

total light of the stars is under consideration), the following table has been constructed from Table I., in order to give the actually-observed light of the stars so far as magnitude 17, the formula being used only beyond this point, where it is quite sufficiently accurate for the purpose. The light is given in terms of the number of first magnitude stars of equivalent intensity. Three very bright stars are given individually.

TABLE II.—*The Equivalent Light of the Stars.*

Magnitude	Number	Equivalent number of 1st magnitude stars	Totals to magnitude
-1.6 ...	Sirius	11	—
-0.9 ...	α Carinæ	6	—
-0.0 ...	α Centauri	2	—
<i>m</i>			
0.0-1.0 ...	8	14	33
1.0-2.0 ...	27	17	50
2.0-3.0 ...	73	18	68
3.0-4.0 ...	189	19	87
4.0-5.0 ...	650	26	113
5.0-6.0 ...	2,200	35	148
6.0-7.0 ...	6,600	42	190
7.0-8.0 ...	22,550	56	246
8.0-9.0 ...	65,000	65	311
9.0-10.0 ...	174,000	69	380
10.0-11.0 ...	426,000	68	448
11.0-12.0 ...	961,000	60	508
12.0-13.0 ...	2,020,000	51	559
13.0-14.0 ...	3,960,000	40	599
14.0-15.0 ...	7,820,000	31	630
15.0-16.0 ...	14,040,000	22	652
16.0-17.0 ...	25,400,000	16	668
17.0-18.0 ...	38,400,000	10	678
18.0-19.0 ...	54,600,000	6	684
19.0-20.0 ...	76,000,000	3	687
All stars fainter than 20 ^m .0		3	690

It appears that the total light of the stars is approximately equal to that of 700 first magnitude stars. Previous estimates of this number have greatly erred on the side of excess (more than three times the present value having been given, though these estimates should be reduced by about 20 per cent. for comparison with the present one, since they have been expressed in terms of first magnitude stars on the visual scale). The present value can scarcely be much affected by our ignorance as to the exact numbers of stars fainter than 17^m, as it is a fairly safe deduction from the above formulæ that the stars fainter than 15^m contribute less than one-eighth of the total light. Indeed, the fainter half of the stars, several hundred millions in number, account for only $\frac{1}{4}$ per cent. of the total light, about equal to that of four second magnitude stars. It may be of interest, in conclusion, to express the total light of the stars in terms of the light of the full moon and of the standard candle; using some Harvard data for the brightness of these two sources of light, it appears that the full moon is very nearly one hundred times as bright as a star of magnitude -6.1, the light of which would equal the combined light of all the stars, while light of the same intensity would be received from an ordinary 16-candle-power electric lamp at forty-five or fifty yards distance.

S. CHAPMAN.

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THE STONE TECHNIQUE OF THE MAORI.¹

THE Maori have long been famous as past masters in the art of working stone, the ornaments and implements of the beautiful nephrite ("jade") of New Zealand being especially noteworthy. It is, therefore, with peculiar pleasure that we welcome the appearance of a monograph which deals in an adequate manner with this important subject; indeed this is the only complete account we have of stone technique in Oceania. The student must not overlook, however, the beautifully-illustrated monograph on "Ancient Hawaiian Stone Implements," by W. T. Brigham (*Mem. Bernice Pauahi Bishop Museum*, vol. i., No. 4, 1902), in which many implements from New Zealand are figured.

The preparation of the present memoir could not have been entrusted to a more competent student, as Mr. Elsdon Best has gained a deservedly high reputation for his intimate and sympathetic knowledge of the ancient lore of the Maori, and for his acquaintance with the literature of all that pertains to New Zealand.

An authoritative account is given of the native terminology for the various kinds of implements and of the stones employed for the blades, as well as of the methods for the manufacture of the ordinary stone tools, the information being culled from numerous published sources and from the natives themselves. There is a certain amount of *tapu* pertaining to the task of cutting nephrite

and no woman was allowed to come near the workers, but there was no *tapu* in connection with the working of any other stone. Holes were drilled in stone by means of the cord drill, but the bow drill (with or without a mouthpiece) and the pump drill seem to have been unknown to the Maori in pre-European times. The same appears to hold good for Polynesia, though it is not easy to see how the pump drill of New Guinea could have been introduced by Europeans. Having chipped and bruised his implement into the desired form,

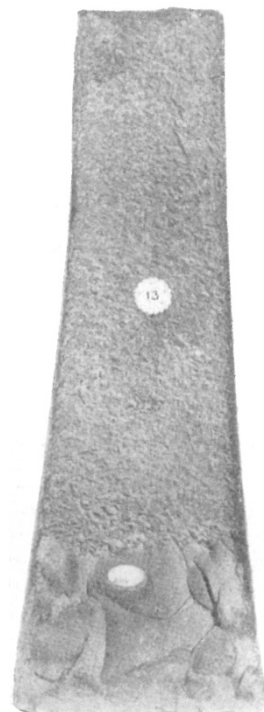


FIG. 1.—Unfinished adze-blade of very fine-grained black aphanite, illustrating the fine symmetrical form attained under the processes of flaking (or chipping) and bruising, without any grinding whatever. The tool could be utilised as an adze if only the lower part of the blade were ground. Length 12½ in. This is also a common Hawaiian type.

