"Molecular Physics and Sound," and "The First Book of Knowledge."

He was elected a Fellow of the Royal Society of Edinburgh in 1859, and a Fellow of the Royal Society of London in 1873. G. C. F.

THE LONGEVITY OF GREAT MEN[1]

THE conclusion that the intellectual giants of the race are favoured by an abundance of years on the scene of their heroic activity, and are thus further differentiated from their more common fellow-men, seems natural, and has been accepted upon evidence which, in a less pleasing conclusion, would be considered ridiculously insufficient, and even false. The usual method of attempting to answer the question whether great men are longer-lived than others, is to prepare a list of the ages, at death, of a number of eminent men, take the average age, and compare it with a similar average of a number of ordinary men, or even with the average lifetime of the race, and in this way to make the results speak decidedly in favour of the superior longevity of great men. All that such a method can prove (and this it does prove) is that it takes long to become great. It neglects to consider that a select class of men is dealt with, and that, to be even potentially included in this class, one must have lived a certain number of years.

For example: in an article translated in the *Popular Science Monthly* for May 1884, it is argued that astronomers are a long-lived race because the average life-period of 1741 astronomers is 64 years and 3 months. An average human life is only 33 years; but as one cannot be an astronomer before adult life, the author takes the expectation of life at 18 years, which is 61 years, and thus makes an excess of over 3 years in favour of astronomers. He also divides his astronomers into four degrees of eminence, and finds that those of the first rank live longer than those of the second, and they in turn longer than those of the third, and so on, thus implying that the best astronomers are most favoured with years. The true conclusion is, that it takes longer to become a first-rank astronomer than it does to become a less eminent one.[2]

If great men were great from their infancy, and we had the means of ascertaining this fact, the method would be correct. But, as it is, we must define in some way or other what we mean by greatness, and then fix the average age at which it becomes possible to distinguish an amount of talent sufficient to enable its possessor to be enrolled in the ranks of the great as already defined. What is known as the "expectation of life" at any number of years tells the most probable age at death of one who has attained the years under consideration: a comparison of this age with the age at death of great men will decide whether they are longer-lived or not.

The attempt was made to select about 280 to 300 of the greatest men that ever lived.[3] Throwing out about 30 of the doubtful names, there remain 250 men, about whom the statement is hazarded that a list of the 250 greatest men, prepared by another set of persons, will not materially differ from our list, as far as all the purposes for which it is to be used are concerned. From this list I have selected at random a set of men of whom it was probably easy to fix the age at which they had done work which would entitle them to a place on this list, or work which almost inevitably led to such distinction: it is a date about midway between the first important work and the greatest work. The average of over 60 such ages is 37 years; which means, that, on the average, a man must be 37 years old in order to be a candidate for a place on this list. The real question, then, is, How does the longevity of this select class of 37-year-old men compare with that of more ordinary individuals? The answer is given by the expectation of life at 37 years, which is 29 years, making the average age at death 66 years. And this is precisely the age at death of these 60 great men; showing, that, as a class (for these 60 may be considered a fair sample), great men are not distinguished by their longevity from other men.

Further interesting conclusions can be drawn if we divide the men into classes, according to real psychological and physiological differences in the ways of manifestation of the several kinds of genius. It is almost surprising how well the ordinary trinity of faculties—intellect, emotions, and will—accomplishes this purpose. Greatness seems to appear either in a brilliant thought, a deep feeling, or a powerful will. Under men of thought would be included philosophers, scientists, historians, &c.; under men of feeling, poets, musicians, religionists, &c.; under men of action, rulers, commanders, statesmen, &c. Before comparing the relative longevity of these three classes of men, I assure myself that the period at which greatness begins to be possible does not materially differ[1] in the three classes, and, as was done in the former case, I exclude all cases of unnatural death. I find that men of thought live 69·5 years, or 3·5 years longer than ordinary men; while the lives of men of feeling are 3 years, those of men of action 5 years, shorter than those of average men,—a conclusion that agrees with the commonly accepted view on the subject. If we subdivide these three classes, we find, that, while all classes of men of thought live longer than ordinary men, the moralists live longest, scientists coming next; that among the men of feeling the religionists alone live the full period of life, while poets' lives are 5 years, and musicians' lives 8 years, too short; that, of men of action, rulers and commanders both fail to complete the full term of life by 4 years. One sees from these statements (which, however, in their detail at least, must be accepted with hesitation, owing to the fewness of examples) that the kind of psychical and physical activity pursued influences the life-period; that certain types of genius are apt to die young, while others are particularly favoured with a full allowance of years.

