AMERICAN MUSEUM
NOVITATES

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CITY OF NEW YORK JULY 23, 1951 NUMBER 1529

NOTES ON SOME ASIATIC SWALLOWS[1]

By Charles Vaurie

INTRODUCTION AND ACKNOWLEDGMENTS

This paper is a study of the swallows collected by Dr. Koelz in Iran, Afghanistan, and India. About 570 specimens were collected. This material was studied together with the series in the collection of the American Museum of Natural History, the specimens in the Museum of Zoology of the University of Michigan collected by Koelz, and a part of the collection of the Academy of Natural Sciences of Philadelphia.

I am, as usual, most indebted to Dr. Ernst Mayr for his friendly guidance, as I am also for advice and help received from my colleagues at the American Museum, Dr. James P. Chapin, Capt. Jean Delacour, Dr. John T. Zimmer, and Dr. Dean Amadon. I thank them with much pleasure.

I am also very grateful to Dr. J. Van Tyne, Mr. R. M. de Schauensee, and Mr. J. L. Peters for their gracious cooperation in lending me specimens. The Koelz specimens sent to me by Dr. Van Tyne include most of the specimens examined from Sind and the Punjab and from some parts of Kashmir. Mr. de Schauensee sent specimens from Siam and the series collected in western China and Chinese Tibet by the two Dolan expeditions. This material from an interesting region was studied by Ernst Schäfer in Schäfer and de Schauensee (1939, Proc. Acad. Nat. Sci. Philadelphia, vol. 90, pp. 201–204). As this paper is often referred to, further citations are abbreviated to Schäfer (1939). Mr. Peters sent a specimen from Yunnan.

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[1] Notes from the Walter Koelz Collections, Number 12.

GENERAL DISCUSSION

Distribution, Genera, and Ecology

Thirteen species of swallows breed in Iran, Afghanistan, and India. Their distribution in the order followed in this paper is given in table 1. In this study the *dasypus* and *urbica* groups in *Delichon* are considered to be conspecific. It is interesting to note that three species, *Riparia paludicola*, *Hirundo smithii*, and *H. daurica*, are common with tropical Africa. Specimens of all the species with the exception of *Hirundo striolata*, which barely reaches eastern India in the hills south of the Brahmaputra, were collected by Dr. Koelz.

TABLE 1

Distribution of the Swallows Breeding in Iran, Afghanistan, and India

	Iran	Afghanistan	India
Riparia riparia	x	x	x
paludicola		x	x
Hirundo rupestris	x	x	x
obsoleta	x	x	x
concolor			x
tahitica			x
rustica	x	x	x
smithii		x	x
fluvicola		x	x
daurica	x	x	x
striolata			x
Delichon urbica	x	x	x
nipalensis			x

In the genus *Hirundo* are included the Crag Martins (*Ptyonoprogne* for *rupestris*, *obsoleta*, and *concolor*) and the Red-rumped Swallows (*Lillia* for *daurica* and *striolata*). As Mayr and Bond have shown (1943, Ibis, pp. 334–341), *Ptyonoprogne* builds a similar nest and should not be separated from *Hirundo*, and it is wiser also to merge *Lillia* with *Hirundo*. As these authors state, *Delichon* appears to be a specialized offshoot of *Hirundo*. *Delichon*, however, is a very weak genus. Its chief character, the all-feathered foot, is not unique, for it recurs as a little tuft of feathers on the back of the tarsus in *Riparia riparia*.

Some obvious ecological differences between swallows are reflected in their vernacular names. These concern chiefly nesting

sites, for the food, consisting of flying insects, is similar in all species. But while this food is more abundant near water, some species are more or less closely attached to the vicinity of water, and some in India also show definite altitudinal preferences. These differences are mentioned below, but from the point of view of potential competition it is more instructive to compare the closely related forms that are very similar morphologically and build identical nests.

In the region under study, these forms consist of three pairs. In the first two pairs, when the breeding ranges meet, as in *R. riparia* and *paludicola*, the two species replace each other altitudinally, or when, as in the other pair, *H. rupestris* and *obsoleta*, the ranges meet and in some regions overlap, the two species again replace each other altitudinally, or one (*obsoleta*) prefers the more arid localities. In the third pair (*D. urbica* and *nipalensis*), the breeding ranges overlap, and the ecological differences are not known.

In the first two pairs, *R. riparia* is a highland form of the Himalayas and foothills and *paludicola* a lowland form, but outside of India, *R. riparia* shows no altitudinal preferences and in India south of the Gangetic Plain, *paludicola* breeds in the mountains where *R. riparia* does not occur as a breeder. In India, *H. rupestris* is Himalayan and breeds also in the mountains of northern Baluchistan; *obsoleta* does not occur in the Himalayas and in Baluchistan replaces *rupestris* in the lower and more arid central and coastal districts. In Iran where both occur, as in Khorasan, the specimens of *obsoleta* that I have examined were collected at more arid localities.

As often happens between potential competitors there is a well-marked difference in size in each of the first two pairs: *R. riparia* and *H. rupestris* are, respectively, larger than *R. paludicola* and *H. obsoleta*. There is no sharp difference, however, in pattern or coloration. *R. riparia* has a dark breast band, lacking in *paludicola*, but, contrary to expectations, this band is almost obsolete in the race (*diluta*) of *R. riparia*, the breeding range of which meets that of *paludicola*.

The third pair is puzzling. *D. urbica* and *nipalensis* are similar in size and, except for the under tail coverts (whitish or grayish in the former and black in the latter), are similar in coloration. This difference would not appear to be a conspicuous one. *D. nipalensis* seems to be purely a cliff builder. But *urbica*, while it

breeds chiefly on houses outside of India, breeds on both houses and cliffs in the Himalayas, and in Tibet (where *nipalensis* does not occur) it breeds only on cliffs and never on houses, according to Schäfer (1939).

The other swallows breeding in India do not appear to be competitors. They are well differentiated morphologically, sometimes very sharply so, from one another as well as from the six species discussed, and they are separated by nesting or other habits or by the fact that they replace one another geographically or altitudinally. For instance, in the species building an open, cup-shaped nest (*concolor, tahitica, rustica, smithii*), one (*rustica*) is Himalayan, another (*tahitica*) is restricted to the higher hills of southwestern India, and, of the two lowland forms with general distribution, *concolor* nests on crags, and *smithii* never builds away from streams or bodies of water. In the species building a closed nest (*fluvicola, daurica,* and *striolata*), the first, like *smithii,* is very closely attached to water, and *daurica* is widely distributed and meets *striolata* only in a restricted region in northeastern India.

Hirundo rustica and *daurica* both breed in the Himalayas. They are not closely related, but perhaps could be competitors as they are similar in size and general form. In this region, however, *daurica* seems to be dominant, as *rustica* occurs only as widely separated colonies. Unlike *rustica, daurica* is not restricted to human settlements, for it is said to occur also in grassy regions and in forest clearings where, unlike a swallow, it is reported to perch on the bare branches of trees, from which it sallies forth after insects in the manner of a flycatcher.

GENUS **RIPARIA**

RIPARIA RIPARIA

The breeding range of this species extends from the Mediterranean region over the greater part of the Eurasian continent to northern India and southeastern China and on the northern islands off the Pacific coast from the Commanders south to Hokkaido. The representative form (*congica*) of the lower and middle Congo has been treated as conspecific, but this form, which lives in a totally different climate, lacks the little tuft of feathers on the tarsus and is better retained as a separate species.

Judging by the variation in the breeding material available to me from Europe and Asia, only three forms are sufficiently dis-

tinct to warrant separation, but other questionable or poorly differentiated races, which I consider to be synonyms, have been described. The three forms that are clearly separable are:

Nominate *riparia* Linnaeus, 1758; type locality, Sweden; a fairly dark, brown form with a distinct breast band. Synonym: *R. r. fuscocollaris* Tschusi, 1912; type locality, Dalmatia.

Riparia r. ijimae Lönnberg, 1908; type locality, Sakhalin; darker than nominate *riparia*, blacker, less brown, with the breast band more sharply defined, and, even in fully adult plumage, with more conspicuous pale edges to the flight feathers and the feathers of the lower back. Synonym: *R. r. stötzneriana* Meise, 1934; type locality, Harbin.

Riparia r. diluta Sharpe and Wyatt, 1893; type locality, Tashkent; a conspicuously pale, grayish brown form, with an ill-defined breast band. Synonyms: *R. fohkienensis* La Touche, 1908; type locality, Fuhkien; *R. r. indica* Whistler, 1916; type locality, Jhelum, Punjab; *R. r. tibetana* Stegmann, 1925; type locality, Dza Chu River [upper Mekong], Sikang; and *R. r. taczanowskii* Stegmann, 1925; type locality, Sidemi near Vladivostok.

From the specimens examined and from the statements in the literature, the ranges of the three forms that I recognize appear to be as follows: nominate *riparia*, from Europe and north Africa (but not Egypt where another race, *shelleyi*, not part of this study, occurs), the Near East to western Iran, and Siberia, north of the Kirghiz Steppes and the Altaï, east to the Kolyma River. *R. r. ijimae*, examined only from Hokkaido, but, according to Dementiev (1935, L'Oiseau, p. 461) and Stegmann (1925, Compt. Rendus Acad. Sci. Russie, p. 39), ranging eastward from the Sayan and the upper Nizhnyaya Tunguska River in northern Irkutsk province. However, a breeding population (June 8) examined by me from the region of Zhigalovo on the upper Lena in south central Irkutsk is identical with a breeding population of *diluta* taken on May 17 in Afghanistan. This places *diluta* squarely astride the range of *ijimae* as given by Dementiev and Stegmann. *R. r. diluta*, Asia south of nominate *riparia* (in the west) and *ijimae* (in the east) to eastern Iran, Afghanistan and probably northern Baluchistan, northern India, and southeastern China. The population said to breed in Seistan and Kirman in eastern Iran by Zarudny (1911, Jour. Ornith., vol. 59, p. 221) probably belongs to this race.

Intermediate populations seem to be common. Breeding specimens examined east of the Kolyma and north of Sakhalin (Anadyr Land, Commander Islands, and Gizhiga on the northern Okhotsk Sea) are intermediate between nominate *riparia* and *ijimae*. Breeding specimens from western Iran are intermediate between *diluta* and nominate *riparia* but identical in size and closer in coloration to the latter.

No topotypes of *taczanowskii*, *stötzneriana*, and *tibetana* are available. But from their descriptions the first two appear to be intermediate to some degree between *ijimae* and *diluta*, while *tibetana*, though apparently closer to *diluta*, is intermediate in coloration between this form and nominate *riparia*, *tibetana* being described as "darker than *R. r. diluta* but distinctly paler than *R. r. riparia*."

The "Handlist of Japanese birds" (1942, p. 80) treats *stötzneriana* as a synonym of *taczanowskii*, but, in my opinion, neither seems sufficiently distinct to warrant recognition. On the basis of general coloration, however, the correct place in the synonymy seems to be as given above (*stötzneriana* is said to be like *ijimae* but to have, in some specimens, a somewhat paler and less extensive breast band; *taczanowskii* is described as being as pale as *diluta* but to have a darker breast band). In both, the described variations in the pale edges of the feathers may be misleading, as these pale edges are more conspicuous in first winter birds.

Riparia r. tibetana is recognized by both Meise (1937, Jour. Ornith., vol. 85, p. 575) and Schäfer (1939). However, this last author states that a breeding series of 26 specimens from the region of Jyekundo [Yushu] in southern Tsinghai which he identifies as *tibetana* may "prove to be a little darker than typical *tibetana*." I have examined 17 of these specimens, 15 of which are adult, and I find that, compared to breeding nominate *riparia* from Scandinavia and western Europe, the Jyekundo specimens are only very slightly grayer above, but below have the breast band less well defined and not so dark.

Riparia r. fuscocollaris was described from specimens taken while on migration and is not recognized by Hartert. Breeding specimens from Dalmatia are identical with nominate *riparia*.

In size, the more southern populations, those of India and southern China, are smaller than the populations of Europe and of central and northern Asia, but the range in variation is rather narrow and probably clinal in character. There is too much

overlap or the differences are too small to warrant the recognition of *indica* and *fohkienensis*. *R. r. indica* was separated from *diluta* on the sole basis of being smaller, and no color differences have ever been mentioned; *fohkienensis*, according to Hartert, differs from *indica* only by being larger. However, according to Stegmann, the wing length in 30 specimens of *diluta* from Turkestan, Mongolia, and Siberia varies from 96 to 108 (102); *fohkienensis*, according to La Touche, measures 3.7 to 4 inches, or 95 to 102 mm.; *indica*, according to Whistler, 88 to 98. Specimens (see below) measured by me from southern China have a wing of 96 to 100, and, from India, 96 to 105 (101.4). The latter, however, were taken in winter and may include visitors from Turkestan.

Meinertzhagen (1938, Ibis, p. 694), who has compared his material from Afghanistan with the series in the Leningrad Museum, found the population of Afghanistan "typical of *diluta*, but a little on the small side." My breeding specimens from Afghanistan (100 to 104, average 102.2) fit perfectly the measurements of *diluta* as reported above. This author identifies as *ijimae* two "large" birds taken while on passage on May 1 at Barfak north of the Hindu Kush. Since it is the only record of this form for Afghanistan, it may be questioned, for *ijimae* is known to migrate only through eastern China, reaching, apparently, only to the Indo-Chinese countries and Cachar. Size alone is not diagnostic, and, since *ijimae* and nominate *riparia* are close in coloration, spring migrants north of the Hindu Kush would be more likely to be the latter on their way to Siberia.

Baker (1926, Fauna of British India, vol. 3, p. 234) states that *ijimae* is the breeding form in Cachar, Sylhet, and Dibrugarh. This appears to be very doubtful, for, apparently, true *ijimae* is known only from those regions from winter specimens. One specimen of this form taken on December 16 in Cachar was examined by me.