¹ Dominion Museum Bulletin No. 4. The Stone Implements of the Maori. By Elsdon Best. (Wellington: J. Macay, Government Printer, 1912.)

the Maori had then to smooth the surface by rubbing it on a piece of sandstone, usually in a longitudinal manner, as he had no knowledge of a rotatory stone for this purpose.

The methods of hafting the implements are described and evidence is adduced to show that, contrary to what was formerly believed, the Maori did use tools helved as axes, but they were not nearly so numerous or commonly used as were tools hafted and used as adzes.

All the available information about nephrite and the tools made from it is summarised by Mr. Best. Many legends have grown up in connection with this precious stone, for this there has been ample time, since "Polynesians, or a mixed people, must have been settled in New Zealand for at least one thousand years, and possibly for a longer period. It is also highly probable that the old-time people of these isles, who here flourished long before the immigration of *circa* 1350, were acquainted with nephrite of the South Island, and also that they worked it to some extent." The memoir is illustrated by fifty-one plates which leave nothing to be desired.

A. C. HADDON.

NOTES.

THE annual visitation of the Royal Observatory, Greenwich, will be held on Saturday, June 6.

THE Faraday lecture of the Chemical Society will be delivered by Prof. Svante Arrhenius in the theatre of the Royal Institution on Monday, May 25, upon the subject of "Electrolytic Dissociation."

DR. ROBERT CHODAT and Dr. Richard Wettstein, Ritter von Westersheim, have been elected foreign members of the Linnean Society. The council of the society has decided to award the Linnean medal at the forth coming anniversary meeting on May 25 to Prof. Otto Bütschli, of Heidelberg.

A REUTER message from Ottawa states that an Order in Council has been passed setting aside as a national park an area of ninety-five square miles situated within the railway belt of British Columbia, in the vicinity of Mount Revelstoke, on the line of the Canadian Pacific Railway. It will be known as the Revelstoke National Park.

THE death is announced, on May 15, of Miss Ida Freund, late staff lecturer at Newnham College, and author of several papers on chemical subjects, as well as of a valuable work published in 1904, entitled "The Study of Chemical Composition: an Account of its Method and Historical Development."

DR. J. C. KONINGSBERGER, director of the Botanic Gardens—'s Lands Plantentuin—Buitenzorg, Java, informs us that the new laboratory for foreign scientific visitors is now open. The laboratory is consecrated to the memory of his predecessor, the late Prof. Melchior Treub, and consequently bears the name "Treub Laboratorium." We are asked to announce that, as hitherto, the director and staff of the gardens welcome visitors, and will do all that is in their power to make a scientific voyage to Java and a stay in Buitenzorg as profitable as possible.

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THE annual meeting of the British Science Guild will be held at the Mansion House to-morrow, May 22, at 4 p.m., the Right Hon. the Lord Mayor presiding. Sir Ronald Ross, K.C.B., will deliver an address, and other speakers will be the president of the guild (the Right Hon. Sir William Mather), Sir Boverton Redwood, Bart., the Right Hon. Lord Blyth, Sir William Beale, Bart., Mr. C. Bathurst, M.P., Major O'Meara, C.M.G., Mr. Alexander Siemens, and Mr. Carmichael Thomas. The dinner of the guild will be held on the same date, at 7 p.m., at the Trocadero Restaurant, under the chairmanship of Sir William Mather.

THE President of the Board of Agriculture and Fisheries has appointed a Departmental Committee to consider and report upon the effect of the present arrangements for the sale of the small-scale maps of the Ordnance Survey. The Committee consists of Sir Sydney Olivier, K.C.M.G., Permanent Secretary of the Board of Agriculture, chairman; Mr. F. Atterbury, C.B., Controller of his Majesty's Stationery Office; and Colonel C. F. Close, C.M.G., Director-General of the Ordnance Survey. Mr. J. L. Bryan, of the Board of Agriculture, will act as secretary to the Committee.

THE young of the grey seal (*Halichoerus grypus*) are stated to differ from those of all other European seals by their inability to swim until several weeks after birth; and as they are born above high-water mark on rocks and skerries in the open sea, they are peculiarly liable to destruction by those acquainted with the haunts and habits of the species. Despite the small value of the pelt of the pup and of the oil of the parent, expeditions have of late years been made to the breeding-places of these seals on the British coasts, with the result that the species is in jeopardy of imminent local extermination. To put matters on a better footing a Bill has been introduced in the House of Lords to enact an annual close time for these seals from October 1 to December 15; it recently passed the third reading in the Upper House.

AT the beginning of this year the *Biologische Versuchsanstalt* at Vienna passed into the possession of the Imperial Academy of Sciences. The institution is for the experimental investigation of organisms, especially experimental morphology and developmental physiology; also of comparative physiology and the borderlands of biophysics and biochemistry. The Academy of Sciences has appointed a committee of trustees for the institution. A limited number of tables is exempt from fees, and may be awarded by the director of the Anstalt or directors of its departments. The Austrian Ministry of Education has reserved four tables of which as a rule one is to be awarded in every department. Applications for research tables may be addressed to the director of the Anstalt, or to one of the following directors of departments:—*Botany*, W. Figdor and L. v. Portheim; *Physical Chemistry*, W. Pauli (until December 31, 1914); *Physiology*, E. Steinäch; *Zoology*, H. Przibram.

THE annual meeting of the Société Helvétique des Sciences naturelles is to be held at Berne on August