North American Deserts: Discussion

Author(s): Captain Lyons, Francis Darwin, A. C. Seward and Douglas Carruthers

Source: *The Geographical Journal*, Vol. 39, No. 2 (Feb., 1912), pp. 120-123

Published by: geographicalj

Stable URL: <http://www.jstor.org/stable/1778562>

Accessed: 09-05-2016 00:58 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at
<http://about.jstor.org/terms>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

The Royal Geographical Society (with the Institute of British Geographers), Wiley are collaborating with JSTOR to digitize, preserve and extend access to *The Geographical Journal*

and dissecting the *bajadas* and filling up the basins to overflowing. Some plants of the desert types would survive on the drier slopes in the sunniest exposures.

The observer who examines a region for evidences of climatic variations of the kind indicated might see the upper portions of detrital slopes hanging to the mountain bases, as well as dissected *bajadas*, saline and wind deposits exposed by stream action in a humid climate. In a desert region, the terraces of lakes and streams, traces of ancient stream flow, remains of human habitations and desiccated plant remains might be taken together as indicative of conditions prevalent in times past. The structure of the great trees of California, which reach ages of twenty to thirty centuries, have been recently examined by Professor Huntington, and it seems probable that when corrections for age and locality are applied to the measurements of the annual rings, some evidence of value as to climatic fluctuations may be obtained. The completion of the computations will be awaited with much interest. A discussion of this and other phases of the problem as to climatic fluctuations lies without the scope of this paper. My present purpose has been to describe and define some of the meteoric, hydrographic and organic agencies, which interlock to make the complex and distinctive conditions of the desert.

The PRESIDENT (before the paper): The reader of the paper to-night, Dr. MacDougal, is a graduate of two American Universities, and has held various appointments. He was Assistant Director of the Botanical Gardens in New York for six years, and is now Director of the Desert Laboratory which has been established in Arizona by the Carnegie Institution of Washington. He has been engaged in exploration and other geographical work in the deserts of North America during the past twenty years, and some of the results of his work he will present to us in the paper we are to listen to to-night. He is the author of several works on his own subject, which is botany, and of various scientific papers. He is a botanist by training, but his desert researches have led him to give very close attention to the geographical conditions affecting botanical distribution. The Carnegie Institution of Washington with which he is connected was founded by Mr. Carnegie in 1902, and its purpose of research has been carried out by the organization of facilities for investigation in various fields which might not be readily occupied by members of University Faculties with the opportunities usually available to them. Many eminent scientists have been brought into connection with the Institution as research associates, while special staffs have been called together to co-operate in seeking the solution of closely related problems, such as those grouped in the programme of the Solar Observatory; the results of the extended surveys of the Department of Terrestrial Magnetism are also probably known to many members of the Society. These are the credentials of the distinguished gentleman whom I will now invite to address you.

Mr. GODFREY SYKES (after the paper): I am sure that Dr. MacDougal has left but little more to be said, but there is one point which he has touched upon which I should like to emphasize a little more. The desert regions in Western North America are a series of more or less isolated areas, extending generally in a north and south, rather than an east and west, direction. In other words, their existence depends not so much upon latitude as upon mountain slope and aspect. The

range of mountains extend in general in a direction west of north and east of south, or roughly parallel to the western coast-line, and quite frequently present a very abrupt face to the east.

The most intense desert conditions exist, as Dr. MacDougal has already pointed out, immediately to the eastward of these mountain ranges, and will gradually become less intense, and merge into a region in which vegetation can more easily exist as one passes from the vicinity of the mountain and out into the plain.

This is true of nearly the whole western slope of the continent, until one approaches the crest of the main divide; when the increased elevation and consequent precipitation more than compensates for the dryness due to the lower western barriers.

The plains of the great interior basin, which extend from the mountains eastward to the Missouri river, were also spoken of by the earlier voyagers across them as the "great America desert," but this was perhaps due in the main to their own lack of experience in such a region, and also to the fact that their equipment and technique of travel and camp was not fitted for such a journey, and so they frequently underwent great hardship in getting across.

