

TABLE I.—Keswick Circle (Lat. 54° 36').

Alignment	Altitude	Azimuth E. of N.	Decl. N.	Object
Circle to Gap (Saddleback-Skiddaw)	2 38	8 25½	37 19	Arcturus rising.
Centre line of chapel to Great Mell Fell	1 42	79 38½	7 6	
Outlying stone to centre of circle	-0 29	64 45½	13 25	May and August Sun.

The Pleiades and Arcturus were the warning stars for the May and August festivals respectively. Of these, the Arcturus alignment is the better preserved, and this gives the date of erection of the circle as about 1400 B.C.

The stones known as "Long Meg and her Daughters" are in the neighbourhood of Little Salkeld, a few miles from Langwalby. There are sixty-eight stones in the circle, and at least one other is buried. The 25-inch Ordnance map gives a fairly accurate plan. The diameters are about 350 feet in an east and west direction, and 305 feet north and south.

Between six and seven hundred yards to the north-east there is a small circle of some 15 feet diameter composed of eleven good-sized stones.

The only shaped stone, Long Meg, is to the south-west of the main circle. It is more than 12 feet in height, and is deeply notched at the top.

The alignments taken were:—

(1) From the centre of the large circle, over a stone which is now recumbent, to a well defined gap on Newbeggin Fell (the only well defined gap on the horizon); (2) from the centre of the large circle to that of the small outlying circle; (3) from Long Meg to the centre of the large circle.

These are dealt with in Table II., and we here also get the date from the Arcturus alignment. This date is 1130 B.C., showing that Long Meg was probably erected after the Keswick circle had fallen into disuse.

TABLE II.—Long Meg (Lat. 54° 43' 20").

Alignment	Altitude	Azimuth E. of N.	Decl. N.	Object
Circle to Gap (Newbeggin Fell)	1 11 20	4 52 20	35 36 35	Arcturus rising.
Large circle to small circle	3 12 0	64 24 40	16 44 35	
Long Meg to centre of large circle	2 40 0	49 37 20	23 53 40	Summer solstice.

Fuller descriptions of the circles, and details of the alignments and the degrees of accuracy to be expected, are given in the original paper in the Proceedings of the University of Durham Philosophical Society. An appendix contains the results of a geological examination of the stones made by Dr. Woolcott. These circles are now brought into line with, and render an additional verification (if such were needed) of, the theories first formulated by Sir Norman Lockyer.

THE FLORA OF SOUTH AFRICA.¹

WHILE ostensibly forming a part of the scientific results of the *Valdivia* expedition of 1898-9, the present volume is in reality much more than this. Indeed, it represents the results of many years of work and experience of the flora of South Africa. For an account of this flora, the editor of these memoirs has been singularly fortunate in securing the cooperation of Dr. Marloth. The author has given to botanists an excellent and comprehensive survey, which for many years must form a standard reference work on

¹ "Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer *Valdivia*, 1898-1899." Edited by Prof. Carl Chun. Zweiter Band, Dritter Teil. Das Kapland, insonderheit das Reich der Kapflora, das Waldgebiet und die Karroo, pflanzengeographisch dargestellt. By Rudolf Marloth. Pp. 436; with 20 plates and 8 maps. (Jena: Gustav Fischer, 1908.) Prices 100 marks and 81.50 marks.

the plant-geography of South Africa. The volume contains a full historical summary of the work of previous investigators and travellers, adds much that is new, and supplies a series of vivid descriptions of the peculiar vegetation of this quarter of the globe.

After giving an account (accompanied by a series of maps) of the various floral regions as suggested by earlier plant-geographers, the author proposes a scheme of his own. This resembles, on the whole, that proposed by Dr. Bolus in 1905, but differs in several essentials from any previous scheme. The following are the larger divisions now suggested:—

- (A) The Cape Province of the South-west.
- (B) The Southern Palæo-tropical Provinces, which include:—
 - (1) The grass steppes of Rhodesia, the Northern Transvaal, part of Natal, &c.
 - (2) The South-eastern Littoral.
 - (3) The forests of the South Coast.
 - (4) The Central Region, including the Karroo, the Karroid uplands, and Little Namaqualand.
 - (5) The Western Littoral.