MOLT: This swallow molts in its winter quarters. The molt is very gradual and starts with that of the body plumage which may be entirely replaced before the flight feathers have scarcely started to molt. The molt of the latter is long drawn out and in some cases probably ends not long before the spring migration. The first specimens showing signs of the molt of the flight feathers were taken on November 15 in Central Provinces and December 5 to 7 in Sind, but in other specimens taken in this last region on February 26 to 28 only the inner wing feathers had been replaced

and the central tail feathers were just starting to molt.

The post juvenal molt is complete, and the first winter bird differs from the full adult by having the pale edges of the wing and tail feathers more conspicuous and, sometimes, those of the body plumage as well, especially on the coverts, forehead, lower back, and rump. In the full adult, even before there are any signs of wear, these pale edges are much narrower, fainter, and are very often lacking on the primaries.

Measurements of the wing and tail are:

Nominate *riparia:* Sweden (three) and Germany (three) (June 6–22): Males, 107, 51; 107.5, 53; 107.5, 53; 110, 54; females, 106, 50; 107, 53. Dalmatia (April 12–20): Males, 106, 52; 107, 51; 111, 54; female, 103, 48. Orenburg (May 20): Male, 108, 48.

Nominate *riparia* × *ijimae:* Anadyr Land (June 6–8): Male, 111, 56; female, 105, 53. Commander Islands (June 20): unsexed, 108, 53. Gizhiga, northern Okhotsk Sea (June 17): Males, 104, 50; 110, 52.

Nominate *riparia* × *diluta:* Luristan (May 16): Female, 109.5, broken; (September 27–October 2): males, [?], 104, 52; 112, 54; females, 107, 50; 108, 49; 110, 41; 112, 52.

Riparia r. ijimae: Hokkaido (May 28–June 5): Males, 101, 45; 102, 43; 103, 46; unsexed, 98, 43.

Riparia r. diluta: Upper Lena (June 8): Male, 100, 48; females, 102, 48; 105, 50. Afghanistan (May 17): Males, 100, 44; 102, 51; 103, 49; 104, 54. Region of Jyekundo (April 28–June 9): Males, 103.5, 49; 106, 52; 106, 53; 107, 49; 107, 50; 107, 51; 107, 52; 108, 53; 109, 53; 109, 53; 109, 54; 109, 55; subadult male, 104, 49; females, 104, 49; 104, 50; 108, 49, plus one unsexed juvenal. Szechwan (March 7): Female, 100, 43. Shaweishan Island (May 1): Female, 96, 48. Kwangtung (April): Male, 100, 43. Fukien (March): Males, 100, 42; 100, 43. Sind (December 5–February 28), adults: Male, 103, 48; females, 101, 50; 102, 49; 103, 49; unsexed, 96, 42; 96, 44; 103, 50; subadults: males, 99, 45; 101, 45; 102, 45; 103, 48; females, 100, 43; 102, 44; 104, 51; 105, 48. Central Provinces (November 15): subadult male, 103, 45. All these winter specimens from Sind and Central Provinces have worn wing and tail feathers.

Riparia riparia riparia × diluta

IRAN: Luristan: Durud, May 16, 1941, 1 ♀, October 22, 1 ♀, May 16, 1942, 1 ♀; Burujird, July 16–19, 1941, 3 juv. ♂, 2 juv. ♀, September 27–October 2, 2 ♂, 1 juv. ♂, 3 ♀, 1 subad. ♀, 2 juv. ♀, 1 unsexed subad.

Riparia riparia diluta Sharpe and Wyatt

AFGHANISTAN: Kabul, May 17, 1937, 4 ♂.

INDIA: Sind: Soneri Lake, December 5–7, 1939, 1 ♂, 3 unsexed ad.; Khinjar Lake, January 20–February 28, 1934, 4 subad. ♂, 2 ♀, 4 subad. ♀. Central Provinces: Bheraghat, November 15, 1946, 1 subad. ♂.

Riparia paludicola chinensis Gray

AFGHANISTAN: Kabul, May 17–18, 1937, 3 juv. ♂.

INDIA: Punjab: Keshapur, March 8, 1931, 1 ♂. Punjab, Kangra: Bhadwar, April 23, 1933, 1 ♂. United Provinces, Kumaon: Tejam, June 4, 1948, 1 juv. ♀. United Provinces, Gorakhpur district: Kalnahi, February 15–24, 1947, 4 ♂, 2 ♀, 3 nestlings. Sind: Khinjar Lake, February 28, 1934, 1 ♀. Bihar: Garhwa Road, September 9–12, 1947, 5 ♂, 3 ♀. Central Provinces: Bheraghat, June 6, 1946, 1 juv. ♀, October 21–23, 3 ♂, 1 ♀. Khasia Hills: Burnihat, May 15, 1949, 4 ♂, 6 ♀.

Gray's *Hirundo chinensis*, 1830–1832, for this form is older than *H. brevicaudata* Horsfield, 1839, and must stand, for, according to Articles 35 and 36 of the International Rules, the adjective *chinensis* is not preoccupied by *sinensis* (for *H. sinensis* Gmelin, 1781).

In Asia this species has an interesting distribution (fig. 1) from Termez on the Amu Darya in southern Bukhara, through northern India (foothills of the Himalayas south to about latitude 20° N.), Burma to northern Tenasserim, northern Siam, southern Yunnan, northern Laos, northern Tonkin, to Formosa, and Luzon. Although it is said to move locally, it is not migratory.

The populations at the two extremes of this range have been described as *bilkewitchi* Zarudny, 1910, for the population of Termez, and *tantilla* Riley, 1935, for the population of Luzon. No specimens are available from these regions, but *bilkewitchi* and *tantilla* have been made synonyms of *chinensis*, the first by Ivanov (1940, Oiseaux du Tadjikistan, p. 280) and the second by Mayr (1945, Zoologica, vol. 30, p. 111).

The specimens listed above have been examined with other specimens from southern Punjab, western and central United Provinces, central Bihar, Bengal, Assam, northern Burma, Arakan, southern Yunnan, and Formosa. All the specimens in comparative plumage are similar in coloration and show but a very slight amount of variation; in some specimens the crown, lower back, rump, or breast band is a little darker or paler. But no geographical trend is apparent, and the larger series show the variation to be individual.

The specimen from southern Yunnan was taken at Szemao on January 26, 1923. This specimen in the La Touche collection, now in the Museum of Comparative Zoölogy, is, apparently, the only specimen of the species on record taken within the borders of China.

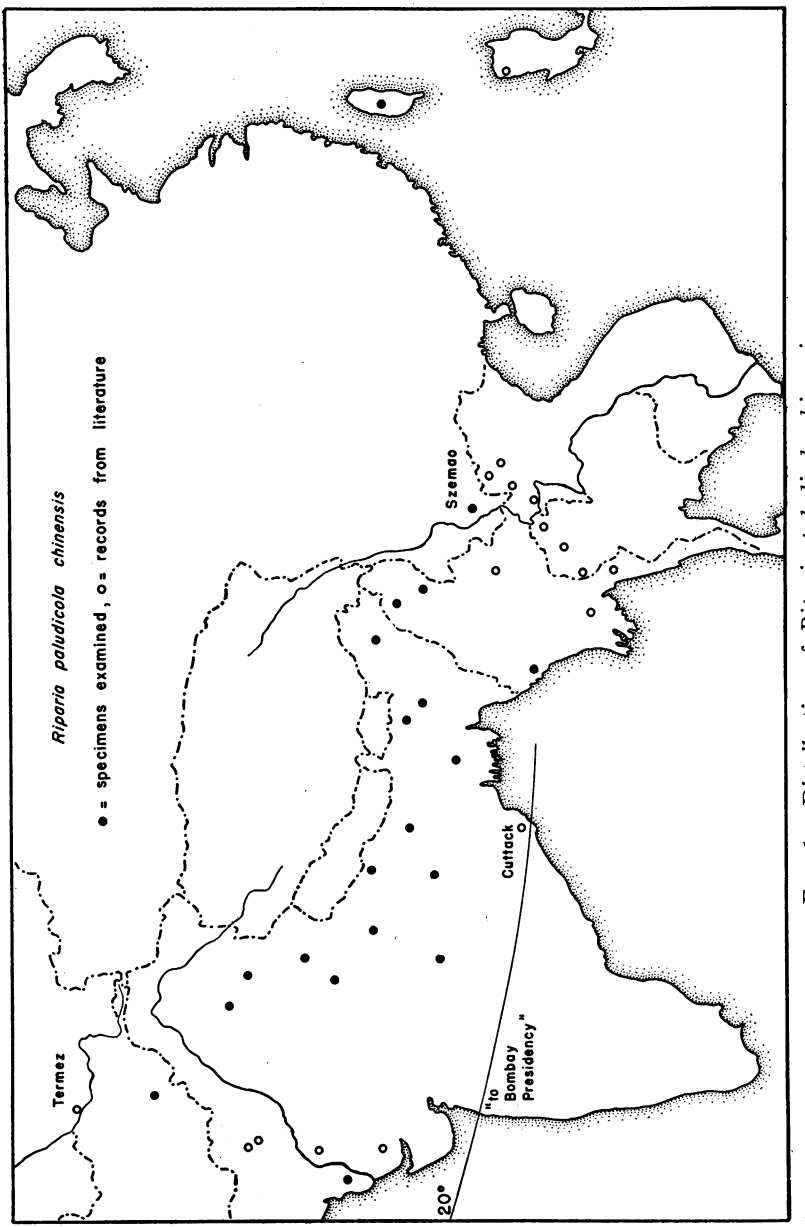

FIG. 1. Distribution of *Riparia paludicola chinensis*.

The three juvenal specimens taken by Koelz at Kabul are the first actual record of the species for Afghanistan, but since it breeds at Termez on the Russian bank of the Amu Darya its occurrence in Afghanistan was to be expected. These three juvenals are slightly paler than a juvenal taken in Kumaon, but another juvenal from Central Provinces is as pale or even slightly paler.

MOLT AND BREEDING: Whistler (1949, Popular handbook of Indian birds, p. 235) states that this species, one of the earliest to breed in India, nests generally from November to February, and in some localities, as late as May. In Sind, according to Ticehurst (1922, Ibis, p. 659) it starts to breed in early December and is still breeding in March and later. The specimens taken by Koelz in February at Kalnahi were breeding and those taken on May 15 in the Khasia Hills had probably just finished breeding, for they are just starting the post nuptial molt. Only two molting juvenals were examined; in these, taken on May 18 at Kabul and on June 6 in Central Provinces, the molt was barely starting with the feathers of the throat and fore crown, but presumably the post juvenal molt is complete.

MEASUREMENTS: The measurements show no evidence of geographical variation. The individual wing measurements of the adult specimens examined are:

Sind: Female, 90. Punjab: Males, 93, 93, 96. United Provinces: Males, 91, 93, 94, 95; females, 92, 94, 95; unsexed, 94, 95, 96. Bihar: Males, 92, 92.5, 94, 94, 94.5; females, 92, 93, 93.5, 95.5. Central Provinces: Males, 91, 92.5, 95.5; female, 95. Bengal: Male, 95. Khasia Hills (worn): Males, 90, 92, 93, 94; females, 92, 93, 94, 94, 94, 94. Assam: Males, 90, 94; females, 89, 93. Northern Burma: Males, 92, 92, 95.5; females, 88, 89. Arakan: Female, 89. Southern Yunnan: Male, 94.5. Formosa: Male, 96.5; female, 92.

GENUS **HIRUNDO**

Hirundo rupestris rupestris Scopoli

SYNONYM: *Riparia rupestris centralasica* Stachanow, 1933; type locality, Yawata, Ala Shan.

IRAN: Luristan: Khali Kuh, June 1, 1940, 1 ♀; Durud, August 28–31, 1941, 2 ♂, 2 juv. ♂, 1 juv. ♀, November 11, 2 juv. ♀. Bakhtiari: Qalichir, June 5, 1 ♂, 2 ♀. Khorasan: Bardu Forest, August 20, 1940, 1 juv. ♂.

AFGHANISTAN: North central: Kamard, August 25, 1939, 1 juv. ♂; Sabz Pass, August 29, 1 juv. ♂; Sufak, September 27, 1 juv. ♂; Shibar Pass, June 30, 1937, 1 ♂. Northeast (Badakhshan): Sufian, July 18, 1 ♀; Zebak,

July 20–21, 1 ♂, 1 ♀. East: Nozi, June 21–23, 1 ♂, 4 ♀. South: Mukur, October 11, 1 unsexed juv.

INDIA: Kashmir, Baltistan: above Sodpur, August 10, 1936, 1 ♂; Pranu, September 1, 1 ♂, 1 juv. ♂; Karzong Nulla, September 12–13, 2 ♂, 2 juv. ♂, 1 ♀, 1 juv. ♀. Kashmir, Ladak: Saspul, August 1, 1933, 1 ♂, 1 ♀ [♂]. Kashmir, Zaskar: Reru, September 18, 1931, 1 ♂, 2 juv. ♂, 1 ♀. Kashmir, Rupshu: Miru, August 13, 1933, 1 ♂, 2 juv. ♂, 2 unsexed juv.; Gya, August 13, 1 juv. ♂. Northern Punjab, Spiti: Lasar, September 4, 2 juv. ♂; Kahze, September 13, 1 juv. ♂. Northern Punjab, Lahul: Bailing Nullah, August 30, 1930, 1 juv. ♂; Kyelang, August 2, 1933, 2 juv. ♂; Gundla, June 9, 1936, 1 ♀. Northern Punjab, Rampur-Bashahr: Chango, October 2, 1 ♂. United Provinces, Kumaon: Rilkot, June 13, 1948, 2 ♂, 1 ♀. Rajputana, Sirohi: Anadra, December 29–30, 1948, 1 subad. ♂, 2 subad. ♀. Northern Madras Presidency: Mahendra, January 23, 1937, 1 subad. ♂.

