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AVIFAUNAL RELATIONSHIPS BETWEEN THE NEOTROPICAL AND ETHIOPIAN REGIONS

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Viewed on a map, there are some striking similarities between the South American and African continents. Both possess large areas of tropical forest and tropical savanna; a western coastal desert; a west-coast winter rainfall area; a cold current along the west coast; temperate grasslands; and high mountains. The main differences lie in the much more continuous mountain range of South America; in that continent's extension 20° to the south of the furthestmost point of Africa, given it a temperate forest biome not represented in the African continent; and in the great Sahara desert of Africa, for which South America has no counterpart.

Notwithstanding these similarities, however, the differences in the terrestrial avifauna are vast. The number of land and fresh water birds in common to the two Regions constitute a mere handful; and whole families and even orders are present in one but absent in the other. This points to a long and rigid separation.

It is therefore worth while to take a brief look at the few species of land and fresh-water birds common to the Neotropical and Ethiopian Regions. I exclude from consideration non-breeding migrants from the Holarctic Region and, without them, the list totals 14, all non-passerines: four Ardeidae, one Threskiornithidae, one Phoenicopteridae, three Anatidae, one Falconidae, one Pandionidae, one Rallidae, one Scolopacidae and one Tytonidae, as under:

<i>Egretta alba</i>	<i>Dendrocygna viduata</i>
<i>Ardeola ibis</i>	<i>D. bicolor</i>
<i>Butorides striatus</i>	<i>Falco peregrinus</i>
<i>Nycticorax nycticorax</i>	<i>Pandion haliaëtus</i>
<i>Plegadis falcinellus</i>	<i>Gallinula chloropus</i>
<i>Phoenicopus ruber</i>	<i>Himantopus himantopus</i>
<i>Netta erythrophthalma</i>	<i>Tyto alba</i>

Of these, there can be little doubt that all except the three ducks and the Cattle Egret *Ardeola* made their way independently into the two continents from the Holarctic. The Egret, however, almost certainly crossed the Atlantic between West Africa and northern Brazil and did so very recently. This probability is strengthened by a recent record of four birds at St. Helena Island (Laveridge, 1963).

The most teasing problem is that of the ducks. The two species of *Dendrocygna* are tropical forms; and in the case of *D. viduata*, the present day

range includes Africa at least as far west as the Gambia. It would therefore appear plausible to conjecture that it spread from Africa to South America by the same route as the Cattle Egret. This is held to be more likely than the reverse because the trade winds, with their easterly component, would help an east-west passage but hinder a flight in the opposite direction.

The present distribution of the other two species presents more difficulty, however, since *D. bicolor* does not extend west of the inundation area of the Niger (Duhart & Descamps, 1963) and *Netta erythrophthalma* occurs on the west side of Africa only as far north as Angola. I nevertheless believe that *Dendrocygna bicolor* also reached America by the same route as its congener *D. viduata*. It remains possible that *Netta*, a bird of more southern distribution in both continents, performed the flight in the opposite direction with the assistance of the westerly winds south of the tropic. For non-marine birds, we therefore have three which probably invaded the Neotropical region from the Ethiopian and one which may have made the transfer either way.

In view of the number of records of North American birds which have reached Western Europe through being blown off-course on migration by westerly winds, it is astonishing that so few South American birds have been recorded as reaching Southern Africa under the influence of the much more violent and persistent west winds of the forties. This is the more surprising in that the avifauna of the Tristan group, although nearer to Africa than to South America, is clearly derived from American sources; and American migrants, especially the Gallinule *Porphyryla martinica*, appear every year on Tristan. In point of fact, this is the only non-marine American bird which has been taken in southern Africa and the records are all very recent (Rowan & Winterbottom, 1963).

The reasons for this absence of records are probably complex and not the least important is the lack of trained ornithologists in South Africa as compared with western Europe. Other factors are the wider ocean—it is 3,700 miles from Buenos Aires to Cape Town but only about 2,600 from Newfoundland to Britain—and the fact that the westerly winds are strongest south of Africa, so that many, perhaps most, of the wind-driven migrants are swept on into the vast expanse of ocean between Africa and Australia to perish there.

