The things saved out were used by the children for two or three days. The rest of the rubbish was burned. Near the last of December the three children were taken sick with scarlet-fever."

The diagram (A) exhibits in a condensed form the experiences of the health-officers in Michigan relating to scarlet-fever during the year 1886. It shows, that, in the 324 outbreaks, the average number of cases was 5.30, and the deaths were .31 ; that in the 45 outbreaks in which isolation or disinfection, or both, were neglected, the average number of cases was 13.84, and the deaths 1.02 ; that in the 58 outbreaks in which isolation and disinfection were both enforced, the average number of cases was only 2.74, and the average number of deaths .19, the difference being an average of 11.10, and .83 deaths, indicating a saving in these 58 outbreaks of 644 cases and 48 deaths. This saving is shown not simply by comparison with those outbreaks in which nothing was done, but also with outbreaks in which either isolation or disinfection was enforced.

A table (compiled in the office of the secretary of the State board of health, from reports made by local health-officers) giving the basis for the diagram and foregoing statement is as follows : —

SCARLET-FEVER IN MICHIGAN IN 1886.

	(1) All Outbreaks. (324 Outbreaks.)		(2) Isolation or Disinfection not mentioned, or Statements Doubtful. (220 Outbreaks.)		(3) Isolation or Disinfection, or Both, Neglected. (45 Outbreaks.)		(4) Isolation and Disinfection Both Enforced. (59 Outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	1,716	100	914	41	623	46	179	13
Averages.	5.30	0.31	4.15	0.19	13.84	1.02	3.03	0.22

BOOK-REVIEWS.

Geology, Chemical, Physical, and Stratigraphical. Vol. II. By JOSEPH PRESTWICH. Oxford, Clarendon Pr. 8°.

THE present volume of Prestwich's 'Geology' treats of stratigraphy and physical geology, — the history of the earth as traced from the study of strata and fossils. In the first volume of this great work, which appeared in 1886, the composition of rocks, and the changes brought about in them by the various meteorological agencies on the surface, and by thermal and chemical action at depths, were discussed, and the nature of the disturbances which the rocks have undergone by the action of subterranean agencies, the elevation of mountain-chains, and the manner of volcanic action, were described. This discussion of dynamic geology is now followed by a geological history. As the handbook is mainly intended for use in Europe, the geological history of Europe, more especially that of Great Britain, is treated more fully than that of other countries ; but the author, after having described the geological history of a period in Great Britain, gives a sketch of the contemporaneous course of events in other parts of the world.

The volume deals naturally with two classes of geological data, — paleontological and physiographical. The description of the evolution of life in the various periods and areas is profusely illustrated by carefully selected illustrations, part of which are printed in the text, while others are shown on lithographed plates. The cuts show the characteristic classes and orders which are peculiar to the greater divisions, while the plates show characteristic genera of each group. In discussing the lesser divisions of formations, figures representing important species are inserted in the text. By this arrangement of illustrations, and by a careful choice of the best among the available material, the author has succeeded in making the volume very instructive and useful to the student. He dwells at some length on the results of recent discoveries, and on the important part played by sponges and foraminifera in building up certain sedimentary strata. The relation of the globigerina ooze of the deep seas to the chalk is fully discussed ; and the author shows that the physical conditions of the deep sea of the present time, with its cold polar water, and those of the cretaceous sea, which was probably not so deep, and certainly not so cold, were so different that their deposits must necessarily be different. He compares the chemical and physical composition of the chalks to that of the globigerina ooze, and shows that the former is far purer than the latter, and that no equivalent deposit is forming at the present time. "The conditions under which it was deposited were peculiar and special ; and, though it presents many points of analogy to the calcareous ooze, there are none of identity ; and the chalk stands alone among the British strata in its peculiar structure and origin. It is for these reasons that I have taken the opportunity of making the foregoing remarks, not because the chalk forms an exception to the general rule of constant change, but because its features are so clear and so well marked that it serves better than most other deposits to illustrate this law of unceasing variation."

The range of genera and species of the same period through space is also briefly described. The geophysical problems which geological history has to treat are wisely confined to the concluding chapters, where the student will find the most important theories held by physicists discussed, so far as they can be proved or refuted by geological data. The author himself advocates the theory of a thin crust, a solid nucleus, and a viscous magma between the two, as he believes that the motions of the earth's crust can only be explained by such a theory.

The volume has a very full index, and is accompanied by a geological map of Europe compiled by William Topley and T. G. Goodchild. The colors adopted resemble, for the most part, those proposed by the International Geological Congress, with the exception of the Trias, Permian, and Siluro-Cambrian, for which the tints more familiar to English geologists were retained.

NOTES AND NEWS.