Specimens have been examined from the Tirol, southeastern Europe, and Mediterranean islands eastward to southern Tsinghai in Chinese Tibet, northwestern Szechwan, and northwestern Kansu. These populations, those that are listed above, and others from Gilgit and Russian Turkestan are identical in general coloration, but one-half to two-thirds of the specimens examined from Europe and the Mediterranean have faint and very narrow pale edges on the tail coverts and the feathers of the body plumage. As the specimens examined from Asia are, or tend to be, more uniformly colored, they appear to be slightly darker. However, these pale markings appear to be a sign of immaturity (see discussion of plumages), for they are lacking in all the specimens from Europe and the Mediterranean that are obviously adult, these specimens being as dark and as uniformly colored as the specimens from Asia. Meinertzhagen (1927, Ibis, p. 602) has found also that the populations of Ladak and of nominate *rupestris* from southern Europe were identical.

Stachanow described "*centralasica*" as being paler, more sandy above, than nominate *rupestris* and differing also by having "considerably greyer" primaries and by having pale edges on the upper tail coverts. This form is recognized by Meise (1937, Jour. Ornith., vol. 85, p. 576) and Schäfer (1939) but solely on the basis that their specimens from northwestern Kansu and Tsinghai appear to be larger than nominate *rupestris*. Color differences cannot be confirmed as stated above and also by Schäfer.

Concerning the size difference it is true that the populations living at higher altitudes or more to the north in central Asia average larger, but the measurements of all the populations overlap. If the individual wing measurements given by Meise from

northwestern Kansu (the population nearest to the type locality of "*centralasica*") are compared with those of the larger series examined by me, the measurements overlap as follows:

Kansu: Males, 130, 132, 134.5, 135, 135, 136, 136, 137, 140, 143.
Northwestern Szechwan (Sungpan): Males, 130, 133+, 135, 137, 137+, 139.
Southern Tsinghai (Jyekundo): Males, 130, 134, 134, 134, 135, 135, 135, 135, 135, 138, 138, 138, 139, 140, 141, 142, 143.
Kashmir: Males, 129, 130+, 130+, 134+, 134+, 136+, 137, 139+.
Europe: Males, 129, 130, 130+, 130+, 131, 132, 134, 136, 136.

A topotype of nominate *rupestris*, a first winter male from Tirol, measures 129; the type of "*centralasica*," a male, measures, according to Stachanow, also 129.

The specimens from southern Tsinghai above are a part of the series collected by Schäfer at Jyekundo. This author had 37 specimens from this locality, but only 17 males and two females are available to me. Schäfer states that 12 specimens collected on "October 24–26" at Batang, a region to the south of Jyekundo, measure smaller than those from the region of Jyekundo and differ also by being rusty or yellowish below. However, judging by the five specimens of Schäfer from Batang, which I have examined, this account appears to be misleading, for Schäfer apparently does not distinguish between adults and juvenals. Only one of the five specimens from Batang is adult, and in this specimen, which is molting, the outer primaries are not fully grown. Of the others, two are still in the full juvenal plumage and are, of course, more rusty. Further, the specimens were collected on November 20, a month later than stated by Schäfer, and at this late date may not have been local birds.

DISTRIBUTION IN IRAN AND INDIA: In Iran, in addition to the Zagros and southern Khorasan, this species breeds in the Elburz and, according to Zarudny (1911, Jour. Ornith., vol. 59, p. 221), in northwestern Iran, Kirman, northern Persian Baluchistan, and northern Khorasan. From this last region I have examined a juvenal taken in August in the Kopet Dagh on the border of Transcaspia. In Baluchistan proper it breeds in the northern mountains, according to Ticehurst (1927, Jour. Bombay Nat. Hist. Soc., vol. 31, p. 869). In India, the species breeds in the western Himalayas and on migration reaches the Nilgiris and the Palni Hills, leaving by the end of March. The juvenal taken by Koelz in southern Afghanistan at Mukur on October 11 was probably a winter visitor or on migration.

MOLT AND PLUMAGES: The molting season in this species, at least in the material examined from Asia, differs from that of other migratory swallows. In the latter, the molt takes place in the winter quarters and is so long drawn out that in many specimens it is barely over by the time of the spring migration. In *H. rupestris* the post nuptial molt is rapid and takes place early, suggesting that it is completed before the fall migration. It is rapid in that adjacent wing quills and sometimes part of the tail are being replaced simultaneously. It starts early; it had already started on August 2 in a specimen from northern Szechwan and was at its height in specimens taken from the end of August to the middle of September in Luristan and Kashmir. In some populations, however, it starts later; it was just starting in a specimen taken on October 2 in northern Punjab and a specimen taken on November 20 at Batang in Sikang was still showing signs of molt.

The post juvenal molt is complete and appears to start later than the post nuptial molt, possibly not until the birds reach the winter quarters. A juvenal taken on October 11 in southern Afghanistan and juvenals taken on November 20 at Batang had not started to molt. This molt had been completed in specimens taken on December 29 to 30 in Rajputana and on January 23 in southern Madras, and was just ending in two, presumably first year birds, taken on December 9, one in Sardinia and the other in southern Spain. In all these specimens, which are now in very fresh first winter plumage, this plumage differs from that of the full adult as follows: the tertials have narrow whitish terminal margins, the feathers at the bend of the wing have rufous edgings lacking or much less evident in the adult, the upper and under tail coverts have pale edges which sometimes, faintly or better marked, are present also on the mantle and rump. Apparently, according to the labels, birds may breed in this plumage.

The new primaries differ in these first winter specimens from India and Europe. In the specimens from Europe the new primaries are identical with those of the adult, that is, they are dark, without pale edges, and are pointed at the tips. In the specimens from India the new primaries resemble juvenal primaries in that they are gray rather than blackish, have faint pale edges, and are somewhat blunt at the tips. It is possible that in some regions or individuals the molt may be retarded.

MEASUREMENTS: The individual wing length in the males of

the larger populations examined has been given. In the females of these populations the wing measures: Sungpan, 130, 131; Jyekundo, 134, 135; Kashmir, 131+, 135+; Europe, 128, 133+; Kansu (Meise), 133. There are no apparent geographical variations in the length of the tail or of the bill. The tail in all the specimens ranges from 49 to 62+ mm. in males and 47 to 60+ in females; the bill, measured from the skull, ranges from 10 to 13 in males and 10.5 to 12.5 in females.

In the smaller populations, not listed above, the individual wing lengths are as follows:

Luristan and Bakhtiari (worn): Males, 131, 132; females, 127, 131, 131. Fars (worn): Female, 127. Southern Khorasan (worn): Female, 128. Afghanistan (worn): Males, 129, 131, 132; females, 125, 125, 128, 129. Gilgit: Male, 135. Northern Punjab (worn): Male, 132; female, 128. Kumaon (worn): Male, 135, 136; female, 128. Russian Turkestan: Male, 132; female, 131. Northwestern Kansu: Male, 131.

HIRUNDO OBSOLETA

While studying the geographical variation in this species, I examined a small series of three specimens from Hofuf in the Hasa district of eastern Saudi Arabia. The population of this region, which apparently is the palest of all, is here described as:

Hirundo obsoleta perpallida Vaurie, new subspecies

TYPE: A.M.N.H. No. 559505; Rothschild Collection; adult female; Hofuf; November 27, 1923; R. E. Cheesman, collector.

SUBSPECIFIC CHARACTERS: Similar to nominate *obsoleta* examined from lower Egypt and the Dead Sea region in Palestine but paler throughout. Above, very pale, whitish French gray; below, almost pure white on the throat and upper breast.

MEASUREMENTS: See table 2.

RANGE: Known only from the present specimens, but probably ranges from Fao at the head of the Persian Gulf south and east in the coastal districts of eastern Saudi Arabia as far, at least, as Hofuf. In extending, tentatively, the range of *perpallida* north to Fao, I am guided by the statement of Ticehurst (1922, Ibis, p. 660) that the palest specimen of the species that he has examined came from Fao.

GEOGRAPHICAL VARIATION IN *Hirundo obsoleta*

From Egypt eastward, specimens have been examined from

lower Egypt, Palestine, Sudan (Merowe, and the White Nile above Khartum), British Somaliland, Hofuf, Laristan, southern Khorasan, and Persian Baluchistan. Four races, differing in coloration, are represented. Possible differences in measurements are discussed below. The darkest and grayest is *arabica* Reichenow, 1905 (type locality, Lahej, Aden) for the populations of the Sudan and Somaliland. The other three races are distinctly paler, the palest being *perpallida*, and the darkest (after *arabica*) is *pallida* Hume, 1873 (type locality, Sind and the Makran coast) which, despite its name, is a little darker than nominate *obsoleta* Cabanis, 1850 (type locality, "north east Africa"). The type locality of *obsoleta* is here restricted to lower Egypt on the right bank of the Nile in the region of Cairo and the neighboring Moqattam Hills. This action seems necessary, for two distinct forms (nominate *obsoleta* and *arabica*) breed in "north east Africa." In the region of the Moqattam Hills, from which I have specimens, nominate *obsoleta* is said to be abundant by Meinertzhagen (1930, Birds of Egypt, p. 311).

The distinction between *arabica* and the other three races is very clear in all plumages. But in the case of the three paler races comparisons should be made with specimens in fresh fall and winter plumage, for the coloration darkens with wear. Such comparisons are valid, for apparently the species is not migratory, although in some regions, as in Sind, it shows altitudinal movements.

My comparative material of the three pale races is limited. Topotypical *pallida* is not available, but specimens collected by Zarudny in Persian Baluchistan, in a region which can be construed as inland Makran, are darker than three specimens from Laristan, two of which are identical with nominate *obsoleta* from lower Egypt and Palestine. Three specimens from southern Khorasan are very faintly paler than the specimens of *pallida* from Persian Baluchistan but are much closer to this race.

Only three specimens of *perpallida*, all from Hofuf, are available. Of these, two are very distinctly paler than any other specimens of the species examined, but the third is a little darker and is matched by one of the three specimens from Laristan mentioned above. Since one specimen out of three in each of these populations is identical, more specimens should be compared, as these two regions face each other across the Gulf. They should be compared also with nominate *obsoleta* from lower

Egypt, for I am aware that Ticehurst (1925, Ibis, p. 21) refrained from separating from this last population a series of eight specimens from Hofuf of which my three specimens were a part. Nevertheless, the nomenclatorial separation of the population of Hofuf is desirable, as it represents, apparently, the extreme in the decreasing pigmentation of the species.

Zedlitz in describing *reichenowi*, 1908 (type locality, Suez and the Sinaï Peninsula), confused *H. rupestris* and *H. obsoleta*, but although no topotypical *reichenowi* is available this name appears to be a synonym of nominate *obsoleta*. Specimens in the Rothschild Collection which, according to notations on the labels, were compared and were found to be "identical" or "very similar" to the type of *reichenowi*, are nominate *obsoleta* taken in lower Egypt and the Dead Sea region of Palestine. Specimens from these two regions are identical.

In Iran, the species breeds in the Zagros. No specimens are available, but, on presumption, this population to the west of Laristan is probably nominate *obsoleta*. The population that in Sind probably breeds in the western hills represents the eastern limits of the breeding range of the species. In Sind in winter it occurs in the plains and has been reported as far east as Kutch, according to Ali (1945, Birds of Kutch, p. 171).

Molt

The only molting specimens examined are four adults of *pallida* in the very last stages of the post nuptial molt. This molt, as in *H. rupestris*, takes place early, for these specimens were taken on September 3 to 7 in southern Khorasan and on September 18 in Persian Baluchistan, and the molt was already over in other adults taken from August 29 to September 11 in the last region. Juvenals, as in *H. rupestris*, may molt later, for the post juvenal molt had not started by September 4 to 5 in southern Khorasan.

Measurements

An insufficient number of specimens have been measured, but *arabica* would appear to be smaller (table 2). This difference is also shown in the wing length of juvenals; in *arabica* one juvenal from Somaliland has a wing length of 112 mm. as against 121, 123, and 124 in juvenals of *pallida* from Khorasan and Persian Baluchistan.

TABLE 2

MEASUREMENTS OF ADULTS IN SOME POPULATIONS OF *Hirundo obsoleta*

Race and Region	N	Wing	Tail	Bill
arabica				
Somaliland	2 ♀	115, 115	50, 51	12, 12
Sudan	1 ♂	116	50	12
	3 ♀	116, 116.5, 118	48, 49, 50	11, 11.8, br.
obsoleta				
Palestine (Dead				
Sea region)	2 ♂	123, 124	47, 49	10.5, 12
	1 ♀	118	47	11
Lower Egypt	4 ♂	114–120 (117.0)	42–50 (47.2)	11–11.5 (11.2)
	3 ♀	110, 112, 119	45, 49, 50	10, 10.5, 11
Laristan	2 ♂	119, 124	47, 51	10.5, 11.5
	1 ♀	119	46	10
perpallida				
Saudi Arabia				
(Hofuf)	1 ♂	118.5	52	12
	2 ♀	118,[a] 121	50, 52[a]	11+, 12[a]
pallida				
S. Khorasan	3 ♂	125, molt	46, molt	10, 10.5, 12
Persian				
Baluchistan	3 ♂	121+, 121+, 125	48+, 49+, 51	12, 12, 12.2
	6 ♀[b]	118–123 (120+)	48+–50+ (49+)	11.5–13 (12.0)

[a] Type of *perpallida*.

[b] Includes two very worn specimens and one molting in which the outer primary is not quite fully grown.

Hirundo obsoleta obsoleta Cabanis

IRAN: Laristan: Isin, December 16–18, 1939, 2 ♂, 1 ♀.

Hirundo obsoleta pallida Hume

IRAN: Khorasan: Robat i Khan, September 3, 1940, 1 ♂; Khaur, September 4–7, 2 ♂, 1 juv. ♂, 1 juv. ♀.

