Archives of Natural History 46.2 (2019): 265–282
Edinburgh University Press
DOI: 10.3366/anh.2019.0590

www.euppublishing.com/anh

Alfred Russel Wallace's "Die Permanenz der Continente und Oceane"

CHARLES H. SMITH[A], JAMES T. COSTA[B] and MATTHIAS GLAUBRECHT[C]

[A] Apt. 403, 1317 Scottsville Road, Bowling Green, KY 42104, USA (e-mail: charles.smith@wku.edu)
[B] Highlands Biological Station, 265 North Sixth Street, Highlands, NC 28741, and Department of Biology, Western Carolina University, Cullowhee, NC 28723, USA
[C] Centrum für Naturkunde, Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

ABSTRACT: A previously unnoticed publication by Alfred Russel Wallace has come to light concerning an important nineteenth-century natural science discussion: whether the continental and oceanic portions of the globe are permanent fixtures. Originally (and only) printed in an obscure German review magazine, it represents the only known substantial work by Wallace that never appeared in English. A translation back into English is provided in the Appendix, preceded by an analysis and discussion of some of its subject matter, especially that pertaining to nineteenth-century theories of changing ocean levels and the changing perception of the importance of land bridges versus dispersal for zoogeography.

KEYWORDS: glacial epochs – permanence of oceanic basins – permanence of continents – sea levels – coastlines.

INTRODUCTION

While executing a review of non-English-language writings on Alfred Russel Wallace (1823–1913) (Figure 1), one of us (CHS) came across a previously uncredited essay by Wallace in German, published in early 1882 in an obscure review magazine titled *Auf der Höhe* (Wallace 1882). The magazine, edited by the novelist and journalist Leopold von Sacher-Masoch (1836–1895) – after whom the term "masochism" was invented – lasted just a few years (1881–1885), and featured review articles on social, literary and scientific topics of the day.[1] The circumstances of the essay's writing are unknown, but it is likely that Wallace accepted the task on commission. This would have been particularly easy for him at this time, as he had written on the subject only recently, notably in *Island Life* (Wallace 1880).

At first it was uncertain as to whether the work was merely an abstract of the discussion in *Island Life*, or perhaps a close paraphrasing of one of his several essays on the subject from the late 1870s and early 1880s. A closer examination, however, revealed it to be an independent work, incorporating some new information, and phrased specifically for an educated lay audience. Wallace, despite his knowledge of several languages, did not speak German, so it was probably originally written in English, delivered to *Auf der Höhe* (roughly: 'On Top of Things'), and translated into German by the journal's editors.[2]

As Wallace's original English-language text is apparently lost, we provide, in the Appendix (pp 273–282), a translation of his essay back into English. Rather than a literal translation,

Figure 1. Alfred Russel Wallace: portrait published in *The Popular Science Monthly* **11** (2): opposite p. 129 (June 1877): wood-engraving by T. D. Smith from a photograph by W. Usherwood of Dorking, Surrey (author's collection).

however, we attempt to best represent what we feel Wallace's original wordings and intent most likely would have been. To put the translation into perspective, we offer some observations on the significance of this essay, including a discussion about a curious characteristic of Wallace's writings on this subject.

ANALYSIS AND DISCUSSION

Apart from its being perhaps the most succinct statement of Wallace's overall thoughts on the subject from this early period, Wallace's German essay is also notable for being the only known example of a full Wallace work that appeared originally in a non-English language, and never in English. Further, it provides evidence that Wallace was following this subject even after *Island Life* appeared in print. On its second page, he refers to a map in an edition of *Stieler's Hand-Atlas* (Berghaus *et al.* 1881) that did not appear until after *Island Life* was published, an indication of his continuing interest. A puzzling characteristic of Wallace's various treatments of changing sea levels is worth noting. As the subject of sea level change is an important one to historical biogeography investigations, it is curious that in Wallace's several related discussions (Wallace 1877, 1879, 1880, 1881, 1883, 1887, 1889, 1892), he fails to distinguish among the possible causes for sea-level fluctuation despite the fact that they had been under discussion for some time, and would have been especially relevant in the special context of explaining the distribution of animals across submerged regions of land in the Indo-Malayan Archipelago (Fichman 1977). In particular, he never cites isostatic rebound as a potential influence, and barely even refers to the fairly obvious effect that the water-into-ice exchange would have had at various stages of the glacial epochs. Instead, he merely refers to the "raising" or "lowering" of ocean levels, or similarly vague terminology. Was he simply avoiding the subject, or had he failed to grasp the significance of ice ages to global sea-level change?

As early as the 1830s there were heated debates at the Geological Society of London regarding the matter of uplift of land versus subsidence of the ocean as the predominant process to explain raised beaches, largely in connection with the debates between the Neptunist school led by German geologist Abraham Gottlob Werner (1749–1817) and the Plutonist school of Scotsman James Hutton (1726–1797) (Wesson 2017). Eventually, there was a full rejection of Wernerism in favour of the uplift concepts inherent in Huttonian Plutonism. This may have made it difficult for Charles Lyell (1797–1875) and his followers to think in terms of sea levels dropping to any appreciable degree when later process models such as glaciation arrived on the scene in the 1840s. Discussions regarding possible glaciation-related isostatic rebounds were underway by the 1860s, but Wallace seems to have noticed only the depression portion of this cycle, noting in 1879 that "[t]he greater subsidences were probably local, and were perhaps due to the enormous weight of the accumulations of ice over given areas. Owing to the Earth's crust giving way slowly to such strains, subsidence would only begin when the ice-sheet had nearly attained its maximum extent, and would probably continue for some time while it was diminishing" (Wallace 1879: 129–130).

In general, Wallace's discussions of sea-level change are almost entirely couched in terms of the prevailing (Lyellian) model of land uplift and subsidence. In this context, Wallace finally joined Darwin in his "protest against sinking imaginary continents in a quite reckless manner" to explain present anomalies in animal and plant distribution (Fichman 1977: 45). Early on, the effect of extensive glaciation on sea levels was most often discussed by naturalists, including James Croll (1821–1890) and Lyell, in terms of rising, not lowering, sea levels, through supposed gravitational effects (that is, that the Earth's centre of gravity might shift in response to the piling up of ice on one Pole or the other [Lyell 1867:**1**: 285–291]). Lyell reviewed and essentially rejected the latter view, as well as the idea that melting glaciers might have substantially increased sea levels, and Wallace apparently concurred.

There are at least two reasons why Wallace and other naturalists, following Lyell, might have been pre-disposed toward thinking in terms of the land and not sea level *per se* fluctuating (whether or not in relation to glaciers). First, Lyell's (and Darwin's) model of how vast sedimentary formations come into existence presupposes a long period of subsidence of the seabed, and so is rather land-centric: as erosion proceeds at a continuous rate on land, slow and long-continued subsidence permits a build-up of extensive, fossil-rich strata, which might later be exposed by uplift. (This was central to the argument of Lyell [1867–1868], Darwin [1872] and Wallace [1880] for why fossiliferous formations and the record of the history of life are gappy – conditions for a long, continuous record are needed, and that only happens in some places at some times.) Subsidence was part of the larger model of oscillation in land levels, with subsidence in some areas offset by uplift in others; John Herschel had a similar model (Greene 2016: 107). Sea-level rise, in contrast, would increase depth, but would also inundate land, restricting the substrate available to erosion and deposition.