The essential differences between Dr. Marloth's scheme and earlier ones consist in (a) the more accurate delimitation of the Cape Province, (b) the separation of the forest region of the South Coast from the Cape Province, and (c) the smaller subdivisions which he proposes for the above provinces. Though brief descriptions are given of the others, the only regions treated in detail in this volume are the Cape Province, the South Coast forests, and the Central Region. Each of these may now be briefly noticed.

The Cape Province.—The peculiar systematic character of the Cape flora is, of course, well known. It is exceedingly rich in species, many of which have a very limited range, and includes numerous endemic forms of the orders Proteaceæ, Thymelæaceæ, Ericaceæ, Restionaceæ, &c. The dominant vegetation is a "Macchia," composed of sclerophyllous evergreen shrubs, with small, entire, xerophytic leaves. Mixed with the shrubs, but subordinate to them, are many xerophytic dicotyledonous herbs, together with bulbous and succulent monocotyledons, and many Restionaceæ. This Macchia (see Fig. 1), which somewhat resembles that of the Mediterranean region, forms the real climatic type of vegetation of the Cape region. Other ecological types, e.g. those found in marshes, or on rocky ground, sand dunes, &c., are due to local edaphic influences. The Macchia is typical only where the original vegetation has not been destroyed, and Dr. Marloth is of opinion that if the land were freed from the influence of bush fires and of grazing herds of domestic animals, in fifty years' time it would become entirely covered with a dense, impenetrable Macchia.

Dr. Marloth has explored many of the mountains outside the area of the Cape Province proper, and finds that outliers of the Cape flora occur as "islands" on the higher mountain ridges, both in the Karroo and also in Little Namaqualand. The occurrence of these Cape "islands" is, he considers, largely due to the fact that the ridges are sufficiently high to experience the effects of the rainy south-east winds. Their climate thus more nearly resembles that of the Cape than that of the dry desert plains below them. Besides this, wherever edaphic and other factors permit, there is a reciprocal invasion between Cape and Karroid forms. For instance, even those parts of the Cape region which have the greatest rainfall are not entirely devoid of succulent immigrants from the Karroo. Comparatively few succulents, however, can survive the effects of an exceptionally rainy winter.

The Forests of the South Coast.—Though formerly more extensive, the true forests of South Africa are now practically confined to a small strip of coast-land in the Knysna district. Floristically, the Knysna forests are so distinct from the Cape Province that Dr. Marloth has classed them (for the first time) as a separate region. In this district, where the annual rainfall amounts to some 36 inches, the woodland has all the characters of a typical temperate rain-forest. Epiphytes are common, and lianes are not infrequent. Westwards the forests become more dwarfed, and finally pass into the Macchia of the Cape Province.

The Central Region.—Passing northwards from the South Coast the rainfall rapidly diminishes, and in consequence the country becomes increasingly arid and desert-like. Thus the Central Province (including the Karroo, the Karroid uplands, and Little Namaqua-

into grass steppes, and to the south and west into the richer vegetation of the Cape Province.

The Karroid uplands, which occupy large tracts of the northern part of Cape Colony, are still comparatively little known botanically, except from the collections of Thunberg, Lichtenstein, and Burchall, made more than a hundred years ago. In fact, according to Dr. Marloth, many parts of this region have never yet been visited by botanists.

