

as is possible, be given. Its extent both southward and northward is somewhat indefinite. The avifauna of Cape San Lucas, at the extremity of the peninsula of Old or Lower California, is said to be thoroughly that of the "Middle" province, but whether the whole of that promontory is to be reckoned as belonging thereto, or only its eastern border, is not known. It appears, however, that some of the most characteristic forms of the Middle province find their way to the Pacific coast through a break in the mountains opposite to San Diego, and it is to be remarked that the difference between the species of birds found at Cape San Lucas (of which about a score are absolutely peculiar) and of Mazatlan, though separated only by the breadth of the Gulf of California, is very great. Northward the boundary of the Californian province probably runs along the Sierra Nevada and the Cascade Mountains before named, so that its extent is contracted to a mere strip along the coast, while still further to the north, in British Columbia, no precise details of its limits have as yet reached this country. But it would seem that in Alaska, as will presently be stated at greater length, an avifauna presenting many very different characters from any found elsewhere in America is reached, for here we encounter a number of genuine Palearctic forms.

But these are not all the zoological provinces into which this part of North America can be separated. A fourth, of especially Arctic type, occupies the northern portion of the continent, and gradually melts away into the rest, extending far to the southward along the highest ranges, even to Fort Burgwyn, in lat. 37° N., if not beyond. This province may be called the "Canadian," from the ancient colony of that name constituting so large a portion of it, but its limits must be confessed to be indefinite in a high degree. The eastern half, at least, of the British possessions in North America are herein included, and the province may be deemed to extend across Davis's Strait to Greenland.

In noticing these provinces, the results of Professor Baird's researches have been, with little deviation, mainly adopted, but his enquiries have been largely supplemented by the more recent investigations of Mr J. A. Allen, who has admirably carried out the further subdivision of the Eastern, or, as it has been termed, the Alleghanian province, together with part of what has just been denominated the Canadian. Regarding the whole eastern half of the continent as one province, he recognises in it the existence of seven distinct ornithological faunas, namely, the Floridan, the Louisianian, the Carolinian, the Alleghanian, the Canadian, the Hudsonian, and the American-Arctic, comparing them also with the distribution therein of Mammals and Reptiles.¹ To describe more fully the boundaries of these faunas would be to enter on matters too special for our present purpose, and it must suffice to direct attention to this essay of Mr Allen's, which, like others of his,² though their titles may seem to indicate for them but a limited scope, has, in truth, a very general bearing.

The provinces above named (and naturally the districts which they comprise) appear to be characterized rather by the presence or absence of certain species of widely spread genera than by the presence or absence of the genera themselves, and much less of families, but it seems expedient to notice some of the chief exceptions to general distribution in the latter of these groups. First we have the peculiar family of *Chamæidæ*, restricted so far as is known to the coast-district of California, where it is represented by a single genus and a single species; and then

¹ *Bulletin of the Museum of Comparative Zoology at Harvard College*, vol. ii. pp. 387-407.

² *Memoirs of the Boston Society of Natural History*, vol. i. pp. 448-526, and *Bulletin of the Museum of Comparative Zoology*, vol. iii. pp. 113-183.

among families of greater range, the *Certhiidae*, already introduced to us as a Neotropical group, but in the Nearctic Region existing only in the case of the colony of a species of *Certhiola* before noticed; the *Aridæ*, nowadays almost limited to Western Louisiana, Arkansas, and Florida, but formerly known along the whole valley of the Mississippi to the verge of the Great Lakes, and even occasionally penetrating to Pennsylvania and the State of New York; the *Cathartidae*, of which one genus (*Pseudogryphus*), having for its sole species one of the largest birds of flight; the Californian Vulture (*P. californianus*), is confined to the Pacific coast from a little north of the Columbia River to the Colorado, extending eastward to the Sierra Nevada, while of another genus (*Cathartes*) one species ranges from the Strait of Magellan to the Saskatchewan, but a second hardly strays further northward than North Carolina, and does not occur on the Pacific coast of the United States; the Turkeys (*Meleagridæ*), found only to the eastward of the Rocky Mountains, and now extinct in most of the settled districts of Pennsylvania, New England, and Canada; the Wood-Ibises (*Tantalidae*), belonging to the southern country from the Colorado eastward, and so far to the north as the State of Ohio and the Carolinas; the Spoonbills (*Plataleidae*), with apparently much the same range as the last, but more limited towards the north, being of only accidental occurrence on the Lower Mississippi and in the Carolinas; the Cowlans (*Aramidae*), frequenting in this region only the shores of the Gulf of Mexico and the coast of Florida; the Flamingoes (*Phoenicopteridae*), with haunts nearly as much confined, though occasionally reaching South Carolina; the Pelicans (*Pelecanidae*), having one species abundant in the Western and only by chance occurring in the Middle and Eastern states, while a second is of strictly marine habit, and is found on the coast of California, and in the Gulf of Mexico and the shoals of Florida. The single representative of the Darters (*Plotidae*) in summer reaches North Carolina and Illinois, but that of the Frigate-birds (*Fregatidae*) is confined to the shores of the great Gulf, while that of the Tropic-birds (*Phaetonidae*) not only haunts the same waters but also finds a nursery in the Bermudas; the species of Divers (*Colymbidae*) breed only in the north—Halifax, in lat. 45° N., being perhaps their most southern limit of reproduction; while, finally, the Auks (*Alcidae*), Sea-birds of northern range, exhibit a most remarkable development of genera, species, and individuals on the rocky cliffs and islets which rise from the North Pacific.