Secondly, insofar as it was believed that large tracts of northern Europe were submerged during the last glacial period (Lyell 1875: **1**: 253), this would contradict the idea of sea levels always falling substantially during glacial periods. In general, one would expect that vast quantities of water locked up in ice on land would result in global sea level drop. But as these naturalists believed the level of the sea had actually been far higher during the glacial period than it is today, this would have directly undermined the hypothesis of massive continental glacial ice leading to lower sea levels. In one line of argument prior to the glacial theory, Darwin and others interpreted erratic boulders in terms of iceberg transport, a model that necessitates extensive marine incursions over present-day dry land (Darwin 1839).

A possible third reason why Wallace and others might have been pre-disposed towards thinking in terms of land movement instead of sea-level fluctuation (as caused by glaciers, or anything else) has to do with their analysis of the global average height of land relative to the depth of the ocean. Again building on Lyell, Wallace discussed this at some length in various works (for example, Wallace 1880, 1889), making the point that the average height of land on Earth is small relative to the depth of the ocean basins. Although Wallace does not actually state this, one wonders whether he might have concluded that the amount of water periodically tied up and released in glacial cycles was rather trivial as compared to the total quantity of water on Earth. Notwithstanding that Wallace and others were aware of many continental islands separated by very shallow seas, they might have surmised it would not take much to periodically expose and flood such low-lying areas.

Amidst these considerations, it remains a fact that Wallace's mentions of the water-into-ice exchange factor are so hard to find that one might initially suspect he was not aware of this phenomenon at all. There are, however, a few references that prove he was. For example, in 1874, in a review of Thomas Belt's *Naturalist in Nicaragua*, he specifically states (Wallace 1874: 220):

> To get over the enormous difficulty as to what became of the exclusively tropical forms of insect and bird life that abound in such overpowering luxuriance in tropical America, he [Belt] has recourse to the increased area of low land caused by the lowering of the ocean owing to the vast amount of water abstracted in the form of ice.

Further, in the last chapter of *Tropical Nature*, Wallace (1878: 338) notes that

> Around the Gulf of Mexico and the Caribbean Sea there is a wide belt of rather shallow water, and during the alternate elevations and subsidences to which this region has been subjected, the newly raised land would afford a route for the passage of immigrants between North and South America. The great depression of the ocean, believed to have occurred during the Glacial period (caused by the locking-up of the water in the two polar masses of ice), may perhaps have afforded the opportunity for those latest immigrations which gave so striking a character to the North American fauna in Post-Pliocene times.

Then, in *Island Life* (Wallace 1880: 477):

> … these risings and lowerings of the snow-line on all mountain-ranges would have been at a maximum, and would have been increased by the depression of the ocean which must have arisen from such a vast bulk of water being locked up in land-ice, and which depression would have produced the same effect as a general elevation of all the continents.

Still, it seems that projected reasons for the changes involved could have been more fruitfully employed in Wallace's biogeographical reconstructions – for example, of the relations among the islands of the Sunda and Sahul Shelf regions, helping to explain the discontinuity in the avian and mammalian fauna of the region later delineated as "Wallace's Line" by Thomas Henry Huxley (1825–1895). Perhaps, however, Wallace was merely being cautious. Not much was then known of the actual full extent of the Ice Age glaciations, nor the absolute thicknesses of the ice sheets. Whereas now most of the estimates of total glaciation-related vertical sea-level change fall at around 120 to 150 metres on average, in Wallace's day some people (Belt, most notably) were suggesting figures of up to 600 metres, while no one could say whether the actual value might have been as little as 60 metres, or even considerably less than that (Wallace 1876: **1**: 151–152).

Wallace's caution is reflected in a letter to Darwin dated 31 August 1872, in which he expresses his distrust of the "facts" posed in three letters to *Nature* from the previous year by the naturalist Henry Howorth (1871, 1872a, 1872b) on the "subsidence and elevation of land" (Marchant 191: 228). We believe this speaks to his overall scepticism on the information available on this subject in general, and why he may have been loath to use more specific language in speaking of rising and lowering sea level.

This seems all the more likely given there were three forces that Wallace looked to as more solidly understood, and therefore as more likely causal explanations. One was simple volcanism; it was generally accepted at the time that local areas of volcanic eruption were associated with corresponding zones of crustal subsidence nearby. Similarly, tectonic uplift could produce a changing shoreline, at least regionally. But Wallace's favourite explanation had to do with the configuration of the continental shelf areas.

In 1893, a review of the "permanence" discussion was given by Scottish geographer and meteorologist Hugh Robert Mill (1861–1950). In this, Mill (1893: 231) lists, as one of Wallace's arguments on the general question, "[t]he enormous disproportion between the mean height of the land and the mean depth of the ocean, which would render it very difficult for new land to reach the surface till long after the total submergence of the sinking continent …". In his summary, Mill (1893: 234) writes:

> The main fact, conceded by all who have studied the subject, is, that there is such a thing as the evolution of continents, the heights and hollows of the Earth's crust having become greater with the lapse of time. And all, also, concede that the present ocean basins represent regions where subsidence has predominated over elevation, while the continental area is that in which elevation has been more active than depression. Thus the actual level of the sea is an accident depending on the volume of its water and the inequalities of the crust, equal variations in which, on the hypothesis of constant volume in the ocean, may have led to very different emergence or submergence of the border areas according to the angle of the slope. At present the coast-line lies nearly mid-way on the flattest expanse of the continental margin, so that a given increase or decrease in the volume of the ocean would cover or lay bare the largest possible area of land.

Thus, glaciation-related changes in the coastline were thought more to be due to the "plateau effect" along the continental margins (as opposed to long and uniformly sloping topographies out to sea), than to more specific issues of water volume or orogeny. (An illustration of the overriding importance of very modest sea-floor slope is presented by the Bay of Fundy, between New Brunswick and Nova Scotia, Canada, the gentle slope of which contributes to tidal variation exceeding 16 metres [Dalton 1951]. Such sites underscore how local near-shore slope or lack thereof can be all-important in determining the magnitude of local sea level, albeit in that case tidally.) This apparently was Wallace's final verdict as well, despite revising (on new information) his estimate for the average land height from 1,000 to 2,250 feet (300 to 685 metres) between the publication of *Island Life* (1880) and *Darwinism* (1889), which effectively halved the predicted "spilling over" effect caused by gently sloping coastal plains and continental shelves. Wallace apparently concluded that dramatic coastline changes could stem from the configuration of long, flat coastal plains and continental shelves (rather than a rapid change in elevation above and beneath the coastlines), and how fairly small amounts of water volume change – or no water volume change – could produce a much changed coastline when combined with volcanism, orogeny, rebound or the supposed "gravitational effects".