The question of longevity becomes important when we consider that through it the leaders of civilisation are allowed to exercise their important function a few years longer, thus enabling more great men to be alive at the same time; and that, by its tendency to be inherited by the offspring, the children of great men will begin life with a better chance of reaching maturity, and, in turn, of becoming important to the world, if, as we have reason to believe it would, the genius of their ancestors has left its traces in them. JOSEPH JASTROW

[1] From *Science*.

[2] Mr. Galton ("Hereditary Genius," p. 34) has allowed himself to neglect a similar consideration. In giving the number of men in each class that the population of the United Kingdom would have between certain ages, he gives 35 as the number of men of class *G* (a very high degree of eminence) between the ages 20 and 30, and only 21 such men between 40 and 50 years. But this cannot be true, because only a very small proportion of men could possibly attain the eminence requisite to be classed among the *G*'s in 20 to 30 years, while almost all (of those who will attain it at all) will have attained it before the end of their fiftieth year. And this consideration far outbalances the excess in absolute number of men between the former ages over those between the latter. Similarly the falling-off in the number of men of class *g*, *i.e.* idiots, from decade to decade, would be more rapid than in ordinary men,—a fact which the tables fail to show.

[3] The names were selected by three others and myself, while engaged in a study of what might be called the natural history of great men. The process of selection was most rigid and careful, by a system which it would take too long to describe.

THE GEOLOGY OF THE LEBANON

WE are indebted to Dr. Carl Diener, of the University of Vienna, for an able monograph on the geological and physical formation of the Lebanon and surrounding districts, accompanied by maps, sections, and

[1] Mr. Sully (*Nineteenth Century*, June 1886) has shown that men of feeling are more precocious than men of thought; but the difference in the age at which their first great work is done, though in favour of men of feeling, is very slight indeed.

illustrations reproduced from photographs.[1] Notwithstanding the observations of Russegger, Fraas, and others, on the physical features and structure of this region, a complete monograph on its geology has long been a desideratum, and the work of Dr. C. Diener forms a fitting continuation of the survey of Lartet in Palestine, and of the Palestine Exploration Society in Arabia Petræa and the Jordan Valley.

Down to a comparatively recent period, the ranges of the Lebanon and Anti-Lebanon were supposed to be formed of Jurassic limestones, but the observations of Oscar Fraas showed that this was an error, and that they are mainly formed of Cretaceous and Eocene limestones. It is only within the limits of a narrow belt at the western base of Mount Hermon that Jurassic beds really occur; this being their first appearance on proceeding northwards from Arabia Petræa. The formations overlying the Jurassic strata are referable to the "Neocomian" (?), Cenomanian, Turonian, Senonian, Eocene, and newer Tertiary periods; while great sheets of basaltic lava of late Tertiary age occur both to the north and to the south of the region embraced by the memoir.

Dr. Diener has worked out with great success the numerous lines of faulting and flexuring which the strata have undergone since their deposition, and which have been produced mainly during the Miocene epoch. Mount Hermon itself owes its position in a great degree to the elevation of its mass along the line of a great fault which coincides with its western base. Its beds of limestone, belonging to the age of the Lower Chalk of Europe, are disposed in the form of a low arch, the axis of which passes under the summit, and ranges in a north-north-east direction along the line of the heights of Anti-Lebanon. Other faults range along the southern and eastern flanks of the great dome-shaped mount which has thus been bodily upheaved in respect of the bordering strata. There can be no question that the system of terrestrial disturbances along which the Syrian mountains have been fractured and dislocated is the same as that which has given origin to the Jordan-Arabah depression; and amongst the lines of displacement traced out by Dr. Diener, we can have no difficulty in recognising that which is the actual prolongation of the leading fault of the Jordan Valley. This great line of fracture and displacement appears to enter the valley of the Leontes (Litany) at the western base of Hermon, where a complete change of the stratification takes place on either side, and the "Lebanon Limestone," with the subordinate Lower Cretaceous beds, are thrown into a nearly vertical position, and brought into contact with horizontal strata of the Upper Chalk (Senonkreide). It may therefore be inferred that the great valley of Cœle-Syria (El Bekâ'a), separating the range of the Lebanon from that of Anti-Lebanon, owes its origin, in the first instance, to the same system of faults which has caused the depression of the Jordan Valley, the original features having been modified by extensive denudation; and if we suppose that the primary line of fault reaches as far north as the Lake of Homs, in the valley of the Orontes, and as far south as the Gulf of Akabah, the distance through which this great line of fracture of the earth's crust will have been traced will amount to about 350 English miles.

