the west borders of the area. The throw of the faults varies from a few feet to 5,000 feet. There are two systems or groups, one of which strikes nearly north and the other about 35° east of north. The Tertiary rocks are not closely folded, but the dip of the beds in any single block is nearly uniform.

It is improbable that any considerable amount of tilting or faulting occurred before all of the Tertiary lavas were extravasated, for the dip of early and of late flows is nearly uniform, and lavas do not overlap faults. The tilting occurred before or after faulting, or else the two processes went on together. If all of the tilting had occurred before the faulting then a given bed at the east border of the area should at that time have been 12,400 feet lower than the same bed at the west border. Evidence of such relief should be preserved if the period between the deformation by the two processes had been sufficient for a considerable amount of erosion, and a large thickness of derived sedimentary rocks should probably have resulted from the erosion of this series. On the other hand, if the faulting had occurred first and the interval was considerable, the relief and consequent intervening erosion would have been equally great. Since there are no faulted rocks not tilted, or tilted rocks not faulted, it is presumed that faulting and tilting operated at the same time or close together.

Tilting before faulting implies a vertical movement of parts of the earth's surface of more than two miles, followed by another vertical movement equally great and of a different character. Faulting before tilting implies equivalent movements in reverse order. Since the processes operated close together, this is regarded as improbable. It is, therefore, assumed that faulting and tilting occurred at the same time, and that the movement was largely rotational, each block moving independently, being tilted as it was faulted. The result is like the fall of a row of books when some are removed from the shelf. It is to be noted that when the books fall and become inclined 27° from an upright position, there is an extension of a line drawn horizontally through them equal to 12 per cent.; that is, some books must be removed if the remainder fall. Unless there was extension due to revolution some of the blocks must move out laterally in order that the other blocks may settle. The faults are not quite parallel in strike, but two systems make 35° angles with each other. Accordingly, some of the blocks would present wedge-shaped edges to any section and these during deformation could easily move laterally outward. That lateral movement did take place is abundantly recorded by nearly flat striæ on horizontal surfaces. The effect of all deformation was to greatly extend the surface east and west in the direction of the dip of the beds.

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QUOTATIONS

THE NOBEL PRIZES

Regret has already been expressed here that the confidence placed by Nobel in his native land has not been justified. His large fortune was made in Great Britain by the discovery and manufacture of dynamite, and it seems likely that the instructions of his will would have been more adequately carried out if their execution had been entrusted to the Royal Society and the British courts. Nobel doubtless believed that the international obligations would be fully met by the Scandinavian countries, and it is truly sad and discouraging that there should be lack of good faith in the administration of a fund intended, as the testator states, "to benefit mankind."

Nobel's will is perfectly clear and explicit. It directs that the interest from the fund "shall be divided into five equal parts," which shall be annually awarded in prizes to those persons who shall have contributed most materially to benefit mankind during the year immediately preceding. "One share to the person who shall have made the most important discovery or invention in the domain of physics; one share to the person who shall have made the most important chemical discovery or improvement; one share to the person who shall have made the most important discovery in the domain of physiology or medicine; one share to the person who shall

have produced in the field of literature the most distinguished work of an idealistic tendency, and, finally, one share to the person who shall have most or best promoted the fraternity of nations and the abolishment or diminution of standing armies and the formation and increase of peace congresses."

In face of these explicit directions statutes have been drawn up, apparently with the sanction of the King of Sweden and others high in authority, providing that only sixty per cent. of the income need be used for the prizes and that they need be awarded only once in five years. The balance of the income—except perhaps in the case of the prize for the promotion of peace, regarding which information is lacking—is now used for the support of certain laboratories and libraries at Stockholm. These are doubtless needed, possibly more than the prizes established by Nobel, but they have been founded in dishonor. The clause establishing the laboratory of physics and chemistry is unpleasantly disingenuous. It says that it is to be "established primarily for the purpose of carrying out, where the respective Nobel committees shall deem requisite, scientific investigation as to the value of those discoveries in the domains of physics and chemistry which shall have been proposed as meriting the award of Nobel prize to their authors. The institute shall, moreover, as far as its means allow, promote such researches in the domains of the sciences named as promise to result in salient advantage." The prizes have so far been awarded annually, but it is to be feared that when the money is needed in Sweden, it will be kept there in accordance with the provision of the statutes that when a prize is not awarded the money may be used for funds "to promote the objects which the testator ultimately had in view in making his bequest in other ways than by means of prizes."