Wallace's German article on the permanency of continents and oceans is another illustration of the nineteenth-century naturalist's search for the "intricate relation between biological and geological theory", as pointed out by Martin Fichman (1977: 45) in the context of continental connections as explanation for animal distribution (another subject of paramount interest to Wallace). Clearly, Wallace's doctrine of the permanency of land and ocean was crucial to his developing model of biotic regionalization, and to his thoughts on biogeography in general. In this wider context it is interesting to note that in his German essay Wallace argued predominantly in geological terms, only to add zoogeographical aspects at the very end of the article. In contrast, in developing his theory of animal geography earlier, he had deployed geology (for example George W. Earle's [1845] insights on the physical structure of the Indo-Malayan Archipelago) as support for his biological argumentation.

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance of Robin McGinnis, and the staffs at the Multnomah County Library (Portland, Oregon), Mary Helen Cochran Library, Sweet Briar College (Sweet Briar, Virginia), Indiana University Libraries (Bloomington, Indiana), and Donald W. Hamer Center for Maps and Geospatial Information, Pennsylvania State University (State College, Pennsylvania).

NOTES

[1] URL (accessed 3 May 2019): https://www.worldcat.org/title/auf-der-hohe/oclc/5528748&referer=brief_results.

[2] A transcription of the source into modern German may be found on *The Alfred Russel Wallace Page* at: http://people.wku.edu/charles.smith/wallace/S347A.htm (accessed 26 March 2019).

[3] These durations must represent some kind of error in the original translation, as Wallace would never have applied the time frame "billions" here.

REFERENCES

BERGHAUS, Hermann, Carl VOGEL and Hermann HABENICHT, editors, 1881. *Stieler's Hand-Atlas über alle Theile der Erde und über das Weltgebäude*. Seventh edition. Gotha.

DALTON, F. K., 1951. Fundy's prodigious tides and Petitcodiac's tidal bore. *Journal of the Royal Astronomical Society of Canada* **45**: 225–231.

DARWIN, Charles, 1839. Note on a rock seen on an iceberg in 61° South latitude. *Journal of the Royal Geographical Society of London* **9**: 528–529.

DARWIN, Charles, 1872. *On the Origin of Species*. Sixth edition. London.

EARLE, G. W., 1845. On the physical structure and arrangement of the islands in the Indian Archipelago. *Journal of the Royal Geographical Society* **15**: 358–365.

FICHMAN, Martin, 1977. Wallace: zoogeography and the problem of land bridges. *Journal of the History of Biology* **10**: 45–63.

GEIKIE, Archibald, 1879. Geographical evolution. *Proceedings of the Royal Geographical Society* (new series) **1**: 422–444.

GREENE, Mott T., 2016. *Geology in the Nineteenth Century: Changing Views of a Changing World*. Ithaca, New York.

HOWORTH, H. H., 1871. Recent changes in circumpolar lands. *Nature* **5**: 162–163.

HOWORTH, H. H., 1872a. Circumpolar land. *Nature* **5**: 420–422.

HOWORTH, H. H., 1872b. Recent climatic changes. *Nature* **6**: 24–25.

LYELL, Charles, 1867–1868. *Principles of Geology.* Tenth edition. London.

LYELL, Charles, 1872. *Principles of Geology.* Eleventh edition. London

LYELL, Charles, 1875. *Principles of Geology.* Twelfth edition. London.

MARCHANT, James, editor, 1916. *Alfred Russel Wallace; Letters and Reminiscences*. New York.

MILL, H. R., 1893. The permanence of ocean basins. *The Geographical Journal* **1**: 230–234.

PAGE, David, 1873. *Introductory Text-book of Geology.* Tenth edition. Edinburgh.

WALLACE, Alfred Russel, 1874. [Book review: Thomas Belt, 1873, *The Naturalist in Nicaragua.*] *Nature* **9**: 218–221.

WALLACE, Alfred Russel, 1876. *The Geographical Distribution of Animals*. US edition. New York.

WALLACE, Alfred Russel, 1877. The comparative antiquity of continents, as indicated by the distribution of living and extinct animals. *Proceedings of the Royal Geographical Society* **21**: 505–534.

WALLACE, Alfred Russel, 1878. *Tropical Nature, and Other Essays*. London.

WALLACE, Alfred Russel, 1879. Glacial epochs and warm polar climates. *Quarterly Review* **148**: 119–135.

WALLACE, Alfred Russel, 1880. *Island Life*. London.

WALLACE, Alfred Russel, 1881. Abstract of four lectures on the natural history of islands. *Report of the Rugby School Natural History Society* **1881**: 1–17.

WALLACE, Alfred Russel, 1882. Die Permanenz der Continente und Oceane. *Auf der Höhe* **2**: 37–51.

WALLACE, Alfred Russel, 1883. Mr. Wallace's reply to Mr. T. Mellard Reade on the age of the Earth. *Geological Magazine* (new series, decade 2) **10**: 478–480.

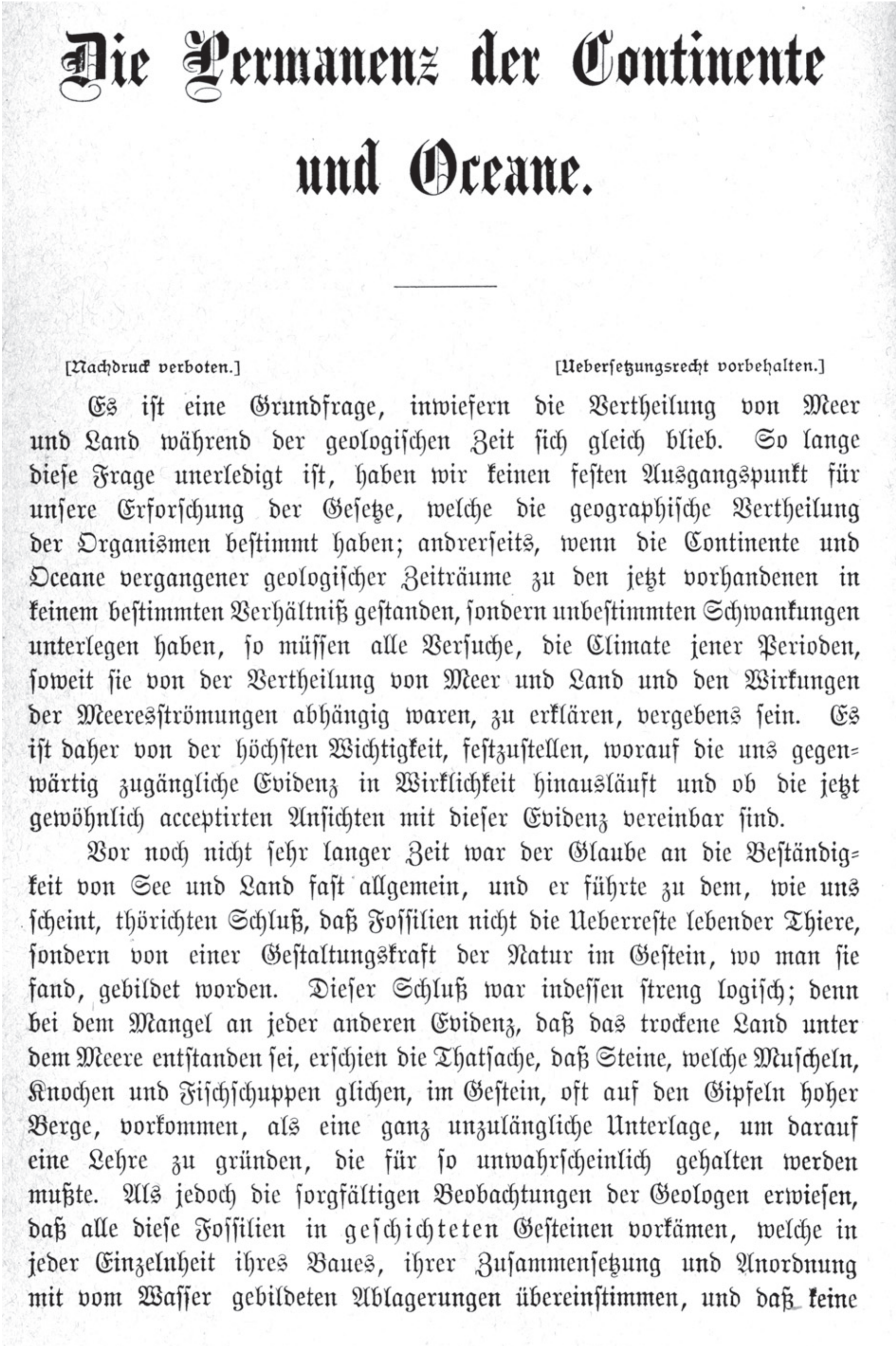
WALLACE, Alfred Russel, 1887. Oceanic islands: their physical and biological relations. *Bulletin of the American Geographical Society* **19**: 1–17.

