

DURBAN MUSEUM

Novitates

ISSUED BY THE DURBAN MUSEUM, DURBAN, SOUTH AFRICA



VOL. IX, PART 7

ISSUED 1ST APRIL, 1971

GEOGRAPHICAL VARIATION IN THE LITTLE SWIFT

APUS AFFINIS (AVES: APODIDAE)

by

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Geographical variation in *Apus affinis* (J. E. Gray), 1830: Cawnpore, India, has not been considered as a whole since Hartert's work was published in vol. 16 of the *Catalogue of Birds in the British Museum*, in 1892. The present paper covers the whole range of the species but gives special attention to the African populations; Abdulali (1966) has recently reviewed the Indian ones. A new race is herein described from Java and some Asiatic ranges are redefined. Much of the work on which this paper is based was undertaken while holding a Frank M. Chapman memorial grant from the American Museum of Natural History, New York. In addition to the museums and authorities acknowledged in Brooke (1969a), I am obliged to C. W. Benson for data on the material in the British Museum (Natural History), London (referred to in the text as B.M.N.H.), and to Dr. Rosa Pinto for facilities for study at the Instituto de Investigação Científica de Angola, at Sá da Bandeira. I am also indebted to Dr. G. F. Mees for the loan of material from the Rijksmuseum van Natuurlijke Historie, Leiden, and for permission to describe on the Rijksmuseum material the Javanese birds whose distinctness he had previously appreciated, as well as to Miss M. Courtenay-Latimer for the loan of material in the East London Museum.

Apus affinis, known as the Little Swift in Africa and the House or White-rumped Swift in Asia, breeds throughout Africa and tropical and subtropical Asia, including the islands on the continental shelves. It has not colonized any oceanic island. Geographical variation affects chiefly the colour of the crown and frons and of the under tail-coverts and underside of the rectrices, the width of the white band on the rump, the general darkness and gloss of the body, tail-length, and the presence and degree of furcation in the tail. Tails were seldom measured as inserting dividers appears to damage the rectrices and coverts. Abdulali (1966) measured the width of the white rump band along the line of the backbone, but this character, while clearly valid in series, seems to be affected in individual specimens by the method of preparation and by the loss of feathers in skinning. Most described races are not well-marked and the characters are often most clearly seen in feathered nestlings. This indicates that genetic systems which have diverged considerably have very similar phenotypes. The Apodidae in general show little divergence in appearance despite their antiquity owing to their specialized way of life. It was these considerations which led Orr (1963) to state "in view of the fact that swifts are a relatively uniform and conservative group of birds, these differences ((in *Cypseloides*, *sensu* Lack, 1956)) assume greater importance than they might in other avian families or suborders.", a view which my own studies fully support.

The darkest races are *bannermani* of the Gulf of Guinea islands, *singalensis* on Ceylon and *subfurcatus* in Malaya and Borneo, and these are, on the whole, from the wettest parts of the species' range. Medium dark races are found in slightly drier climates: *theresae* in south-western Africa, *aerobates* in tropical Africa, *affinis* in peninsular India, *nipalensis* from Nepal through the Indochinese lands to southern China, *kuntzi* in Taiwan (Formosa), and *furcatus* in Java. The pale race *galilejensis* from Morocco to Baluchistan, south to the Niger River and northern Somalia and north to the Turkmen S.S.R., occurs in generally arid areas. But the correlation with rainfall or humidity is not particularly close. *Nipalensis* in Assam and elsewhere should be darker and *theresae* in south-western Africa paler than they are. Some furcation of the tail is confined to the long-tailed eastern races *nipalensis*, *kuntzi*, *subfurcatus* and *furcatus*. These races show variable, usually obsolescent, barring on the abdominal feathers, and provide the link through the white-rumped *A. pacificus* (Latham) with the barred *Apus* swifts discussed in Brooke (1969a) and with the black, white-rumped swifts of Africa (*affinis* subsp., *horus* (Salvadori and Antinori) and *caffer* (Lichtenstein)).