The administrators of the Nobel foundation have violated the conditions of the bequest in other ways which, though not so discreditable as the conveying of the money to local purposes and men, can not be regarded as justifiable. Nobel expressly stipulates that the prizes shall be awarded to those "who shall have contributed most materially to benefit mankind during the year immediately preceding." The statutes hedge, as follows: "By the proviso in the will to the effect that for the prize competition only such works or inventions shall be eligible as have appeared "during the preceding year" is to be understood that a work or invention for which a reward under the terms of the will is contemplated shall set forth the most modern results of work being done in that of the departments, as defined in the will, to which it belongs; works or inventions of older standing to be taken into consideration only in case their importance has not previously been demonstrated."

In no single case has the award been made for work accomplished or published during the preceding year. The prizes have been given to men of eminence, most of whom accomplished their important work long ago. It would certainly be difficult to select each year the work most beneficial to mankind, and mistakes would undoubtedly be made; but the effort to make such a selection and to award the prize without regard to nationality, age or eminence would be a great stimulus to research, far greater probably than the methods adopted. But the question is not which method is the better, but for what purposes Nobel made his bequest. The terms of the will have also been violated by dividing the prizes and by awarding them to institutions, and its spirit has been especially ignored by giving the power of nomination and determination chiefly to Swedes. It does not of course follow that the dead hand should forever control. But Nobel died only ten years ago. He might be given his will for a little while at least, and under the special circumstances of the case it would seem only just to submit any provisions which proved impracticable or unwise to international consideration.

There is a certain lack of courtesy in thus criticizing actions sanctioned by the Swedish government and by those Swedish men of science at least who are accepting gratuities from the fund. Neither can we as a nation regard ourselves as fit to cast stones when we

remember the histories of the Stewart, Tilden and other bequests, or when we consider that the Smithsonian Institution, established by a foreigner "for the increase and diffusion of knowledge among men" has been used largely for the promotion of local interests. But it is only by frankly considering these things that we may learn that honor is more than great riches.—*The Popular Science Monthly,* January, 1907.

We agree with Mr. Lange when he says, on page 1060 of this issue, that Dr. Alfred Nobel was a man of remarkable originality, as is shown by his bequest of his fortune to Scandinavia to reward the benefactors of mankind. But we fear that his originality will never be allowed much scope by those who have charge of the administration of the fund, for they have from the beginning shown a flagrant disregard of the intentions of the founder. This, of course, is no new thing. Many philanthropic testators, if they could rise from their graves fifty or a hundred years after they had been laid in them, would repudiate the work that is being carried on in their names. This is sometimes the fault of the trustees and sometimes their wisdom. The provisions of a will may prove to be impracticable, or in the course of time the changed conditions may make it useless or detrimental to the cause it was intended to promote.

But Nobel's plan has been proved neither unpractical nor unwise, because it has never been tried. In his will of November 27, 1895, he directs that his property "shall constitute a fund, the interest accruing from which shall be annually awarded in prizes to those persons who shall have contributed most materially to benefit mankind *during the year immediately preceding.*"

The clause we have italicized has been disregarded from the start by the five Nobel committees, although it is the most original and promising feature of the plan. Great discoveries in science and innovations in literature are often the work of young men, unappreciated by their colleagues and superiors, overburdened by drudgery and inadequately provided with the means of study and research. To men like this the free gift of $40,000 and the public recognition of the value of their work would be a godsend. They would be stimulated to greater exertions and would be able to devote themselves to the work for which they had already proved themselves exceptionally fitted.