WALLACE, Alfred Russel, 1889. *Darwinism*. London.

WALLACE, Alfred Russel, 1892. The permanence of the great oceanic basins. *Natural Science* **1**: 418–426.

WESSON, Rob, 2017. *Darwin's First Theory: Exploring Darwin's Quest for a Theory of Earth*. New York.

Received 6 June 2018. Accepted 10 August 2018.



Die Permanenz der Continente und Oceane.

[Nachdruck verboten.] [Uebersetzungsrecht vorbehalten.]

Es ist eine Grundfrage, inwiefern die Vertheilung von Meer und Land während der geologischen Zeit sich gleich blieb. So lange diese Frage unerledigt ist, haben wir keinen festen Ausgangspunkt für unsere Erforschung der Gesetze, welche die geographische Vertheilung der Organismen bestimmt haben; andrerseits, wenn die Continente und Oceane vergangener geologischer Zeiträume zu den jetzt vorhandenen in keinem bestimmten Verhältniß gestanden, sondern unbestimmten Schwankungen unterlegen haben, so müssen alle Versuche, die Climate jener Perioden, soweit sie von der Vertheilung von Meer und Land und den Wirkungen der Meeresströmungen abhängig waren, zu erklären, vergebens sein. Es ist daher von der höchsten Wichtigkeit, festzustellen, worauf die uns gegenwärtig zugängliche Evidenz in Wirklichkeit hinausläuft und ob die jetzt gewöhnlich acceptirten Ansichten mit dieser Evidenz vereinbar sind.

Vor noch nicht sehr langer Zeit war der Glaube an die Beständigkeit von See und Land fast allgemein, und er führte zu dem, wie uns scheint, thörichten Schluß, daß Fossilien nicht die Ueberreste lebender Thiere, sondern von einer Gestaltungskraft der Natur im Gestein, wo man sie fand, gebildet worden. Dieser Schluß war indessen streng logisch; denn bei dem Mangel an jeder anderen Evidenz, daß das trockene Land unter dem Meere entstanden sei, erschien die Thatsache, daß Steine, welche Muscheln, Knochen und Fischschuppen glichen, im Gestein, oft auf den Gipfeln hoher Berge, vorkommen, als eine ganz unzulängliche Unterlage, um darauf eine Lehre zu gründen, die für so unwahrscheinlich gehalten werden mußte. Als jedoch die sorgfältigen Beobachtungen der Geologen erwiesen, daß alle diese Fossilien in geschichteten Gesteinen vorkämen, welche in jeder Einzelnheit ihres Baues, ihrer Zusammensetzung und Anordnung mit vom Wasser gebildeten Ablagerungen übereinstimmen, und daß keine

Figure 2. First page (p. 37) of Alfred Russel Wallace's 1882 essay "Die Permanenz der Continente und Oceane", published in *Auf der Höhe*, January 1882 (courtesy of Indiana University).

APPENDIX: Translation of "Die Permanenz der Continente und Oceane"

The Permanence of the Continents and Oceans.

(Reprint forbidden.) (Right of translation reserved.)

It is a basic question as to what extent the distribution of sea and land during geological time has remained the same. As long as the matter is left unsettled, we have no firm point of departure for our inquiry into the laws that have determined the geographical distribution of organisms. If the continents and oceans of past geological periods have been in no particular relation to the present, but instead have been subject to indeterminate fluctuations, so all attempts to explain the climates of those periods, as far as they were dependent on the distribution of sea and land and the effects of ocean currents, must be in vain. It is, therefore, of the utmost importance to ascertain what the evidence currently available to us in fact shows, and whether the now usually accepted views are compatible with this evidence.

Not so long ago, a belief in the stability of sea and land was almost universal, and it led to the conclusion, as foolish as it now seems to us, that fossils are not the remnants of living animals, but had been formed of a creative power of nature in the rock where they are found. This conclusion was strictly logical, for, lacking other evidence that the dry land had arisen under the sea, the fact that stones resembling shells, bones and fish scales were higher in the rock, often on the tops of high mountains, must have appeared as a very inadequate basis for founding an otherwise unlikely doctrine. However, as the careful observations of the geologists proved, all fossils occur in stratified rocks, which in their details of construction, composition and arrangement coincide with deposits formed by water, and no other known natural cause being sufficient to produce this resemblance, ranging from the least to the most general, it was no less logical to conclude that these fossils, of which the great majority resembled marine organisms, were really living animals and had been preserved in the stone that had been deposited over them.