In the following synopsis of races, all of which I have examined, detailed localities are given only where it assists in defining boundaries more exactly. I have seen material from the places named except where an authority is cited. Races are dealt with from south to north, then from west to east, dropping southward as appropriate.

(a) **A.a.theresae** Meinertzhagen, 1949: Brandvlei, north-western Cape Province, South Africa, when compared with *aerobates* to the north and east is somewhat paler on the frons, the front part of the crown, the under tail-coverts and the underside of the rectrices. It has an unstreaked throat. The general colour is darker than that of *galilejensis* and it averages larger than *aerobates*. It is resident in South Africa (except Natal where *aerobates* occurs), south-western Rhodesia, South-West Africa, and coastal Angola north to Luanda. Peripheral localities: **South Africa:** Peddie and Tarkastad, eastern Cape Province, Excelsior, O.F.S., Hennopsrivier, Langlaagte and Pretoria, Transvaal; **Rhodesia:** Beit Bridge, Matopos, Bulawayo; **Angola:** Luanda, Lucira, Ruacana. The Rhodesian and some Angolan specimens placed here are a little darker than topotypical material, but are still clearly paler than *aerobates* found to the north and east of them. Rhodesian *aerobates* show some influence of *theresae* in their longer wings (see under *aerobates* South-eastern Highlands below) but not in colour, whereas Angolan *theresae* are shorter winged than topotypical populations. Range and average wing-length: south of the Cunene River ♂♂ 123-139 av. (26) 133.3 ♀♀ 128-140 av. (17) 135.3, overall 123-141 av. (52) 134.4; north of the Cunene River in Angola ♂♂ 119-131 av. (7) 128.1, ♀♀ 123-135 av. (14) 129.1, overall 119-140 av. (25) 129.0 mm. Wing-lengths include material in the B.M.N.H. measured by C. W. Benson on my behalf. We both measure by flattening the wing against a ruler and our measurements are strictly comparable. Weights are only available from Angola: ♂♂ 21-30 av. (10) 24.50, ♀♀ 19-30 av. (16) 25.00, overall 19-30 av. (30) 24.93 gm.

(b) **A.a.aerobates** Brooke, 1969: Mbandaka, Equateur Province, Congo-Kinshasa, when compared with *theresae* is generally smaller and darker, particularly on the frons, forepart of the crown, under tail-coverts and underside of the rectrices. It is not as dark as *bannermani*. It is similar to nominate *affinis* of India but somewhat larger, heavier and darker, and is resident in tropical Africa south of the Sahel to northern and eastern Angola, central Rhodesia and Natal; also to Ethiopia (excluding Eritrea), and southern and high level Somalia. It does not occur in Chad. One specimen reported in Friedmann (1964) proves upon examination to be *A.horus* (Brooke, 1970) and the other two *galilejensis*.

A. a. abessynicus (Streubel) has been used by many authors for the tropical African populations, but as shown in Brooke (1969c) it is a synonym of *galilejensis*, which ranges down the Red Sea coast of Africa to Somalia, and includes Massawa, on the Eritrean coast, which is the type-locality of *abessynicus*.

Since *A. a. aerobates* has a wide range from Senegal to Somalia and south to Angola and Natal the possibility of geographical variation in wing-length was investigated. Its range was divided into seven regions: West Africa (Senegal to Nigeria south of the range of *galilejensis*), Lower Guinea (Cameroon and Gabon), Congo-Kinshasa (including the Central African Republic but excluding the lower Congo River west of Kinshasa), Angola (including the lower Congo River west of Kinshasa), South-eastern Highlands (Rhodesia and Zambia), East Coast (Somalia to Natal), Eastern Highlands (Somalia, Ethiopia, Sudan, Kenya, Uganda, Tanzania, excluding their coastal regions and parts inhabited by *galilejensis*). The shortest winged birds are found in Angola; increasing average wing-length occurs in the following order: East Coast, Eastern Highlands, Lower Guinea, West Africa, Congo-Kinshasa, South-eastern Highlands. The overlap between measurements for the different regions is far too great to permit subspecific recognition of any populations. The small weight samples show no corresponding variation.