But the Nobel committees, instead of this, have chosen to bestow their awards in many cases on men who, long before the Nobel Fund was established, had done the work for which the world is their debtor, and were resting on their laurels. The money, however much needed, will not enable them to do more than they have; the honor, however much deserved, will not add to their fame. The Nobel prizes have been given only six years, yet six of the recipients—Carducci, Moissan, Dunant, Mommsen, Finsen, Curie—have died since they were so honored, three of them from old age. The following table shows how far the Nobel committees have departed from the intention of the founder in rewarding contemporary achievement:

Name	Achievement	Age of Achievement	Age of Award	Years of Delay
Dunant	Geneva Convention	36	73	37
Sully-Prudhomme	"Justice"	39	62	23
Mommsen	"History of Rome"	37	85	48
Fischer	Sugar synthesis	33	50	17
Björnson	"Arne"	26	71	45
Mistral	"Mirêio"	29	74	45
Echegaray	"O Locura ó Santidad"	45	71	26
Passy	French Arbitration Society	45	79	34
Arrhenius	Electrolytic theory	25	44	19
Becquerel	Uranium rays	44	51	7
Behring	Diphtheria antitoxin	38	47	9
Ramsay	Helium	43	52	9
Finsen	Light cure	34	41	7
Cremer	Interparliamentary conference	50	65	15
Rayleigh	Argon	52	62	10
M Curie	Radium	39	44	5
Madame Curie	Radium	31	36	5
Röntgen	X-rays	50	56	6
Ross	Malaria parasite	40	45	5
Carducci	"Odi Barbare"	44	71	27
Ramon y Cajal	Neurology	41	56	15
Moissan	Isolation of fluorine	35	44	9
Baeyer	Artificial indigo	45	70	25
Koch	Tuberculosis bacillus	41	64	23
Sienkiewicz	"With Fire and Sword"	38	59	21
Lenard	Lenard rays	32	43	11
Suttner	"Die Waffen nieder"	47	63	16
Golgi	Nerve staining	25	58	33

The Code of Statutes of the Nobel Foundation, issued in the name of the King, June 29, 1900, contains the following section:

The proviso in the Will to the effect that for the prize competition only such works or inventions shall be eligible as have appeared "during the preceding year" is to be so understood, that a work or an invention for which a reward under the terms of the Will is contemplated, shall set forth the most modern results of work being done in that of the departments, as defined in the Will, to which it belongs; works or inventions of older standing to be taken into consideration only in case their importance have not been previously demonstrated.

This action loosened up the stringency of the phrase used by Nobel, but the committees have not even kept within the elastic limits that they imposed upon themselves, as a glance at the table shows. What we have put down as the "age of achievement" is the year of the man's life when he produced his first work of superlative importance, the excellence of which was either recognized at once by the world or would have been discernible by a learned and well-equipped body like the Nobel Committee. But in many cases, nothing had occurred to "demonstrate the importance" of their achievements during "the preceding year," or even during the time the Nobel Foundation has been in existence. Carducci was too weak to rise from his chair when the emissaries of the Nobel Committee brought him his medal and too feeble in mind to answer them. He had not published a book for nine years, and his position as the foremost of Italian poets had been established for over thirty years. The fame of Sully-Prudhomme, Echegaray and Mistral has declined rather than risen in the last six years, because they have become more historic monuments than leaders of modern thought.

Mr. Lange defends the appropriation of 25 per cent. of the income for administrative expenses on the ground that it is necessary in order to insure that the prizes are worthily bestowed. This might be justifiable if the money were spent for this purpose. If the committees used the laboratories and libraries they have established out of the Nobel Fund for the purpose of testing the real value of alleged inventions it would do much to promote science and assist in the discovery of struggling genius. But no man is allowed to present his own claims. He must first have the endorsement of scholars occupying certain narrowly specified official positions in his own land.

As a matter of fact, the selections of the Nobel Committees have not been such as required special ability or expenditure for investigation. Any college student in chemistry, physics or medicine, if asked offhand to name the greatest living men in his branch of science would have hit upon at least fifteen out of the twenty-two names on the list of the Nobel prize men. In the choice of those who had done most for the promotion of peace or produced the greatest work in idealistic literature there would have been greater diversity of opinion, but not because the names chosen were not well known. Did it require an $80,000 laboratory to test the reality of the X-rays? How much of the "rather more than $12,000" appropriated for that purpose last year did the committee expend in repeating Baeyer's synthesis of indigo, first made a quarter of a century ago, and now accomplished at the rate of thousands of tons a year? Did the Caroline Medical-Chirurgical Institute of Stockholm have to spend much time in ascertaining that Golgi's method of nerve staining, which has been in common use for over twenty years, is practical and valuable? How large a reference library was needed to discover that Mommsen was a great historian?