Reference has already been made to the peculiarity of the avifauna of Alaska—Russian America, as it was formerly called,—and its character needs brief notice. The list of Birds observed in this territory, as given by Messrs Dall and Bannister,³ seems after due revision to number 210 species. Of these 96 are Land-birds, belonging to 63 genera, whereof 20 at the outside are peculiarly American, while of the remaining 43, which are common to the Nearctic and Palearctic Regions, 3 are found nowhere else in the New World but in Alaska, and their occurrence there does not preclude us from setting them down as being emphatically Palearctic forms. Two of them are actually represented by species common throughout the greater part of Asia and Europe, as is the case with *Budytes flavus*, a Yellow Wagtail, and *Phylloscopus borealis*, a Willow-Wren, while the third is a peculiar species of Bullfinch, *Pyrrhula cassinii*. Of the whole 96 species of Land-birds, 23, or nearly one-fourth, are common to the two Regions. The Water-birds, amounting to 115 species, are referable to 63 genera, of which only 4 (all belonging to *Scolopacidae*) are

³ *Transactions of the Chicago Academy of Sciences*, vol. i. pp. 267-310.

peculiarly Nearctic, though of the species 58 are truly American against 52 common to both Regions, one of these last, however, not having been found elsewhere in the New World, while the home of 5 seems doubtful. These numbers will show the great influence of Palearctic forms on Alaska, and it only remains to be said that some of the ordinary summer-migrants thither would seem to arrive there from Asia, as the Wagtail and Willow-Wren just mentioned, to which should possibly be added the Wheatear (*Saxicola ananthe*), for though that species is known as a regular annual visitant to Greenland and Labrador (where it breeds), and almost annually appears as a straggler on the eastern coast of the United States, the flocks which throng the stony hill-tops of Alaska in spring are not likely to have performed a north-west passage from Europe, and indeed it is stated that specimens from Norton Sound differ considerably in dimensions from those obtained in Greenland. All these Birds are unseen in British Columbia, and as all are migratory, the inference that they make some part of Asia their winter-quarters is almost irresistible.

After all, perhaps there is nothing very surprising in this, when we consider the narrowness of the channel¹ by which in these longitudes the New World is divided from the Old, and it would seem that it is almost within the confines of the Arctic circle that, apart from circumpolar species, the connection of the faunas of the two continents is closest. At any rate, the Aleutian Islands, though they look like stepping-stones from the one to the other, do not appear to be used as a route of communication; for Mr Dall calls especial attention to the fact that no intrusion of Asiatic forms occurs towards the western end of the chain, while observing that its avifauna beyond Oonalaska is reinforced by several Arctic species not possessed by more eastern islands.²

Northward of the Aleutians lies a little volcanic group known as the Prybilov Islands, whose coasts are frequently encumbered by ice, and there only 40 species of Birds have as yet been found, while those which breed are about 12 in number, and among them a Sandpiper (*Tringa pilocnemis*), apparently peculiar to St Paul's Island, the largest of the group. Only one of the characteristically Palearctic forms, and this also a Water-bird (*Limosa uropygialis*), which appear but in Alaska, seems there to occur—a fact which points yet again to the more northern connection of the two continents by way of Cape Prince-of-Wales and the East Cape (Vostochni) of Asia.

We have next to turn to another group of islands, situated in a different ocean, and in formation very unlike that last considered. These are the Bermudas, a cluster of low coral-reefs rising from the Atlantic, about 600 miles from Cape Hatteras, the nearest point on the eastern coast of North America. They possess but few Land-birds, and not a single peculiar species, yet they play by no means an unimportant part as a resting-station to the flocks of migrants as they retreat southward from their northern homes in Labrador and Greenland, and, though less often, on their northward journey in spring. Only about 6 Land-birds are resident, and about as many Water-birds are known to breed there; but the number of stragglers is large, and includes two or three of undoubtedly European extraction.

Greenland is the last portion of the Nearctic Region to which we shall especially invite attention, and there though the character of the avifauna is certainly that of the New World, yet that of the Old is very influential. Out of the 45 genera to which the feathered inhabitants of Greenland

¹ Behring's Strait is said also to be very shallow, which fact is suggestive as to a still greater interchange of animal life in past ages.

