered. Moreover, an adult and young taken March 12, 1916, above San Pablo (4000 ft.), Prov. Tucuman, are wholly typical of *patagonica*, the young bird having the lower half of the under tail-coverts white. While, therefore, we have an ultratypical adult of *cyanoleuca* taken on the Tafi trail (2000 ft.), Prov. Tucuman, April 12, 1916, it is improbable that intergrades between this species and *cyanoleuca* would be found at the highest of the three localities mentioned.

If those from the intermediate locality were intergrades, the fusion of the two species might be indicated in this region. Under the circumstances, however, I conclude that the variations shown by the Tilcara specimens are either individual or racial, and that they do not indicate the intergradation of *cyanoleuca* with *patagonica*.

It is worthy of note that the variation shown by the west Peruvian bird, described below, is similar to that exhibited by the Tilcara adult, that is, it has wholly black under tail-coverts. In the paleness of the under wing-coverts the Peruvian form is even further removed from *cyanoleuca* than is *patagonica*, and, as shown beyond, it is quite certain that it does not intergrade with that form.

Further evidence of the stability of the characters of *patagonica*, east of the Andes, is shown by the fact that a specimen from La Merced, eastern Peru, agrees closely with others from Argentina.

In view of these facts, I conclude that *cyanoleuca* and *patagonica* do not intergrade and hence are specifically distinct.



***Pygochelidon patagonica peruviana***, new subspecies

SUBSPECIFIC CHARACTERS.—Similar to *Pygochelidon patagonica patagonica* but smaller, the under wing-coverts and axillars paler; the under tail-coverts wholly black with bluish reflections, the lower parts, particularly flanks, tinged with grayish.

TYPE.—No. 152,289, Amer. Mus. Nat. Hist.; ♀ ad.; December 26, 1918; Huaral, Prov. Lima, Peru; H. Watkins.

The *Pygochelidon* of western Peru has heretofore been referred to *cyanoleuca* but proves to be a northern representative of *Pygochelidon patagonica*. Our collection contains forty-four specimens of this race taken from Moquegua in southern Peru, north to Trujillo. Specimens from Arequipa, listed in the 'Catalogue of Birds of the British Museum' under "*Atticora cyanoleuca*," are probably to be referred to this form, but it apparently does not reach the tableland. Although our Peruvian collector, H. Watkins, has sent us specimens of this swallow from nearly every station from Trujillo to Moquegua, it is not included in his large collections from the Payta region and the Peruvian-Ecuadorian boundary. This fact, in connection with Stolzmann's<sup>1</sup> definite statement that the species does not occur at Tumbez, and its absence from Noble's<sup>2</sup> collections made from Payta eastward, indicates that it is not found in extreme northwestern Peru.

RELATIONS OF *P. p. peruviana* WITH *P. cyanoleuca*.—The possession by *peruviana* of the wholly black under tail-coverts of *cyanoleuca* and the wings and tail of *patagonica* might be accepted as evidence that it was a connectant between these two species. The fact, however, that in *peruviana* the under wing-coverts and axillars are even paler than they are in *patagonica*, shows that in this respect it is less like *cyanoleuca* than *patagonica* itself. Moreover, the probability that the range of *peruviana* does not reach that of *cyanoleuca* further indicates their non-intergradation.

RELATIONS OF *P. p. peruviana* WITH *P. p. patagonica*.—Although I have seen no specimens of either of these races from the region between Tofo, Chile, and Moquegua, Peru, just north of the Chilean line, the species has been recorded from east of Iquique and doubtless occurs at suitable localities between these two points, for example, Taena and Arica. Tofo specimens are typical of *patagonica*; one from Moquegua is immature, but an adult female of *peruviana* from Cocachaera, on the coast south of Mollendo, shows an approach to *patagonica* in its larger

<sup>1</sup>1884, 'Orn. Per.', I, p. 245. In view of Stolzmann's statement that this swallow was replaced at Tumbez by *Progne chalybea*, it is interesting to note that the only specimens of this martin sent us by Watkins are from localities in the Payta district where he did not take *P. p. peruviana*.

<sup>2</sup>1918, Auk, p. 458.

size (wing, 99 mm.) and the presence of white in the shorter under tail-coverts. The latter character is shown also by a specimen from Pisco, and these two birds indicate, in my opinion, the intergradation of *peruviana* with *patagonica*.

***Pygochelidon flavipes*, new species**

**SPECIFIC CHARACTERS.**—Resembling *Pygochelidon cyanoleuca* (Vieillot) but the feet yellow and smaller; the upperparts darker; sides and flanks blackish; throat cinnamon-buff, chin dusky.