Hirundo concolor concolor Sykes

INDIA: Junagadh: Sasan, January 30–February 1, 1949, 2 ♂, 1 ♀. Rajputana, Sirohi: Anadra, December 28–30, 1948, 1 ♂, 1 juv. ♂, 2 ♀, 1 subad. ♀. Central Provinces: Bheraghat, March 20–24, 1946, 2 ♂, 2 ♀, May 9, 1 ♂, 1 ♀. Madras: Mahendra, January 24, 1937, 1 ♂; Hospet, March 24, 1 ♀. Southern Bombay: Londa, February 2–12, 1938, 1 ♂, 1 ♀.

It is possible that the various Indian populations vary slightly in coloration, but an insufficient number of specimens has been

examined. Those from Junagadh, Sirohi, and Mahendra and Hospet in Madras are slightly browner than specimens from Londa which are a little darker, blacker. The March specimens from Bheraghat and one from Mysore in similar plumage are intermediate. However, all the differences are slight and may be due to the individual degree of wear, for in the two May specimens from Bheraghat in which the body plumage is very fresh, the upper parts are distinctly blacker, less brown, than in any of the other specimens which are in moderately worn to worn plumage.

No specimens from the Shan States are available, the population of which has been separated as *sintaungensis* by Baker on the basis of being darker above, more blackish, less brown (1933, Bull. Brit. Ornith. Club, vol. 54, p. 24). Judging, however, by the mentioned differences caused by wear, *sintaungensis* may be based on a state of plumage.

MOLT: In the specimens taken on March 24 at Hospet and at Bheraghat, the post nuptial molt is just starting with that of the body plumage and inner wing. In the specimens taken on May 9 at Bheraghat the molt of the body plumage is ended but not that of the wing and tail. No molting adults from other regions and no molting juvenals are available.

MEASUREMENTS: The measurements of the specimens examined show no evidence of geographical variation. The individual wing lengths of adults are as follows: Junagadh: Males, 104, 107; female, 103+. Rajputana: Male, 109; females, 106, 107. Central Provinces: Males, 107+, 109, molt; female, 104, 108, molt. Madras: Male, 109; female, molt. Mysore: Male, 109. Southern Bombay: Male, 109; female, 107.

Hirundo tahitica domicola Jerdon

INDIA: Southern Madras Presidency: Ootacamund, February 16, 1937, 1 ♀.

This specimen, a topotype, measures: wing, 105; O.T.F., 46; fork, 7.5; bill, 9.5.

This appears to be another bird species that has reached Ceylon and southern India presumably across the Indian Ocean.

HIRUNDO RUSTICA

The nominate race breeds in Iran, Afghanistan, Baluchistan, and in the Himalayas to Sikkim. In northeastern Assam and in northern Cachar it is said to be replaced by *gutturalis*, but no

breeding specimens of this race have been examined by me from India. Nominate *rustica* differs from *gutturalis* by being larger, by having the pectoral band unbroken by the downward extension of the red chestnut of the throat, and apparently by having in fresh plumage a blue rather than a greenish gloss.

In addition to the Koelz specimens listed below from various parts of Iran and Afghanistan and from northern Punjab and Nepal, breeding specimens of nominate *rustica* have been examined from Sweden, Great Britain, western Europe, western and eastern Russia, and Russian Turkestan. The measurements and the size of the white spots in the tail decrease very slightly from west to east and north to south, but the cline is ill defined and the geographical variability taken as a whole is not clear cut.

This examination fails to confirm the validity of the following forms: *loudoni* Zarudny, 1923, type locality, Djarkent, Russian Turkestan; *afghanica* Koelz, 1939, type locality, Baghlan, Afghanistan (Proc. Biol. Soc. Washington, vol. 52, p. 75); and *ambigua* Stresemann, 1940, type locality, Gangtok, Sikkim (Ornith. Monatsber., p. 89).

The first (*loudoni*) was described as having a longer tail than nominate *rustica* and the pectoral band invaded by the red of the throat. This form is not recognized by Dementiev and is not confirmed by my examination of nine topotypes taken during the breeding season from April 3 to May 29. The second (*afghanica*) was said to have the under parts, under wing coverts, and axillaries paler than in nominate *rustica*, but examination of the Koelz specimens shows that they are worn, the coloration falling within the range of variation normal in worn nominate *rustica*.

According to its description, *ambigua* differs from nominate *rustica* only by being of smaller size. However, although the measurements of specimens from Sikkim fall at the lower end of the range of variation in nominate *rustica*, similarly small specimens occur in other widely separated populations. The measurements of four adult males from Sikkim are given by Stresemann as: wing and tail, 115, 91; 120, 82; 120, 93; 120, 95. Two unsexed adults examined by me from Sikkim measure: 117, 81+; 123, 83+. In 26 males, presumably from the British Isles, the lower limits in the range of variation is 120 for the wing and 93 for the tail (1949, Handbook of British birds, vol. 2, p. 232). (See also table 3.) Additional measurements from Sikkim

may confirm an average difference in size, but, lacking other characters, *ambigua* does not appear sufficiently distinct to warrant recognition.

Stresemann states that he is of the opinion that the population of Sikkim is derived from *gutturalis* rather than from nominate *rustica*. However, the population of Sikkim has the unbroken pectoral band of nominate *rustica* and may represent another instance of the curiously broken distribution of the latter in the Himalayas. Whistler (1937, Ibis, p. 414) shows that the breeding colonies of nominate *rustica* are separated by very wide gaps all the way from the Vale of Kashmir to the Nepal Valley. Actually, the region of Katmandu in the Nepal Valley where Koelz collected breeding specimens is much closer to Sikkim than it is to Kumaon where, according to present knowledge, occurs the nearest breeding colony west of Katmandu.

Variation in the Coloration of the Under Parts

The coloration of the under parts varies individually from pinkish to creamy to pure white. These parts become whiter with wear in nominate *rustica*, but specimens may be white even in fresh plumage. This variation, chiefly in the case of the populations of eastern Asia, has been studied by Dementiev (1936, Alauda, pp. 49–53). In the breeding adults of the western populations that I have examined the variation is as follows:

British Isles: 13 pinkish, 4 creamy, 5 whitish
Sweden: 1 creamy, 6 white
Western Europe: 6 pinkish but less so than in British Isles, 3 creamy, 2 white; 1 as red as, or redder than, *transitiva* from Palestine
Western and eastern Russia: 5 white
Russian Turkestan: 1 faintly pinkish, 9 dingy white
Iran: 6 faintly pinkish, 34 creamy or dingy, 11 white
Afghanistan: 6 dingy white
Nepal: 1 pinkish, 3 creamy

There is no clear-cut trend. In series, however, the population from the British Isles is pinkest, the populations of Sweden and Russia are whitest, while the populations of Iran are most homogeneous, the differences in the last being less distinct, although this cannot be expressed numerically.

The same range in variation can be observed in winter specimens of *gutturalis* examined from the Philippines and various

parts of India, but these winter visitors contain much fewer specimens with pinkish under parts.

Winter Visitors in India

Nominate *rustica* and *gutturalis* occur as winter visitors in various parts of India, but authors on Indian ornithology have been reluctant to identify many of the specimens. Whistler states this viewpoint when he remarks that since the molt of the flight feathers takes place in the winter quarters, "it is impossible to verify the racial identification of the large proportion" of the winter visitors (1933, Jour. Bombay Nat. Hist. Soc., vol. 36, p. 840). This presupposes, however, that, as stated by Ticehurst, the only reliable difference is the difference in size (1927, Jour. Bombay Nat. Hist. Soc., vol. 32, p. 349). Actually, as this author observes, there is a slight amount of overlap. The pectoral band, if not the coloration of the under parts, is fairly reliable. It is true that occasional specimens occur throughout the breeding range of nominate *rustica* in which the band is more or less "smudged" with red, but these specimens are few and they are not smudged to the same extent as in *gutturalis*. I have not seen specimens of nominate *rustica*, nor had Ticehurst, in which the band was completely broken through by the red as in *gutturalis* where these specimens are very common. I cannot discern the difference in the depth of the red mentioned by Ticehurst, but one difference that he does not mention is that in the adult the metallic reflections on the upper parts are purplish blue in nominate *rustica*, whereas they are as a rule greenish blue in *gutturalis*. This difference holds well, but only in specimens in fresh body plumage, and is therefore not caused through wear. Dementiev (1936, *loc. cit.*) mentions a difference in the color of the gloss, but, perhaps through error or through the comparison of specimens in different states of wear, his statement is the reverse of mine.

On a combination of characters, therefore, adult winter visitors to India are not too difficult to identify. Juvenals, however, are harder to identify with certainty, but in juvenal *gutturalis* the pectoral band is usually broken through or much more smudged than in juvenal nominate *rustica*.

I have found nominate *rustica* as a winter visitor to India only in Sind where, as well as in the Punjab, Ticehurst reports only nominate *rustica*. The distribution of this form as given by

Baker in the "Fauna" is not reliable, but it has been identified with certainty from Ceylon by Whistler where *gutturalis* also occurs as a winter visitor (1944, Spolia Zeylanica, vol. 23, p. 190). Since nominate *rustica* reaches Ceylon it must occur in the intervening region between Sind and Ceylon.

All the specimens I have examined from the following regions are without a doubt *gutturalis:* Burma, northern Cachar, southern Bengal, Bihar, Orissa, Central Provinces, Madras Presidency, Mysore, Nilgiris, and Ceylon. Other regions where *gutturalis* is reported tentatively by Whistler are Hyderabad, Travancore, and possibly Gwalior. Ali reports it from Bombay and Salsette. Ticehurst is of the opinion that *gutturalis* does not reach northwestern India. Two juvenals taken on July 15 at Hitaura on the plains of lower Nepal by Koelz appear, on the basis of their well-smudged pectoral bands, to be *gutturalis*. This date seems unusually early, but Deignan reports that in northern Siam *gutturalis* appears "in numbers" between July 13 and 21 (1945, Bull. U. S. Natl. Mus., no. 186, p. 267).

Molt

The post nuptial and post juvenal molts are complete and take place in the winter quarters. According to the "Handbook of British birds" the post nuptial molt is very gradual and in Europe starts in August before the migration with the molt of the body plumage and sometimes that of the lesser and median wing coverts. The only molting bird examined from the fall is an adult taken on October 29 in Luristan in which the body molt is starting.

According to Whistler (1936, Jour. Bombay Nat. Hist. Soc., vol. 38, p. 513) the molt in India takes place slowly and irregularly, occupying most of the winter and in some specimens is not yet completed by April. The tail is still molting in one specimen taken on April 13 in Luristan. With the exception of these two specimens from Luristan the molting specimens examined were taken in southern Bengal, Central Provinces, and Madras. The earliest, an adult taken on December 9 in Central Provinces, is just barely starting to molt. In southern Bengal, an adult taken on January 16 is also starting to molt, but in another taken on January 17 the molt is already completely over. In Madras, specimens, adult and juvenal, are in various stages of molt from February 2 to March 5. Two juvenals taken on March 3 are

just starting, but in two adults taken on March 5 the molt is nearly over.

Schäfer (1939) reports two specimens from Yachow, Szechwan, as "badly moulting" on August 3. This, if correct, would be unusually early and would intimate that this population molts before the fall migration. However, examination shows that these specimens are not molting. One of them has barely completed the post natal molt and in the other, which is barely out of the nest for the gape is still fleshy and yellowish, the outer primaries are still growing.

TABLE 3

MEASUREMENTS[a] OF ADULT MALES IN *Hirundo rustica*

Race, Region, and/or Locality	N	Wing	O.T.F.	Fork
Nominate *rustica*				
Sweden	4	122–130 (125.5)	110–120 (115.0)	66–77 (72.0)
W. and E. Russia	3	125, 126, 126	104, 106, 110	62, 64, 66
Khuzistan	1	118	95	53
Luristan	12	119–130 (124.5)	89–128 (109.5)	60–86 (68.8)
Fars	19	120–127 (123.0)	82–118 (101.3)	45–76 (59.7)
Kirman	1	124	103	67
Khorasan	1	122	97	50
Afghanistan	3	119, 121, 127	102, 106, 108	61, 63, 66
Djarkent	8	122–131 (126.4)	107–124 (114.3)	68–83 (73.4)
Nepal	2	121, 123	90, 94	50, 51
Sikkim	2[b]	117, 123	81+, 83+	37+, 39+
gutturalis				
Philippines	7	111–118 (114.2)	75–93 (85.4)	35–50 (44.6)

[a] In view of the absence of clear-cut geographical variability, the measurements of females are omitted. In nominate *rustica* the specimens were taken during the breeding season.

[b] Unsexed and not dated.

Hirundo rustica rustica Linnaeus

IRAN: Khuzistan: Siamansur, April 24, 1940, 1 ♂. Luristan: Durud, May 20, 1 juv. ♂, March 18–June 22, 1941, 10 ♂, 2 juv. ♂, 8 ♀, 3 juv. ♀, October 29–November 10, 2 ♂, 1 juv. ♂, 1 ♀, 1 juv. ♀; Burujird, October 2, 1 ♀. Fars: Persepolis, March 10–12, 1940, 4 ♂, 2 ♀; Jahrum, March 20–23, 8 ♂, 6 ♀; Niriz, March 28–30, 5 ♂, 1 ♀; Kazerun, April 10, 2 ♂, 1 ♀; Borazjan, April 11, 2 juv. ♂, 1 juv. ♀. Kirman: Tomogaon, February 8, 1 ♂. Northern Iran, Kazvin: Siadehan, October 24, 1 juv. ♂. Mazenderan (region of Gurgan): Gurgan, July 11–30, 3 juv. ♂, 1 unsexed juv. Khorasan: Bujnurd, July 2, 1940, 1 ♂.