Angola: wing-length ♂♂ 121-134 av. (14) 127.1, ♀♀ 118-131 av. (10) 124.1, overall 118-134 av. (26) 125.9 mm; weight ♂♂ 21-26 av. (9) 22.94, ♀♀ 19-26 av. (10) 23.60, overall 19-26 av. (19) 23.29 gm.

East Coast: wing-length ♂♂ 123-136 av. (23) 128.3, ♀♀ 121-134 av. (25) 127.6, overall 121-136 av. (48) 127.9 mm; weight ♂♂ 26-28 av. (3) 26.80, ♀ 25, overall 25-28 av. (4) 26.35 gm.

Eastern Highlands: wing-length ♂♂ 123-135 av. (18) 129.1, ♀♀ 122-134 av. (11) 128.3, overall 122-135 av. (33) 128.7 mm; weight ♂♂ 22-25 av. (4) 23.63, ♀♀ 25.0-26.3 av. (3) 25.43, overall 22.0-26.3 av. (8) 25.64 gm.

Lower Guinea: wing-length ♂♂ 124-135 av. (23) 130.8, ♀♀ 177-136 av. (27) 128.2, overall 117-136 av. (51) 129.4 mm; weight — none recorded.

West Africa: wing-length ♂♂ 125-135 av. (23) 129.5, ♀♀ 122-136 av. (23) 129.1, overall 122-136 av. (64) 129.7 mm; weight ♀ 24 gm. Berlioz (1931) gives weights ♂ 14.7, ♀♀ 15.7, 20.8 gm of birds from Guinea. These are remarkably low and were perhaps taken from birds that had died of starvation.

Congo-Kinshasa: wing-length ♂♂ 124-138 av. (49) 131.0, ♀♀ 126-137 av. (33) 131.1, overall 124-138 av. (99) 130.8 mm; weight ♀ 24 gm, Verheyen (1953) gives ♂♂ 24, 28, ♀ 28, overall 24-28 av. (4) 26.00 gm. In Kasai Province De Roo (in litt.) when ringing this species found a range of 19-30 with an

average of 23 gm when the birds were at their hungriest in the early morning. **South-eastern Highlands:** wing-length ♂ 134, ♀♀ 131-135 av. (5) 132.6, overall 131-135 av. (6) 132.8 mm; weight ♂ 25.7, unsexed juvenal 29 gm.

Weights include figures provided by Prof. Oscar T. Owre, of the University of Miami, in respect of birds from Kenya in the Eastern Highlands. Britton (1970) gives many additional weights from East Africa, which fall within the range given above for Eastern Highlands birds.

Peripheral localities—**South Africa (Natal):** Park Rynie, Scottburgh; **Southern Moçambique:** Bela Vista, Caniçado, Moveve, Umbeluzi, Vila Luiza; **Rhodesia:** Selukwe, Umniati, Inyantue; **Angola (Huila):** Caconda, Capelongo, Castanheira de Pera, Matala; **Angola (northern):** Duque de Bragança, 15 miles north of Calalo, Cassinga, Dondo, Mucoso, Rosa Mukoto; **Gambia:** Bakalari, Bathurst, Kerewan (all B.M.N.H.). I have seen old specimens of this race, merely labelled Senegambia or Gambia; **Ghana:** Fantee, Gambaga, Karaga, Kwebia (all B.M.N.H.); **Nigeria:** Jarko, Lokoja; **Somalia:** Hambale on the Juba River, Hargeisa. I have seen no material from the Ethiopian highlands but expect that it will be of this race, since Hargeisa is on an outlying spur of these highlands. Red Sea coast birds are clearly *galilejensis*. Otherwise *aerobates* occurs widely south of the range of *galilejensis* and a list of recorded localities would seem to have little value. As noted under *theresae* above, Rhodesian *aerobates* show an approach to *theresae* in size, and Rhodesian and Angolan *theresae* are somewhat darker than topotypical material of that race due to there being no gap in the species' range at that point. Likewise Angolan *aerobates* from Huila district are a little paler than topotypical material and show an approach to *theresae*. A similar situation probably obtains on the *aerobates/galilejensis* boundary, but I have not seen critical material which may not have yet been collected.