ABOUT one hundred and fifty scientific men and women of Washington gathered in the hall of the Columbian University on the evening of Thursday, April 5, to pay their tributes to the memory of Dr. Asa Gray, the eminent botanist, and to listen to addresses by several of his intimate friends and co-workers. The president of the meeting was Professor Langley, secretary of the Smithsonian Institution, who opened the exercises with a brief tribute to the memory of Dr. Gray. Professor Chickering delivered the first address, giving a sketch of the life and life-work of Dr. Gray, tracing the gradual unfolding from the pioneer's life of boyhood to the finished scholar and true scientist of middle and later life. The world is indebted to him, he said, for popularizing botany. He put into plain English that which interested people. He had a genius for work. Work was a delight. He was never in a hurry. He had time for social enjoyment with his friends, as well as for investigation and the preparation of a great number of books. He conducted a very large correspondence, but he economized time and labor even in this. He often returned a letter containing a great number of questions with simply 'yes' or 'no' written at the bottom of each. Professor Chickering also spoke of the honors that had been heaped upon him. He was a member of the Royal Society of London, and, of the Institute of France, one of the eight immortal foreign members. Professor Chickering spoke of the last year of his life as the happiest, and closed with an eloquent tribute to his memory. Dr. Vasey of the Agricultural Department spoke of the influence Dr. Gray exerted upon botanical science. He began with a review of the state of botanical knowledge before his time, spoke of his studies under Dr. Torrey in New York, of his botanical text-books, and of his investigations of the collections made by the government and by private individuals. He spoke in detail of his work ; said that during his lifetime the number of known botanical species upon the continent of North America had increased from 4,081 to more than 11,000, and the number of volumes of his school-books published was more than half a million. Prof. L. F. Ward of the National Museum spoke of Dr. Gray's relations to the discovery of the theory of evolution, showing that Mr. Darwin had the greatest confidence in him, and intrusted to him, almost before he did to any other, the secret of his great discovery. Dr. Gray was one of the first to understand and appreciate the importance of Mr. Darwin's work, and did more than any other to make it acceptable

to American thinkers. Professor Ward's address, like every thing that he writes, was very compact, and showed an intimate acquaintance with the history of the struggle of the doctrine of evolution for recognition in this country, and of the honorable part Dr. Gray took in it. Dr. C. V. Riley, who was the last speaker, dealt with Dr. Gray as a man. His address was an eloquent tribute to the memory of one of the most delightful men he had ever known, and its interest was heightened by the relation of circumstances connected with Dr. Gray's visit to Europe last summer. Especially touching was his description of Dr. Gray's reception in the meeting of the British Association for the Advancement of Science. Dr. Gray, who was one of the regents of the Smithsonian Institution, had many very close friends among the scientific men of Washington, who mourn him more as a father or a brother than as a fellow-worker in the field of science.

— Captain van Gèle has at last succeeded in solving the problem of the Welle. A telegram sent by Mr. Janssen, governor of the Kongo Free State, on March 15, and published in the *Mouvement géographique*, announces that the Obangi above the rapids of Zongo flows from east to west between 4° and 5° north latitude. Captain van Gèle ascended the river as far as 22° east of Greenwich, and ascertained its identity with the Welle-Makua of Schweinfurth and Junker. Captain van Gèle, after thus having solved the much-discussed problem of the Welle, returned, and reached Leopoldville in safety. It will be remembered that Captain van Gèle, after Junker's discoveries had become known, was put in charge of the exploration of the Welle. On his first expedition, which was made at the high-water season, he was unable to pass the rapids of Zongo. Later on, he made an attempt to reach Junker's Ali-Kobbo from the Itimbiri; but, on account of scarcity of supplies and the density of the woods, he was unable to carry out his plan. On Oct. 2, 1887, he started on his last expedition on the 'En Avant.' After a brief stay at Kwa-mouth, he began his ascent of the Obangi, accompanied by Lieutenants Liénart and Dhanis and a small detachment of soldiers. Junker's farthest point west on the Welle was 22° 55′ east from Greenwich. It would seem, therefore, that Captain van Gèle approached this point to within a distance of about sixty miles. The *Mouvement géographique* announces, besides the death of Captain vande Velde, chief of the military expedition to Stanley Falls, — not the explorer of the Obangi, as was erroneously stated in *Science* of March 30, — that of Lieutenant Warlomont, second in command at Boma. This is a serious loss for the Kongo Free State, which had of late been very fortunate, so far as the health of its employees was concerned.

— In a review of Chamberlain's 'Catalogue of Canadian Birds,' it was said that the addition of a systematic table would have greatly enhanced the value of the work. This table has been published by the author under the title 'A Systematic Table of Canadian Birds' (St. John, N.B., published for the author). The table, which contains 551 species belonging to 236 genera, 55 families, and 15 orders, is very clear, presenting at once a table of the higher groups, and a check-list of the birds that are found within the boundaries of the Dominion. Students of American ornithology will be glad to read the author's announcement in the preface, that his promised 'Bibliography of Canadian Ornithology' is well under way, and will probably be published during the coming summer.

