

I was quite unable at first to account for the fact that some drops were frozen while others were not; it occurred to me later, however, that the drops which reached the ground as pellets of ice had been derived from the *topmost* branches, while those remaining uncongealed had fallen from the *lower* ones.

I based my conclusion on the assumption that the drops from the top of the tree in falling a greater distance, and in travelling more rapidly, than those beneath them, consequently suffered a greater loss of heat by more rapid evaporation, and hence were converted into ice before reaching the ground; but it seems to me nevertheless a most remarkable thing that such a result should depend upon so small a difference in altitude (10 ft. at the most), and the atmospheric conditions favourable for the production of such a phenomenon must have been so unusual as to make its recurrence very unlikely.

I have heard of a railway train becoming coated with ice after travelling through an atmosphere above freezing-point and laden with mist, but we can easily grasp the phenomenon when occurring on so large a scale.

CECIL CARUS-WILSON.

Bournemouth, January 14.

"British and Irish Salmonidæ."

ALTHOUGH calling in question statements made by reviewers is generally a thankless task, still, when an author believes himself to have been misquoted as well as erroneously corrected, a deviation from the usual course may sometimes be excusable. Acting under such an impression, and feeling sure that the Editor of NATURE, and the reviewer of my "British and Irish Salmonidæ," would be equally unwilling to promulgate errors to the public, I must ask for a small space with reference to the review of my work which appeared in your last issue.

Purporting to quote a sentence of mine (p. 31) as an example of my "originality in sentence construction," the reviewer has rendered it misleading by omitting five words which I have here re-inserted in italics and within brackets. Alluding to the water containing the recently expressed eggs and milt, he makes me say as follows:—"This is gently stirred with the hand (*and then allowed to stand*) until the eggs harden, or 'free' as it is termed, being a period from one-quarter to three-quarters of an hour," &c. If newly expressed eggs and milt were thus stirred up from fifteen to forty-five minutes they could not "set," and would therefore have no occasion to "free," as the Americans have termed it, but such misplaced energy in the operator (which I never proposed) would assuredly destroy their vitality.

The reviewer says, "the description in the text of the mode of packing eggs which has been perfected at Howietoun seems to be erroneous, . . . while in a quotation in a footnote the correct account is given—namely, that the ova lie in direct contact with the damp moss, and are covered by another layer of the same, the muslin being only used in order that the layer of moss may be lifted and moved." The reviewer has here confused the text, or general principles as laid down, with the note (p. 42) of the mode pursued at Howietoun, which he asserts to be "the correct account"; but had he read the quotation to the end he would have seen that, besides the plan adopted at Howietoun for packing eggs going *long distances* when no muslin is used, a second mode is employed for those going *lesser journeys*, and was described as follows: "For shorter journeys eggs are thrown off the frames on to swans' down, which takes little more than half the time, and greatly facilitates the unpacking at the end of the journey."

The reviewer observes that "no reference is given to any work where the correct description of *S. namaycush* as a char can be found." If this remark is seriously made under the impression that the fish is not a char or a *Salvelinus*, I would refer among others to *Salvelinus namaycush*, Jordan, Bull. 16, U.S. Mus. 1883, p. 317; Bean, "Fish Com. Report," 1884, p. 1042; Garman on the "American Salmon and Trout," Boston, 1885, p. 5; to Brown Goode in his "Game Fishes of the United States," and his more recently published account in the "Fisheries and Fishery Industries of the United States," 1884, p. 485, &c. In this last work he observed of the *namaycush* that "the Lake trout is in fact a member of the same group of the salmon family with the chars," while I referred to his statements at p. 249.

FRANCIS DAY.

Cheltenham, January 14.

PHYSICAL SCIENCE AND THE WOOLWICH EXAMINATIONS.

IN June 1884 we called the attention of those who are interested in science and in the science-teaching in our public schools to some new regulations for admission to Sandhurst which had lately been announced, and to efforts that had been made by the President of the Royal Society, and others, to induce the authorities at the War Office to reconsider their scheme, which appeared likely to seriously handicap those public schools in which real attention to science is given in the regular school work, and to be unjust to young men of scientific ability.