(c) **A.a.bannermani** Hartert, 1928: Sao Tomé, is the darkest of the African races, with a streaked throat, even in juvenal plumage. It is resident on Fernando Po, Príncipe, and Sao Tomé, in the Gulf of Guinea. Cameroon Mtn. birds are darker than average *aerobates* but are clearly not *bannermani*, and are better placed with the former race since they can be matched by a few Congolese birds. Wing-length (including material in the B.M.N.H.) ♂♂ 128-139 av. (19) 133.9, ♀♀ 126-138 av. (15) 133.0, overall 126-139 av. (37) 133.6 mm. Weight 23-25 av. (5) 23.90 gm.

(d) **A.a.galilejensis** (Antinori), 1855: Sea of Galilee, with synonym *A.a.koenigi* (Reichenow), 1894: Jebel el Meda, Tunisia, is the palest race and the one with the broadest white rump. The throat is apparently never streaked. There is a clinal increase in the intensity of colour in the west of the range, the Mahgreb, which is the basis for recognizing *koenigi*, but it is not well-marked, and a substantial number of specimens cannot be separated from material from populations to the east. I therefore do not recognize *koenigi*. The breeding range is from Morocco to Egypt, down the Red Sea coast to Erigavo, northern Somalia, and inland to Suru on the Ethiopian escarpment (both B.M.N.H.), eastwards through Israel, Syria, Iraq, Arabia, and Iran to the Turkmen S.S.R., Afghanistan and Baluchistan. It is a summer visitor to the Turkmen S.S.R., and some birds of the northern African populations also move south to the southern edge of the Sahara in winter where they overlap resident *aerobates*. A good series from the interior of north-east Africa is needed to define the limits of this race and of *aerobates* to the south and west and also the location and breadth of the zone of intergradation, if any, in Ethiopia and Somalia. Peripheral localities in Africa— **Niger**: Mt. Baguezan (May, June), Gangara (June); **Nigeria**: Farniso, near Kano (December), Zaria (November); **Chad**: Korotoro (January), Mongonu (May, June); **Sudan**: Jebel Marra (March, May, December) (B.M.N.H.); **Ethiopia**: Samhar, Suru (both B.M.N.H.); **Somalia**: Bihendula, Dubar, Erigavo (both B.M.N.H.), Gibile, Sheikh. *A.a.galilejensis* intergrades with the nominate race in West Pakistan (Jodhpur and Lahore), and according to data in Abdulali (1966) at Karachi, Mekran, Mitauri and Hyderabad (Sind). He notes that a nestling from Mt. Abu, in Rajasthan, is indistinguishable from a Bombay nestling and is therefore nominate *affinis*. Only birds from south of the main Sahara were measured by C. W. B. and myself: wing-length ♂♂ 122-135 av. (17) 129.4, ♀♀ 125-137 av. (17) 128.9, overall 122-137 av. (36) 129.3 mm. Abdulali (1966) gives the tail-length range as 39-45 mm. No weights are known.

(e) **A.a.affinis** (J. E. Gray), 1830: Ganges R., India, restricted to Cawnpore by Stuart Baker, is similar but somewhat paler, smaller and lighter than *aerobates* and the throat is seldom streaked. The boundary with *galilejensis* in West Pakistan was discussed under that race above. *A.a.affinis* extends into the foothills of the Himalayas as far as Hetora in Nepal, beyond which it is replaced by *nipalensis* there and in the Assam hills. In the far south of India, in Travancore, Whistler and Kinnear (1935) found the population better placed with *singalensis*, but I have been unable to verify this.

Abdulali (1966) states that birds from northern India have rather long wings: 130-135 av. (6) 132.5 mm, whereas further south in the centre of the range they are somewhat shorter: 123-132 av. (18) 127.5 and that tail-lengths range 37-44 mm. Naik and Naik (1966), in their study of the weight of this species and race, found that there was no sexual dimorphism in this character; that the range for ♀♀ was 14.5-21.5 gm and that all ♂♂ fell within it and that the average for 82 ♂♂ was 17.8 and for 72 ♀♀ 18.1 gm.