**TYPE.**—No. 169,932, Amer. Mus. Nat. Hist.; ♀; April 7, 1921; Maraynioc, 10,850 ft., Prov. Junin, Peru; H. Watkins.

**DESCRIPTION OF TYPE.**—Upperparts shining, dusky slate-blue; wings and tail blacker, less blue; throat cinnamon-buff, this color tinging the breast, chin dusky; under wing-coverts, axillars, flanks and tibiæ fuscous-black; under tail-coverts like wings; tarsi wholly bare, with toes and nails buffy yellow. Wing, 92; tail, 47; tarsus, 9; middle toe without claw, 6.5; depth of tail-fork, 11 mm.

This species differs so widely from any specimens in our large collections of allied forms that I venture to describe it on the basis of but one example. It is apparently an Andean Temperate Zone representative of *Pygochelidon cyanoleuca* and the fact that it comes from Maraynioc, in the humid Temperate Zone of the Eastern Andes of Peru, is a further proof that exceptionally potent forces have prevailed in the zone in which that locality is situated.

The bird's evident relationships with *P. cyanoleuca* make it of interest to note that, like that species, of which specimens were secured only 3000 feet farther down the Valley, it inhabits a wooded region.

If, as seems probable, *P. p. patagonica* occurs at this or a higher altitude in Peru, it doubtless will be found on the treeless areas of the arid Temperate or Puna Zones.

From Maraynioc have been described such distinct generic types as *Doliornis sclateri*, *Xenodacnis parina*, *Pseudospingus xanthophthalmus*, and *Microspingus trifasciatus*, besides a number of species and races all as yet unknown outside the humid Temperate Zone in Peru.

## MEASUREMENTS OF MALES

	NUMBER	WING	TAIL
<i>P. cyanoleuca</i> , Costa Rica, Irazu, 9000 ft.	2	95-96.5	51-51.5
" " Colombia, Caldas, 2000 ft.	1	94	45
" " " Popayan, 6000 ft.	1	98	50
" " " Gallera, 5700 ft.	1	97	51
" " Venezuela, Barsiquimeto	1	91	42
" " Ecuador, Rio de Oro, sea-level	3	86-90	43-45.5
" " " Quito region, 8-9000 ft.	3	97-98	48-51
" " " Portovelo, 2500 ft.	1	94	47
" " Peru, Perené, 2000 ft.	1	95	44
" " " Utcuyacu, above Perené, 4800 ft.	2	98-102	49-53
" " Bolivia, Prov. Cochabamba, 7700-9400 ft.	5	98-103	50-53
" " Brazil, Matto Grosso,	1	98.5	50
" " Argentina, Tafi Trail, 2000 ft.	1	94	46
<i>P. p. patagonica</i> , Argentina, Mar del Plata	1	101	52
" " " Chile, Temuco	1	101	51
" " " " Los Andes	1	101	51
" " " " Tofo, sea-level	2	101-101.5	50-52
<i>P. p. peruviana</i> , Peru, Huaral, sea-level	3	96-97	49.5-52
" " " " Lima	2	95.5-96	51-53

## MEASUREMENTS OF FEMALES

	NUMBER	WING	TAIL
<i>P. cyanoleuca</i> , Costa Rica, Turrialba, 3700 ft.	1	90	45
" " Colombia, Caldas, 2000 ft.	1	97	48
" " " San Antonio, 6800 ft.	1	96	48
" " " La Palma, 5500 ft.	1	95	47
" " Ecuador, Portovelo	1	90	45
" " Peru, Ft. Machu Picchu, 5000 ft.	1	96	46.5
" " " Santo Domingo, 6000 ft.	2	91-95.5	44.5-45
" " Brazil, Therezopolis, 3200 ft.		94	47
" " Bolivia, Prov. Cochabamba, 8800 ft.	1	99	48
<i>P. p. patagonica</i> , Argentina, Tilcara, Jujuy, 8000 ft.	1	101	52
" " " Chile, Tofo, sea-level	2	101.5-104.5	50
<i>P. p. peruviana</i> , Peru, Huaral	2	93	49
" " " " Vitarte	2	93-94	49
" " " " Huacho	1	94	49