Ecology.—The chief value of Dr. Marloth's work is on the floristic side of plant geography. He has travelled extensively, and, although many parts of South Africa are still incompletely known botanically, he has considerably advanced our knowledge of plant distribution in this part of the world. But, in addition to this, Dr. Marloth has not lost sight of the ecological point of view. Throughout the work the dependence



FIG. 1.—Macchia from the North side of Table Mountain, showing Protea, Leucadendron, Brunia, &c. Reproduced from "Das Kapland," by Dr. R. Marloth.

land) forms a vast area, over which semi-desert conditions prevail. But the only true desert in South Africa is the narrow strip of coast-line known as the Western Littoral. Elsewhere, the streams arising in the mountains somewhat lessen the severity of the conditions, and even in the "Gouph" we can only speak of a stony semi-desert. The term "Gouph," a word of Hottentot origin, signifying barren, empty, void, is employed to denote the most arid and desert-like part of the central Karroo. The vegetation, for the most part, consists of dwarfed, rounded shrubs, with reduced, often ericoid leaves, and numerous succulent herbs scattered between the shrubs. Here and there, one or the other type of plant is so dominant as to render it possible to distinguish a succulent steppe from a dwarf-shrub steppe, but in general they are mixed. Eastwards the Karroo passes

of vegetation on rainfall (which is nowhere better seen than in South Africa) is emphasised, and rainfall and temperature tables are introduced wherever possible. One very interesting point brought out is the importance, especially at higher altitudes, of moisture deposited on the vegetation from the thick clouds which so often cover and obscure the mountain tops. An apparatus for collecting the moisture precipitated from clouds has been employed on Table Mountain. On one occasion, during a period of six days, this instrument registered a precipitation of 152 mm., while an adjacent rain-gauge only recorded an actual rainfall of 4 mm. The author devotes a special section of more than fifty pages to the "General Ecology of South African Plants." Under this heading are discussed the various growth-forms found in different plant formations, such as annuals,

tuberous and bulbous plants, shrubs, &c. Epiphytes (as is to be expected in a climate of such general dryness) are few, but parasitic phanerogams are abundant. A good deal of attention is paid to the various contrivances for storing water and reducing transpiration. Other matters discussed are insects and birds as agents of pollination, the influence of wind, light, &c. Several curious instances are adduced, especially in the genus *Mesembrianthemum*, of so-called protective resemblance. Though supposed cases of mimicry in the plant kingdom should be received with caution, it must be admitted that the resemblance, both in colour and form, between some of these curious plants and the stones and rocks amongst which they grow is exceedingly striking.

The closing chapters of the volume are occupied by a useful discussion on the affinities and origin of the South African flora in general, and that of the Cape Province in particular. The older theories of Hooker and Wallace, as well as those of later authors, to account for the resemblances between the floras of South Africa, Australia, and temperate South America, are given at some length, and discussed in the light of what is known of geological and climatic changes since the Cretaceous period.

Not the least interesting feature of the volume is a series of short, posthumous sketches of the vegetation of various districts, by the late Prof. A. F. W. Schimper, who was botanist to the *Valdivia* expedition. These sketches, which are marked by Prof. Schimper's usual lucidity, supplement Dr. Marloth's descriptions in many respects.

On p. 188 is a photograph, taken in the Knysna forest district, in which both Prof. Schimper and Dr. Marloth appear. The latter, however, with characteristic modesty, has omitted his own name from the description of the figure. The volume is copiously illustrated by line drawings and photographs. Some of the latter take the form of particularly beautiful heliogravures. There are also a number of useful maps, illustrating the rainfall, geology, and phytogeographical regions of South Africa. Karte 6 would be improved by a clearer method of indicating the regional boundaries.

To sum up, the work presents a most useful account of the present position of geographical botany in South Africa. Its very limitations, particularly in the ecological sections, afford a graphic indication of the enormous (and in many directions practically untouched) field which awaits future investigators.