AFGHANISTAN: Northwest: Aq Cha, September 8, 1937, 1 juv. ♀. South: Girishk, October 27, 1 juv. ♂. North: Baghlan, July 1, 1 ♂ (the type of *H. r. afghanica*), 1 ♂. East: Mamakhel, May 23, 1 juv. ♀; Laghman, May 25, 1 juv. ♀; Charikar, June 11, 1 ♀; Gardez, June 15–16, 2 juv. ♂, 2 ♀; Kulangar, June 23, 1 ♂, 1 juv. ♂, 1 juv. ♀.

INDIA: Northern Punjab: Baijnath, May 18, 1933, 1 juv. ♂. Nepal: Bhimpedi, March 12–14, 1947, 1 ♂, 1 ♀; Thankot, March 21–April 14, 1 ♂, 1 juv. ♂, 1 ♀, 1 unsexed juv. (Nepal, "breeding," March 12). Sind: Khinjar Lake, January 22–February 3, 1934, 4 ♂.

Hirundo rustica gutturalis Scopoli

INDIA: Nepal: Hitaura, July 15, 1947, 2 juv. ♀. Bengal: Dacca, January 15–17, 1937, 1 ♂, 2 ♀, 1 juv. ♀, 1 unsexed ad. Bihar: Garhwa Road, November 17–18, 1947, 1 ♂, 4 juv. ♂, 1 ♀. Central Provinces: Bheraghat, December 9, 1946–January 10, 1947, 1 ♂, 1 juv. ♂, 1 juv. ♀, 1 unsexed juv. Madras Presidency: Ellore, February 2, 1937, 1 ♀; Sidhout, March 22, 1 ♀; Hospet, March 24, 1 juv. ♂; Ootacamund, March 3, 1948, 1 juv. ♂, 1 juv. ♀; Coimbatore, March 5, 2 ♂.

Hirundo smithii filifera Stephens

SYNONYM: *Hirundo smithii bobrinskoii* Stachanow, 1930; type locality, Tchubek, Bukhara.

AFGHANISTAN: North central: Aq Kupruk, September 11–12, 1939, 3 ♂. Badakhshan: Gumbad, Kishm, July 7, 1937, 1 ♀; Lala Maidan, August 27, 1 nestling ♂. East: Kabul, May 17, 1 ♂, 1 ♀; Laghman, May 26–28, 1 ♂, 3 ♀. South: Girishk, October 27, 3 ♂, 1 unsexed ad. [♂], 1 juv. ♀.

INDIA: Kashmir, Baltistan: Shigar, August 19, 1936, 1 ♀. Northern Punjab, Kangra: Bhadwar, April 21–May 9, 1933, 3 ♂, 7 ♀. Kumaon: Lechiwala, October 28–29, 1948, 1 ♂, 1 juv. ♀. Bihar: Garhwa Road, September 9, November 17, 1947, 2 ♀. Junagadh: Sasan, February 5, 1949, 1 unsexed juv. Central Provinces: Bheraghat, March 8–April 22, 1946, 3 ♂, 1 juv. ♂, 6 ♀, November 26, 2 ♂, 1 ♀. Bastar: Korher, March 24, 1949, 1 ♂. Madras Presidency: Hospet, March 24, 1937, 1 juv. ♂. Southern Bombay Presidency: Londa, January 11–February 2, 1938, 5 ♂, 5 ♀.

These specimens have been compared with a series of nominate *smithii* from the Belgian Congo. All the populations are identical in coloration except for the color of the crown which is less variable individually in Africa. The only constant geographical variation is in size. Nominate *smithii* (type locality, Chisalla Island, lower Congo River) has a slightly shorter wing, and the wire of the outer tail feather is distinctly shorter. There is a slight amount of overlap, particularly with the population of southern India which measures somewhat smaller than the populations from farther north in Asia, but the difference (table

4) between the populations of Africa and Asia is certainly well marked enough to warrant the separation of the latter as a dimensional race. The longest tail measured in Africa was 118 mm., and in India, locality unknown, 212 in a specimen in which the tip of the wire was incomplete.

The color of the reddish cap varies individually, strikingly so in Asia. In the two larger populations from India, the population of northern Punjab in very fresh plumage and that of southern Bombay in fresh to slightly worn plumage, the intensity of the red varies from deep dark chestnut to pale reddish cinnamon. With wear, the crown becomes paler, almost yellowish in very worn specimens. In the population from the Belgian Congo, as well as in one from Angola and another from east Africa, the color of the crown is much more constant, and the crown is reddish chestnut; very dark or very pale specimens as found in Asia do not occur.

TABLE 4
MEASUREMENTS IN ADULT *Hirundo smithii*

Race and Region	N	Wing	O.T.F. (Wire)[a]
Nominate *smithii*			
Belgian Congo	9 ♂	107–117 (112.0)	90–118 (104.0)
	6 ♀	106–111 (108.0)	52–64 (55.5)
filifera			
Bukhara[b]	♂	115–120.5—	130–170—
	♀	114–118—	60–71—
Afghanistan	9 ♂	118–124 (120.5)	128+–191+—
	5 ♀	115–119 (116.8)	61–82 (67.6)
Northern India	4 ♂	118–120 (119.2)	112+–201—
	7 ♀	114–119 (116.0)	54–73 (61.0)
Central India	6 ♂	115–124 (118.9)	142+–161+—
	9 ♀	113–121 (116.1)	52+–87—
Southern India	5 ♂	112–119 (116.4)	101–202+—
	5 ♀	112–114 (113.6)	53–66 (57.4)

[a] No averages given when the tip of the wire is broken.

[b] Stachanow's (1930, Ornith. Monatsber., p. 77) measurements of 11 specimens; numbers for each sex and no averages given.

Stachanow has separated the population breeding in Bukhara north of the Amu Darya as *bobrinskoii* on the grounds that in this population the crown is paler and the wing longer than in nominate *smithii* and *filifera* and the outer tail feather intermediate. No specimens are available from Bukhara, but the color of the crown, said by Stachanow to be similar to that of the upper tail

coverts of *H. daurica rufula*, falls within the range of variation in *filifera*, as do the measurements (table 4). Dementiev (1935, L'Oiseau, p. 459) has already made *bobrinskoii* synonymous with *filifera*.

Dementiev includes "Perse" in the range of *filifera*, but I am not aware of any records, and it is not listed by Zarudny as occurring in Iran (1911, Jour. Ornith., vol. 59, p. 221).

MOLT: Only one molting specimen has been examined from Asia. In this specimen, an adult female, taken on April 23 in northern Punjab, the outer primaries and the tail feathers are not quite fully grown. Judging by this specimen, the molt in *H. smithii* is slow and gradual as in *H. rustica* and also takes place in winter.

Hirundo fluvicola Blyth

AFGHANISTAN: Kabul, May 17, 1937, 1 juv. ♂.

INDIA: Western United Provinces: Saharanpur, December 1, 1936, 1 juv. ♂, 2 ♀; Kashipur, August 22, 1948, 1 subad. ♀. Central Provinces: 7 miles west of Jubbulpore, February 24, 1946, 1 ♀; Bheraghat, March 11–May 16, 6 ♂, 1 subad.? ♂, 2 juv. ♂, 6 ♀, 6 subad. ♀, 2 juv. ♀, December 9, 1 juv. ♀. Southern Bombay: Hubli, March 20, 1948, 1 juv. ♂, 1 ♀, 1 juv. ♀, 1 unsexed ad.

The juvenal collected by Dr. Koelz at Kabul is apparently the first record for the species in Afghanistan.

No instance of geographical variation has been reported in this species, and none is shown in the populations above and in another from Rajputana. The juvenal from Afghanistan is identical with other juvenals from United Provinces, Rajputana, southern Bombay, and northern Central Provinces. The last population can be considered as topotypical, for the type locality of *fluvicola* is Bundelkhand, not far from Bheraghat.

MOLT AND PLUMAGES: There appears to be but one annual molt. This molt, post juvenal and post nuptial, is complete, but a number of specimens which are probably first year birds differ from specimens which are unquestionably adult by having the tertials tipped with whitish. The rest of the body plumage, wing and tail feathers, as well as the measurements, appear to be identical. The molting season itself is irregular, as the species, according to Baker (1926, Fauna of British India, vol. 3, p. 247) breeds in every month of the year, though the main breeding seasons seem to be January to March and again from July to

October. Molting specimens, juvenals, first year birds, and adults, have been examined from southern Bombay (March 20), Central Provinces (April 19 to May 16), and western United Provinces (August 22). With the exception of the last, a first year bird in which the molt was nearly over, the other specimens were just starting to molt.

MEASUREMENTS: Adults and first year birds. United Provinces: Female, wing, 94, 96; O.T.F., 38, 45. Rajputana: Male, wing, 92+; O.T.F., 44+. Central Provinces: Wing, seven males, 91+ to 94+ (92+); 12 females, 89+ to 95+ (91+); O.T.F., seven males, 40+ to 42+ (41+); 12 females, 40+ to 43+ (40+). Southern Bombay: Female, wing, 92+; O.T.F., 41+.

RELATIONSHIPS: The nearest relative of this little species seems to be *H. ariel* of Australia. Both species nest in the vicinity of water and construct similar mud nests shaped like a retort, with a tubular entrance from 2 to 6 inches long in the Indian species, from 2 to 9 inches in the Australian species. The appearance, measurements, and proportions of the two species are similar. In the adult plumage they both have a chestnut or rusty red crown, the throat is streaked, but more so and farther down in the Indian species; in the Australian species the rump is dull white, whereas in the Indian species it is brown, but the feathers are tipped with buff or dull white. The metallic gloss in its distribution and color is identical. Juvenals are even more similar in appearance than adults, the throat in the Indian species being faintly or less distinctly streaked than in the adult and the upper part of the rump whitish or buffy, or the feathers are very broadly to broadly edged with whitish or buffy. In both juvenals the centers of the crown feathers are dusky or blackish, and the upper parts of the breast and the flanks are fulvous. First year birds have the tertials tipped with whitish in both species.

THE RED-RUMPED SWALLOW

Some of the forms in this group have been discussed by Ticehurst (1927, Jour. Bombay Nat. Hist. Soc., vol. 32, pp. 349–350, and 1933, Ibis, pp. 547–548), and by Mayr (1941, Ibis, pp. 367–371). Mayr considered that two separate species were involved, *daurica* and *striolata*. He reviewed *striolata* and in this species described two new races: *stanfordi*, type locality, Tamu, Myitkyina district, upper Burma; and *formosae*, type locality, central Formosa. In *daurica*, Schäfer (1937, Proc. Acad. Nat. Sci.

Philadelphia, vol. 89, p. 385) described the population of Chinese Tibet as *tibetana*, type locality, "100 miles north east of Jyekundo" [Yushu].

This study reviews the status and distribution of some of the Asiatic forms and reports on a series from Java and specimens from Sumatra and Sumba received by Mayr after the completion of his study. Unfortunately the problem of whether one, two, or even three species are involved is not solved. The distribution during the breeding season, insofar as available data permit, is shown on figure 2.

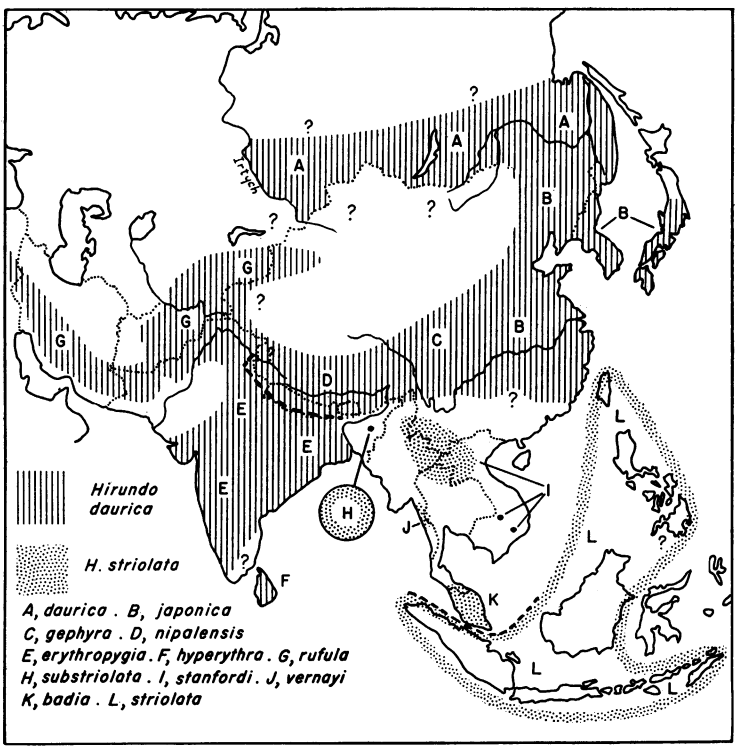

FIG. 2. Distribution during the breeding season of *Hirundo striolata*, and of *H. daurica* in some parts of Asia.

If all the forms are conspecific one would expect to find that they intergrade, at least on the continent. This is not the case. A distinct hiatus occurs at the Brahmaputra. In the mountains to the north the resident form (*nipalensis*) is smaller (115–121)

and is narrowly streaked below, while in the hills to the south the breeding form (*substriolata*) is larger (120–125) and is broadly streaked. Mayr stated that it is disturbing to find that in the area where the two groups meet the forms of the *striolata* group are large, although they live in humid tropics, while the forms of the Palearctic group (*daurica*) are small.