(f) **A.a.singalensis** Madarász, 1911: Ceylon, is a very dark brown race, including the crown, with slight furcation in the tail. It is not as blue-black as *bannermani* or *subfurcatus* and the tail is intermediate. It is resident in Ceylon and, perhaps, southern India as noted above. Abdulali (1966) states that their wings range 127-130, av. (6) 129.3, and tail-lengths 43-45 mm. Two unsexed birds weighed 23 and 24 gm.

(g) **A.a.nipalensis** (Hodgson), 1836: central Nepal, restricted to Khatmandu by Biswas, with synonym *A.a.leucopygialis* (Cassin), 1850: no locality (*Proc.Acad.Nat.Sci.Philadelphia*, 1856, p. 58) (type examined in Philadelphia), is slightly darker than nominate *affinis*, and has a distinctly forked tail to the same degree as in *subfurcatus* and *kuntzi*. It lacks the blue-black colour of *subfurcatus*, particularly on the crown. There are clinal increases in wing- and tail-length and in the intensity of the colouring of the underside of the rectrices towards the China Sea, but these are not well-marked and it would not seem desirable to separate such populations nomenclaturally. *A.a.nipalensis* ranges from Nepal to the Kiangsu Province of China, south through Assam to Trong, in Thailand north of the Straits of Tenasserim, and to Vietnam.

A specimen from Trong, lower Thailand, is better placed here since the crown is browner and paler than the mantle, but overall the bird is nearly as saturated with melanin as is *subfurcatus* immediately to the south. *A.a.nipalensis* is migratory in the north of its range, resident elsewhere, but this matter needs further study. I have seen a winter-taken specimen from Luzon, Philippines, where this swift is regarded as a vagrant, and Abdulali (1966) records a November specimen from Bombay which he also regards as a vagrant. However, he records a wintering bird from Maharashtra, where the resident breeding birds are clearly nominate *affinis*, and from Orissa (two specimens) and Dharbanga. Study of swift migration has peculiar problems, as non-breeding resident swifts usually feed very high in the air and may not be seen at their nesting cum roosting sites except for a couple of minutes at about sunrise and

sunset. Unless an observer is critically placed he may miss these short appearances and erroneously assume that the birds have migrated (see also Abdulali, 1966). In their winter-quarters they normally feed high out of gunshot and out of sight of the few people capable of identifying them on subtle field characters. For instance, *A. pallidus* (Shelley) is known from the Ethiopian Region by three specimens: Uganda, Zambia where it was found dying in the road, and the northern Cape Province of South Africa. No winter roosting quarters are known for any old world migratory swift. The American *Chaetura pelagica* (L.) is the only swift known to roost in its winter-quarters (in South America) which it does in tall chimneys as on its breeding grounds. R. M. Lockley (in press for *Ostrich*) has shown that *A. apus* (L.) does not come to ground at all between the time it last leaves its nest to the time it returns to it, or to an adjacent one, and that this applies even to newly-fledged juvenals. It is probably equally true of all Old World migratory swifts. Nonetheless, we may accept that *nipalensis* is migratory at higher levels in Sikkim and elsewhere, since Salim Ali (1962) says that they breed in nests of *Cecropis daurica* (L.) and may be seen returning to them in early summer, whereas they do not frequent them in winter. According to Abdulali (1966) toponymical material has wing-lengths 128-138 av. (22) 132.8, and tail-lengths 42-49 mm. Coastal Chinese birds, which as noted above are darker on the undersides of the rectrices, are also larger: wing-length 134-142, tail-length 48-55 mm (four specimens measured) (see also La Touche, cited by Abdulali, *op.cit.*). No weights are known.

(h) **A.a.kuntzi** Deignan, 1958: Shih Lin, northern Taipei, which is the capital of Taiwan, is intermediate in general colour between *nipalensis* and *subfurcatus*, but has the rump ashy white and usually with dark shaft-streaks, not clear white as in all other races. This race is confined to Taiwan and is resident there. Wing-length 124-141 av. (51) 133.0 mm. Thirty-eight specimens of this taxon were kindly measured by Dr Richard L. Zusi, of the U.S. National Museum, Washington, at my request. Weight: ♂♂ 20-32 av. (5) 21.10, ♀♀ 22-35 av. (9) 26.13 overall 20-35 av. (14) 24.34 gm. It is unusual to find such marked dimorphism in weight in a small swift.