² *Proceedings of the Californian Academy of Sciences*, 14th March 1874.

belong, none are peculiar to the Palearctic Region, while 2—*Zonotrichia*, one of the *Emberizidae*, and *Rhodostethia*, one of the *Laridae*—are peculiar to the Nearctic. If we take the species, we find that of the 63 inhabitants, those peculiar to the New World amount to 11, while those not elsewhere dwelling out of the Old are only 5. But, on the other hand, the Sea-Eagle (*Haliaeetus*), the Ringed Plover (*Egialitis*), and the Snipe (*Scolopax*) which breed in Greenland are those of Europe instead of their American congeners; and the Wheatear (*Saxicola*), the Sanderling (*Calidris*), the Knot (*Tringa canutus*), and the Barnacle Goose (*Bernicla leucopsis*) would appear to cross the Atlantic from the east, while 43 out of the 63 inhabitant species are every bit as much Palearctic as Nearctic; and 2 more, the Ptarmigan (*Lagopus rupestris*) and Barrow's Duck (*Clangula islandica*) breed abundantly in Iceland. Following the western coast-line (for of the eastern we know little) to the Arctic circle,³ we find the proportion of forms which are common to the Palearctic Region increase, until in lat. 75° N. or thereabouts, there are (so far as our means of information will allow us to judge) no species of Birds which have not been known to occur, and only about 5 which have not been known to breed, in the Old World.

It has been already stated that 128 out of the 330 Similarity of Nearctic genera, or more than one-third, are common also to the Palearctic Region. This will serve to shew the great similarity of the two; and if we investigate the species, the similarity is still to a great extent borne out. Taking the number of Nearctic species at 700 (which is perhaps an exaggeration), and that of the Palearctic at 850 (which is certainly under the mark), we find that, exclusive of stragglers, there are about 100 common to the two Regions. Nearly 20 more are Palearctic but occasionally occur in America, and about 50 are Nearctic which from time to time stray to Europe or Asia.⁴ But this is not the only ground of the resemblance. Of many genera the species found in the New World are represented in the Old by species which often no one but an expert can distinguish. Of such representative or parallel species, somewhere about 80 might be enumerated; and thus the relation of the two regions may be concisely stated:—

Species inhabiting the Nearctic Region....	(say) 700.	Species inhabiting the Palearctic Region..	(say) 850.
Species of one Region represented by closely allied forms in the other.....	(say) 80.	Species identical in both Regions....	(say) 100.
Palearctic species occasionally found in the Nearctic Region	(say) 20.	Nearctic species occasionally found in the Palearctic Region..	(say) 50.

IV. THE PALEARCTIC REGION begins with the Atlantic Islands (the Azores, Canaries, and Madeiras) and includes that portion of North-west Africa which was formerly known as the Barbary States, the whole of Europe and its islands—from Iceland and Spitsbergen to those of the Mediterranean—Asia Minor, Palestine, Persia, Afghanistan, and all the rest of the Asiatic continent lying to the northward of the Himalaya Mountains and of a line drawn as though it was a prolongation of that range to the east-

³ People are apt to forget that Cape Farewell, the most southerly point of Greenland, lies in the latitude which cuts the Shetlands and passes far to the south of Iceland; and a large portion of the country though undoubtedly exposed in the highest degree to the rigours of an Arctic climate, is situated outside the Arctic circle.

⁴ Professor Baird, in the essay before cited, has reasonably accounted for this disproportionate reciprocity between Europe and America; but perhaps something more than he has allowed must be set down to the comparative want of records in the new country, where observers and amateur collectors have until lately been scarce. This want is, however, being speedily supplied by the numerous students of out-of-doors ornithology, who are everywhere springing up throughout the United States.

ward somewhere between lat. 30° and 35° N. till it meets the Pacific Ocean, besides Japan and the Kurile Islands. The propriety of comprehending this enormous tract in one Zoological Region was first shown by Mr. Sclater, in the paper to which reference has before been made,¹ and as regards the distribution of most classes of animals there have been few to doubt that it is an extremely natural one. Not indeed altogether so homogeneous as the Nearctic Region, it presents however even at its extreme points no very striking difference between the bulk of its Birds. Though Japan is far removed from Western Europe, and though a few generic forms and still fewer families inhabit the one without also frequenting the other, yet there is a most astonishing similarity in a large portion of their respective Birds. In some cases the closest examination has failed to detect any distinction that may be called specific between the members of their avifauna; but in most it is possible to discover just sufficient difference to warrant a separation of the subjects. Nevertheless it is clear that in Japan we have as it were a repetition of some of our most familiar species—the Redbreast and the Hedge-Sparrow for example—slightly modified in plumage or otherwise so as to furnish instances of the most accurate representation.

its limits generally definite.

The limits of the western portion of the Region are definite enough, for except in its African province it is girt by the sea, but even there we find a boundary hardly inferior to a coast-line in the precision with which it may be recognized and in the influence it exerts. This is the Great Desert, commonly known as the Sahara, which, though yearly crossed by innumerable multitudes of many of the more migratory species, just as the sea itself is traversed by them, acts as a complete barrier to the less migratory and to the residents, cutting off the denizens of Morocco, Algeria, and Tunis from the rest of the continent to which they are geographically attached. Further to the eastward, however, the limits of the Region are if in any way marked at least but little known, though indications are not wanting to show that the avifauna of Tripoli is rather Ethiopian than Palearctic in its character. When we reach Egypt we have a state of things which may be compared to that debatable land in Central America wherein the Neotropical and Nearctic avifaunas meet but hardly mingle. During winter the bird-population of the Nile-valley is formed almost exclusively of the hordes of European migrants of nearly all Orders and families which there seek refuge. When spring returns these begin to troop across the Mediterranean, and their place is taken by the indigenous Birds of Egypt which had been either reduced to comparative insignificance by, or actually thrust out before, the northern invaders. The seaboard of Palestine, and even its interior, until the western limits of the Jordan-basin are touched, are on the contrary almost purely Palearctic, but the depressed valley of the Ghor, part of which is sunk about 1300 feet below the level of the Mediterranean, seems to be an outlier of the Ethiopian Region, and though the scanty avifauna of the Mountains of Moab may possess a northern phase, the desert, with its characteristic, and in the main Ethiopian, forms of animal-life almost immediately succeeds, and it is not until the fertile plains of Mesopotamia are approached or attained that we can feel assured we have again entered the Palearctic area, which may be considered to reach the head of the Persian Gulf. Coasting this inlet on its eastern side we have a fauna the character of which it is as yet impossible to declare, and this difficulty becomes greater still when we emerge into the Indian Ocean. It seems most probable