The so-called desert area in the west has, however, gradually diminished to such an extent, and the remainder is becoming so well known, that we are at present extending our search for typical arid areas further afield, and are at present *en route* for Egypt in quest of a real desert.

Captain LYONS: The wearisome monotony of desert scenery is that on which in most cases stress is laid by those who travel in deserts, but I think all have realized to-night that there is a great deal of information and interest to be extracted from even the most arid desert. What interests me personally so much is to see that in these American deserts almost every feature, every phenomenon that I am familiar with in the deserts of Egypt, is repeated here again, as is natural, since under the governing conditions of a very scanty rainfall, a great range of temperature, and an area where wind action has full play, the results in all arid regions are naturally very much of the same type. Dr. MacDougal has perhaps chosen his photographs so as to show areas where vegetation is best developed; I do not know, but from the Egyptian point of view, I regard the vegetation we have seen in his lantern slides as almost excessive for a desert, though perhaps I should rather compare them with the eastern desert of Egypt, to the east of the Nile, where there are high ranges of mountains, and where the conditions in their valleys are perhaps more akin to those which he has shown us than in other parts. In the western desert, towards the western oases, except in the oases themselves, there is vegetation here and there, but it is very scanty indeed and hardly to be seen in most photographs of the desert surface that are taken. The western desert, I believe, will interest Dr. MacDougal extremely, from that point of view of its extreme aridity; also I hope he will have time to visit the shores of the Birket Qarun in the Fayum depression, where there has been a sinking lake-level since the Middle Kingdom of Egyptian times, and where he will see those features that he has shown us round the Salton lake very well shown by the vegetation round the present lake margin.

Mr. FRANCIS DARWIN: Dr. MacDougal has given a most vivid and interesting account of the American deserts, and has incidentally demonstrated the value of his desert laboratory for ecological and physiological work in botany. I have one question to ask. Dr. MacDougal referred to Fitting's interesting work on desert plants with high osmotic pressure. Fitting describes certain plants

No. 11.—FEBRUARY, 1912.]

K

which no one would imagine could exist in a desert, they being neither of the succulent nor of the spiny type. They had broad flat leaves with a delicate cuticle and unprotected stomata, so that they were absolutely of the non-desert type. Yet they lived in the very dry country near Biskra, and they did so entirely by possessing a high osmotic pressure which enables them to tear the water out of a soil so dry that it baffles the ordinary plant. I should be glad to know whether this type has been found in America.

Prof. A. C. SEWARD: I am glad to take this opportunity of expressing the great pleasure that it has been to me, and I am sure to many other botanists here, to have heard Dr. MacDougal's lecture to-night. For some time past English botanists have watched with very great interest the work which has been going on in the Desert laboratory. To-night we have had brought home to us much more vividly than is possible in a written account the enormous interest and importance of the work which has already been done and is still in progress. One aspect of the lecture which especially interested me is the striking illustrations which Dr. MacDougal's account of his work has given of what he calls the conjunction of sciences; the research that is being done in the Desert laboratory throws light not only on purely botanical questions, but also on geological and many other problems. Those who are more especially interested in studying the plants of past ages endeavour, so far as they can from the available data, to find out something of the changes through which different parts of the world have passed—changes such as are registered in the different kinds of plants preserved as fossils. New observations on desert vegetation such as have been outlined this evening afford very important evidence from this point of view.