Whilst we wrote, those regulations were already undergoing revision, and they were subsequently replaced by others in which certain improvements had been made, but in which the mark value of science was still so low as to be likely to do harm. In a second notice of the subject in August of the same year, whilst admitting that improvements had been effected, we expressed our opinion that even in their new form the regulations would tend to check freedom and progress in education, and act unfavourably on the work of those public schools which have aimed at widening the basis of education by introducing the study of physical science into the regular school work of all, or nearly all, their pupils.

We regret to add that this view has proved to be, to a considerable degree, correct. We hear, for example, that almost directly after the issue of the amended regulations at least one large school decided to omit all work in science from the instruction given to boys *at once upon their deciding to become candidates for Sandhurst*. In the interests of the subsequent career of the boys this was, and is still, considered to be almost invariably necessary. And we find that at the last four examinations only about 2 per cent. of successful Sandhurst candidates have offered a knowledge of some branch of physical science ("experimental science" in the regulations), whereas formerly the very moderate but much larger proportion of 8 per cent. did so. In the case of physical geography and geology the corresponding proportions are 19 per cent. during the four years that preceded the date of our article, and about 8 per cent. during the last two years.

No doubt the candidates for Sandhurst are not, as a rule, drawn from the class of boys to whom the study of science is particularly attractive, and it is not impossible that to some extent the present regulations for admission to Sandhurst may have had the effect of inducing scientific boys to enter more freely for the scientific branches of the army, to which admission is gained through Woolwich.

In the examinations for Woolwich, science has hitherto met with more liberal treatment than at Sandhurst, and has been taken up by a fair, but not excessive, proportion of the successful candidates, which has lately tended to increase in the case of chemistry and physics. It is therefore with the greatest regret that we learn that new regulations for admission to Woolwich are to come into effect in November, which will be likely to seriously further discourage the teaching of physical science. These regulations correspond pretty closely to those for Sandhurst, which we have previously discussed; it will be sufficient, therefore, to say that compulsory mathematics, optional mathematics, Latin, French, and German, form Class I., have each of them an allotment of 3000 marks; that Greek, English history, chemistry, physics, physical geography and geology, form a second class, to each of which 2000 marks are allotted; and that candidates may take all the subjects of Group I.,¹ or may substitute one subject from Group II. in place of one of those in Group I.

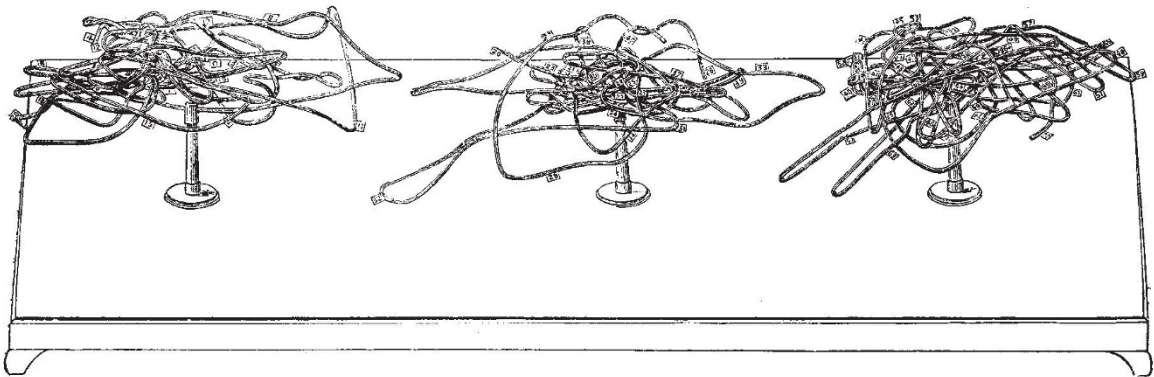
¹ They may also take any or all of Group III., viz. English composition, freehand and geometrical drawing, to each of which 500 marks are allotted.

