

From the verticality, linear form, and condition of atmosphere I was led to remark at the time to my companion that the phenomenon appeared more of the nature of parhelia than referable to the zodiacal light. An intensely cold easterly wind encountering ocean-warmed airs to the westward would not improbably lead to the ice-molecule condition of atmosphere now assumed to be associated with the occurrence of parhelia.

It may be added (though of little probable significance) that the time corresponded roughly with the time of high water along that coast.

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Kingstown, April 24

On the Value of the "Neoarctic" as one of the Primary Zoological Regions

PERMIT me to make a few remarks relative to Mr. Wallace's criticisms (NATURE, vol. xxvii. p. 482) of my paper on "The Value of the Neoafrican as one of the Primary Zoological Regions." Briefly stated, it is maintained in the early portion of this paper (1) that the Neoafrican and Palaearctic faunas taken individually exhibit, in comparison with the other regional faunas (at least the Neotropical, Ethiopian, and Australian), a marked absence of *positive* distinguishing characters, a deficiency which in the mammalia extends to families, genera, and species, and one which, in the case of the Neoafrican region, also equally (or nearly so) distinguishes the reptilian and amphibian faunas; (2) that this deficiency is principally due to the circumstance that many groups of animals which would otherwise be peculiar to, or very characteristic of, one or other of the regions, are prevented from being such by reason of their being held in common by the two regions; and (3) that the Neoafrican and Palaearctic faunas taken collectively are more clearly defined from any or all of the other faunas than either the Neoafrican or Palaearctic taken individually.

In reference to these points Mr. Wallace, while not denying the facts, remarks: "The best division of the earth into zoological regions is a question not to be settled by looking at it from one point of view alone; and Prof. Heilprin entirely omits two considerations—peculiarity due to the absence of widespread groups and geographical individuality." Numerous families and genera from the classes of mammals and birds are then cited as being entirely wanting in the western hemisphere, and which—in many cases almost sufficient to "characterise the Old World as compared with the New"—"must surely be allowed to have great weight in determining this question." No one can deny that the absence from a given region of certain widespread groups of animals is a factor of very considerable importance in determining the zoological relationship of that region, and one that is not likely to be overlooked by any fair-minded investigator of the subject. But the value of this *negative* character afforded by the absence of certain animal groups as distinguishing a given fauna, is in great measure proportional to the extent of the positive character—that furnished by the presence of peculiar groups—and indeed may be said to be entirely dependent on it. No region can be said to be satisfactorily distinguished from another without its possessing both positive and negative distinguishing characters. Mr. Wallace has in his several publications laid considerable stress upon the negative features of the Neoafrican fauna as separating it from the Palaearctic or from any other, but he has not, it appears to me, sufficiently emphasised the great lack, *when compared to the other faunas*, of the positive element, the consideration of which is the point aimed at in the first portion of my paper, and which has led to the conclusions already stated, that only by uniting the Neoafrican and Palaearctic regions do we produce a collective fauna which is broadly distinguished by both positive and negative characters from that of any other region. If, as Mr. Wallace seems to argue, the absence from North America of the "families of hedgehogs, swine, and dormice, and of the genera *Meles*, *Equus*, *Bos*, *Gazella*, *Mus*, *Cricetus*, *Meriones*, *Dipus*, and *Hystrix*" be sufficient, as far as the mammalian fauna is concerned, to separate that region from the Palaearctic, could not on nearly equally strong grounds a separation be effected in the Palaearctic region itself? Thus, if we were to consider the western division of the Palaearctic region, or what corresponds to the continent of Europe of geographers, as constituting an

¹ In the paper under consideration I have given what appear to me satisfactory reasons for detaching certain portions of the South-western United States from the Neoafrican (my Triarctic), and uniting them with the Neotropical region.

independent region of its own, it would be distinguished from the remainder of what now belongs to the Palaearctic region by negative characters probably fully as important as those indicated by Mr. Wallace as separating the Neoafrican from the Palaearctic region. The European mammalian fauna would be wholly deficient, or nearly so, in the genera *Equus*, *Moschus*, *Camelus*, *Poephagus*, *Gazella*, *Oryx*, *Addax*, *Saiga*, *Ovis*, *Lagomys*, *Tamias*, in several of the larger *Felidae*, as the tiger and leopard, and in a host of other forms. A similar selection could be made from the class of birds (among the most striking of these the *Phasianidae* and *Struthionidae*), but it is scarcely necessary in this place to enter upon an enumeration of characteristic forms. Divisions of this kind, to be characterised principally or largely by negative faunal features, could be effected in all the regions, and in some instances with probably more reason than in the case under discussion.

But the question suggests itself, What amount of characters, whether positive or negative, or both, is sufficient to distinguish one regional fauna from another? Mr. Wallace states: "There runs through Prof. Heilprin's paper a tacit assumption that there should be an equivalence, if not an absolute equality, in the zoological characteristics and peculiarities of all the regions." Is it to be inferred from this quotation that Mr. Wallace recognises no such general equivalence? Is a region holding in its fauna, say, from 15 to 20 per cent. of peculiar or highly characteristic forms to be considered equivalent in value to one where the faunal peculiarity amounts to 60 to 80 per cent? If there be no equivalence of any kind required, why not give to many of the subregions, as now recognised, the full value of region?

Surely, on this method of looking at the question, a province could readily be raised to the rank of a full region. In the matter of geographical individuality little need be said, as the circumstance, whether it be or be not so, that the "temperate and cold parts of the globe are necessarily less marked by highly peculiar groups than the tropical areas, because they have been recently subjected to great extremes of climate," does not affect the present issue, seeing that the peculiarity is greatly increased by uniting the two regions in question; nor does it directly affect the question of the Neoafrican-Palaearctic relationship.

The second part of my paper deals with the examination of the reptilian and amphibian faunas, and the general conclusion arrived at is: "that by the community of its mammalian, batrachian, and reptilian characters, the Neoafrican fauna (excluding therefrom the local faunas of the Sonoran and Lower Californian subregions, which are Neotropical) is shown to be of a distinctively Old World type, and to be indissolubly linked to the Palaearctic (of which it forms only a lateral extension)." Towards this conclusion, which, it is claimed, is also borne out by the land and freshwater mollusca and the butterflies among insects, I am now happy to add the further testimony of Mr. Wallace (overlooked when preparing my article respecting the *Coleoptera* ("Distribution," "Encycl. Britann." 9th ed. vii. p. 274).

As regards the name "Triarctic," by which I intended to designate the combined Neoafrican and Palaearctic regions, and which may or may not be "somewhat awkward," I beg to state that, at the suggestion of Prof. Alfred Newton (who, as he informs me, has arrived from a study of the bird faunas at conclusions approximately identical with my own), it has been replaced by "Holarctic." In conclusion, I would say that, while the views enunciated in my paper may not meet with general acceptance at the hands of naturalists, it is to be hoped that they will not be rejected because they may "open up questions as regards the remaining regions which it will not be easy to set at rest."

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Mock Moons

A LITTLE before midnight on Monday, the 16th inst., the moon, being nine days old and about 30° above the western horizon, was surrounded by an unusual halo. Its radius was certainly more than the normal 22°. By careful estimation I judged it to be about 30°, the lower edge resting on the horizon. On the right and left limbs of the ring were very distinct bright patches, rather broader than the ring itself, and slightly elongated outwards. The right-hand patch appeared to be in its normal position on a line passing through the moon, parallel with the horizon, but the left-hand patch was distinctly elevated