## SPECIMENS EXAMINED

*Pygochelidon cyanoleuca*.—COSTA RICA: San José, 1; Boruca, 2; Irazú, 2; Turrialba, 1. COLOMBIA: Caldas, 4; San Antonio, 2; Popayan, 2; Gallera, 2; Ricuarte, 1; Salento, 2; El Eden, 2; Rio Toché, 2; Sta. Elena, 2; La Palma, 1; El Carmen (near Bogotá), 1. VENEZUELA: Barsiquemeto, 2; Mérida region, 1; Caracas, 2; Guácharo, 2. BRAZIL: Therezopolis, 1; Rio region, 2; Chapada, Matto Grosso, 1. ECUADOR: Rio de Oro, Prov. Manaví, 3; 'Quito' skins, 7; Mocha, 1; Portovelo, 2; Zamora, 1. PERU: Chilpes, Prov. Junin, 1; Tulumayo, Prov. Junin, 2; Utcuyacu, Prov. Junin, 2; La Merced, 1; Perené, 2; Sta. Ana, 1; Ft. Machu Picchu, 1; Torontoy, 1; Santo Domingo, 10. BÓLIVIA: Prov. Cochabamba, Incachaca, 7; Parotani, 5; Vinto, 2; Prov. Sucre, Pulque, 4; Rio Pilcomayo, 1; Rio Cachimayo, 1; California, Prov. Santa Cruz, 1. ARGENTINA: Tafi Trail, Prov. Tucumán, 2000 ft., 1, April 12. PARAGUAY: Bahia Negro, 1. URUGUAY: Lazcano, Dept. Rocha, February 7, 8 (Wetmore).

*Pygochelidon patagonica patagonica*.—PARAGUAY: 200 km. west of Puerto Pinasco, September 24 (Wetmore). ARGENTINA: above San Pablo, 4000 ft., Prov. Tucuman, 2, March 12; Tilcara, 8000 ft., Prov. Jujuy, 4, February 8–12; Mar del Plata, 1, October 19; Mendoza, 1, November; Zapala, Neuquen, December 8, 1920 (Wetmore); General Roca, Rio Negro, November 27, 1920 (Wetmore); N. W. Rio Negro, breeding (Peters); Tunyan, Prov. Mendoza (Peters); Protrerillos, 5000 ft., Prov. Mendoza (Peters); Protrerillos, 5000 ft., Prov. Mendoza, March 19, 1921 (Wetmore); Carhué, Buenos Aires, December 18, 1920 (Wetmore); Guamini, Buenos Aires, March 5, 7, 1921 (Wetmore). CHILE: Temuco, Cautin, 1, October; Los Andes, 2700 ft., 1, August; Tofo, 60 miles north of Coquimbo, 4, December 3–24.

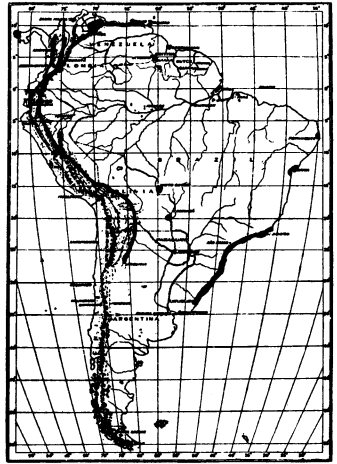
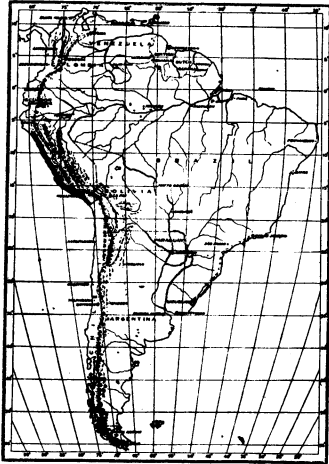
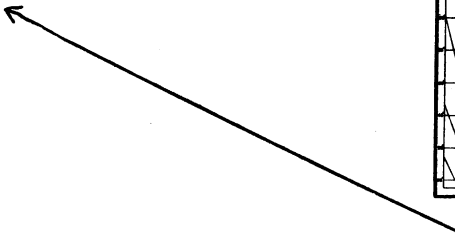
*Pygochelidon patagonica peruviana*.—PERU: Moquega, 1; Coca-chacra, 1; Vitor, 1; Pisco, 1; Lima, 3; Chorillos, 1; Vitarte, 6; Huacho, 7; Bequeta, 3; Huaral, 14; Trujillo, 6.

*Pygochelidon flavipes*.—PERU: Maraynioc, the type.

## GENERAL REMARKS AND CONCLUSIONS

From the preceding studies it appears that the west Peruvian form, of a group distributed from Costa Rica to Tierra del Fuego, was derived not from the north, as might be expected, but from the south. The geographical origin of the group must remain as much a matter of speculation as its ancestry. The extent and geological history of the area it

inhabits, however, indicates that *cyanoleuca* is the older of the two species composing it. This species has been shown to be chiefly mountain-inhabiting, its range being subtropical rather than tropical. If now we look for an ancestral form inhabiting the tropics we find nothing nearer to *cyanoleuca* than *Diplochelidon melanoleuca*, which differs from it

1 *P. cyanoleuca*3 *P. patagonica peruviana*2 *P. patagonica patagonica*

in the more complete adherence of the basal phalanx of the middle toe to the outer toe, its more deeply forked tail, and bluish black breast-band. The fact, however, that, without regard to locality, specimens of *cyanoleuca* often have partially black feathers in the breast, suggest that this is a vestigial character, a matter of possible significance in this connection.