¹ Journal of the Proceedings of the Linnean Society, Zoology, vol. ii. pp. 134-138.

that Beloochistan belongs to the Palearctic region, but if not then the line of demarcation must run inland and so continue between that land and Afghanistan till, ascending the right bank of the valley of the Indus, it turns the shoulder of the Great Snowy Range and thence proceeds in the direction already traced parallel to the southern frontier of Thibet, and across the intervening portion of the Chinese Empire, once more to the ocean. Arrived here the remaining limits of the Region are as well marked by the coast-line as they were in Europe. They extend to Kamchatka, and rounding the furthest verge of Asia, within the Arctic Circle, they return by the north coast of Siberia till the confines of Europe are again reached.

To separate this vast area into subsidiary districts according to the zoological properties of each is perhaps a less easy task than is the same operation with regard to the Nearctic Region, and, as in that case, the mapping-out of the whole into Subregions is almost impossible except it be done arbitrarily. Nevertheless the attempt must be made, and, though in the Asiatic half considerable assistance is to be derived from a careful essay by Mr. Elwes,² respecting the European moiety much doubt may be reasonably entertained.

The very fullness of the information which we possess as to the ornis of some countries of Europe makes the scarcity of it in respect to others all the more conspicuous, and renders any really comprehensive view of the whole all the more difficult. Grounds are not wanting at first sight in favour of a longitudinal or approximately longitudinal division of this quarter of the globe, in which case the line of demarcation might be taken to run up the Adriatic Sea, and starting from the neighbourhood of Trieste, to cross the Carnic Alps, descend the valley of the Inn till it falls into the Danube, and thence follow the angular mountain-frontier of Bohemia as far as the head-waters of the Niesse, along which it would proceed to their junction with the Oder, and so to the Baltic a little to the westward of Stettin. Thence it might be continued northward between Öland and Gottland up the Gulf of Bothnia to the confines of Sweden and Finland, where cutting the Scandinavian peninsula to the westward of the Lower Torneå and its affluent the Muonio it would strike the shores of the Arctic Ocean perhaps on the Lyngen Fjord. Though undoubtedly most species of Birds are common to both sides of this imaginary line, yet it would be found to divide the breeding-range of a few which are very characteristic of the east and west of Europe respectively. But on further consideration it would seem that though such a division as has just been suggested may be convenient if not natural for the countries lying north of the Mediterranean basin, those, such as the three principal peninsulas which project into the great inland sea, together with the portion of North Africa which was at one time known as Mauritania, form a group which have much in common, and collectively differ more from the countries lying further to the north than the two (Eastern and Western) divisions of Central and Northern Europe, just suggested, do from one another. Accordingly it seems best to adopt primarily a latitudinal division of the Western part of the Palearctic Region. This done we should have as our first Subregion all Europe north of the Pyrenees, the Alps, the Balkan, the Black Sea, and the Caucasus, and since it would thus comprehend by far the greater portion of this quarter of the globe, we may not inappropriately call it the "European" Subregion, further subdividing it if we think fit into a Western and an Eastern Province, according to the boundary above traced—the eastern boundary of the last being indeed very uncertain, though perhaps to

² Proceedings of the Zoological Society, 1873, p. 615.

be limited by the Ural Mountains and the River of the same name. Next we should have the Subregion to which we may most properly affix the name of "Mediterranean," comprehending the portion of North Africa already indicated, the Iberian and Italian peninsulas, as well as Turkey in Europe and the Peloponnesus, but we must extend it far to the eastward through Asia Minor and Persia until it touches the Indian Region. The lofty range of the Caucasus would divide it from the European Subregion between the Black Sea and the Caspian; beyond the latter, however, we cannot do more than guess that the desert of the Tekko Turcomans and the mountains of Cabool would form its northern boundary. Then stretching from the eastern shores of the Caspian in a wide belt, but how wide is a matter of the greatest uncertainty, comes the third Subregion, which we may call the "Mongolian"—marching with the Mediterranean Subregion till the Hindoo Koosh is reached, and thence coincident with the southern borders of the Region towards the Yellow Sea—possibly following the course of the Yangtze-kiang. To this Subregion also would belong the greater part if not the whole of Japan. Northward again we have the great "Siberian" Subregion, but materials for any attempt to shew whether its southern boundary is capable of being laid down are absolutely wanting. Even on the seaboard it is at present impossible to say whether it is in Manchuria that one Subregion passes into the other, or whether first the Stannovoi and further inland the Altai Mountains mark their respective limits.