Consideration of the relations between the marine avifauna of the Neotropical and Ethiopian Regions are more interesting, because closer, than those of the land birds. They also offer some instructive parallels.

The Neotropical Region, partly because it extends so much further to the south, possesses a rich breeding fauna of Procellariformes, whereas none of this order breed in Africa, though four species breed on the Cape Verde Islands. The orders which will be dealt with here are the Lariformes, Steganopodes and Sphenisciformes, chiefly in respect of their southern members.

The five species of Sternidae common to the two regions need not detain

us long. All are virtually pan-tropical and problems posed by their distribution are not relevant to the American-African relations we are considering here.

The case is quite different with the gulls, however. All three African breeding species are found in other southern regions too. The Grey-headed Gull *Larus cirrocephalus* occurs also in South America; the Southern Black-backed *L. dominicanus* on all shores of the temperate and sub-antarctic south except Australia; and Hartlaub's *L. novaehollandiae* in Australia and New Zealand.

The Grey-headed Gull is predominantly an inland and tropical species. Its distribution is very similar to that of *Dendrocygna viduata* and is probably to be explained in the same way-i.e., it is most likely to be an African species which has invaded the Neotropical Region, where it has differentiated to the threshold of subspecific difference but has not quite reached it (Winterbottom, 1961).

The other two species both have distributions to be explained, I think, by the westerly winds of the Southern Ocean. If we set out the distribution of *L. dominicanus* following the line of the winds, it occurs in New Zealand and its sub-antarctic islands; southern South America; the sub-antarctic islands of the South Atlantic; South Africa; the Prince Edward Island; Kerguelen and Heard Island. It does not occur in Australia, where its place is taken by *Gabianus pacificus*. It is therefore possible that this species originated in New Zealand and spread down wind as far as Heard Island but was prevented from establishing itself in Australia by the presence of *Gabianus*. In view, however, of its close resemblance to *L. fuscus* of the North Atlantic, which is known to reach Sierra Leone and the Transvaal on migration, it is possible that *L. dominicanus* is of northern origin, developed specific status in South Africa and spread from there, by-passing Australia to the south via Heard Island and the Macquarie Islands.

The distribution of the third species, *L. novaehollandiae*, is quite simply explained by the "west wind drift" theory. It would have originated in Africa and spread thence to Australia and New Zealand. Possibly its nearest counterpart in South America is *L. maculipennis*, belonging to a different but related section of the genus.

The remaining groups of sea birds can be considered in connection with the parallels and contrasts between the cold currents along the west coasts of the two continents. The American is the more pronounced and has much the richest fauna, for the African current starts further north and ends further south. There is a second, even shorter, cold current in Africa along the Sahalan coast, but this has no peculiar species and its avifauna is richest in Palaearctic migrants such as *Sula b. bassana* and *Phalaropus* spp.

The enormous populations of the Humboldt and Benguella currents are dominated by a few species of the genera *Spheniscus*, *Sula*, *Phalacrocorax* and, on the Humboldt current only, *Pelecanus*. Of these, *Spheniscus*, with three American and one African species, would appear to be a group of

American origin, which has spread to Africa, where *S. demersus* differs little from *S. magellanicus* and even less from *S. humboldti*.

While each of these biomes possesses a representative of the genus *Sula*, these are not particularly closely related. The Cape Gannet of Africa belongs to the sub-genus *Morus* and is, indeed, no more than a subspecies of the North Atlantic *S. (M.) bassana*. The ranges of immatures of the two on migration approach to within a few degrees of latitude (though distant perhaps 1500 miles from east to west) on the West African coast. A third subspecies occurs in Australia and New Zealand, even closer to *S. b. capensis* than the latter is to *S. b. bassana*. The Piquero *S. variegata*, by contrast, belongs to the tropical sub-genus *Sula*, of which it is a species that has become adapted to cold water.

The case of the Cormorants is similar to that of the Gannets. In each biome there is one dominant species, peculiar to it and present in vast numbers, *Phalacrocorax bougainvillei* in America and *Ph. capensis* in Africa. They are not particularly closely related, *Ph. bougainvillei* being nearest to *Ph. magellanicus* and other southern Cormorants, whereas *Ph. capensis* is closer to *Ph. carbo* of the north (which also occurs in the African subspecies *lucidus*, in the waters of the Benguella current).

