

neglected the old; and whether a combination of what is sound and true in both may not rather be needed in order to attain the whole truth. It is doubtful whether supply does not react upon demand as much as demand on supply; whether the consideration of disutility, implied in the conception of cost of production, is not equally important with that of utility, and equally deserving of distinct investigation; whether, in fine, the efforts and exertions of producers to supply wants are not as potent a factor in advancing civilization, and as creative of new wants, as the pressure of wants and desires themselves. The Austrian writers allow so much—though perhaps they here exhibit some lack of distinct statement—to the influence of “cost of production,” that they might, it would seem, go a little further, and place it on an equality with the principle of marginal utility. They would then, perhaps, recognize what Prof. Marshall, in his broader, and, as it appears to us, more philosophic, exposition of value, calls the fundamental symmetry of the laws of the forces working on both sides, which is exhibited in the analogy between “marginal utility” and “marginal cost of production,” and a law of “diminishing returns” and one of “decreasing utility.” They would, in short, without sacrificing altogether the vast amount of trouble bestowed by Ricardo and his followers on one side of the problem, assign a proper, and not an exclusive, emphasis to the side which they had themselves done so much to elucidate. For these reasons we consider Mr. Smart’s modest conclusion—that “the last word on value has not been said by the Austrian school”—to be as sound and as pertinent, as his exposition of their views is clear, pointed, and suggestive.

#### OUR BOOK SHELF.

*Across Tibet.* By Gabriel Bonvalot. Translated by C. B. Pitman. Two Vols. (London: Cassell and Co., 1891.)

AFTER the return of M. Bonvalot and Prince Henry of Orleans from the East, so much was said of their journey that we need not now repeat any of the details of M. Bonvalot’s narrative. It may suffice for us to commend the book very cordially to the attention of readers who like to wander in imagination with travellers in remote parts of the world. M. Bonvalot, as his translator says, has those qualities of courage, self-command, tenacity, knowledge of human character, and good humour, which go to make up the successful traveller; and he writes of his achievements so simply and naturally that there is nothing to interfere with the reader’s full enjoyment of his story. The travellers, as everyone interested in geographical exploration will remember, started from the frontiers of Siberia, and in the course of the journey which brought them to Tonquin passed right through Tibet. Their route lay to some extent over ground which no European had ever before traversed, and this is, of course, the portion of his subject on which M. Bonvalot writes most carefully and effectively. The work has been translated in a clear and pleasant style, and it is enriched with many interesting illustrations.

*Light.* By Sir H. Trueman Wood. “Whittaker’s Library of Popular Science.” (London: Whittaker and Co., 1891.)

WE have here a popular and interesting account of many of the facts relating to the nature and properties of light. The subject is treated in a way that will induce many readers to glance through its pages, even if they do not

more carefully peruse it; while many a more advanced student will read the chapters on double refraction and polarization, lenses, and interference and refraction. Of other points touched on, we may mention spectrum analysis, optical instruments, chemical effects of light, fluorescence and phosphorescence—all of which are delightfully treated by the author.

In the appendix will be found a list of the more elementary and popular works on the subject, which should prove useful to those who wish to extend their knowledge.

#### LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

#### Opportunity for a Naturalist.

WILL you allow me to say that the letter which you kindly inserted under this head in your issue of December 24, 1891 (p. 174), has brought me many replies? After considering them, I have made arrangements with Mr. O. V. Aplin (member of the British Ornithologists’ Union, and author of “The Birds of Oxfordshire”) to proceed to Uruguay in August next. Mr. Aplin will reside for six months on an *estancia* in the province of Minas, and devote himself primarily to birds, but will also collect insects and plants.

P. L. SCLATER.

3 Hanover Square, W.

#### Dwarfs and Dwarf Worship.

IN the slow course of post in this Protectorate I have just received copies of the *Times* of September 3 containing Mr. R. G. Halliburton’s paper on “Dwarf Races and Dwarf Worship,” and of September 14 and 22, containing subsequent correspondence on the same subject. Having crossed the Atlas Mountains at several different points, and approached the district which is indicated by Mr. Halliburton as the original home and hidden sanctuary of his diminutive and venerated people, I have read his paper with much interest and may perhaps be permitted to criticize his conclusions. My chief during my expedition to Morocco, that distinguished traveller Mr. Joseph Thomson, is, I believe, at present in Katanga, and therefore more inaccessible than I am; but when he is able to speak on the subject, his judgment on the case which Mr. Halliburton has very elaborately set up will not, I am confident, be different from mine.