However this may be, the obvious distinctness of *cyanoleuca* suggests the probability of its development in the older mountain areas of Guiana or Brazil; whence, following the coastal mountains, it, on the one hand, reached the Venezuelan Andes and, on the other, subtropical latitudes to the south.

Once in the Andean region, it found suitable conditions for range extension in the practically unbroken expanse of the Subtropical Zone, stretching from Venezuela to Bolivia but, although it has reached the Pacific coast just south of the equator, the northward extension of the Temperate Zone on the coast of Peru, under the influence of the Humboldt Current, checked its progress on the coast south of Ecuador. Furthermore, since *cyanoleuca* is found in the vicinity of forests, and probably nests in holes in trees, the absence of wooded areas on the coast of Peru would discourage it from entering that region.

Through the mountains of Panama it reached Costa Rica. It appears to be uncommon in the Isthmus at present, a fact readily to be accounted for by the subsidence which has created a hiatus in the ranges of many species common to the Subtropical Zone of Colombia and Panama, but which are wanting in the intervening area.<sup>1</sup>

From the theoretical point of origin in the mountains of eastern South America, the range of *cyanoleuca* extends southward to subtropical latitudes in Uruguay, Paraguay, and northern Argentina. Here it meets the northern limit in this region of the range of *patagonica*, with which species it is not known to intergrade. The ranges of the two birds apparently do not overlap, but one replaces the other and they may, therefore, be regarded as representative species.

The question now arises: assuming that *cyanoleuca* is the older of the two, is *patagonica* an offshoot of it or were they derived from a common ancestor?

The fact that their ranges join but that the birds do not intergrade indicates that *patagonica* is not a geographic derivative of *cyanoleuca*

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<sup>1</sup>A list of these species is given in the author's paper on the 'Distribution of Bird-Life in Colombia, 1917, Bull. Amer. Mus. Nat. Hist., XXXVI, p. 158.

but that both forms had acquired their distinguishing characteristics before they came into contact with each other.

Aside from these suggestions, further discussion of their origin involves a more exact knowledge of past physiographic and climatic conditions in South America than we at present possess.

Granted, however, that *patagonica* had a northern ancestor, we may follow its extension of range southward until it reached the ends of the continent. Once well within the South Temperate Zone, its further southward distribution must have occurred only during the warmer part of the year, and with the coming of winter it evidently retreated toward the north where it now remains at the junction of the South Temperate and Subtropical Zones until returning spring permits it to revisit its breeding ground. Thus has been developed the habit of migration.

It is natural to assume that the Pacific coast was reached from Argentina. Thence, west of the Andes, for the facts all indicate the birds' appearance on the Peruvian coast since the elevation of these mountains, it extended its range toward the equator following that arm of the Temperate Zone which, under the influence of the Humboldt Current, passes up the coast to the vicinity of Trujillo, the most northern point at which this swallow is known to occur. Here the counteracting forces of a cold current on the one hand and the approach to equatorial regions on the other, produce what may be termed a Subtemperate Zone, where conditions differ sufficiently from those prevailing farther south to bring about the development of numbers of new forms and our swallow now becomes smaller and presents slight but constant color characters which distinguish it from true *patagonica*, the parent form.

The case is an especially interesting one to compare with that of *cyanoleuca* and *patagonica* as outlined above. Although in both instances the differentiating characters are slight, in one we have contact of range without intergradation, in the other apparently gradual merging of one form into its representative race.

North of Trujillo the effects of a warm, southward flowing, inshore current begin to be apparent, and this vicinity marks the northern known limit on the coast of Peru of Humboldt's Penguin (*Spheniscus humboldti*) and the Diving Petrel (*Pelecanoides garnoti*) the ranges of which extend northward, as Murphy<sup>1</sup> has shown, to 7°, and 6° 21' south latitude respectively.

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<sup>1</sup>1920, Brooklyn Museum Quarterly, p. 91.



This study, therefore, shows that, when due consideration is given to relationships and their bearings on geographic as well as physical origin, and to those factors which determine climatic and hence faunal conditions, it is not surprising that the form of *Pygochelidon* inhabiting the coast of Peru was derived from the south instead of from the north.

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POSTSCRIPT.—In reply to an inquiry, Mr. Harry Watkins, our collector in Peru, writes from Lima that he saw no swallows at any of his several stations in the coastal region of Peru north of Trujillo. His experience in regard to these birds agrees, therefore, with that of Stolzmann at Tumbes, as quoted above.





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FRANK E. LUTZ, Editor

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