LETTERS TO THE EDITOR.

Volapuk: Is it Difficult?

HERE is a subject pronounced difficult to learn; yet the learners are unaware of the difficulty. Is not this an anomaly? It is like the considerate Irish father who proposed to surprise his son with a birthday gift by having him taught the violin 'unbeknownst.' Professor March and Mr. Melville Bell, to whom the learning of strange tongues is a mere pastime, pronounce Volapük too highly inflected, not for themselves, but for the English-speaking masses. But the American business-man, snatching an hour or two in the evenings, somehow or other manages to surmount the obstacle which the professors declare insurmountable, and after a week writes grammatical Volapük. Possibly, had he known that such high authority had declared the feat impossible, he would, with his well-known modesty, have refrained from a practical contradiction of their dicta.

But do not these philologists (both of whom I greatly admire and respect) unconsciously exaggerate the difficulty of inflected language? Is it not simply that the inflected languages which they learned as boys, and which they have seen other boys toiling over ever since, had got into a state of anomaly and chaotic irregularity? It seems to me, from what I have learned by reading the works of these and other eminent philologists, that the crushing-off of terminations which finally happens, is a protest against their lawlessness. I say this with deference and in quotation-marks. Is it not a fact that terminations, when regular, are retained, not destroyed? There is no indication that we or the Spaniards are likely to drop the convenient and nearly regular plural-sign *s*, and denote plurality by a separate word or not at all. We have, it is true, lost a great many terminations *-en*, and the Germans are doing the same in speech; but that is of a converse kind of irregularity. Instead of many forms for one thing, *-en* had too many functions: it died of overwork.

Mr. Bell thinks we "may safely assume that the universal language to be some time adopted will express all verbal relations by separate words, and not by root-inflections." Then Chinese is the type of the coming language. Are its methods easy even in the colloquial tongue? Missionaries say not: I do not know.

Mr. Bell's transformation would result in this, for example, retaining the Volapük syllables: to express 'of the man,' 'of the time,' 'of the form,' 'of the staff,' 'of the stone,' where we now say *mana, tima, foma, stafa, stona*, the new reading would be *a man, a tim, a fom, a staf, a ston*. *Tima*, in one word, comes under the head of 'Case-Endings and Other Grammatical Subtleties:' *a tim*, in two words, is simple, and devoid of subtlety. What a wonderful change is wrought by the printer's space!

I could sincerely wish, with Mr. Bell, that there were an alphabet in use, not only for Volapük, but for all languages, which should be "easily and uniformly intelligible to all readers." Mr. Bell's marvellously perfect alphabet, 'Visible Speech,' would answer the description; but it would have been folly to use it for Volapük until adopted for national languages. The Roman alphabet is the international alphabet at present, and Schleyer acted wisely in keeping it. In so far as he deviated from it by his use of the un-Roman *ä, ö, ü*, and his un-Roman sounds of some consonants, in so far he is at fault. His principle was right. It is the associations of our barbarous English spelling which make us mispronounce new words like Volapük. If the English *o* had not double duty to perform, we should unerringly begin the word like '*vo*cal,' not like '*vol*ume.' Some of us spelling-reformers hope some day to restrict *o* to its proper function.

Bishop Wilkins's 'Real Character' (by which he does *not* mean 'phonetic representation'), and scores of other attempts at philosophical language based on classification of ideas, have failed (in spite of the genius of at least the first named) to come into practical use. Volapük has been learned by more persons, I believe, and more used in printing and writing, than all the others put together. There must be a reason for this, which I call upon the theoretical objectors to explain. An imperfect mechanism which actually works is better than a most scientific motor which 'motes' not.

In counting up the words which are like their English prototypes, Mr. Bell has omitted such as these: *tim* (time), *fom* (form), *spid* (speed), *sid* (seed), *skil* (skill [the Philological Society of London spells it 'skil']), *slet* (slate), *slip* (sleep), *smok* (smoke), *snek* (snake), *silab* (syllable). I have picked up most of these within a page.

Well, I suppose the unlearned man wll go on acquiring this difficult language easily: the masses *will* do things wrong. Half a dozen will write me letters this coming week (just half a dozen did last week) to show me what they have accomplished in a few days.

On the other hand, I have some choice specimens of educated foreigners' English which are conclusive evidence, I think, that our "simple," "grammarless," "uninflected," "analytic" language contains some fearful pitfalls for the unwary.

I read a good deal about English being or becoming the "universal language," but what I read to that purport is never written by Frenchmen or Germans or Italians, somehow or other. This is strange, isn't it?

CHARLES E. SPRAGUE.

New York, March 31.