General characteristics.

Having thus indicated the component parts of the whole area, it is time to say somewhat of its avifaunal characters. Like the Nearctic the Palearctic Region seems to produce but a single peculiar family of Birds—the *Panuridae*, the type of which is the beautiful species known to Englishmen as the Bearded Titmouse (*Panurus biarmicus*)—and this is a family which has not been long or very generally recognized. Its members, however, are found stationed at intervals from the western to the eastern extremity, and every attempt to refer them to other groups of Birds has proved unsatisfactory—for the different genera (about the number of which there is much doubt) have often been widely scattered by systematists, one being placed at times with the Titmouse-family (*Paridae*), at times with the Bunting (*Emberizidae*), another relegated to the Finches (*Fringillidae*), and a third or even more to the so-called "Babblers" (*Timeliidae*). The entire number of Palearctic families, computing them as we have already done those of other Regions, is about 67, not counting 1 other (*Nectariniidae*) of which a single species is peculiar to the valley of the Ghor, and that of the genera 323, about which there can be little doubt, or if any exist it may be that the number is understated. Of these as we have above mentioned 128 are common to the Nearctic Region. Species of 51 more seem to occur as true natives both in the Ethiopian and Indian Regions, of which 4 genera belong to *Sylviidae*, 1 each to *Timeliidae*, *Ixidae*, and *Oriolidae*, 2 to *Muscicapidae*, 1 to *Laniidae*, 2 to *Motacillidae*, 1 to *Dicaeidae*, 2 to *Fringillidae*, 1 to *Emberizidae*, 3 to *Alaudidae*, 1 to *Cuculidae*, 2 to *Coraciidae*, 1 to *Meropidae*, *Upupidae*, *Caprimulgidae*, and *Cypselidae* respectively, 4 to *Vulturidae*, 6 to *Falconidae*, 1 to each of *Strigidae*, *Columbidae*, and *Pterocleididae*, 3 to *Tetraonidae*, 1 to *Turnicidae*, 2 to *Otididae* and *Charadriidae*, and 1 to each of *Glareolidae*, *Cursoriidae*, *Laridae*, and *Anatidae*. Besides these 18 appear to be common to the Ethiopian without being found in the Indian Region, and no fewer than 71 to the Indian without being found in the Ethiopian. Of the former 1 is referable to *Turdidae*, 3 to *Sylviidae*, 1 to each of *Timeliidae*, *Muscicapidae*, *Laniidae*, and *Motacillidae*, 3 to *Fringillidae*, 1 to *Emberizidae* and *Sturnidae* respectively, 3 to *Alaudidae*, and 1 to each of *Gruidae* and *Ciconiidae*

Relations to other regions.

Of the latter, 2 genera belong to *Turdidae*, 17 to *Sylviidae*, 4 to *Timeliidae*, 1 to each of *Troglodytidae* and *Certhiidae*, 3 to *Liotrichidae*, 1 to *Paridae* and *Ixidae* respectively, 4 to *Muscicapidae*, 1 to each of *Motacillidae* and *Hirundinidae*, 3 to *Fringillidae*, 4 to *Sturnidae*, 3 to *Corvidae*, 1 to *Pittidae*, 2 to *Picidae*, 1 to *Jyngridae* and *Cuculidae* respectively, 2 to *Alcedinidae*, 1 to *Vulturidae*, 3 to *Strigidae*, 2 to each of *Columbidae* and *Tetraonidae*, 5 to *Phasianidae*, 1 to *Otididae*, 3 to *Scolopacidae*, and 1 to *Anatidae*. To compare the Palearctic genera with those of the Australian and Neotropical Regions would be simply a waste of time, for the points of resemblance are extremely few, and such as they are they lead to nothing. It will therefore be seen from the above that next to the Nearctic Region, the Palearctic has a much greater affinity to the Indian than to any other, a fact which need not surprise us when we consider the great extent of their contact.

Having shewn this much we have next to deal with the peculiarities of the Region under our view. At the lowest computation 37 genera seem to be peculiar to it, though it is certain that species of several are regularly wont to wander beyond its limits in winter seeking a southern climate there to avoid the distress they would suffer in that of their birth. Of these genera 3 are to be apportioned to the Warblers, *Sylviidae*; probably 2 to the Babblers, *Timeliidae*; at least 3 or perhaps 4 to the *Panuridae*; 1 to each of *Paridae* and *Ixidae*; 2 to the Flycatchers, *Muscicapidae*; 6 to the Finches, *Fringillidae*; 1 to the Buntings, *Emberizidae*, Starlings, *Sturnidae*, Crows, *Corvidae*, Woodpeckers, *Picidae*, and the Sand-Grouse, *Pterocleididae*, respectively; 2 to each of the Grouse, *Tetraonidae*, and Pheasants, *Phasianidae*; 1 to the Ducks, *Anatidae*, and Cranes, *Gruidae*, respectively; 2 to the Plovers *Charadriidae*, and 5¹ to the Snipes, *Scolopacidae*.