Dr. Diener expresses some doubts regarding the former existence of glaciers in the Lebanon, notwithstanding the opinions of such observers as Hooker, Fraas, Girard, and others. Hooker especially identifies the mound upon which the grove of ancient cedars is planted as an ancient moraine. The author throws some doubt upon this view, because he was unable, after three hours of search, to find scratched or striated boulders, although he admits that, viewed in certain directions, the mounds do present the appearance of a terminal moraine. In reference to this subject, it may be observed that the position and altitude of the Lebanon Range makes it extremely probable that perennial snow, giving origin to glaciers, occupied the higher regions during the Glacial epoch. Amongst the Caucasus, which are only a few degrees further north, though somewhat higher, glaciers occur at the present day, and during the Glacial epoch the valleys were brimful of ice. Hence it would be strange if in the Lebanon it were proved that they had been entirely absent. The scarcity or absence of glacial striations, on which Dr. Diener founds his objection, is easily accounted for when we recollect that the blocks and stones consist of rather friable limestone which has been exposed through thousands of years to the effects of frost, heat, and rain. It is only when the surface of a rock, or of a boulder, has been protected by a coat of stiff glacial clay, that we can expect the striæ and scars to be preserved throughout a long period of time.

On another point Dr. Diener expresses his dissent from the views of previous observers, arising, as it seems to the writer, from his want of appreciation of the full effect of eroding agencies. The neck of land which connects the Râs Beyrût with the outer ridges of the Lebanon is formed of beds of stratified gravel or conglomerate rising from 120 to 150 feet above the sea. This is to all appearance an old sea-bed formed at a time when the land was submerged to the extent above indicated, during which Râs Beyrût was an island. The author cannot accept this view, because his observations of the coast-line of Syria, bearing on the present state of the harbours, do not appear to show a change of level of more than a few feet; less, in fact, than would be necessary to submerge the neck of land. On the other hand, he accepts the evidence offered by Lartet and the writer of a submergence of the coast of Southern Palestine and Philistia to an extent even greater than this, namely 200 feet and upwards; and he points to the evidence of great changes of level on the coast of Northern Syria and Asia Minor. May not the absence of raised beaches on the coast of Southern and Middle Syria be due to the waste caused by the wave action of the Mediterranean, which would tend to carry away such soft materials during the period of emergence where exposed and unprotected? In another case the author throws doubt on the observations of Dr. Post regarding the presence of shell-beds at levels of 150 to 250 feet near Lâdikîeh, an account of which appeared in NATURE, vol. xxx. p. 385, and which is given with much detail. It seems an instance of hypercriticism to call in question an authenticated statement merely on the ground that the author was unable to personally verify it.

The above instances will, however, go to show with what care and labour Dr. Diener has accomplished his task, and he is to be congratulated upon the production of a work which will doubtless be considered a standard of reference regarding the physical history of the Syrian mountains. I may perhaps be allowed to remark that his admirable geological map would have been improved by following the English custom of showing the dip of the strata by means of small arrows, and of distinguishing between ordinary boundaries of formations and those which are produced by faults and fractures, and the book itself would have been rendered easier for reference by an index.

EDWARD HULL

[1] "Libanon; Grundlinien der physischen Geographie und Geologie von Mittel-Syrien." (Wien, 1886.)

AUTUMNAL FLOWERING

THE "extraordinary gooseberry" season seems to have set in this year with more than usual severity. Country clergymen and amateur gardeners, who would see nothing unusual in the autumnal flowering of a hybrid perpetual rose (which reminds them, perhaps, of their old school-days, when they read of "*biferique*