The Leiden series shows that moult starts in May, after the main egg-laying period.

(i) **A.a.subfurcatus** (Blyth), 1849: Penang, is a blue-black race with the crown concolorous with the mantle, and the tail somewhat forked (5-8 mm deep) as in the last two races. It is resident in the Malay Peninsula, from the Straits of Tenasserim southwards, and

also in Borneo. According to Peters (1940) this race breeds in Sumatra and on the Anamba, Billiton, North Natuna and Rhio Islands. I have not seen material from any of these island groups, so can neither confirm nor set aside his statements. Wing-length 130-140, tail-length 47-55, tail-fork 5-8 mm. Three North Borneo birds weigh 22-25 gm.

(j) **A new race from Java.** In Java a relatively long and deeply fork-tailed form occurs, which is paler than the three other fork-tailed races just discussed. As it is unnamed I propose:

***Apus affinis furcatus*, subsp. nov.**

Type: ♂, juvenal. Telar Tjabang Tempajan, near Sedari, western Java (c.5° 58'S, 107° 20'E). 20 August 1907. M. Bartels collector. Collector's No. 5,004. In the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, Reg. No. 43,220.

Description: Differs from *A.a.subfurcatus* (Blyth) by having the head dark brown, not black, and thus contrasting with the black back, the under-parts dark brown instead of brownish black, and in having a more deeply forked tail: 8-13, instead of 5-8 mm deep. The increase in the forking of the tail is achieved by an increase in length of the two outermost rectrices, which are more staggered than in *subfurcatus* in which taxon they are of virtually equal length. *A.a.furcatus* has a simple somewhat pointed fifth rectrix of the same shape as in *subfurcatus*. In both taxa the fifth rectrix differs in shape from the very blunt ended rectrices of the virtually square-tailed races from India westwards. The newly fledged juvenal has pale brown feet and white tips to the three outermost rectrices as is usual in the Apodini (Brooke, 1969b). It also has dark shafts to the white feathers of the throat and rump and the abdomen is well barred, *sensu* Brooke (1969a).

Range: I have seen material of *furcatus* from various localities in Java in the collections of Leiden (14 specimens), the Museum of Comparative Zoology of Harvard University, Cambridge, Mass. (four specimens), and the United States National Museum, Washington (four specimens).

Measurements: Wing-length ♂♂ 135-144 av. (9) 139.2, ♀♀ 134-145 av. (6) 138.0, overall 134-145 av. (18) 139.2; tail-length 55-59 av. (4) 57.3, tail-fork 8.0-13.5 av. (16) 11.00, culmen 6.0-7.5 av. (17) 7.09, chord of tomium 15.5-18.5 av. (16) 16.91 mm. No weights are known.

Measurements of Type: Wing, 144, tail 46, depth of tail-fork 9.5, culmen 7, chord of tomium 15.5 mm.

Remarks: The name *furcatus* (Latin: forked) is chosen to show that this new taxon has the principal character of *subfurcatus*, *sensu auctorum*, in a more developed form. Primary wing moult takes place between December and June.

FUTURE WORK

A number of problems remain unsolved: (i) the loci and nature of meeting of *theresae* and *aerobates* in eastern South Africa; (ii) the places and nature of meeting of *aerobates* and *galilejensis* in north-eastern Africa; (iii) the places and nature of meeting of nominate *affinis* and *nipalensis*; (iv) the migratory movements of *galilejensis* and *nipalensis*; (v) the northern boundary of *nipalensis* between Nepal and the Kiangsu Province of China; (vi) the racial status of the breeding birds of south-west India, of Sumatra and its adjacent islands, and of Hainan; (vii) weights of most races, particularly in east Asia. (viii) If *nipalensis* does not intergrade with nominate *affinis* are the long and fork tailed, barred races of east Asia a separate species despite the similarity in breeding habits?

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