Stratified rocks containing the fossil record of animals identical or closely related to those now living in the sea are more or less scattered across all continents, and up to high altitudes in many mountain ranges. Accordingly, it was concluded, with equal certainty, that all these regions of the Earth had at one time or another formed the sea-bottom. However, another conclusion was arrived at that was not logical. The spatial dimensions to which geological formations extended – stratified deposits of marine shells were found up to a height of 10,000 feet [3,000 metres] in the Alps, and up to an even greater height in the Himalayas – made it seem necessary to assume the former presence of other fixed lands where now the deep oceans are rolling, in order to arrive at the explanation that they supplied the rubble from which our present continents were formed. Hence the belief in a reciprocal transition of oceans and continents into each other which may have been repeated several times during the mighty eons of geological time, and it came to pass that it was taught as an elementary fact that there is "not a foot of the land we now inhabit but has been repeatedly under the ocean, and the bed of the ocean has formed as repeatedly the habitable dry land" [Page 1873: 12]. Even so acute and learned a geologist as Sir Charles Lyell, opposed to all geological catastrophism, had similar views. In the eleventh edition of the *Principles of Geology* he says [Lyell 1872: **1**: 258]: "Continents, therefore, although permanent for whole geological epochs, shift their positions entirely in the course of ages." The best proof, however, that geologists usually pronounced themselves in favour of the complete mutual displacement of sea and land, lies in the fact that in a discussion of geological works in the scientific journal *Nature* in October 1879 the opposite view, that the oceans have always been in their present situation, is mentioned as "a funny idea" which finds no vent among "practical geologists". And yet the doctrine of the general persistence of our present continents and oceans is one with which some agree. Geological ideas so new and unlikely that some have even called them a joke have been and are accepted by some of the greatest masters of science. The venerable geologist James Dwight Dana [1813–1895] taught the theory for many years with reference to the American mainland and implied the whole globe; while Archibald Geikie [1879], the distinguished head of the Geological Survey of Scotland, has shown in his remarkable lecture on "Geographical Evolution" [Geikie 1879] that it is compatible with the great facts of stratigraphic geology alone. Clear indications pointing to the same general conclusion are given us by the physical characteristics of the land and ocean, while by far the most facts with regard to the distribution and the migrations of organisms in recent and older geological periods can only be ordered and explained by this hypothesis.

I now propose to present to my readers an outline of these various types of evidence, grouped under the following categories.

a) The relations of sea and land as to extent as well as surface area.
b) The outlines of ocean basins.
c) Deep sea and coastal deposits.
d) The character and the distribution of stratified rocks.
e) The distribution of freshwater and brackish deposits in space and time.
f) The structure and distribution of oceanic islands.

They will then be able to judge whether the view advocated here is likely enough at least to take its place as a viable hypothesis on which future investigations of the Earth's past physical and organic history can proceed.

The relation between sea and land as an indication of constant continuance. It has long been known, with approximate accuracy, that the ratio of the surface area of the sea to that of the land is nearly equal to 5 : 2; until very recently, however, there were only the most vague ideas as to the shape of the ocean basin. It was believed that it corresponded in its main course to that of dry land, and that, like this, it offered high mountains and deep valleys. Thanks, however, to recent research expeditions and soundings made in the context of the telegraphic connections we now have a sufficient general knowledge of the sea-bottom. The chief facts relating to it are well presented in Figure 8 of a new edition of *Stieler's Hand-Atlas* [Berghaus *et al.* 1881], now published. From this very instructive map we see that by far the greater part of the sea-bottom consists of a vast plain, which has a depth of 2 or 3 geographical miles (or from 12,000 to 18,000 feet [3,700 to 5,500 metres]). Very considerable tracts in all the great oceans have a depth of 3 to 4 miles [5 to 6.5 kilometres] and above, and as these together are not much smaller than the parts which are less than 2 miles [3 kilometres] deep, it follows that the mean depth of the whole surface-space of the world's ocean is not much less than 2½ miles [4 kilometres]; if we have 2¼ miles or 13,500 feet, we will come close to the truth.

The average height of the land above the sea is quite different, determined by the famous Alexander von Humboldt [1769–1859] to be about 1,000 feet [300 metres]; and though a slight revision may be necessary in consequence of our recent knowledge of the interior of Africa, it will not affect the general result significantly. Let us now combine the ratio of 13,550 : 1,000 with that of the 5 : 2 ratio of the surface areas of water and land to arrive at the result that the water volume of the ocean is nearly 34 times that of the volume of land above sea level.

The outline of the ocean basin. Before we proceed to consider how this ratio of land to sea affects our question, it is well to consider the shape of the sea-bottom as compared with existing continental lands. The most important fact to be noted here is the remarkable proximity of the 1,000-fathom or 6,000-feet [1,800-metre] line to the nearly 2,000-fathom line. Around Africa, for example, the 1,000-fathom line is usually much less than 100 miles [160 kilometres] from the land, except in the Gulf of Guinea and where it turns to include Madagascar, which once formed part of the African mainland; while the 2,000-fathom line closely follows it at about the same distance. Along the whole west coast of North and South America the distances are seldom more than 50 English miles [80 kilometres] for the 1,000-fathom line and 100 miles for the 2,000-fathom line; while on the east coast it is often 200 miles or even more for those; but a large part of it consists of less than 100 fathoms [180 metres] of submerged shores which have recently formed part of the mainland. In Asia, the same depths are at a much greater distance from the coast; but this is due to the great extent of the shallow banks which connect the recently flooded Malay and East Asian islands with the mainland, and which indisputably should be regarded as a part of the Asiatic continent. The general fact, therefore, is that just after the ocean basin has left the coast and the shallow, newly submerged land, it regularly sinks to a depth of about 2,000 fathoms [3,600 metres], and then forms a mighty, somewhat undulating plain, which here and there lowers large surface areas to almost twice their average depth.

These two clear facts now, 1) that the volume of water in the ocean is 33 times as great as that of the land above sea level, and 2) that the depth of 2,000 fathoms is usually reached at about 100 to 200 miles from the shores of the current or recently existing mainland, are in themselves almost proof of the constant duration of the existing distribution of sea and land in their general aspect, as the following considerations will prove.

It will be admitted that the elevation and subsidence of the Earth's surface go together and always have to stay nearly the same: that the uplift, on the whole, cannot be much more greater than the reduction, because, according to the opposite assumption a gap would be left in the interior of the Earth. Now suppose the continent sinks slowly until it is flooded throughout by the ocean while at the same time an approximately equal area of the adjacent ocean basin (to support the most favourable case) rises to the same extent. Because the average height of the land is only about 1,000 feet, then the whole continent, with the exception of the mountains, would soon be submerged, while at the same time only a small part of the narrow strip between the coast and the 1,000-fathom line could rise above the sea, even if the rising area begins along the coastline. If the submergence lasted, only the mountain tops could linger as islands, and a long, narrow strip along its former coast would be all that would have taken the place of the flooded mainland, because an elevation of the sea-bottom of even 10,000 feet over the rest of the area would not add up to the surface area, while over the still greater part of it a depth of several thousand feet of water would still exist. Any further elevation of this oceanic area could not proceed without a corresponding lowering of another part of the land or the sea. It is therefore evident that, unless we make an exception and accept favourable conditions, a whole country, with the exception of the mountain peaks, which would remain as unfertile islands, could disappear under the water, while the corresponding uplifts would diminish the depth of a similar sea area only by 1,000 or 1,500 fathoms.

Conversely, assuming that a section of the bottom of the sea from the average depth of 13,500 feet is lifted so that it forms a new one in the place of a sinking continent, it is quite clear that the old mainland would be long gone before the new could rise above the surface of the sea, and so the terrestrial life of one could not possibly be transmitted to the other. But in order to maintain the uninterrupted continuity of the organic types proven by geological history, the new land should always have arisen, not only in close, but in direct, connection with the old. And this, as proved in the doctrine of reciprocal transition of oceans and continents, has occurred only rarely, if ever, because of the enormous depths of the former compared to the average height of the latter.