The European Subregion does not seem to possess a European single genus which can be accounted absolutely peculiar to Subregion it, but it has two genera, each containing but one species—*Mergulus*, one of the *Alcidae*, and *Pagophila*, belonging to the *Laridae*—which do not appear to be elsewhere found in the Palearctic Region though both inhabit the most northern parts of the Nearctic. *Muscicapa* as now restricted² almost fulfils the conditions of peculiarity, but one species has been said to breed, though in small numbers, in Palestine.

The Mediterranean Subregion appears to have peculiar Mediterranean to it 4 genera of *Sylviidae*, and 1 of *Laridae*; but some 23 more belong to it and to no other part of the Region, though having a wider range outside of the latter. Of these there are 8 common to both the Ethiopian and Indian Regions, namely, 1 of *Vulturidae*, 3 of *Falconidae*, and 1 of *Tetraonidae*, *Anatidae*, *Glareolidae*, and *Cursoriidae* respectively. Confined to the same Subregion and the Ethiopian Region are 11, to wit, 1 of *Turdidae*, 1 of *Sylviidae*, 1 of *Timeliidae*, 1 of *Laniidae*, 2 of *Fringillidae*, 1 of *Emberizidae*, 1 of *Sturnidae*, 1 of *Alaudidae*, 1 of *Vulturidae*, and 1 of *Charadriidae*; while having the like relation to the Indian Region are 2—1 belonging to *Cuculidae* and 1 to *Otididae*. Of the family last named another genus (*Eupodotis*), which only just makes its appearance in Morocco, ranges over Africa, India, and Australia; and a genus of *Anatidae* (*Erimaturus*) is represented in America and Australia as well as in Africa.

The Atlantic Islands, which must be regarded as outliers

¹ One of these last has for a wonder received no name from systematists, but its generic separation seems on several grounds expedient. It is that which would have for its type the *Tringa platyrhyncha* of Temminck.

² That is excluding *Bulalis*, *Erythrosterma*, and other kindred groups, as well as the purely Ethiopian forms which have been by some systematists attached to *Muscicapa* proper.

of the Mediterranean Subregion, offer some peculiarities too remarkable to be here left unnoticed. First we have the Azores, the subject of an excellent monograph by Mr Frederick Godman,¹ in which is contained the result of his own investigations in that group, as well as those of his predecessors. There is a general tendency among Azorean Birds to vary more or less from their continental representatives, and this is especially shown by the former having always darker plumage and stronger bills and legs. In one instance the variation is so excessive that it fully justifies the establishment of a specific distinction. This is the case of the Bullfinch of the more eastern of these islands (*Pyrrhula murina*), the male of which, instead of the ruddy breast of its well-known congener (*P. vulgaris*), has that part of a sober mouse-colour. A similar sombre hue distinguishes the peculiar Chaffinch of the Canary Islands (*Fringilla teydea*), but to these islands as well as the Azores and Madeiras there belongs in common another Chaffinch (*F. tintillon*), which, though very nearly allied to that of Mauritania (*F. spodiogenia*), is perfectly recognizable, and not found elsewhere. Madeira has also its peculiar Golden-crested Wren (*Regulus maderensis*), and its peculiar Pigeon (*Columba trocas*), while two allied forms of the latter (*C. laurivora* and *C. bollii*) are found only in the Canaries. Further on this subject we must not go; we can only state that Mr Godman has shown good reason for declaring that the avifauna of all these islands is the effect of colonization extending over a long period of years, and going on now.

The Mongolian has the largest number of peculiar genera of any Palearctic Subregion. In *Sylviidae* there is 1, in *Timeliidae* 2, in *Panuridae* and *Ixidae* 1 each, in *Fringillidae* 3, in *Sturnidae* and *Pteroclididae* 2 1 respectively, in *Phasianidae* 2, and in *Anatidae* 1—or 13 in all; but, in common with the Indian Region, and that only, there are 10 of *Sylviidae*, 4 of *Timeliidae*, 1 of *Troglodytidae*, 3 of *Liotrichidae*, 1, rather doubtful in position, but possibly belonging to *Panuridae*, 1 of *Ixidae*, 4 of *Muscicapidae*, 1 of *Motacillidae* and *Fringillidae* respectively, 2 of *Sturnidae*, 1 of *Picidae*, 2 of *Strigidae* and as many of *Columbidae*, 1 of *Tetraonidae*, 4 of *Phasianidae*, and 1 generally referred to *Scolopacidae*²—or 39 altogether. In common with the Ethiopian Region alone, the Mongolian Subregion has only 1 genus, and that belongs to *Motacillidae*; but in common with both Ethiopian and Indian, though with these only, there are 1 of *Muscicapidae* and 1 of *Laniidae*; while 2 genera—1 of *Fringillidae* and 1 of *Scolopacidae*—belong equally to the Nearctic fauna: 2 genera, members respectively of the *Dicidae* and *Pittidae*, are common as well to the Ethiopian, Indian, and Australian Regions.

The Siberian Subregion seems to have but 1 genus peculiar. This is *Eurynorhynchus*, one of the *Scolopacidae*; but as its breeding-quarters have never yet been discovered the matter must remain in doubt. One genus of *Laridae* and 6 of *Alcidae* are also common to the Nearctic Region, but do not inhabit any other Palearctic Subregion.