Other sharp breaks in the continuity of characters occur also on Ceylon and on both sides of the Strait of Malacca. The population of Ceylon (*hyperythra*) is larger (114–123) than the population (*erythropygia*) of southern India (109–115) and has the whole of the under parts a strong chestnut, whereas these parts are whitish or creamy in *erythropygia*. But the contrast is even sharper between the population of the lower Malay Peninsula (*badia*) and the population of Sumatra (nominate *striolata*). Again, *badia* is larger (137–141) than nominate *striolata* (122–132), is virtually unstreaked, and has the whole of the under parts even darker and redder than *hyperythra*, whereas nominate *striolata* is broadly streaked and is whitish below. Nowhere else does such an abrupt contrast occur, but nevertheless *badia* is connected to the *striolata* group by *vernayi* of the upper Malay Peninsula, and there is no doubt that *hyperythra* is closely related to *erythropygia*.

The relationships of the two groups are obscure, and it is interesting to note that the very widely ranging form (nominate *striolata*) found on Formosa, the Philippines, and throughout the whole of the Greater and Lesser Sundas is scarcely differentiated from the form of the China coast (*japonica* in the *daurica* group) or the form of the hills south of the Brahmaputra (*substriolata* in the *striolata* group). Nominate *striolata* obviously represents a recent expansion, because although well isolated geographically, its populations have not had time apparently to become sufficiently distinct to warrant separation. As Mayr stated, nominate *striolata* has arrived via Indochina-Borneo or via Formosa-Philippines-Borneo. The latter seems more likely, for nominate *striolata* is still more similar to *japonica* than it is to the resident form of Indochina (*stanfordi* in the *striolata* group).

At present all the forms of the Red-rumped Swallow appear to be geographical representatives. But the division into the two species (*daurica* and *striolata*) receives support from a statement of Baker (1926, Fauna of British India, vol. 3, p. 248) that both forms breed in the hills south of the Brahmaputra, *daurica* breed-

ing "in human habitations only, whereas *striolata* is purely a cliff builder." However, this has never been confirmed, and Baker refrained from treating the two forms as separate species; also, *daurica*, at least elsewhere, breeds on both houses and cliffs.

The only breeding birds I have examined from the hills south of the Brahmaputra are an adult specimen of *substriolata* "caught in the nest" at Shillong, Khasia Hills, on May 15, and a juvenal of this race, barely out of the nest, collected at the same locality on June 22. Ticehurst (1927) wrote that the statement that *daurica* breeds in the hills south of the Brahmaputra "is not borne out by any specimens." He reported a specimen of *daurica* caught in May in Cachar but believed it may have been on passage. The six specimens of *daurica* collected by Koelz at Nongpoh in the Khasia Hills on April 29 to 30 appear to be winter visitors of *H. d. japonica*, because they are either identical or match very closely the coloration and streaking of specimens from eastern China, Korea, and Japan. Further, this swallow molts in its winter quarters, and these specimens are completing the molt of the tail and wings, and in another week, more or less, would have been ready to leave. In the spring, according to La Touche (1927, Birds of eastern China, p. 397), *daurica* is still passing through northeastern China "to the beginning of the last decade in May." No form of *daurica* is reported anywhere in the Malay region; the winter grounds are apparently from southeastern China to India.

Editorial obtrusion in Mayr's paper has confused somewhat the situation in northern Burma. Of the eight specimens from the Myitkyina district listed as *daurica*, it is only the six specimens of *striolata*, described by Mayr as *stanfordi*, that were nesting. The other two are not separable from *H. d. japonica* and according to the labels were on passage on April 6 and 8. Their gonads were not enlarged; one was shot out of "a large flock" and the other from "a passing flock not apparently stopping."

I have retained Mayr's division into the two species, as this division calls attention to the problem, but further study and, especially, more breeding birds are needed from the hills south of the Brahmaputra.

Only birds that appear to be fully adult are used for measurements and the comparisons in table 5. Specimens in which the tertials are edged with white are first year birds, even though the rest of the plumage appears to be adult. In table 5 it will be

TABLE 5

COMPARATIVE CHARACTERS IN FULL ADULTS IN THE RECOGNIZED FORMS IN THE *Hirundo daurica* AND *Hirundo striolata* GROUPS

Form	Under Parts[a]	Nuchal Band	Rump	Thigh Patch
H. d. daurica[b]	Narrowly streaked	Interrupted	Faintly streaked	?
H. d. japonica	Well streaked, streaks of medium width	Interrupted	Streaked	None
H. d. gephyra	Well streaked, but streaks narrower than in *japonica*, "broader than nominate *daurica*"[c]	Interrupted	Streaked	None
H. d. nipalensis	Well streaked, but streaks still narrower than in *gephyra*	Variable; interrupted (1/2), not interrupted (1/2)	Variable; streaked (1/3), faintly streaked (1/3), not streaked (1/3)	Trace[d]
H. d. erythropygia	A little less streaked and streaks slightly narrower than in *nipalensis* (in the north); a little more streaked than in *nipalensis* and streaks slightly broader (in the south)	Usually interrupted (in both north and south)	Not or very faintly streaked (in both the north and south). Rump distinctly darker in the south	None
H. d. hyperythra	Well streaked but streaks very narrow. Under parts strongly red chestnut	None	Very faintly streaked	Present but ill defined in 1 specimen, lacking in 3
H. d. rufula	Very poorly streaked, streaks faint or very narrow	Broad and not interrupted	Not streaked or very faintly in occasional specimens	None

TABLE 5—*Continued*

H s. substriolata	Well streaked, streaks broad, slightly broader than in *H. d. japonica*	None or indistinct	Well streaked	Present but very ill defined in 5, lacking in 4
H. s. stanfordi	Most heavily streaked and with broadest streaks	None or indistinct	Well streaked	Well defined in all specimens (9)
H s. vernayi	Like *stanfordi* but under parts much more rufous	None	Very faint	Very large
H. s. badia	Very faintly streaked with very minute streaks. Under parts deep red chestnut, darker than in *H. d. hyperythra*	None or indistinct	Not streaked	Present but very ill defined and very small in 3, lacking in 4
H. s. striolata	Like *substriolata* but streaking averages slightly less and slightly narrower; very similar to *H. d. japonica*	None or indistinct	Like *substriolata*, averaging perhaps very slightly narrower	Present but very small or ill defined in 7, lacking in 8

[a] The general color of the under parts, where not indicated, is whitish or creamy tinged with buff.
[b] Not examined, characters according to literature.
[c] According to Meise (1934, Abhandl. und Ber. Mus. Dresden, vol. 18, no. 2, p. 48).
[d] Faintly present in two out of 19 specimens.

noted that the red nuchal band is usually interrupted or lacking in the *striolata* group and that a glossy thigh patch is generally present. However, it is clear that all the characters are variable and that it is impossible, as Mayr pointed out, to give a clear-cut diagnosis separating the various groups.

Individual measurements (wing and O.T.F.) and breeding range of the various forms in the *daurica* and *striolata* groups follow. The forms in quotation marks are not recognized and are discussed below. Migrants or specimens that appear to be migrants are not included in the *daurica* group.

H. daurica daurica: Siberia from Ussuriland, Amurland, Transbaïkalia, westward north of the Altaï to the Irtych: "at least 125–138," cf. Hartert.

H. d. japonica: Manchuria, Korea, Japan, northeastern, central, and eastern China. Korea: Males, 120, 90; 125, 106. Japan: Male, 122, 104; female, 122, 100. Eastern China (Shantung and Shaweishan Island): Males, 114, 93; 118, 89; 120, 94; 121, 103. Szechwan (Kwanhsien): females, 117, 85; 119, 95.

H. d. gephyra: Northern Szechwan, Sungpan: Males, 124, 98; 125+, molt; 126, 98; 127, 102; females, 121, 98; 125, 95; 126, 101.

"*H. d. tibetana*": Chinese Tibet. Region of Jyekundo [Yushu] (paratypes): Males, 125, 95; 127, 96; 127, 103; 127, 105; 128, 98; 128, 102; 131, 98; females, 123, 97; 124, 97; 126, 96; 126, 100; 127, 93; unsexed, 123, 102; 125+, 97; 127, 98; 127, 98; 127, 100; 128, 97; 128, 102.

H. d. nipalensis: Central Himalayas to southeastern Tibet. Nepal: Males, 116, 86; 116, 92; 117, 102; 118, 96; 121, 94; females, 115, 81; 115, 84; 116, 91; 120, 90.

H. d. erythropygia: India, from the foot of the Himalayas to the Nilgiris. Punjab, Kangra, 2000 feet: Males, 109, 77; 112, 76; 112, 76; 114, 83; 114, 91; 115, 81; 115, 86; females, 108, 75; 110, 78; 111, 76; 111, 79; 112, 77. Agra: Unsexed, 114, 74. Bihar: Female, 114, 80. Central Provinces: Males, 106, 73; 110, 72; 110, 77; 114, 73; 114, 80; females, 106, 72; 108, 74; 111, 73; 112, 76. Southern Madras: Male, 109, 71; 114, 74; unsexed, 109, 76. Mysore: Male, 115, 77.

H. d. hyperythra: Ceylon: Female, 118, 78; unsexed, 114, 75; 123, 80.

"*H. d. scullii*": According to Ticehurst from southeastern Punjab (Hissar) west through Kashmir to Baluchistan and eastern Afghanistan, "9 ♂ and ♀ wing, 111–121" (1933, Ibis, p. 547).

H. d. rufula: From Morocco and southern Spain, southeastern Europe, and Levant eastward through southern Iran, Afghanistan, northern Baluchistan, to western Himalayas. Morocco: Males, 117, 92; 117, 93; 118, 98; 119, 102; 120, 98; 120, 100; 120, 105; 121, 97; 122, 100; 123, 103; 124, 105; females, 116, 91; 116, 92; 119, 95; 119, 104; 120, 95. Palestine and Asia Minor: Males, 120, 100; 128, 105; females, 118, 96; 119, 103; 122, 96; unsexed, 119, 100; 124, 98. Iran: Luristan and Bakhtiari: Males, 122, 100; 122.5, 105; 124, 108; 125, 100; females, 119, 91; 121, 100; 127, 99. Western Afghanistan: Male, 119, 99. Eastern Afghanistan: Males, 116, 98; 118, 95; 118, 96; 119, 102; 123, 107; females, 113, 92; 116, 92.

H. striolata substriolata: Khasia Hills. Khasia Hills (breeding): Female, 122, 85. Upper Chindwin (winter): Male, 125, 83. Southern Shan States (winter): Female, 123, 87. Northern Siam (winter): Males, 120, 92; 123, 93; females, 122, 95; 122, 96; 123, 92.

H. s. stanfordi: Northern Burma (Myitkyina) to northern Siam, Laos, and Annam, southern Laos (Bolovens). Northern Burma: Males, 129.5, 91; 131, 95; 133, 97; 135, 100; 136, 94 (type); female, 134, 99. Northern Siam: Males, 129, 95; 130, 98. Northern Annam: Males, 133, 95; 133.5, 99; female, 131, 89.

H. s. vernayi: Siam-Tenasserim border: Male (paratype), 129 (second primary), 88.

H. s. badia: Southern Malay Peninsula. Perak: Male, 139, broken; females, 138, 100; 141, 112; unsexed, 138, 111. Pahang: Male, 139, 104. Malacca: Male, 137, 99; unsexed, 137, 105.

H. s. striolata: Formosa, Philippines, Greater and Lesser Sundas. Sumatra: Unsexed, 125+, 90+. Java: Males, 126, 104+; 128, 104+; females, 124, 91; 126, 100; unsexed, 124, broken. Philippines (Luzon): Female, 126, 101.

"*H. s. rothschildiana*": Lesser Sundas. Sumba: Male, 124, 96. Flores: Male, 122, 96. Wetter: Male, 123, 91+; female, 124, 86.

"*H. s. formosae*": Formosa: Male, 128, 110; females, 124, 96; 131, 108+ (type); 132, 105.

HIRUNDO DAURICA

Two races of *H. daurica* have been separated solely on size, *tibetana* as larger than *gephyra*, and *scullii* as smaller than *rufula*, but, since this separation cannot be maintained, I consider that *tibetana* is a synonym of *gephyra* and *scullii* a synonym of *rufula*.

Concerning *tibetana*, Schäfer (1939) stated that it was "very much larger than *gephyra*," but the individual measurements listed above show that about half of the measurements of the paratypes of *tibetana* overlap those of topotypical *gephyra*. Concerning *scullii*, the type locality of which was restricted to Gilgit by Ticehurst (1933, Ibis, p. 547), the overlap is virtually complete with the measurements of *rufula* from the Mediterranean region and eastern Afghanistan. No specimens from Gilgit are available, but the specimens on the basis of which Ticehurst recognized *scullii* were from the western Himalayas, Baluchistan, and eastern Afghanistan.

Concerning coloration, Schäfer states that he "cannot find any distinction in color" between *tibetana* and *gephyra*, and Ticehurst states that the streaking of the under parts and the color of the rump are the same in *scullii* and *rufula*. Actually, examination shows that the paratypes of *tibetana* vary individually and that in *rufula* a cline of decreasing pigmentation runs from west to east.

The majority of the paratypes of *tibetana* are identical with the topotypes of *gephyra* which are in the same state of plumage, but some specimens of *tibetana* are more rufous while others are paler than *gephyra*. In *rufula*, populations examined from Morocco eastward through western Iran and Persian Baluchistan to eastern Afghanistan become generally paler below as the populations range eastward, the streaking becoming less distinct and the width of the nuchal band and the size of the rufous area on the rump more reduced. However, individual variation is high, and the difference at both ends of the cline is too slight to warrant the separation of the eastern populations as *scullii*.