Although this reasoning is not proof for the constant continuity of the existing continental and oceanic surface areas, it should prove the other assumption to be extremely unlikely. We now turn to facts which offer us immediate evidence.

The deposits on the coasts and the ocean basin. It is clear that stratified rocks have been formed from masses of sediments; yet it has only been proved in comparatively recent times where these latter are deposited. The numerous deep-sea measurements made in many lakes and seas have given us insight into the deposits now forming at various distances from the land. It has been found that the coarser sediments are formed only near the shore or, if far from it, in places where currents of some known force extend along the bottom. At ever greater distances the material becomes finer and finer, so that we pass from coarse to fine sands, and then to a uniform mud or clay, formed of the smallest particles of silt carried out by the currents into the sea and slowly lowered to the bottom. All these gradations usually occur at distances of 50 to 100 miles, with the finest mud reaching 150 and only very rarely 200 miles from the land, beyond which all silt derived from the continents ceases altogether.

The distances are in a curious way consistent with the varying distances of the 1,000-fathom-line from the shores of all the existing continents, so that generally all stratified deposits in the sea are presently formed inside that line. In inland lakes, where the scree is brought in from all sides, only in rare cases can a larger surface be covered with deposits which have taken place during the same period; the sediment deposited in the ocean, however, will necessarily be confined to large strips or belts which follow the trace of the shore-lines, and alternate in a certain manner in composition and thickness the farther we depart from the land. The varying quantity of water brought down by rivers at different times, the greater or lesser degree of destruction of the coasts during periods of powerful winds, and the distinct power and direction of oceanic currents resulting from periodic winds and other causes, all bring about variations in the quantity and manner of the deposits formed on the sea bottom, causing the widespread appearance of stratification. As soon as we go beyond the narrow boundaries within which stratified rocks are formed, we occasionally find that the bottom is clothed in a very different garment. These genuinely oceanic deposits are chiefly of organic origin, and are interspersed with some meteoric matter, and with a portion of fine continental dust which is carried far away by the wind for a long distance. They form the calcareous and siliceous mud of the deep bottom of the sea; while in the deepest oceanic abysses they are transformed, by the decomposing effect of the abundant oxygen in the extremely dense water, into the red and grey clay we regularly find there. These deposits, of course, will not be stratified, and very seldom will contain any discernible fraction of the silt from which the actual stratified rocks are almost entirely composed.

Now if the view developed here, that our present continents have never been deep seas, is the right one, these oceanic clay and mud masses must not form part of the geological formation series; whereas, according to the opposite assumption, in certain horizons corresponding to those periods of geological history during which every mainland was lifted up from the depths of the sea, they should not only be found, but be widespread, if not general. Geologists, however, have been unable to identify any such deposits among the rocks that they have so thoroughly researched, and this is another great objection to the customarily accepted doctrine.

However, there is an alleged exception to this claim, as many excellent men consider the Cretaceous to be the precise representation of the calcareous globigerina mud of the Atlantic Ocean, therefore taking it as a truly oceanic deposit. Yet the weight of the proof, no less than that of authority, is contrary to this identification. It is not the place to discuss this question in more detail here, but some examples may be given of the reasons upon which the above statement is based.

First of all, John Murray [1841–1914], in his account of the oceanic deposits collected during the *Challenger* expedition, says: "The globigerina-oozes which we get in shallow water resemble the chalk much more than those in deeper water, say over 1,000 fathoms." Then we have the profound analysis of Archibald Geikie, who in his previously mentioned lecture on geographical evolution, where he talks about the chalk, says: "During that time the Atlantic sent its waters across the whole of Europe and into Asia. But they were probably nowhere more than a few hundred feet deep over the site of our continent, even at their deepest part. Upon their bottom there gathered a vast mass of calcareous mud, composed in great part of foraminifera, corals, echinoderms and molluscs. Our English chalk represents a portion of the deposits of that sea-floor." Then we have the statement of two experts on the biological side of the question. The late Samuel Pickworth Woodward [1821–1865], author of the *Manual of Mollusca*, was of the opinion that the ammonites and other cephalopods so abundant in the Cretaceous were limited to a depth of less than 100 fathoms; while John Gwyn Jeffreys [1809–1885], in his address as chairman of the British Association at Plymouth in 1877, says that if we sum up the whole series of molluscs found in the Cretaceous, 71 in number, we find that all are in comparatively shallow-water formations, many of which do not exceed depths of 40 or 50 fathoms, while some are confined to even more shallow waters. In contrast, those species especially characteristic of the deep Atlantic mud are either very rare or completely absent in the old chalk deposits. (A more complete discussion of this question can be found in my *Island Life*, Chapter VI.)

Without further delving into the question, we can conclude with certainty that there is no adequate proof that chalk is an oceanic deposit, and thus we find that the one immediate geological evidence assumed to favour the change of oceans and continental lands is contradicted by some very considerable facts.

The distribution and nature of the stratified rock. Let us now turn from those deposits which form on the sea-bottom to those of which our mainland countries are chiefly composed. Here we find the most striking proof that they were all formed by successive shallow water deposition along formerly existing shorelines. What Archibald Geikie says about this point is so striking and decisive that I have to cite his words. In the lecture mentioned above, he states: "Among the thickest masses of sedimentary rock – those of the ancient Palaeozoic systems – no features recur more continually than the alternations of different sediments, and the recurrence of surfaces covered with well-preserved ripple-marks trails and burrows of annelides, polygonal and irregular desiccation marks, like the cracks at the bottom of a sun-dried muddy pool. These phenomena unequivocally point to shallow and even littoral waters." They occur from bottom to top in the formations, which reach a thickness of several thousand feet. They can only be interpreted in one way, that is, that the formations in question began in shallow waters; that then the area of the deposit gradually fell several thousand feet, but that the rapidity of the accumulation of sediments as a whole kept pace with the subsidence, and consequently that the original shallow-water condition of the deposits was preserved, even after the original sea-bottom had been buried under a large mass of sediment. He also proves that this general explanation applies equally to younger basins. And if we remember the continued alternation of sandstones, slates and coals in the Triassic, the slate filled with ammonite and limestones in the Lias, the shales, clay, sandstones and impure limestones in the oölites, and finally the sand and clay, as well as the ammonite-rich chalks, of the Cretaceous formation, we see that the entire Mesozoic rock presents all the characteristics of bank deposits and, therefore, must have been deposited within the comparatively narrow belt of shallow water, to which those deposits are still confined. The Tertiary basins offer similar, more clearly expressed features, and they have never been regarded as formations of the deep sea, so we can regard Geikie's conclusion as indisputable. It reads as follows: "In short, the more attentively the stratified rocks of the Earth are studied, the more striking becomes the absence of any formations among them which can legitimately be considered those of a deep sea. They have all been deposited in comparatively shallow water."

