

drought are recorded, besides the preliminary drought years of 1557-1558. The fifth will, then, cover the equally well marked cycle of drought, which, beginning in or about the year 1860, has continued with scarcely an exception up to the present."

This was written in 1902, and it is noticeable that, as required by the cycle, the intervening years have proved of normal rainfall in northern China. Proceeding, I stated:—

"We have thus four well marked eras of 29.25 years, the beginnings of which in each case were marked by perfectly similar climatal phenomena, each being characterised as a period of drought in one special locality. It has always seemed to me that meteorologists have been in the habit of excessive generalisation, and that the true way to arrive at the secular variations of climate is to compare all observations made within a limited locality, where the conditions are more or less specialised. The mean rainfall of China, as I remarked at the beginning, would not have afforded the necessary data for such a comparison as I have attempted, the reason being that droughts in north and south China are in effect complementary, and never occur contemporaneously: and herein lies the key to the phenomena.

"According to the accepted theory of the 'monsoon,' it is produced by the excessive heating of the continent of Asia between the degrees of 35 and 45 N.L. which causes the rarefied air to flow off and leaves a partial vacuum to be filled in by moist warm air rushing across the equator. If from any cause the heat radiated from the sun be greater one year than another, the regions where the monsoons are elaborated are raised to a higher temperature, and the force of the monsoon increased, and the warm air carrying an extra supply of moisture is carried further north and spread over a wider area; hence the north of China, the usual limit of the monsoon, is superabundantly watered.

"If, however, the heating of the surface be insufficient to set up the normal circulation, the moisture from the tropics is dumped down in or about the latitude of the Yangtse basin, and mid-China receives a superabundant supply of rain, while the entire north is parched, and famine in one or more province is the result. Hence a wet summer in Shanghai is rarely or never accompanied by a sufficient rainfall in the north."

Similar conditions to a large extent prevail in India, and hence it has happened that the latter third of the last century was a period of drought and famine, which severely taxed the resources of the country. I wound up the note with the following remarks:—"It is not for me to suggest an explanation. But the 29.25 year will probably be found to depend on some hitherto unsuspected cosmical cause."

I do not pretend in this to take any credit to myself for any discovery. My part was confined to drawing up a column of centuries divided into three lines; in one was marked the year, in the second the dates when sun-spots had been observed, and in the third the years when droughts had been recorded in the northern provinces; in each of the latter a dark line was drawn across the column. The result was remarkable at the first glance, the dark lines congregating themselves thickly at the ends of the seventh, tenth, thirteenth, and sixteenth centuries, the rest being almost a blank. Personal experience showed me how the nineteenth century had followed the same rule. Mr. Clough's observations may therefore be looked upon as fully borne out by Chinese records; and it only remains to ascertain the cause of the phenomenon, which has certainly had a very considerable effect on the history of Asia.

I may point out the curious coincidence that the climatic cycle of about thirty-four years seems to agree with three sun-spot cycles, while the greater period of 29.25 would seem to correspond with twenty-seven.

Shanghai, January 8. THOS. W. KINGSMILL.

The Origin of Bronze.

In connection with Prof. W. Gowland's remarks on the origin of bronze in his presidential address to the Anthropological Institute, abstracted in your issue of February 15 (p. 381), it may be of interest to direct attention to the fact that Plutarch, in his "De defectu oraculorum," refers to worked-out copper deposits in the island of Eubœa, from which were formerly manufactured swords

which were "cold-forged" (*ψυχρήλατος*), and in this connection he quotes Æschylus, who mentions a "self-sharpened (*αὐτόθηκτος*) Eubœan sword," self-sharpened meaning, I presume, sharpened without fire. I believe that bronze containing only a small proportion of tin is malleable in the cold, but do not know if this would be the case with that referred to by Prof. Gowland as containing antimony. It would be interesting to know if tin is associated with copper in Eubœa. Swords of pure copper would hardly be of much use.

JOHN W. EVANS.

Imperial Institute, February 23.

Result of War affected by Soldier's Stature.

MR. TWIGG at p. 340 of your issue of February 8 points out that the Japanese had an unquestionable advantage in the recent war, as being smaller than the Russians—they were smaller targets for fire-arms. This is quite correct, but the advantage is inversely as the cubes of their heights, and not as the squares only, which would only apply to plank dummies. Bullets come from all sides, and not from the front only, so that the thickness of the men's bodies must be taken into account as well as their height and breadth. The average targets offered by each to the enemy are (taking Mr. Twigg's figures) as the cubes of 1585 and 1642, or as 106 to 118, an advantage in favour of the Japanese of about 12 per cent., or nearly double that calculated by Mr. Twigg.

W. E. WARRAND.

Westhorpe Hall, Notts, February 24.

TWO BOOKS ON BIRDS.¹

TO watch the ways and habits of birds is a taste which is growing rapidly. Some watchers of birds, indeed, are not content to stop at observing their habits; they want to know how the birds acquired those habits and of what use they are to them. They speculate upon what a certain habit, if persisted in, may ultimately lead to. They wish to know, among other things, how a bird came by its colours, and what purpose in the bird's economy is served by, for instance, the red inside to its mouth, seen only when it gapes. And when careful, minute, and scrupulously accurate observers write down on the spot what they see, or think they see, natural history will always be the richer for their labours; and the theories and speculations which these inquisitors weave from what they have seen and heard cannot fail to prove interesting and suggestive reading.

Mr. Selous, at once the pioneer and the great exponent of this "close observation," who in a former work on bird watching touched upon the birds of the Shetlands, returned to his loved islands two years later, and now gives us a whole volume devoted to their birds and seals. In some three dozen short chapters he discourses, with digressions, delightfully upon his experiences. With the exception of a few "peckings," and minor interpolations—mostly having to do with the working out of ideas jotted down in the rough—the chapters contain his journal, written from day to day amidst the birds with whom he lived without another companion on one or other of these remote islands, "hated by thousands" of birds, and feeling himself the most unpopular person on the island. Nothing more need be said to recommend the book to the notice of those who follow birds in the field. For his digressions, leading him sometimes wide of the subject of birds, the author does not apologise.

¹ "The Bird Watcher in the Shetlands. With some Notes on Seals—and Digressions." By Edmund Selous. Pp. xii+338; with 10 illustrations by J. Smit. (London: I. M. Dent and Co., 1905.) Price 10s. 6d. net. "Nature-Tones and Undertones." Being Sketches of Life in the Open. Illustrated by Photographs from Nature. By J. Maclair Boraston. Pp. 223. (London and Manchester: Sherratt and Hughes, 1905.) Price 6s. net.