The breeding populations of *H. daurica* in India vary geographically. In the Himalayas, *rufula* apparently does not extend so far east as northern Punjab, for a population taken in June in Kulu is identical with topotypical *nipalensis* from central Nepal. From the foothills of the Himalayas south to Travancore, *nipalensis* is replaced by the smaller *erythropygia*. This form, which has been examined from the lowlands and foothills of the Punjab Himalayas, Kathgodam in Kumaon, Junagadh, Bundelkand, Bihar, Central Provinces, northern and southern Madras, and southern Mysore, becomes progressively darker and more heavily streaked as the populations range farther south, but the measurements do not change. In Travancore, Whistler has already noticed that the rump is "slightly richer in colour than is usual" (1936, *in* Ali, Jour. Bombay Nat. Hist. Soc., vol. 38, p. 514), but he adds that the difference is very slight and varies with wear and bleaching. While these last remarks are correct, the difference appears to me to be part of the trend. The difference is quite clear between the most northern and the most southern populations, but unfortunately the type locality of *erythropygia* is Poona, halfway between north and south. No specimens from this region are available, but judging by the trend in variation the population of Poona will probably turn out to be intermediate. Under the circumstances it appears best to use the name *erythropygia* for all the populations of India from the foothills of the Himalayas to Travancore.

In the population from the lowlands and foothills of the Punjab Himalayas the streaks on the under parts are slightly narrower and fewer than in both *nipalensis* and *erythropygia*. In this sense, this population may be said to show a tendency towards *rufula* which replaces it to the west, but in *rufula*, of course, the streaks are much fewer and fainter.

In the eastern Himalayas, and, according to Ludlow, in southeastern Tibet, *nipalensis* is the breeding form (1944, Ibis, p. 362). In this last region it is interesting to note, in connection with Baker's remark on nesting habits, that Ludlow found *nipalensis* (a true *daurica*) nesting on both houses and on cliff faces. Much farther east, at Yachow [Yaan] on the borders of western Szechwan and at Kwanhsien in western Szechwan, Schäfer (1939) states that *nipalensis* inhabits the plains and is replaced in the mountains by the larger *gephyra*. I do not question the statement that in this region a small and a large form replace each other altitudinally, but I cannot accept the identification of the smaller form. Schäfer had but two specimens from Yachow which he states are identical with others (presumably adult) from Kwanhsien. I find, however, that the two specimens from Yachow are barely out of the nest, the juvenal feathers are still growing, and two adults examined by me from Kwanhsien are definitely not *nipalensis* but are identical with *japonica* from Japan and eastern China. These two specimens, however, were collected on April 25 and 26 and may or may not have been on their breeding grounds.

When the streaking is compared there is no difficulty in separating topotypical *nipalensis* and *japonica*, but the two forms probably intergrade in western China, and Ticehurst (1927, *loc. cit.*) stated that he could not always separate the two forms. Since measurements overlap and the streaking may vary individually, it is probably not possible to identify with certainty all the specimens outside of the breeding range. Nevertheless, I find throughout India specimens taken from about the middle of October to the end of April which do not appear to be separable from *japonica* from Japan and eastern China on size, coloration, or streaking. These specimens, which are in various stages of molt, have been examined from upper Assam, Khasia Hills, northern Cachar, Bengal, United Provinces, Central Provinces, Junagadh, northern Madras, and the Londa district in southern Bombay. I have not examined specimens from the breeding range of nominate *daurica*, but the measurements of the winter specimens that I identify as *japonica* are smaller than the published measurements of nominate *daurica*.

HIRUNDO STRIOLATA

When Mayr reviewed this species he had, as he stated, no proper

material from Java. Now, thanks to the kindness of Dr. Van Bemmel of the Buitenzorg Museum, a series of 10 specimens is available. This series consists of eight specimens from Java, five of which are fully adult, one adult from Sumatra, and a juvenal from Sumba. The six adults measure 124 to 128; according to Rensch two other specimens from Java in the Berlin Museum, a female and an unsexed specimen, have a wing length of 125.5 and 126 (1931, Mitt. Zool. Mus. Berlin, vol. 17, p. 550).

These measurements show that nominate *striolata* (type locality, Java) is not appreciably larger than *rothschildiana* from the Lesser Sundas, separated solely on the basis of being smaller, or appreciably smaller than *formosae*, separated mainly as being larger. Rensch, in describing *rothschildiana*, used the material in the Rothschild Collection, but I find that all the specimens he measured are not fully adult; the adults, which are from Flores, Sumba, and Wetter, measure 122 to 124. Four adults from Formosa, including the type of *formosae*, measure 124 to 132. The color differences mentioned by Mayr for *formosae* are not confirmed, although in the specimens from Formosa the streaking on the under parts averages slightly narrower and approaches closely the streaking in neighboring *H. d. japonica*, but in specimens from Java the width of the streaks varies slightly individually, and some specimens are identical with those of Formosa. The color of the rump also varies somewhat individually but within the same range in all the populations of nominate *striolata* examined. Since no particular geographical trend is apparent and the measurements show so much overlap, it is best, I think, to consider *rothschildiana* and *formosae* synonyms of nominate *striolata*. This form has been examined, whether as adult or not, from Formosa, Philippines, Sumatra, Java, Lombok, Sumba, Flores, Alor, Wetter, and Timor. It is said to occur on Borneo.

Nominate *striolata* and *substriolata* are poorly differentiated. The former has a little longer tail (about 99 mm. on an average as against 90) and a slightly longer wing (about 126 as against 122) and is a little less heavily streaked, the streaks themselves being slightly narrower. However, as mentioned by Mayr, the specimens of *substriolata* from northern Siam are more narrowly streaked and are, I find, except in measurements, indistinguishable as a series from nominate *striolata*.

Molts and Plumages

There is only one annual molt in *H. daurica* and *H. striolata*. This molt, whether post juvenal or post nuptial, is complete and in the same form takes place, apparently, at the same time of the year.

Examination shows that the first winter plumage differs from the plumage of the full adult in that the new tertials, as in *H. fluvicola*, are narrowly tipped with white or pale buff. These markings are lacking in the adult, and in the juvenal the tertials are brown, not glossy, and are broadly tipped with strong buff. In the first winter plumage the tertials are as glossy or almost as glossy as in the adult, and there are, with the exception of the white-tipped tertials, no other apparent differences in the appearance of the plumage. Nevertheless, as birds in first winter plumage generally have somewhat shorter wings and outer tail feathers, they should not be used for comparative measurements. The only measurements given in this study are those of fully adult birds.

In *H. daurica*, only molting specimens of *erythropygia* and *japonica* were examined. In the latter, the molt apparently starts later and is more protracted than in *erythropygia*. In *erythropygia* the first specimens showing signs of molt were taken on August 19 to 25 in Bihar and Kumaon and the last on January 11 in southern Bombay. In this last specimen, a juvenal, the molt is half completed. In the August specimens, which include juvenals, first year birds, and one adult, the molt is just starting. In *japonica* the first molting specimens examined consist of two juvenals in which the molt had barely started by December 1 at Saharanpur in western United Provinces. This date seems early, for in the other molting specimens of *japonica* examined from various parts of India, the molt is just starting by the middle or end of January and, as stated in the opening discussion, specimens still show signs of molt at the end of April in the Khasia Hills. In contrast, in adult and first winter specimens of *erythropygia* taken at the end of March in Kangra and in adult specimens of *nipalensis* which were already breeding on March 15 in Nepal, the molt had been completed for some time, for the plumage is somewhat worn.

Hirundo d. erythropygia appears to be sedentary, and the migrations of *nipalensis* appear to be limited. It is interesting to note that in *japonica*, which is highly migratory, the molt, as in some

other highly migratory swallows such as nominate *rustica*, is apparently completed in some cases only a few days before the spring migration.

In *H. striolata*, molting specimens were examined only in *vernayi* and nominate *striolata*. Both forms are tropical and nonmigratory, and in the case of nominate *striolata* there seems to be no regular molting season. In *vernayi*, the only specimen examined is molting and in the very last stages on January 24. In nominate *striolata* molting specimens have been examined from Timor (March 5), Sumba (April 20), Alor ("end of April"), Lombok ("July"), Luzon (July 27), and Wetter (October 5).

Hirundo daurica rufula Temminck

SYNONYM: *Hirundo scullii* Seebohm, 1883; type locality restricted to Gilgit by Ticehurst (1933, Ibis, p. 547).

IRAN: Luristan: Durud, May 27, 1942, 1 ♂, 1 ♀. Bakhtiari: Cheshmashirin, May 12–13, 1940, 3 ♂, 2 ♀.

AFGHANISTAN: Western: Qala Sarkari, September 7–8, 1939, 1 ♂, 1 juv. ♂, 1 juv. ♀; Aq Kupruk, September 11–12, 1 subad. ♂, 1 juv. ♂, 1 unsexed juv.; Khwajaebichagalak, October 18, 2 juv. ♀. Eastern: Nazhil, May 29, 1937, 1 ♂, 1 ♀; Daulatshah, May 31–June 1, 1 ♂, 1 ♀; Nozi, June 23, 1 ♂; Khanabad, July 4, 1 ♂; Jurm, July 8, 1 ♂.

Hirundo daurica nipalensis Hodgson

INDIA: Northern Punjab, Kulu: Kulu, June 13, 1933, 1 juv. ♀; Bandrole, June 27, 1 unsexed juv., June 2, 1936, 1 ♀. Nepal: Chitlang, March 15, 1947, 2 ♂, 1 ♀, "breeding"; Thankot, March 22–April 10, 3 ♂, 3 ♀, "breeding"; Bhimpedi, May 6, 1 ♂; Hitaura, June 2–July 30, 4 juv. ♂, 5 juv. ♀.

Hirundo daurica erythropygia Sykes

INDIA: Northern Punjab, Kangra, 2000 feet: Bhadwar, March 26–April 26, 1933, 6 ♂, 1 subad. ♂, 5 ♀, 1 subad. ♀; Baijnath, May 23, 1936, 1 ♂. United Provinces: Kathgodam, August 19, 1948, 1 juv. ♂. Junagadh: Sasan, February 3, 1949, 1 subad. ♀. Bihar: Muhammadganj, August 19–31, 1947, 1 subad. ♂, 5 juv. ♂, 1 ♀, 2 subad. ♀, 3 juv. ♀. Central Provinces: Bheraghat, February 27–April 20, 1946, 5 ♂, 3 ♀, 1 subad. ♀, November 10, 1 unsexed subad.; Belwani-Kisli, August 7, 1 juv. ♂; Kanha, August 13, 1 juv. ♂. Southern Madras: Salem, March 11, 1948, 1 ♂. Southern Bombay: Londa, January 11, 1938, 1 juv. ♀.

Hirundo daurica japonica Temminck and Schlegel

INDIA: United Provinces: Saharanpur, December 1, 1936, 2 juv. ♀. Junagadh: Sasan, January 31–February 5, 1949, 1 juv. ♂, 1 unsexed subad. Madras: Bengasai, January 26, 1937, 1 subad. ♀, 1 unsexed subad. Southern Bom-

bay: Londa, January 11–March 13, 1938, 6 subad. ♂, 1 juv. ♂, 3 subad. ♀, 1 juv. ♀; Sapor, March 11, 1 juv. ♂. Khasia Hills: Nongpoh, April 29–30, 1949, 5 subad. ♂, 1 subad. ♀.

GENUS **DELICHON**

THE HOUSE MARTIN

The Asiatic populations of the House Martin comprise four well-differentiated groups, the first three of which are geographically representative and constitute one species, by name *urbica*. These three are: (1) nominate *urbica*, which ranges from western Europe, north Africa, and the Mediterranean region to Kashmir and the Punjab Himalayas and to the Yenissei in Siberia; (2) *lagopoda*,[1] which replaces nominate *urbica* east of the Yenissei to Ussuriland and Manchuria; and (3) the *dasypus* group, divided into *dasypus* proper, *nigrimentalis*, and *cashmeriensis;* in this group *dasypus* replaces *lagopoda* in Sakhalin, Korea, and Japan, and *cashmeriensis* meets nominate *urbica* somewhere in the region of the Punjab Himalayas. The fourth group, divided into nominate *nipalensis* and *cuttingi*, is a separate species, the breeding range of which overlaps that of *cashmeriensis* in the *dasypus* group. The distinguishing characters of the four groups are given in table 6 and their measurements and proportions in table 7.

In *D. urbica* the conspecificity of the first two groups (nominate *urbica* and *lagopoda*) is not questioned, but Ticehurst (1927, Jour. Bombay Nat. Hist. Soc., vol. 32, p. 348; and 1938, Ibis, p. 621) held that the *dasypus* group is a separate species characterized by a more shallow fork and a proportionately shorter tail than in *urbica*. He stated that *cashmeriensis* in the *dasypus* group and nominate *urbica* both "breed close together in Ladak" and do not intergrade. However, there is no evidence of overlap, and in *lagopoda* (table 7) the depth of the fork is intermediate between that in the *dasypus* group and nominate *urbica* while the propor-

[1] I follow Dementiev (1935, L'Oiseau, p. 460) in using the earlier *lagopoda* Pallas, 1811, rather than the later *whiteleyi* Swinhoe, 1862. The name *lagopoda* is rejected by Hartert on the grounds that it applies, in part, to *urbica* and *rustica* since these names are cited by Pallas and *lagopoda* is said to occur "*in omni Rossia et Siberia*" (1910, Die Vögel der paläarktischen Fauna, p. 809). However, it is clear from Pallas' account that this statement of range refers to the species as a whole and that *urbica* and *rustica* are cited only as bibliographical references; *lagopoda* itself is accurately described from a definite type locality, Dauria [= Transbaïkalia], and appears to be therefore perfectly valid.

tions are virtually identical with those in the *dasypus* group. Concerning the overlap, it is true that Baker (1926, Fauna of British India, vol. 3, p. 228) stated before Ticehurst that *cashmeriensis* and nominate *urbica* both bred in Ladak and that summer specimens of each had been collected at Leh, but the breeding of *cashmeriensis* in Ladak has not been confirmed. Although on the lookout for it, Osmaston (1925, Ibis, p. 699) and Meinertzhagen (1927, Ibis, p. 601) found only nominate *urbica* breeding in Ladak and in the Indus Valley of northern Kashmir. All the breeding specimens that I have examined from various parts of Kashmir including eastern Ladak are nominate *urbica*. A June 20 specimen from Lahul in northern Punjab also belongs to this race. In a search of the literature I also failed to find evidence of overlap anywhere between the three groups, and I feel, therefore, that they are better treated as one species despite small differences in proportions or coloration.