Mr. Halliburton begins with a statement that is at once startling and decisive. The information he has collected puts it, he says, beyond question that there exists in the Atlas Mountains, only a few hundred miles from the Mediterranean, a race of dwarfs only 4 feet high, who are regarded with superstitious reverence or are actually worshipped, and whose existence has been kept a profound secret for 3000 years. Such an emphatic assertion ought to rest on clear and irrefragable evidence; and I read Mr. Halliburton’s paper in constant expectation of the proofs of his remarkable discovery, but reached the end of it without coming on a shred of testimony in support of his contention, of the slightest value to anyone acquainted with Morocco and the Moors. The paper is highly discursive, and abounds in what seem to me far-fetched and irrelevant speculations, on the connection between ancient Moorish poems and Greek mythology, on the derivation of the Phœnician deities, and on the meaning of Moorish habits and customs; but the only evidence, confirmatory of its thesis, adduced in it and in Mr. Halliburton’s subsequent letters, amounts to this: that six Europeans have seen dwarfs in Morocco; that an indefinite number of natives have romanced about dwarfs in their usual way; that there are in Morocco artificial caves—presumably dwellings—of such small size as to suggest that they must have had very short inhabitants; and that there have come down to us from antiquity traditions as to Troglodytes who dwelt in the Atlas Mountains.

Mr. Halliburton’s European witnesses are unimpeachable; and had my friend Mr. Hunot, whose knowledge of the country is extensive and accurate, distinctly said that there is a race of dwarfs in Morocco, I should not have ventured to con-

tradict him. But all that Mr. Hunot says, in the long paragraph quoted from his letter, is that he recollects an adult dwarf of about the height of a boy of ten or eleven years of age who lived and died in Mogador. All that Captain Rolleston says is that he saw in Tangiers a dwarf of about thirty-five or forty years of age 3 to 4 feet in height, and of an unusually light complexion. All that Mr. Carleton says is that he has seen a dwarf at Alcazar. All that Sir John Drummond Hay says is that he hunted up at Tangiers some Sus and Dra people who had seen dwarfs. All that Miss Day says is that she had done the same at Telmen. All that Mr. Harris says, of his own knowledge, is that he has seen two dwarfs—one at Fez, about 4 feet 2 inches in height, and of a light brown colour; and the other, about whom no particulars are given, somewhere in the country. All that Miss Herdman, whom I had the pleasure of meeting at Fez, says is that she has never seen a dwarf in Morocco, but that she has heard of one, and has drawn out tales about a tribe of dwarfs from her native servants. All that Mr. Halliburton himself says to the point is that he has seen and measured a very timid and obliging dwarf of about thirty years of age, 4 feet 6 inches in height, and of a peculiar reddish complexion, in Tangiers.

Let me add to Mr. Halliburton's list of European witnesses. I have myself seen two dwarfs in Morocco—one in Fez, and the other in some northern town (I cannot for the moment recollect which, and have of course no papers to refer to). The first of these might perhaps have passed as a true dwarf—a man of small size, but well proportioned, like Tom Thumb; but the other was certainly a disease-dwarf, with a large unshapely head and trunk, and little bowed legs, like Canny Elshie, or the Wise Wight o' Mucklestane Moor. Rickets are not unknown in Morocco. I have no doubt that that malady is common in certain districts periodically visited by famine or devastated by war, and in which infant feeding is not conducted on scientific principles; and the probability is that men and women of stunted and distorted growth are more numerous in proportion to population in Morocco than they are in England. The wonder is to me that the number of instances of the occurrence of dwarfs in Morocco, which Mr. Halliburton in his long-continued researches has been able to establish, is so exceedingly small; and that one dwarf, for example he of Fez, has, like a stage army, to do duty several times over. But had he succeeded in identifying ten times the number of dwarfs that he has actually traced out, he would only have proved that dwarfs exist in Morocco as in all other countries, and would not have advanced a step towards proving his proposition that there is a tribe of dwarfs in the Atlas. I know a little Scotch town in which there are three dwarfs; but it would be scarcely legitimate to infer from that fact that there is a concealed clan of MacManikins in the Grampians. That the dwarfish condition in the dwarfs described by Mr. Halliburton was an accidental variation, and not a racial characteristic, is rendered more than probable by the fact that two of them—the only two who are reported to have had families—had offspring of normal stature.