Thus we see that although many stratified rocks have a thickness of 10,000 feet, they may have been deposited in such a sea, which was never more than a few hundred or a thousand feet deep. The sinking area must have been situated along the shores of a mainland, from whose drainage the deposits were formed; but the mainland itself could not have participated in the subsidence or it would soon have disappeared under the ocean, and from that point on, the runoff would have ceased. The adjoining land is more likely to have risen as the ocean-bed sank, with a steady supply of debris from the denuding of an elevated stretch of land. The very frequent occurrence of high land or a mountain range running parallel to the coast indicates the likelihood that the shoreline may almost coincide with the neutral line between rising and falling land, and that the occurrence of stratified rock at heights of 10,000 feet or more in mountain ranges results from the continuous elevation of an adjacent strip of land to counterbalance the continual subsidence of the ocean depths which must be present while that dense mass of stratified rock forms. The true idea of the growth of a continent, therefore, seems to have been that it has been subjected to long-continued elevation and subsidence in adjacent bounded strips, usually of a linear or ligamentous form, and that the moving areas alternate from time to time such that the whole country has been under the sea during long geological periods, though not a large part of it may have been completely inundated at any time. We can think of the phenomenon as a series of very powerful secular terrestrial waves, which proceed so slowly across the surface that their undulation period must be measured by millions or billions of years,[3] and which follow one another in equal or greater periods with consistency. The direction of these undulations seems to have changed at different epochs, presumably as a result of the rigidity imparted to the Earth's crust by large mountain ranges formed of mighty masses of stratified and metamorphic rock.

This concept agrees well with all the principal facts, especially with the occurrence of marine strata in successive zones across the centres of the largest continents; suggesting that, though every part of such a continent was at one or more periods of geological history under the sea, this sea has always been closely bounded by continental land, from whose effluence the continent's rocks successively separated themselves and formed. In this regard we have another evidence that deserves a brief elucidation.

The wide distribution of freshwater and estuarine deposits. The opinion of geologists is now that a considerable part of the deposits once thought to have originated in the sea really has its origin in freshwater or estuaries. And since such structures occur in every period of geological history and are found widely scattered across all continents that are geologically explored, they provide one more proof, and indeed a very convincing one, for the persistence of land cover in the regions of existing continental lands throughout the geologic periods. It is, therefore, instructive to note the widespread distribution of deposits of the same age which contain numerous remnants of land or freshwater organisms, as it is clear that these show the presence of widespread land surface in present continents during those epochs.

Beginning with the Miocene or middle Tertiary period, we find deposits rich in land animals or plants in Devonshire and Scotland, in many areas of France, in Switzerland, Germany, Croatia, Vienna and Greece; in Asia they have been found in northern and central India and in Burma; in North America there are many on either side of the Rocky Mountains, and they have been encountered in Greenland and several other areas within the Polar circle. Recalling now that such deposits may form only in interior lakes or fluvial estuaries, and that numerous similar deposits must have been destroyed by flooding, or are probably still uncovered because they are hidden under later deposition on the surface, the evidence that we actually possess is just as we must expect it, as soon as we assume that the continents have been in scope and shape in those periods as they are now, though in insignificant geographical particulars they considerably deviate from each other.

If we next go back to the secondary or Mesozoic period, we have reason to believe that an inland sea comparable in size to that of the Mediterranean spread over all of central Europe, and that it deposited those formations now known to us as chalk. However, in the same formation and in the same area we also have sand, loam and marl, and in some of these we find very many land and freshwater remains, as in the rich plant beds of Aachen and the Wealden Formation of England, France, Hanover and Westphalia. These hint at deposition at the mouths of large rivers or at varying distances from land in an inland sea, and indicate the presence of a great continental Europe just as complete as the older Miocene formations. In North America, Cretaceous plant-beds occur in New Jersey, Alabama, Kansas, at the sources of the Missouri, along the Rocky Mountains from New Mexico to the Arctic, in Alaska and California, and in Greenland and Spitzbergen. The older Jurassic limestone formations also provide proof of continental conditions in the "dirt-beds" of the Purbecks with plants, insects and mammals; in the lithographic stone of Bavaria, with fossil birds and insects; in the rich Jurassic flora of eastern Siberia and the Amur valley; in the Wiltshire Forest marble, with ripple-marks, wood and broken shells indicative of an extensive beach; in the oölitic coal of Yorkshire and Scotland; and in the rich Liassic insect deposits of England and Switzerland. The older Triassic formation provides similar evidence with the ancient mammals (Microlestes) of Württemberg, the ferns and conifers of the Keuper and red sandstone in Germany, in the rock salt deposits in England, and in many regions of the continent that must have been formed in inland lakes or seas, and thus point to continental conditions in the same way. In North America there are coalfields from that time in Virginia and the Carolinas, while in both Massachusetts and the Rocky Mountains deposits with remains of land reptiles, amphibians and even mammals occur. Thus, we see that our two great northern continental lands were present throughout the Mesozoic period and were probably just as, or at least as extensive as, they are now.

When we look at the Palaeozoic formations, we find in Perm numerous proofs of continental conditions in coal deposits and layers of fossil plants. These occur in England, France, Saxony, Thuringia, Silesia and eastern Russia. Further back, in the Carboniferous period, we encounter still more widespread signs of ancient land in the well-known coalfields found on all continents. In Europe we find them in Ireland, England and Scotland; in France, Spain, Belgium, Saxony, Prussia, Bohemia, Hungary, Sweden, Russia and Greece; while in Asia they are known to occur in Siberia, Turkey, Persia and many areas of India and China. In North America, they are almost as extensive and widespread, and a real coal formation from this era occurs in southern Brazil. Still further back, the red sandstone of the Devonian period is now generally considered to be freshwater, and it occurs frequently in both Europe and North America, where it often contains freshwater shells, land plants, and even insects; while Andrew Ramsay [1814–1891] believes that he has discovered cracks in the still older Cambrian formation as the mud dried up, as well as the impressions of raindrops.

If we bring to bear the tremendous amount of erosion that these formations must have suffered, we are obliged to believe that the evidence of land surface age that we now find is very rare compared to that which has either been destroyed or buried deep beneath later deposits; and if we add to this the many signs which speak of the deposition in shallow seas within a few miles of the land, both in the mechanical structure of the rock and in its organic remains within the whole series of geological configurations, we shall become convinced that, however imperfect the geological records concerning the living organisms which existed on the Earth are, we may yet deduce from them the great fact of the continual permanence of our continents in their present situations, albeit not without constantly changing outlines and fluctuating distribution of the inland seas and mountain ranges. And this continuance of the continent also signifies the persistence of the great oceans over accumulated geological time; but for this last fact we have another, decisive, proof.

The structure of oceanic islands. The illustrious Charles Darwin [1809–1885] says in his *Origin of Species* [Darwin 1872: 288]:

> Looking to the existing oceans, which are thrice as extensive as the land, we see them studded with many islands; but hardly one truly oceanic island … is as yet known to afford even a remnant of any Palaeozoic or secondary formation. Hence we may perhaps infer that during the Palaeozoic and secondary periods, neither continents nor continental islands existed where our oceans now extend; for had they existed, Palaeozoic and secondary formations would in all probability have been accumulated from sediment derived from their wear and tear; and these would have been at least partially upheaved by the oscillations of level, which must have intervened during these enormously long periods. If then we may infer anything from these facts, we may infer that, where our oceans now extend, oceans have extended from the remotest period of which we have any record; and on the other hand, that where continents now exist, large tracts of land have existed, subjected no doubt to great oscillations of level, since the Cambrian period.