It would extend the present article far beyond all reasonable bounds were we to dwell upon more than a few of the curiosities of distribution which have been revealed by the continuous observations of European ornithologists. There is no need to travel out of our own island to meet with some of the most remarkable among them, and we may take that of the Nightingale (*Daulias luscinia*) as an

¹ *Natural History of the Azores or Western Islands*, 8vo. London: 1870.

² The genus of this family here meant is *Syrhaptes*, the Three-toed Sand-Grouse, one species of which (*S. paradoxus*) overran Europe in astounding numbers in 1863, and effected a temporary settlement both in Denmark and Holland.

³ This is *Ibidorhynchus*, which, until some details of its osteology are known, can hardly be placed without risk of error.

example. In England the western limit of the range of this incomparable songster seems to be formed by the valley of the Exe, which is only overstepped on rare occasions—Montagu having once heard it near Kingsbridge, while it is said to have been observed at Teignmouth and Barnstaple. But even in the east of Devonshire it is local and rare, as it also is in the north of Somersetshire, though plentiful in other parts of that county. Crossing the Bristol Channel it is said to be not uncommon at times near Cowbridge in Glamorganshire; but this seems to be an isolated spot, or at any rate there is no evidence of its being found elsewhere in Wales, or between that place and Tintern on the Wye, where it has been reported to be plentiful. Thence there is more or less good testimony of its occurrence in Herefordshire, Shropshire, Staffordshire, Derbyshire, and so on, to about 5 miles north of York, but not further. Along the line thus sketched out and immediately to the east and south of it, the appearance of the nightingale, even if regular, which may be doubted, is rare, and the bird exceedingly local; but in many parts of the midland, eastern, and southern counties it is abundant, and the woods, coppices, and gardens ring with that thrilling song which has been the theme of writers in all ages. There are many assertions of its occurrence in England further to the northward, but some of them rest on anonymous authority only, and all must be regarded with the greatest suspicion. Still more open to doubt are the statements which have been made as to its visits to Scotland, while in Ireland there is no pretence even of its appearance. No reasonable mode of accounting for the partial distribution of the Nightingale has hitherto been propounded: there is no peculiar kind of soil which it especially affects, or none, so far as we know, that it especially avoids; and the same may be said of its relations to the flora of this country. It is not so entirely *adscrip-tus glebæ* that it will not readily betake itself to new localities suited to its wants, when these have been formed within its natural limits, though they may be miles away from its ancient haunts. On the contrary, it is often one of the first birds to establish itself when a heath has been broken up, and plantations of trees thereon made have grown sufficiently to afford it the sheltering covert that it loves. This instance, taken from a bird whose habits have been so closely studied both in captivity and at large, and one which is so familiar, and in many places so numerous, that abundant opportunities are given for observing all that can be observed about it, shews how futile would be the expectation that in most cases we could at present, even if ever, satisfactorily account for the existing causes which limit the distribution of species. A vast majority of them, we know, have each its bounds, which virtually it cannot pass, and the case of the Nightingale in England, beyond the fact that its distribution is extremely well marked, and therefore has long attracted especial attention, has really nothing out of the common way in it.⁴ In Europe, the neighbourhood of Copenhagen is the most northern point which our Nightingale is asserted to reach; but on the continent its range is less extended, and though abundant in Mecklenburg, it is not found in that part of Pomerania

⁴ When the history of the earth shall be really well and minutely understood, it seems quite possible that as much light will be shed on this and other particular cases of the same kind by a knowledge of the various changes and displacements which sea and land have undergone as has already been done by the same means in regard to many of the general facts of distribution. The results of the labour of the geologist are doubtless just as necessary to, and closely connected with, the work of the biologist, as those of the investigation of the historian are to and with the efficiency of the statesman; while, in return, the researches of the biologist are, or ought to be, of the greatest service to the geologist. The history of the earth is for a long period of time that of its inhabitants.

which lies to the north of the river Peene, nor does it stretch so far to the eastward as Danzig. It occurs, however, sparingly on the Polish frontier, near Thorn, and is observed in Austria, Upper Hungary, and Gallizia. In Russia its distribution cannot be laid down with any degree of accuracy, but it does not reach the Governments near the Ural, though it is said to be plentiful in that of Kharkov, and it is known to visit the Crimea. Still further to the eastward it can be traced through Circassia, and as far as Kasbin in Persia. Southward of this imperfectly-drawn line it may be found as a winter-visitant even in Arabia, Nubia, and Abyssinia, as well as in Algeria, where it is reported as breeding, and it would seem to migrate thence so far as the Gold Coast. It is abundant in Spain and Portugal; but it is a stranger to Brittany, the western peninsula of France, just as it is to the western peninsula of England.¹

One other example we may take, and this, though much less familiar, is equally instructive, as exhibiting some of the as yet unexplained peculiarities of distribution. It shall be from a Bird belonging to a very different Order from the last, having habits entirely dissimilar, and presenting in most ways a great contrast. The Kentish Plover (*Aegialitis cantiana*), first determined from specimens obtained on the coast of that English county whence it takes its specific name, has its breeding-place in Britain limited to the pebbly beach between Sandwich and Hastings, and in other parts of the British Islands only occurs as a chance straggler. Yet this bird has as wide a range elsewhere as almost any that could be named—breeding not only abundantly along the greater part of the coasts of the temperate and warmer portions of the Old World north of the Equator, but also occasionally in the interior, as at the base of the Caucasus and in the *chotts* of the North African plains; while during its migrations it wanders to the Malay Archipelago and South Africa, or even seems most likely to be specifically identical with a Plover which is found on the west coast of America, from California southward—though this last has been described as distinct under the name of *A. nivosa*.