The native reports about dwarfs and dwarf tribes, which Mr. Halliburton sets forth in much detail, are obvious fictions—of the kind which the professional story-teller pours forth copiously every day in the Soko in scores of Moorish towns and villages, only adapted, of course, to the requirements of an eager English listener. The names of the reporters are not given, nor are the opportunities they possessed of obtaining the information they convey explained; while some of the practices they attribute to the dwarfs—such as finding of treasure by writing on wood, and the feeding of horses on dates and camels' milk with the view of rendering them swift of pace—I have heard ascribed to tribes in the Atlas that are certainly not composed of dwarfs.

Morocco is the hot-bed of fable, and infested by the cock-and-bull, and I can picture to myself the grave delight with which the natives questioned by Mr. Halliburton would stimulate his curiosity and then satisfy it. Mr. Halliburton emphasizes the fact that he is a Q.C., and accustomed to cross-examination; but British perjury and Moorish mendacity have little in common, and are to be fathomed by entirely different methods. The way in which he measured the Tangiers dwarf, Jackin (he actually took 2 inches off his height because a native who was present told him that Jackin had raised his heels to that extent while being measured), casts some doubt on his powers of observation; while the extracts from his diary show that no process of sifting has been carried out, but that everything favourable to his theory has been thankfully received. I

would undertake to collect in Morocco in a month's time native testimony in support of the existence of a tribe of giants in the Atlas, or of a tribe of men with six digits on each hand, quite as specious and convincing as that which Mr. Halliburton has accumulated in favour of the existence of a tribe of dwarfs. Even if the natives interrogated by Mr. Halliburton had no wish to deceive or to please him, much would depend on the intelligence and honesty of his interpreter, and on the exact terms employed. Only those who have tried can realize how difficult it is to get precise information on any subject out of natives of Morocco.

If the caves in Morocco are to be regarded as at one time the dwellings of dwarfs, then it is clear that dwarfs must at one time have been in complete possession of the country, for such caves are to be found all over it. The most remarkable of them which I have visited at Tassimet, about two days' journey from Demnat—caves which Europeans had never before explored, and which were excavated in a rock by the side of a waterfall—were in many instances too small even for the accommodation of dwarfs; and as they yielded to our digging fragments of bone and of pottery, it seemed probable that they had been places of sepulture and not of habitation. Such caves have also undoubtedly been used sometimes for the storage of grain, like the underground metamors; and the invariable answer returned to our inquiries about their origin was that they had been made by the *Romi*, or Christians. Never on any occasion did I hear them ascribed to dwarfs.

The classical tradition that there were dwarfs in the Atlas is unworthy of serious consideration in the absence of any observation suggesting that it had other than an imaginative foundation. "Nearly all the myths of Greece," says Mr. Halliburton, "are laid in Mount Atlas," and monsters more extraordinary than dwarfs must have dwelt there if these myths are to be received as of historical authority.

I have tried to prove that the evidence given in favour of the existence of a tribe of dwarfs in the Atlas is utterly trivial and untrustworthy; and I shall now endeavour to show that the evidence that can be called to discredit that hypothesis is cogent and convincing. The dwarfs are described by Mr. Halliburton as brave, active, agile, swift-footed, as possessing a vigorous breed of ponies, as experts in the pursuit of the ostrich, and as trading in the Sahara and at Tassamalt. Is it to be believed that being all this, and being very numerous—there are, Mr. Halliburton says, about 1500 of them in Ait Messad, about 1500 at Akdeed, about 1000 at Ait Messal, about 500 at Ait Bensid, and about 400 in three Akka villages—is it to be believed, I ask, that these swarming and enterprising dwarfs would have allowed themselves to be bottled up in a cleft in the Atlas Mountains, so that only half-a-dozen specimens of them have found their way to the great towns to the north of the Atlas, where are to be found numerous representatives of all the other Atlas tribes? Is it to be believed again, that the existence of such a peculiar and notorious tribe, known, Mr. Halliburton tells us, to all Moors, should have been concealed from all the inquisitive travellers who have penetrated into the interior of Morocco, to be revealed to Mr. Halliburton standing at its outer gateway? Leo Africanus, whose account of Morocco is marvellously minute and accurate, and who enumerates its tribes, has not a word to say about dwarfs. De Foucauld, who visited Akka, is equally silent about them; and so is Rohlf, who explored the valley of the Dra. Not one traveller in Morocco has ever heard even a rumour or dark hint relating to them.