The Nobel bequest was reported to be more than $8,000,000. This, if invested in safe securities, as Nobel directed, should produce about $64,000 for each of the five annual prizes. So much of the income has been spent for other purposes, in salaries, traveling expenses, ceremonials and purchases of books and apparatus, that the amount of the money prize has now shrunk to $37,000. And still the local administrators are not satisfied with what they get out of it. Mr. Lange suggests that they may take advantage of the clause allowing them to suspend the award for not longer than four years in the absence of suitable candidates in order to get money for the "constructive" work of the Nobel Peace Institute, for the maintenance of a library and

reading-room in Christiania, for a complete catalogue of the literature of internationalism, a school, the printing of books and periodicals and the establishment of another arbitration court. These are highly creditable projects, but the Nobel Fund was given for another purpose. All the countries of the world have the same interest in it as Norway and Sweden, and they have a right to protest against its misappropriation.—*The Independent,* May 9, 1907.

CURRENT NOTES ON LAND FORMS

PIT CRATERS IN MEXICO

Among the many basins of the Central Plateau of Mexico, bordered by volcanoes in various stages of growth and dissection, and smoothly floored with aggraded layers of volcanic ashes and dust, of fluviatile and lacustrine desposits, and of occasional lava flows, there is one of typical development in the state of Puebla, east of the city of Mexico and separated by the volcano of Orizaba and its neighbors from the dissected escarpment by which the descent is made from the highland to the coastal lowlands. Ordoñez gives a good account of this basin-plain and of the pit craters that have been formed in it by explosion ("Los Xalapascos del Estado de Puebla," Inst. Geol. Mex., Parerg., i, 1906, no. 9). The plain is like all its fellows in having risen on the irregular flanks of the larger and smaller, younger and older volcanic masses that enclose it, and in being interrupted by more or less completely isolated volcanic knobs and ridges which rise here and there through its smooth surface. The gentle ascent by which one ordinarily approaches the border of an explosion crater is an insignificant element of relief in comparison with the much larger volcanic forms on all sides; indeed, the slope is sometimes hardly perceptible, and the depression of the crater, 1,000 to 1,800 met. in diameter, and 50 or more met. deep, is come upon as a surprise for which there is no warning at a little distance. A shallow blue lake usually occupies the floor; the walls are frequently steep and expose good sections of the layers by which the plain has been built up; special interest attaching to such items as buried stream channels and occasional thin lava sheets. Paths lead down in zigzags on the steep face or more directly by centripetal ravines; for the poor natives in neighboring villages have long been accustomed to carry water up from the lakes for domestic uses. Ordoñez regards these craters as among the latest manifestations of volcanic activity, and characterizes them as seeming unduly large for the feebleness of the explosive force which produced them.

BATOKA GORGE OF THE ZAMBESI

Among the results of the British Association visit to South Africa in 1907 is an account of "The Geology of the Zambesi Basin around the Batoka Gorge," by G. W. Lamplugh (*Quart. Journ. Geol. Soc.,* LXIII., 1907, 162–316), which includes an excellent description of a plateau in a youthful stage of dissection. In the region of Victoria Falls, the South African highland is built up of basalt sheets; older rocks, including a fundamental complex of gneiss, schists and granite, appear to the northeast and southeast. The relief is small; occasional residual knobs—*Inselberge* of the German explorers—rise here and there in the crystalline areas; low escarpments traverse the belts of inclined strata bordering the crystallines; broad swells of sand, supposed to be wind deposits of an earlier and more arid period, are spread over the basalts. The present altitude of the plateau is 3,000 feet or more. The upper Zambesi is a wide, placid river flowing through a shallow valley, bordered by low slopes of greatly decomposed basalt; its branches are of gentle fall and their valleys (called "channels" by Lamplugh) are but little below the general highland level. At Victoria Falls, the river plunges down 360 feet into a narrow gorge with nearly vertical walls, in which the peculiar zigzag turns have been well explained by Molyneaux ("The Physical History of Victoria Falls," *Geogr. Journ.,* XXV., 1905, 40–55) as the result of groups of obliquely transverse joints. In 60 miles below the falls, the river descends about 400 feet, and the walls of the gorge become more and more open. At the same time, the side gorges increase in length,