Islands must always be a matter of the greatest interest to the student of Geographical Distribution, and we have already mentioned some peculiarities of those groups which belong to the Mediterranean Subregion of Europe. There are not many more here to be cited. Spitsbergen is supposed to have its peculiar species of Ptarmigan (*Lagopus hemileucurus*), though it is confessedly very nearly allied to the Rock-Ptarmigan (*L. rupestris*) which inhabits the Arctic portion of the American continent and islands, Greenland, and Iceland, but, except in the last-named country, does not occur in the Palearctic Region. Iceland is also remarkable for being the headquarters of the noble Falcon (*Falco islandus*) which takes its name therefrom, though this bird also inhabits the southern districts of Greenland, to say nothing of other countries; and in Iceland alone of the western portion of the Region does the beautiful Harlequin-Duck (*Histrionicus torquatus*) breed. It is, however, known to inhabit North America and the eastern half of Siberia.

Coming nearer home, we have a remarkable case of restricted distribution in the Red Grouse (*Lagopus scoticus*), found (and in certain districts, as every one knows, numerously), in each of the three kingdoms composing the British Islands as well as in the principality of Wales. The details of its local distribution, as of that of all other birds which breed in Great Britain, have been carefully and concisely given by Mr More,² and we do not propose to con-

¹ Cf. Yarrell, *British Birds*, ed. 4, vol. i. pp. 315-318.

² *Ibis*, 1865, pp. 1-27, 119-142, 425-453.

sider them here, but what is worthy of remark is that this particular species differs in no essential character save coloration from the Willow-Grouse (*L. albis*), which is an abundant bird throughout the whole of the northern parts of the Palearctic Region from Norway to Kamchatka, and again throughout the same or even lower latitudes of the Nearctic Region from Alaska to Newfoundland. Its remains, as has before been said (page 731), have also been found in the south of France, associated with those of the Reindeer and Snowy Owl. It is not for us now to enter into any hypothetical discussion, but it is hard to resist drawing an inference that at a time, geologically speaking, not very recent, both these species of Grouse had a common ancestor, and that the severe winters to which it has for a long period been exposed have caused the Willow-Grouse to don the snowy garb that is characteristic of it and other species of the genus, the more so since we find it in its first plumage possessed of the coloured quills, which are precisely similar to those of the Red Grouse at the same age.

Other instances there are in which British-born examples of species common to the continent are in a less degree distinguishable from those of neighbouring countries. The Coal-Titmouse of England is to be recognized from that of continental Europe (*Parus ater*), and accordingly by some ornithologists it is regarded as a distinct species (*P. britannicus*), but the scanty remnants of the ancient pine-forests of Scotland are inhabited by birds between which and European examples no difference can be established. The home-bred Bottle-Titmouse of Britain, too, has, from its darker coloration, been accorded specific rank, but then we occasionally find continental birds of this species (*Acridula candata*) varying in this respect, and the specific validity of the British form (*A. rosea*) can hardly be with consistency maintained. Indeed, as a matter of fact, nearly all our smaller birds can be distinguished by an expert from their continental brethren, and this mainly through their duller or darker plumage. The difference is not so great by any means as obtains in the case of the birds of the Atlantic Islands above mentioned, but it most unquestionably exists to a greater or less degree; and it is curious that an analogous state of things is observable in regard to many of the birds of Japan, a country which is subject to many of the same climatic conditions as the British Islands. It will be for future investigators to ascertain the cause of this similarity, we here only record the fact; but another remarkable instance of the forms of the western portion of the region being repeated in the far east, is found in the range of the two kindred species of the beautiful genus *Cyanopica*—the Blue Magpie of Portugal and Spain (*C. cooki*) being replaced in Amoorland and Japan by a species (*C. cyanea*) so closely allied that some authorities refuse to acknowledge their distinctness, and yet throughout 130° of longitude no representative of either is found.

V. THE ETHIOPIAN REGION, comprising the whole of the African continent, except the Barbary States, besides the Cape-Verd Islands and naturally those situated in the Gulf of Guinea, as well as Madagascar and the Mascarene group from Reunion (Bourbon) to the Seychelles, and the large island of Socotra, and crossing the Red Sea to Arabia, is sufficiently well marked out in a geographical point of view. The Ghor, or valley of the Jordan and the depressed basin of the Dead Sea, has been before mentioned as an outlier of this Region, the north-eastern part of which melts into the Palearctic between Palestine and the Persian Gulf. There, and apparently there only, do its boundaries admit of no precise definition. Some zoogeographers seem inclined to extend its limits further to the eastward, through Beloochistan and even beyond the Indus; but though the desert-forms of a large portion of that tract of country are

Other Peculiarities of British Birds.