Thomson and I spent some months in the Atlas in constant communication with natives of every class, and in all the strange legends, histories, and adventures narrated to us by the camp brazier, in the *fondak* or the *kasba*, there was never a distant reference to a Moorish Liliput; and be it remembered our servants knew that we had a keen eye and ear for curios, human and inhuman. In all our wanderings in the Atlas we never met a dwarf, and indeed, at a great gathering of people at which we were present, at the feast of Aid el Assir at Glawa we were much struck by the height of the men. Mr. Aissa, who is quoted by Mr. Halliburton as having seen one of the tribe of dwarfs east of Demnat, was our interpreter for three months, and conversed with us with the utmost freedom on all conceivable subjects, and he never adverted to this dwarf story. I have had several long talks with Mr. Hunot, whom Mr. Halliburton also quotes—conversations covering a wide range of topics, amongst them the origin of the caves already alluded to—and he certainly at that time had no belief that they had ever



been tenanted by dwarfs, or that there was any dwarf tribe in the country. It is especially noteworthy that Du Bekr, the confidential agent of the British Government at the Court of Morocco, replied to Sir William Kirby Green that no Moor had ever heard of a race of dwarfs in the country. Sir William knew how to interrogate a Moor, and as he accepted Du Bekr's statement, I have no doubt that Du Bekr was speaking the truth.

Until the existence of a race of dwarfs in the Atlas Mountains is proved, it is idle to indulge in guesses at the reasons which have led to the fact of its existence being jealously kept secret; so I shall not follow Mr. Halliburton in the argument by which he seeks to show that the race has been regarded with superstitious reverence, and so kept apart. In all countries, at all times, I believe dwarfs and deformed persons have been looked at askance by the ignorant and superstitious. In Scotland they were regarded as fairies of a brutal and malignant type; and in Morocco I have no doubt they have been credited with the possession of the evil eye and of other pernicious powers. But to maintain that a tribe of them has ever been held sacred and worshipped in the heart of a Mahometan country that is fiercely fanatical is to do violence to our fundamental conceptions of Islam.

Mr. Halliburton's statements about the origin and habits of his supposed tribe of dwarfs are not more worthy of discussion than his theory of the causes which have led to their concealment. They are derived from native sources of the most tainted description, and are either pure inventions, or concoctions of truth and falsehood. We are told that a tribe of acrobats—the Ait Sidi Hamed O Moussa (the tribe of the son of Moses)—is an offshoot of the Aglimien dwarfs, living between the Dra and Akka; that they are a rather small race with a light red complexion; and that dwarfs perform with them in Southern Morocco, but avoid the coast towns where Europeans are; and that they are smiths and tinkers. Now, the paragraph setting forth these statements contains just as much error and confusion as it is possible to cram into so many words. The Sidi Hamed O Moussa are not a tribe at all, but the followers of a saint whose Kuba is not far from Taradant. Their troupes are made up of men drawn from various parts of the country; and it would be as correct to regard the Jesuits as a tribe, and describe their ethnic characteristics, as it is to assign distinctive features to the Sidi Hamed O Moussa. Then, as a matter of fact, they are not unusually small men, they are not smiths and tinkers, and they never have dwarfs performing with them either in town or country. I saw several troupes of them in Southern Morocco, and can testify that they are of average size and of the usual Moorish tint; that they follow a more profitable trade than that of tinkering; and that they have no dwarfs among them.

Mr. Halliburton strongly advises European travellers and tourists to abstain from any attempt to enter the districts of Morocco inhabited by the dwarfish race, as they would inevitably, while doing so, be murdered or robbed, whether Moslems, Jews, or Christians. The advice is judicious, for open-mouthed travellers of any persuasion, in quest of dwarfs, are not unlikely to be murdered or robbed in any part of Morocco except in those coast towns to which Mr. Halliburton has apparently confined his own wanderings in the country. European travellers of another sort, however—resolute, incredulous men, explorers, and pioneers of trade and commerce—will certainly before long penetrate all those regions where the dwarfish race has been located by Mr. Halliburton. Remembering what I have heard on good authority of the resources of some of those regions, and the indications I have seen of the mineral wealth of that region to the south of the Atlas where Mr. Halliburton has placed the original home of his dwarfs, I feel disposed to exclaim, like the old sailor in Millais's famous picture "The North-West Passage": "It can be done, and England ought to do it!" When, however, these regions are opened up, I feel sure that, amongst much that is wonderful in them, there will be found no tribe of dwarfs hemmed in by religious sentiment.