Mr. DOUGLAS CARRUTHERS: If Dr. MacDougal wants to see a real desert, he must go to Arabia. I assure him he can travel there for two weeks at a time and see nothing but black stones—no vegetation whatever. Listening to his paper on the extremely interesting data which he has collected, naturally makes one rather eager that the work should be continued across the arid regions of Central Asia—the very home of arid desert and isolated inland drainage. During a recent expedition I touched on no less than ten of these isolated inland drainages, and found them full of interest. The basin of the sea of Aral, for instance, has, I believe, a total rainfall of about 4 inches; but the sea of Aral takes something like 2500 cubic metres per second of water from the great rivers, the Oxus and the Daria, yet the whole of this water is taken up by evaporation; so I think the evaporation probably in Central Asia is greater than what it is in America. His remark on the adaptability of man and animals to the waterless surroundings is also of great interest, and corresponds exactly with what I noticed in Arabia. I repeatedly came across large antelope, which exist in a country which is entirely rainless for ten months of the year, and there is no possible chance of its getting water for ten months out of the twelve, except small juicy desert plants which they dig up out of the sand, and I believe, in the Sahara, antelope lives in the same way. In the Kalihari desert, in South Africa, the Bushmen are supposed to exist for a considerable time on small water melons which grow there. If Dr. MacDougal has a chance of visiting Central Asia and Arabia, he will find them of surpassing interest.

The PRESIDENT: I am sure you will wish before we separate that I should express your thanks to Dr. MacDougal for his lecture. It was a most interesting paper delivered in a very pleasant style, illustrated by excellent slides and characterised by an agreeable and strictly American flow of humour. I agree with the last speaker, knowing something of the deserts of Central Asia myself. When Dr. MacDougal has exhausted the deserts of Egypt, or rather, when they

have exhausted him, I hope he will move on to Central Asia; and certainly, having seen some of the deserts there, I can promise him something compared with which his pictures of the outlook from the Desert laboratory which he himself inhabits in Arizona, suggest a perfect garden of Eden. There was one other feature of his lecture which impressed me strongly; it was this. It is one of the privileges of the President of the Society to have placed in his hands a printed copy of the lecture which the hero of the evening is about to deliver. I had my copy of Dr. MacDougal's lecture, and satisfied myself that it would be most striking and erudite. But when I came here, I found that Dr. MacDougal, captivated by his own slides, delivered an entirely different lecture. Therefore I must congratulate the Fellows of the Society, because alone to-night, so far as my own experience extends, we have succeeded in obtaining two lectures from the same man. First, there was the address which Dr. MacDougal delivered to us just now; and later on, when the original essay appears in type, imagine the elation of every one when he finds he has secured a second lecture for the same money.

VOLCANIC CRATERS AND EXPLOSIONS.*

By TEMPEST ANDERSON, D.Sc.

THE subject of Volcanoes naturally divides itself into two branches—the Physiographical, or naked-eye one, and the Petrological, which latter deals with the chemical and microscopical structure of the rocks produced. This branch has by itself provided the subject of life-studies by such men as Sorby, Bonney, Teale, in this country, to say nothing of foreign investigators almost equally distinguished; but it is extremely difficult and complicated, and I do not propose to discuss it to-night.

The other branch deals with the physiographical phenomena of volcanic cones, craters, and lava streams; with deposits of pumice, tuff, ash beds; with dykes, sills and intrusive sheets, their structure and mode of production, and their alteration by weathering and other forms of denudation. It may fairly be included in physical geography, and is, therefore, suitable for consideration by this Society. Even this is far too large a subject to be dealt with in a single lecture, so to-night I shall confine myself chiefly to one division of it, viz. Craters and Explosions, and only mention the other branches incidentally and by way of illustration.

If we watch most volcanic eruptions, small enough to be safely approached, such for instance as that of Vesuvius in September, 1898,† we see a discharge from the crater of vast quantities of dust and ashes suspended in steam and various volcanic gases,† while lower down the cone is a discharge of lava, building up in this case a hill, Colle Umberto primo.

These mark two very distinct factors, and according as one or other predominates, the eruption may be classed as of the explosive or effusive type. Thus the eruption of the Soufrière in St. Vincent in 1902 was wholly explosive, no lava being discharged, while in those of the Hawaiian and

* Royal Geographical Society, November 20, 1911.

† Slide shown.