Hitherto the mark values of all subjects, except mathematics, have been equal in the Woolwich examination, and free choice of subjects has been permitted to candidates. This has been fair to young men of different orders of ability; it must have secured officers of varied powers, and has satisfied the schools by leaving them free to do for each boy that which was best for him. In one respect the new scheme is better than the old—viz. in the grouping of the physical science subjects. But with such a bribe as will now be offered for Latin and modern languages, we cannot think that it will often be worth while even for boys of more than average scientific capacity to adopt the study of science if they desire to enter Woolwich. It is evident that, other things being equal, those who do so will come out lower in the list of those who succeed, and be more likely to find themselves amongst those who have failed, than will be the case with such as are of equal ability in the study of languages. We do not believe that it is the intention of the War Office authorities thus to partly bar the way into the scientific branches of the service against young men of more than average promise in the experimental sciences, subjects that will afterwards form a very important part of their work in the Royal Military Academy; and we trust that leaders in science, and the representatives of those schools which are doing their best for their scientific boys, as well as for their unscientific

boys, will not fail to unite in calling attention to the inevitable results of the final adoption of the present scheme. The reception that such representations met with in 1884, and the position accorded to physical science in the course of study for the cadets after having entered Woolwich, cause us to feel sure that such representations will not be without effect, especially if they be not too long delayed.

A MODEL OF AN EARTHQUAKE.

IN the latest part of the Journal of the Science College of the University of Tokio, Prof. Sekiya describes a very curious and remarkable model he has made to exhibit the manner in which a point on the earth's surface moves during an earthquake. Readers who have followed the recent progress of seismometry in Japan are aware that the motion which is recorded at an earthquake observatory is a prolonged series of twists and wriggles of the most complicated kind, so that the path pursued by a point on the surface of the soil has been aptly compared to the form taken by a long hank of string when loosely ravelled together and thrown down in a confused heap. Prof. Sekiya has taken advantage of a very complete earthquake record obtained by him with a set of Prof.



Professor Sekiya's Model of an Earthquake.

Ewing's seismographs to follow out this path step by step, and to represent it, in a permanent form, by means of stiff copper wire. The earthquake he has modelled in this way took place on January 15, 1887, and was unusually severe, for Japan. It has been already described in NATURE (vol. xxxvi. p. 107), and we have given there a copy of the seismographic record by help of which the model has been constructed. The seismogram shows the vertical displacement and two rectangular components of the horizontal displacement, instant by instant, throughout the disturbance.

It was only necessary to go through the laborious task of compounding the three displacements in order to find the actual path. This, Prof. Sekiya has done for the first seventy-two seconds of the earthquake—a period which embraces all the most interesting features, although large movements in a horizontal plane continued for a minute more, and small movements for a still longer time.

After the seventy-second second, however, the vertical component of motion had virtually disappeared, so that the later part of the disturbance might be represented by a curve drawn on a horizontal plane. To avoid confusion, the model (a sketch of which is given above) is constructed in three parts: the first and second parts each refer to twenty seconds, the third to thirty-two seconds. The parts are mounted together on a lacquered stand 3 feet long, genuinely Japanese as to its legs, as the

sketch will show. The model represents the absolute motion of the ground magnified fifty times. Little metal labels are attached to the wire to mark successive seconds of time, from 0, where the shock begins, to 72, where the model ends.

Prof. Sekiya is to be congratulated on his patience and skill. The model will serve to show at a glance the real character and enormous complexity of earthquake motion; it may also serve to open the eyes of seismologists of the older school to the perfection to which earthquake measurement has now been brought. We learn by a Japanese advertisement that a native firm (Seirensa and Co., Tokio) has undertaken to sell copies of Prof. Sekiya's model, lacquered stand and all, at a price so low that it should induce many private persons, not to speak of curators of museums and others officially interested in scientific novelties, to possess themselves of this pretty and instructive Japanese "curio."

ANTON DE BARY.

ON January 19, after a painful illness, died Anton De Bary, for many years the Professor of Botany in Strassburg. He had been suffering for some time since his visit to this country in September, and had undergone an operation which entailed the removal of parts of the face, but he did not recover.