Britain; but the proof of their marine origin remains to be written. They contain no undisputed organic remains. The rocks in which they are intercalated are not proved to be altered sedimentaries. There were numerous animals living in the Salopian area in the Longmyndian epoch, for their trails are quite abundant in some of the slaty seams; but, if there were no carbonate of lime in the sea, there could, of course, be little material to provide shells for its inhabitants. Numerous creatures of many types might have been evolved, whose soft tissue would leave no traces in the rocks. In succeeding ages, as the forces of denudation cleared off the newer Archæan, and cut down into partially decomposed crystallines, abundance of calcic carbonate would be carried down into the sea. C. CALLAWAY.

Wellington, Shropshire, March 1.

The Artificial Spectrum Top.

IN your issue of March 7, we notice a letter from Dr. Dawson Turner, in which he says he has had a "Benham's Spectrum Top" made on glass, by an optician, for the lantern, and recommending others to do the same.

Will you allow us to state that we have sold all rights in this copyright top to Messrs. Pears, reserving to ourselves only the sole right of making them as lantern slides, in which form we have been supplying them for some time.

The tops can be obtained from Messrs. Pears, and the lantern slides from us; any one else supplying either will, of course, be infringing the copyright. NEWTON AND CO.

RESEARCH IN EDUCATION.[1]

NO branch of *research work* at the present day offers greater opportunities, whilst none is more urgently in need of *original* workers, than that which lies open to the teacher in school or college; and it is surprising how small an amount of sound work is accomplished in it—how little it is realised that there is a science of education to be developed by persistent study, application and research. An analytical habit of mind seems to be the very last qualification sought for in a teacher—such is the influence acquired by clerical instructors in the course of centuries by the universal extension of methods of teaching originated in the monkish cell and cloisters, and wielded with but slightly diminished force, even to-day, by their lineal descendants, whose voices still preponderate in educational affairs. Conservative and sheep-like—as we cannot fail to be if all our early life be spent in an atmosphere of dogmatism—the slowness with which we evolve and apply new ideas is phenomenal. It cannot be that sterility is the outcome of excessive labour in days gone by, and consequent exhaustion of the soil; still less, that it is owing to absence of demand; for it is only too clear that the entire change in the conditions of life witnessed within the century renders it necessary that our children should be so educated that they may successfully grapple with the new conditions, and it stands to reason that the preparation which sufficed in the case of their forefathers must be insufficient in theirs. This is now being universally recognised, but all too slowly and imperfectly. Thus the academic oration first on my list, delivered only in September last, at Freiburg, by the Professor of Anatomy, is a vigorous protest against the practice prevailing in the German "Humanistic" Gymnasia of devoting an enormous proportion of the school-time to classical studies, and the consequent neglect of drawing, natural science, geography and modern languages, as well as of gymnastic exercises, which is very strange, as he points out, when it is remembered that the meaning of *gymnasium* is a place for athletic pursuits. He especially complains of the way in which exercises in classical style are insisted on and monopolise attention, and strenuously advocates their banishment from the three lowest classes at least. He refers with feeling to the pressure which is brought to bear in school and at home on the child to whom such work does not appeal, and the unhappy state of house and family on "style-days," remarking that every one who, like himself, has had this experience in his own person and that of his children, will sympathise with this view. He tells us that his own bitter experience of thirty-five years ago still follows him in his dreams, and that he can never forget the encouraging words hurled at him by the master of the "Prima" of the Stuttgart Gymnasium when he had done a bad Latin exercise—"You never in your life will come to any good, as sure as my name is Schmid." Is not this too often the attitude of our schoolmasters, and is it not too often forgotten that the human mind, fortunately, will not in all cases respond to one uniform system of treatment? Surely the time must soon come when it will be the main duty of headmaster and headmistress to study their scholars, and assort them in accordance with their aptitudes; when no headmaster will set down a boy as of inferior intellect merely because he does not get on well on the classical side, and cannot therefore be made use of with effect as the winner of a scholarship at the university—a course which some of our most noted headmasters appear too often to countenance if report belie them not. Fortunately we are not here so much the victims of educational overpressure as is Germany under the terrible influence of its military system, although there is enough to complain of, especially in the case of girls' schools, owing to the improperly large number of subjects included in the time-table; moreover, examinations, such as the London University Matriculation, are exercising a most insidious effect: and now that County Councils all over the country are granting scholarships on the results of examinations, it behoves us to be much on our guard, and to take steps to secure that all such examinations are so conducted that reasonably well-taught and reasonably intelligent scholars can be submitted to them without any interference with the normal school course. Prof. Wiedersheim, referring to the very one-sided training given in the Gymnasia to the future jurist, theologian and philologist, calls attention to the importance to such students of some knowledge of natural science in the following passage, which undoubtedly deserves our attention, as we suffer in like manner: "Kein Gebildeter vermag sich heutzutage dem Einflusse, welchen die Naturwissenschaften auf das Geistesleben aller Culturnationen gewonnen haben, mehr zu entziehen. Die ganze moderne Weltanschauung, unser Leben und Denken, die Forschung auf allen Gebieten—ich erinnere nur an das auch in der vergleichenden Linguistik zur Geltung kommende genetische und causale Element—stehen unter der Signatur der inductiven Forschung. Mit diesem Umschwung hat auch das humanistische Gymnasium zu rechnen, sollen nicht Juristen, Philologen und Theologen in ihrem ganzen Bildungsgang einen Fehler aufweisen, der oft nicht mehr gut zu machen ist." But this is nowhere properly recognised. And yet Charles Kingsley long ago dreamt of a day when every candidate for ordination should be required to have passed creditably in at least one branch of physical science—*if only to teach him the method of sound scientific thought.* Dr. Percival

[1] "Ueber die Vorbildung unserer akademischen Jugend an den humanistischen Gymnasien."—Programm wodurch zur Feier des Geburtsfestes seiner königlichen Hoheit unseres durchlauchtigsten Grossherzogs Friedrich im Namen des academischen Senats die angehörigen der Albert-Ludwigs Universität einladet der gegenwärtige Prorector Dr. Robert Wiedersheim. (Freiburg, 1894.)

"The Teacher's Manual of Lessons on Elementary Science." By H. Major, B.A., B.Sc., Inspector of Board Schools, Leicester. (Blackie and Son.)

"Practical Lessons in Physical Measurement." By Alfred Earl, M.A., Senior Science Master at Tonbridge School. (Macmillan and Co.)

"A Laboratory Manual of Physics and Applied Electricity." Arranged and edited by Edward L. Nichols, Professor of Physics in Cornell University. Vol I. Junior Course in General Physics, by Ernest Merritt and Frederick J. Rogers. Vol. II. Senior Courses and Outlines of Advanced Work, by G. I. Moler, F. Bedall, H. J. Hotckiss, C. P. Matthews, and the Editor. (New York and London: Macmillan and Co.)