TABLE 6

COLOR PATTERN IN *Delichon urbica* AND *Delichon nipalensis*[a]

Form and Group	Throat	Under Tail Coverts	Upper Tail Coverts	
			Color	Markings
1. *D. u. urbica*	White	White	White and black	Vertical
2. *D. u. lagopoda*	White	White	All white	None
3. *D. u. dasypus*[b]	White	White	White and black	Vertical
4. *D. nipalensis*[c]	Black or blackish	Black	White and black	Horizontal

[a] In the *dasypus* group of *D. urbica* the white of the throat and of the under tail coverts is less pure. In *D. u. lagopoda* all the upper tail coverts are white; in all the other forms the lower rows of the upper tail coverts are black. In *D. u. urbica* faint or very narrow shaft streaks are generally present; in *D. u. lagopoda* these shaft streaks are lacking or extremely faint; in *D. u. dasypus* and its group the shaft streaks are narrow but better marked than in *D. u. urbica*. In *D. nipalensis* (including *cuttingi*) there are no shaft streaks, but the upper tail coverts are "banded" by dark terminal edges.

[b] Including also *nigrimentalis* and *cashmeriensis*.

[c] Including also *cuttingi*.

DELICHON URBICA

The specimens examined from Iran, Afghanistan, and India are mostly in worn plumage but are identical in coloration with nominate *urbica* in similar plumage examined from Europe, the

TABLE 7

MEASUREMENTS AND PROPORTIONS IN *Delichon urbica* AND *Delichon nipalensis*
(25 specimens of both sexes except in *lagopoda*.)

Wing and Form	Tail	Wing/Tail (Per Cent)	Depth of Fork
D. u. urbica[a]			
98–111 (104.2)	47–60 (54.3)	48–56.5 (52.6)	13–21 (16.3)
D. u. lagopoda (4 specimens)			
109, 110, 111, 113	45, 47, 50, 50	40, 43, 45, 46	5, 7, 8, 10
D. u. dasypus[b]			
95–111 (103.2)	40–50 (42.5)	38–45.5 (42.5)	3–7 (4.5)
D. nipalensis[c]			
91–106 (97.0)	37–44 (39.6)	37.5–44.5 (41.0)	−1–2 (.6)

[a] The 25 specimens are from Iran, Afghanistan, and India as these populations replace *dasypus* to the west.

[b] The 25 specimens consist of *dasypus* proper, *nigrimentalis*, and *cashmeriensis*.

[c] The 25 specimens consist of nominate *nipalensis* and *cuttingi*.

Mediterranean region, and Russian Turkestan. Meinertzhagen (1927, *loc. cit.*) found also that his specimens from Ladak were "in every way identical with European specimens."

The populations of the south were separated by Hartert as *meridionalis* and those of the Pamirs and Alaï as *alexandrovi* by Zarudny. Since color differences are lacking, these populations were separated solely on the basis of being smaller than nominate *urbica*. While it is true that the populations of the south average smaller than those of the north, the measurements in table 8 show a considerable degree of overlap. The decrease in size is clinal and does not, it seems, warrant separation. The range of *meridionalis* as given by Hartert is from southern Spain and northwest Africa east to Iran and Russian Turkestan. However, specimens from these regions can be large as well as small (table 8); the population from Fars is smaller than topotypical *meridionalis* from Algeria, while the specimens from Russian Turkestan were the largest measured in nominate *urbica*. No specimens are available from the range of *alexandrovi*, but the measurements given by Zarudny are "100–107.8" and Dementiev (*loc. cit.*) makes *alexandrovi* a synonym of *meridionalis*, but both these names, I believe, should be considered synonyms of nominate *urbica*. Clancey, in a recent paper (1950, Bonner Zool. Beitr., vol. 1, pp. 39–42), divided nominate *urbica* into five races, recognizing both *alexandrovi* and *meridionalis*, and three additional

races in northern and western Europe. This splitting is, in my opinion, not warranted.

TABLE 8

MEASUREMENTS OF ADULT MALES IN SOME POPULATIONS OF *Delichon urbica*[a]
(Except where noted, the specimens were collected from May to August, or, if before May, while breeding or in breeding condition.)

Region and Race	N	Wing	O.T.F.	Fork
Nominate *urbica*				
Sweden	1	110	61	18
W. Russia	2	110, 113	59, 60	18, 20
Gt. Britain	5	102–113 (107.0)	58–62 (60.0)	17–21 (19.0)
Sardinia	2	106, 109	55, 59	18, 19
Algeria	13[b]	101–108 (103.7)	55–58 (56.9)	15–19 (17.0)
Palestine	2	110, 110	55, 57	17, 18
Zagros	5	102–106 (104.1)	50–60 (54.4)	14–21 (16.2)
Fars	4	100–103 (101.6)	52–54 (53.0)	16–19 (17.5)
Afghanistan	4	101+–105+ (104+)	50+–55+ (53+)	11+–17+ (15+)
Ladak	2	108+, 111+	57+, 60+	17+, 18+
R. Turkestan	3	113, 114, 115	62, 62, 63	16, 18, 23
cashmeriensis				
Tehri[c]	2	100, 100	44, 45	6, 6
N. Burma[d]	3	98, 104, 105	41, 44, 45	3, 4, 6
N. W. Szechwan	6	100–103 (101.9)	44–47 (46.0)	3–6 (5.0)
S. Tsinghai	8	100–109 (104.0)	45–50 (46.7)	3–6 (5.0)
nigrimentalis				
Fukien[e]	4[e]	95–98 (96.5)	40–43 (41.2)	4–5 (4.2)
dasypus				
Shaweishan Is.[f]	3	105, 105, 109	45, 45, 46	All 5
Japan	5	106–111 (109.2)	42–46 (44.0)	3–7 (4.4)

[a] For measurements of *lagopoda*, see table 7.
[b] Type of "*meridionalis*": male, Hamman R'Hira, May 8; 101, 55, 17.
[c] September 27 to October 5.
[d] December 20.
[e] February, no date; or April 30 in type of *nigrimentalis:* male, Kwatun; 97, 43, 4.
[f] April 2 to 6.

The populations of the *dasypus* group are more saturated than nominate *urbica* and *lagopoda*, the wings and tail are blacker, and on the body the blue is deeper, blacker, and the white not so pure, being smoky on the lower belly and flanks. *D. u. dasypus* and *nigrimentalis* differ only in size, but *cashmeriensis* is less saturated and therefore "bluer" and whiter. It generally lacks or shows faintly the little narrow black band under the bill present in *dasypus* and *nigrimentalis*. Although *cashmeriensis*

shows a tendency towards nominate *urbica*, it is still much closer to *dasypus-nigrimentalis*.

In the *dasypus* group the population of Fukien (*nigrimentalis*) is smallest; the populations of Szechwan, northern Burma, and Himalayas (*cashmeriensis*) are intermediate; and the population of Japan (*dasypus* proper) is largest. In this case there is no overlap in measurements between the two extremes, and the difference is, perhaps, sufficiently well marked to warrant the separation of *dasypus* and *nigrimentalis*, but on size alone it would not be great enough to allow the recognition of an intermediate. This intermediate (*cashmeriensis*) is, however, separable by the differences in coloration mentioned above.

All the populations of *cashmeriensis* that I have examined are identical in coloration, but in the northern part of its range the populations average a little larger, and Schäfer (1939) has suggested that the northern populations might be separable. Schäfer came to this conclusion after comparing the population from the region of Jyekundo [Yushu] in Chinese Tibet with a population found at lower altitudes, farther south and east in the Wassu region of northwestern Szechwan. However, when individual wing measurements are compared, the specimens of Schäfer that I have measured from Jyekundo have a wing of 100, 101, 102, 103, 105, 106, 106, 109 (104.0) in males as against 100, 101, 102, 102, 103 (101.9) in males measured from the Wassu region and the neighboring Min Valley. The overlap is too great and the average difference too small to warrant separation.

MOLT: Owing to the lack of material the complete plumage sequence is still somewhat obscure. It appears to be fairly complicated. According to the "Handbook of British birds" (1949, vol. 2, p. 238) there are two annual molts in Europe in adults: a partial post nuptial molt, usually starting in August, through which the body plumage is renewed, as well as sometimes the wing coverts and some secondaries; and a complete prenuptial molt taking place from January to April. The first winter bird is said to have the new feathers like those of the adult but to retain many juvenal feathers until spring. However, in the specimens that I have examined the immature-looking feathers are unmistakably not retained juvenal feathers but new feathers. As specimens with such feathers have the white parts of the plumage less pure and the metallic gloss duller than in specimens which are unquestionably fully adult, this plumage

seems to be a true first winter plumage acquired apparently through a complete post juvenal molt. It is doubtful if this plumage is renewed again in the spring, for in specimens in first winter plumage in which the wings and tail are molting the body plumage is fresh in specimens taken on December 20 in northern Burma and on February 3 in Orissa.

The molting specimens I have examined are very few. In addition to the two first winter specimens mentioned, another first winter specimen in very worn plumage is starting to molt the crown and throat feathers on August 29 in Afghanistan. At the same date in Sardinia, a specimen apparently adult is molting the three or four inner pairs of primaries, but the body plumage which is somewhat worn shows no signs of molt. The same primaries, but not the body plumage which is worn, are molting in adults taken on September 16 in Algeria (one specimen), on September 27 to October 5 in three specimens from Tehri in the Himalayas, and in one specimen from December 20 in northern Burma.

Delichon urbica urbica Linnaeus

SYNONYM: *Hirundo urbica meridionalis* Hartert, 1910; type locality, Algeria.

IRAN: Luristan: Durud, March 25, 1941, 3 ♂, 1 ♀, August 31, 3 juv. ♂. Bakhtiari: Cheshmashirin, May 12–13, 1940, 2 ♂, 2 ♀. Fars: Kotalimalu Bridge, April 11, 4 ♂, 1 ♂ [♀], 2 ♀.

AFGHANISTAN: North central: Shibar Pass, June 30, 1937, 1 ♀; Aoi Khorak, August 28, 1939, 1 ♂, 1 juv. ♀; Sabz Pass, August 29, 1 subad. (?) ♂, 2 juv. ♂, 1 juv. ♀. Badakhshan: Zebak, July 20–21, 1937, 2 ♂; Munjan Pass, July 28, 1 ♀; Mughal Tai, August 11, 1 juv. ♂.

INDIA: Kashmir, Baltistan: above Sodpur, August 10, 1936, 1 ♀; Shigar Nulla, August 22, 1 juv. ♀; Karzong, September 12, 1 juv. ♂, 1 unsexed ad. [♀]. Kashmir, Ladak: Uga, August 5, 1931, 1 ♂, 1 ♀; Lamayuru, August 30, 1 unsexed ad. [♂]; Yugu, August 12, 1933, 1 ♀, 3 unsexed nestlings; Kampuk, Shyok Valley, September 9, 1936, 1 juv. ♀, 1 unsexed juv.; Miru, September 25, 1 juv. ♂. Northern Punjab, Spiti: Lasar, September 3, 1933, 1 ♂. Northern Punjab, Lahul: Kolang, June 20, 1936, 1 ad. [?] ♀.

Delichon urbica cashmeriensis Gould

INDIA: Northwestern United Provinces, Tehri: Urni, September 27, 1948, 1 ♂, 1 ♀; Bhatwari, October 5, 1 ♂.

Delichon nipalensis nipalensis Horsfield and Moore

INDIA: Northwestern United Provinces, Kumaon: Rathi, June 9, 1948, 4 ♂, 1 ♀. Tehri: Bhatwari, October 5, 1 unsexed ad.

These specimens and others from Naini Tal are identical in coloration and size with two topotypes of nominate *nipalensis* from east Nepal and with a series from Sikkim. The population of northern Burma, separated as *cuttingi* by Mayr (1941, Ibis, p. 365), is larger and has distinctly more black on the throat. The increase in black is clinal in character; in specimens from Tehri, Kumaon, and Naini Tal the black is faint or is restricted to the chin; it comes farther down in specimens from Sikkim, and in northern Burma covers, in some specimens, the whole throat. Although this trend is very evident, the amount of black is quite variable individually.

A specimen taken on January 14 at Bao Ngai in northern Tonkin has a solid black throat as in the best-marked specimens of *cuttingi* but has a wing length of only 92. The primaries, however, are very worn.

MOLT: Only three molting specimens have been examined, but the molt may be the same as in *Delichon urbica*, for these three specimens have molted the four inner primaries but apparently no other feathers. These specimens which appear to be adult were collected on January 14 in northern Tonkin, February 15 in northern Burma, and April 28 in eastern Nepal. In the Tonkin and Nepal specimens the old outer primaries are very worn but are rather fresh in the Burma specimen. It is possible that the Tonkin and Nepal specimens are first winter birds, but their body plumage appears to be that of the adult.

MEASUREMENTS: Given for both sexes since all the Sikkim specimens are unsexed:

Nominate *nipalensis:* Wing: Tehri, Kumaon, and Naini Tal: eight specimens, 91–99 (95.7). Nepal: 92+, 94+. Sikkim: six specimens, 93–100 (95.7). Tail: Tehri, etc., male, 36–40 (38.0). Nepal: 39, 41. Sikkim: 37–41 (38.5). Bill: Tehri, etc.; 6.5–9 (7.5). Nepal: 7, 9. Sikkim: 7–9 (8.0).

D. n. cuttingi: Northern Burma (Gangfan, Burma-Yunnan border): six specimens not counting the type: wing, 99.5–106 (102.2); tail, 40–44 (42.0); bill, 8–9 (8.2). Type of *cuttingi:* male, 102, 43, 9. Northern Tonkin: one female, 92+, 39, 9.