R. H. Y.

PALÆOLITHIC MAN.¹

RECENT discoveries have filled up to a great extent the gaps in our knowledge of Palæolithic man. The skeleton find in the lower grotto of Le Moustier (Dordogne) in the main confirms Klaatsch's conclusions, based on a comparison of the face-skeleton of the Neanderthal race with that of the present Australians. *Homo mousteriensis* belongs to the older Diluvial race, that is, to the Neanderthal type, not to *Homo sapiens* found in more recent Diluvium. The subject was about sixteen years old probably a male. That *Homo mousteriensis* belongs to the Neanderthal type is further shown by the character of the femur and radius (of which the length is estimated at 195 mm., while the upper arm measures 210 mm.). The Neanderthal race had short extremities, in which fact Klaatsch sees an approximation to the present Arctic races of Mongoloid relationship.

¹ "Recently discovered Fossil Human Remains and their Bearing upon the History of the Human Race," by Moritz Alsberg (*Globus*, vol. xciv., No. 17, May 6, 1909).

Mention must also be made of the extraordinarily massive proportions of the absolutely chinless lower jaw. The knobs on the backs of the incisors recall the Krapina find. All the upper front teeth have much curved roots adapted to the round arching of the upper jaw-bone.

The position of the skeleton at Le Moustier, like that of the find at Grimaldi, proved that Diluvial man buried his dead with care. The posture is that of sleep, with the face turned to the right, and the right arm under the head, which was surrounded by flint flakes. Beside the skeleton were found, in addition to flint implements of the Mousterian type, some of the Acheulean type, among them a splendidly worked "hand-wedge." A mark on the right femur is traceable to burning, but there is no sign of the cannibalism ascribed by Kramberger to Krapina man.

Another important find in France is that of a male skeleton, brought to light by the Abbés A. and J. Bouyssonie and Bardon near La Chapelle-aux-Saints (Corrèze), in an absolutely undisturbed archaeological stratum. The subject is an old man of about 1'60 m. in height. The skull is actually 208 mm. long by 156 mm. broad, that is to say, dolichocephalic, with an index of 75. The height from basion to bregma is only 116 mm. The breadth-height index is 62, far outside the variation in living man. The huge, almost round orbits and very wide nasal aperture agree with what has been noted as very remarkable in skulls of the Neanderthal type. Though the face is defective, its prognathous nature is clear. The mandible is of great dimensions, and in so far as senile atrophy has not produced changes, exhibits a formation which agrees in the main with those of lower jaws from Spy, Krapina, La Naulette, &c. Here, too, we have absence of chin, "negative chin-formation" (Klaatsch). The occipital and temporal regions have Neanderthal characteristics. The old man's grave contained no tools of the Acheulean stage. This fact, and the predominance of reindeer-bones in the grave, would lend some degree of probability to the supposition that La Chapelle man belongs to a rather later cultural phase than Le Moustier man. Both are to be taken as representatives of the Neanderthal type, and as belonging to the Middle Diluvium.

P. Adloff has in several publications dealt with the question as to whether the above physical characteristics comprised under the term "Neanderthal race" represent an absolutely fixed human type, or whether they were subject to variations. As regards differences of dentition in different specimens of the Neanderthal type, he comes to the conclusion that by no means insignificant differences do exist; Krapina man especially exhibits a form sharply distinguished from other representatives of the genus *Homo*. Obviously, in a type like the Neanderthal, scattered over a vast area, and doubtless existing for many thousands of years, certain variations must arise by way of adjustment to different climatic conditions, food, mode of life, &c.

Dr. O. Schoetensack has recently made a notable find at Mauer, near Heidelberg, of a fossil human lower jaw, which he has called *Homo heidelbergensis*. It unites two at first seemingly contradictory qualities: (1) massiveness of the body of the jaw, combined with entire absence of chin-projection, breadth and thickness, and special form of the ascending rami—phenomena usually taken as indicating a development little advanced, so-called pithecoïd qualities; (2) a set of teeth agreeing with that of present man in all essentials, the size of the teeth not surpassing the scale of variation in some still extant primitive peoples (e.g. Australians). No doubt, as Adloff says, the teeth of man are in many respects more primitive than