There are five other species of Cormorant in South America, but none shows any affinities with African species, though *Ph. atriceps* occurs also on Heard Island, *Ph. albiventris* on the Crozets and Macquarie Island and *Ph. magellanicus* and *Ph. albiventris* extend eastward as far as the Falkland Islands. Curiously enough, no Cormorant has colonised the Tristan group.

There are two other species of Cormorant on the waters of the Benguella current in addition to *Ph. capensis* and *Ph. carbo*. Neither is in any way related to South American species, though it would appear that *Ph. neglectus* is the ecological replacement of *Ph. gaimardi* of the Neotropical Region. The fourth species, *Ph. africanus*, has developed a well-marked marine subspecies (*coronatus*) in the waters of the Benguella current.

These facts emphasise the essentially shore-dwelling habits of the Cormorants and their inability to adapt themselves to a pelagic life.

The greater richness of the Humboldt current is emphasised by the presence of a peculiar species of Pelican, *Pelecanus thagus*, nearly related to the smaller Brown Pelican *P. occidentalis* of the rest of America. Neither of the African species of Pelican habitually fishes at sea, though *P. onocrotalus* does so sometimes; and neither has developed the diving habit of *P. thagus* and *P. occidentalis*.

These, then, are some of the problems and points of interest which arise from a comparison of the avifauna of the Neotropical and Ethiopian Regions. In studying them, I have made great use of Sclater (1924-30) and Alexander (1955) and have also used McLachlan & Liversidge (1957), Olrog (1959) and Murphy (1936).

SUMMARY

Excluding Holarctic migrants, there are 14 species of land and fresh water birds common to the Neotropical and Ethiopian Regions, all non-passerines and all but four, species which have invaded these regions from the north. Of the other four, the Cattle Egret certainly and the White-faced and Whistling Ducks probably invaded South America from Africa. The evidence in respect of the Pochard is inconclusive.

Despite the strong and steady westerly winds in the south Atlantic, only one South American bird, the American Purple Gallinule, has been recorded as a stray from Africa.

Among sea-birds, the Grey-headed Gull probably invaded South America from Africa, but several alternatives are possible to explain the distribution of the Southern Black-backed Gull. The Penguin genus *Spheniscus* is almost certainly of South American origin.

There are interesting parallels between the guano-producing seabirds of the west coasts of South America and Africa. In each, a Gannet and a Cormorant are the most important but they would appear to have evolved *in situ* from different stocks.

RESUMEN

Relaciones avifaunísticas entre las regiones Neotropical y Etiópica.—Si se excluyen las aves migradoras de la región Holártica, hay solamente 14 especies de aves continentales comunes a la región Neotropical y Etiópica, todas no-paseriformes y, excepto cuatro, todas especies que han invadido estas regiones desde el norte. De estas cuatro, la Garza bueyera (*Ardeola ibis*) con seguridad y probablemente los dos patos silbones, el común (*Dendrocygna bicolor*) y el de cara blanca (*D. viduata*), invadieron Sud América desde África. La evidencia en ese sentido, con respecto al Pato de cabeza castaña (*Netta erythrophthalma*), no es concluyente.

A pesar de la permanente presencia de vientos fuertes del oeste en el Atlántico sur, solamente un ave sudamericana, la Pollona azul grande (*Porphyryla martinica*) ha sido registrada, como casual, en África.

Entre las aves marinas, la Gaviota de capucho gris (*Larus cirrocephalus*) probablemente llegó a Sud América desde África, pero hay varias alternativas posibles para explicar la distribución de la Gaviota cocinera del sur (*Larus dominicanus*). Entre los pingüinos, el género *Spheniscus* es casi con seguridad de origen sudamericano.

Hay paralelos interesantes entre las aves guaneras de las costas occidentales de Sud América y África. En cada una de ellas, un Piquero (*Sula* sp.) y un Cormorán (*Phalacrocorax* sp.) son las especies más importantes, pero parecería que éstas se hubiesen originado *in situ*, de antepasados diferentes.

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