To those interested in the generation and growth of myths in modern times, and under Congress culture, Mr. Halliburton's dwarf-story cannot but afford an instructive study.

HAROLD CRICHTON-BROWNE.

Maclostie Camp, Bechuanaland, November 15, 1891.

#### Sun-spots and Air-temperature.

It is now widely believed by meteorologists that a certain relation exists between the solar sun-spot cycle and the air-tem-

perature of the earth, such that to a minimum of sun-spots corresponds, approximately, a maximum of air-temperature, and *vice versa*. From the comprehensive researches of Dr. Köppen on the subject some time ago, it appeared that this relation is most clearly proved in the case of the tropics, the evidence becoming less as we go north and south. Mr. Blanford showed recently in NATURE (vol. xliii. p. 583) that the evidence in the case of India has of late years greatly increased in force.

In a climate so variable as ours it is not, perhaps, to be expected that the existence of such a relation should be very patent and obvious. And there may be some legitimate doubt whether its existence has yet been demonstrated. It is in the hope of possibly advancing the matter somewhat that the following facts are presented.

If we decide to take for our consideration a part of the year instead of the whole, we shall naturally select the hotter part; the part in which the solar action is greatest (just as we might expect to find, and do find, better proof of the relation in tropical than in cold countries). I select the four months June to September. The data used are, Mr. Belleville's observations of Greenwich mean temperature from 1812-1855, which are, it should be noted, reduced to sea-level (see Quart. Journ. of the R. Met. Soc., January 1888, p. 27), and thereafter the ordinary Greenwich figures. The average difference (about half a degree) does not materially affect the purpose here set.

Taking the mean temperature of those four months, and smoothing the values by means of five-year averages, we get the second, thick line curve in the upper diagram herewith. The dotted line curve is that of sun-spots, inverted (*i.e.* minima above and maxima below). The vertical scales for these are both to the left.

There is evidently a correspondence between these curves as far as about 1870; maxima of temperature lagging a little, as a rule, behind minima of sun-spots, and minima of temperature behind maxima of sunspots. Since about 1870, the correspondence appears to fail. We look for a temperature-maximum about 1879, and we do not find it.

A consideration of the rainfall here seems instructive. The smoothed curve of rainfall in those four months (third in the diagram; Chiswick to 1869, thereafter Greenwich) is, in the main, roughly inverse to the temperature-curve, as we might expect. Yet it is difficult to trace a very definite relation between it and the sun-spot curve. Thus, consider the three most salient "crests" in it. The first (in height as well as time), in 1829, is close before a sunspot maximum, 1830. The second (least salient of the three), in 1861, is close after a sunspot maximum, 1860. The third, in 1879 and 1880, is close after a sunspot minimum, 1878. These rainfall variations, indeed, seem to be under some different law, and it will be observed that the last crest comes (the first example in the whole period) just about where we should expect, from previous experience, to find a temperature-maximum. The regular variation of this curve in one direction for several years is a noteworthy feature recently (in 1880 to 1885, and again in 1885 to 1889). Is the curve now near a maximum which will be found to coincide with a further obliteration of the normal correspondence between sun-spots and temperature?

We have thus far considered the group of four months, and they seem to me to support the view under consideration. May we further look for the relation in individual months?

Suppose we see reason in doing so, and make a selection. The most likely month would perhaps seem to be July, as having the maximum temperature; or June, as that month in which the sun is highest.

On examining the smoothed curves of mean temperature for each of those four months, we find that June and September show a large amount of the correspondence with the sun-spot curve, while the two others do not show much correspondence. These two curves (June and September) are given in the lower diagram, superposed; the two vertical scales being at the left. June, it will be noticed, presents a wave crest fairly corresponding with each of the six, or seven, sun-spot minima. In the case of September there is a pronounced failure at the sun-spot minimum in 1878.

As a possibly good reason why September might show the relation, while July and August do not (or not so well), I would suggest the fact that September is the month with least cloud. Between May and September, cloud increases to a small secondary maximum in July.

The absence of a maximum of temperature in September