It is impossible to state more clearly the general doctrine of the continuity of continents and oceans than has been done in this remarkable passage, written at a time when the whole conception was so new to most geologists, with Darwin standing alone, that the proof on which it was based had comparatively little weight and was hardly noticed. But as this serves to support and validate a number of other definite proofs, each of which relies upon a class of phenomena, it attains new meaning and serves as one more example of Darwin's wonderful foresight. This proof is all the more complete now, as it can be proved that the rule pronounced by Darwin is absolutely without exception. New Zealand is not an oceanic island, but, as shown in my *Island Life* (Chapter XXI), essentially continental in its character; so the Seychelles Islands are undoubtedly an ancient part of the great continental island of Madagascar; while Rodriguez – the only island believed to be an exception to the rule – was found by the naturalists associated with the expedition that observed the passage of Venus across the sun to be formed entirely of volcanic or coral rock.

Importance of the doctrine of the continuous placement of the continents. Now that we have completed our sketch of the evidence accumulating from different sources for the general continuity of the continents and oceans during known geological time, it is merely superfluous to consider their importance as a fact, as a definite starting-point for any study of the past history of the Earth, be it physical or biological. From this point of view, the currently evident distribution of water and land on the globe is a constant feature throughout geological history, not a mere coincidence of the time in which we live, and has determined the climatic conditions of the Earth and the different parts of it. So long as it was assumed that the possible changes in the distribution of land and water in past ages had no limits, all attempts to ascertain the geographical and physical conditions of geological periods were hopeless because of the vast sea-area on which, according to this doctrine, continents, for whose existence we had not received proof, may have been present at any time. This complete uncertainty about the condition of so great a part of the surface of the Earth would completely throw doubt on anything we could attain from that little part where actual knowledge is possible.

But if, as is stated here – and we dare to believe has been proved – that the change of land and water has always moved strictly within the limits known to us, we shall feel ourselves encouraged to use the knowledge that geology is granting to determine the geography of the Earth's surface in successive periods. In this experiment, the facts of the geographical distribution of the organisms will be very helpful to us, since we often experience the period through them, in which separate countries or seas were at last united; and we are also supported by knowledge of the formation of the bottom of the sea, as it serves to approximate the site of the flooded countries. An application of these principles on one of the most difficult problems in geographical biology – the origin and the relationships of the fauna and flora of New Zealand – has been undertaken by myself in my work *Island Life*.

Another problem that we can hope to solve by starting with this fact is that of geological climate. The great importance attached to the establishment of land and water, and especially to the direction and force of ocean currents in determining climate, is now generally acknowledged. Both, we believe, can be approximately determined for many geological periods if we accept the general insistence of that distribution of land and water that prevails today; whereas according to the opposite doctrine – of the indeterminate alternation of oceanic and continental realms – any such attempt is utterly hopeless.

Finally, I would like to emphasize that the view advocated here is strikingly consistent with the uninterrupted continuity that seems to have marked the development of life on Earth. In like manner, that equally remarkable permanence of climatic conditions throughout the whole of geological time, except for where the last consolidation of the great northern continental lands and the final closure of the warm waters of the North Pole area, with the exception of one important tributary, made possible the onset of the great Ice Age. With indefinite change in the continent and oceans, it would be almost impossible for such uninterrupted continuity to have taken place. Instead of the extensive geographical distribution of organisms, which so clearly characterizes the earlier geological periods, we would then have to expect a greater variety, since where continents were often completely isolated and submerged, each of them would lead to a particular series of development from very remote points of departure. The phenomena presented by the propagation of living animals, as well as those of their geological order and distribution in the past; their own characteristic features, and the distribution of the sediments settling to the ground on all the existing continental lands – they all plainly tell us that these continental elements are all parts of the original skeleton of the dry land of our globe, that they have undergone development and growth, and have undergone many formal changes, but that they have never been completely destroyed during the long period of time which the geological record comprises.

Alfred R. Wallace.
(Irith [*sic*: Frith] Hill Godalming.)

Die Permanenz der Continente und Oceane. 51

sehr entlegenen Ausgangspunkten aus geführt hätte. Die durch die Verbreitung lebender Thiere dargebotenen Erscheinungen, sowie jene ihrer geologischen Reihenfolge und Verbreitung in vergangener Zeit; die eigenthümlichen Merkmale und die Vertheilung des sich zu Boden setzenden Gesteins auf allen vorhandenen Festländern — sie alle sagen uns deutlich, daß jene Festländer Theile des ursprünglichen Skeletts des trockenen Landes unseres Erdballs sind, daß sie eine Entwickelung und ein Wachsthum durchgemacht haben und vielen Formveränderungen ausgesetzt gewesen sind; daß sie aber während des langen Zeitraums, den die geologischen Urkunden umfassen, niemals gänzlich vernichtet worden sind.

Alfred R. Wallace.
(Irith Hill Godalming.)

Figure 3. Concluding text of Alfred Russel Wallace's 1882 essay "Die Permanenz der Continente und Oceane", published in *Auf der Höhe*, January 1882 (courtesy of Indiana University).

Your short guide to the EUP Journals Blog http://euppublishingblog.com/

A forum for discussions relating to [Edinburgh University Press](#) Journals

1. The primary goal of the EUP Journals Blog

To aid discovery of authors, articles, research, multimedia and reviews published in Journals, and as a consequence contribute to increasing traffic, usage and citations of journal content.

2. Audience

Blog posts are written for an educated, popular and academic audience within EUP Journals' publishing fields.

3. Content criteria - your ideas for posts

We prioritize posts that will feature highly in search rankings, that are shareable and that will drive readers to your article on the EUP site.

4. Word count, style, and formatting

- Flexible length, however typical posts range 70-600 words.
- Related images and media files are encouraged.
- No heavy restrictions to the style or format of the post, but it should best reflect the content and topic discussed.

5. Linking policy

- Links to external blogs and websites that are related to the author, subject matter and to EUP publishing fields are encouraged, e.g.to related blog posts

6. Submit your post

Submit to ruth.allison@eup.ed.ac.uk

If you'd like to be a regular contributor, then we can set you up as an author so you can create, edit, publish, and delete your *own* posts, as well as upload files and images.

7. Republishing/repurposing

Posts may be re-used and re-purposed on other websites and blogs, but a minimum 2 week waiting period is suggested, and an acknowledgement and link to the original post on the EUP blog is requested.

8. Items to accompany post

- A short biography (ideally 25 words or less, but up to 40 words)
- A photo/headshot image of the author(s) if possible.
- Any relevant, thematic images or accompanying media (podcasts, video, graphics and photographs), provided copyright and permission to republish has been obtained.
- Files should be high resolution and a maximum of 1GB
- Permitted file types: *jpg, jpeg, png, gif, pdf, doc, ppt, odt, pptx, docx, pps, ppsx, xls, xlsx, key, mp3, m4a, wav, ogg, zip, ogv, mp4, m4v, mov, wmv, avi, mpg, 3gp, 3g2***.**