

race. . . . Well, we want to know exactly how many have laid adhesive eggs. The author tells us that the egg-character is non-Mendelian, and that, though of course a character of the female, it is transmitted through the female. We want the details of the evidence on which this statement is based, in the form of a table preferably. In no case is the probable error of his results worked out.

#### THE OLDEST EUROPEAN SEDIMENTS.

MR. J. J. SEDERHOLM, director of the Geological Survey of Finland, has issued in English his "Explanatory Notes to accompany a Geological Sketch-map of Fenno-Scandia" (Helsingfors: Frenckellska Tryckeri-aktiebolaget, 1908). The beautifully coloured map of Norway, Sweden, and Finland (Prof. W. Ramsay's "Fenno-Scandia") that accompanies this memoir was originally issued in Bulletin No. 23 of the Commission géologique de Finlande. Photographs are given of critical rock-specimens, such as the conglomerates that mark uniformities between the Archaean systems in Finland, and the early pre-Cambrian (Bottnian) banded sediment of the shores of Näsijärvi. This rock indicates seasonal stratification, strangely like that of the adjacent Glacial clays of Pleistocene age.

Those who have seen the actual specimens, or, better still, the beds in the field, cannot deny the existence of an immense series of pre-Cambrian sediments in Fenno-Scandia. The gneisses, such as those of the Hangö islets, are by no means the oldest or fundamental rocks, but result from the intrusion of granite into various series and at various times. Some of the granites in the north of Finland appear to be post-Silurian, as in Scandinavia. Sederholm's admirable summary is, of course, written from a Finnish point of view, and some of the results may meet with criticism when applied to Scandinavia; but they deserve the keen attention of geologists in our own islands, where post-Silurian movements have masked much of the older sequence, but where patches of ungranitised pre-Cambrian sediments may remain amid metamorphic areas.

A visit to Finland healthily counteracts the tendency, still apparent in some quarters, towards bringing all our clearly stratified rocks somehow into the Palaeozoic era. Dr. A. Mickwitz has recently proposed (*Bulletin de l'Académie impériale des Sciences de St. Pétersbourg*, 1907, p. 699) to correlate the results of deep borings on the south side of the Gulf of Finland, in the hope of ascertaining the relations of the lower Cambrian strata of Russia to the pre-Cambrian beds that appear across the sea in Finland. Perhaps the areas still unexplored by the Finnish Survey may include some Palaeozoic strata. For the present, the "Jatulan" dolomites, sandstones, and true bedded anthracites are sufficiently fascinating. What forms of vegetable life in pre-Cambrian times furnished the bed of coal 7 feet thick in Olonetz?

G. A. J. C.

#### METEORIC SHOWER OF JANUARY.

THE Quadrantids, or Bōtids as they are sometimes called, the former constellation being modern, and not fully recognised, ought to reappear under favourable auspices on the nights of Saturday, January 2, and Sunday, January 3; but the shower is a very fugitive one, and its more abundant phase will probably be confined to a few hours on one of the nights mentioned.

These January meteors really form a very rich stream, and I believe that, next to the Perseids, Leonids, and Andromedids, they are entitled to take precedence as regards numbers; but the annual returns are seldom well observed in this country owing to cloudy weather, moonlight, and other causes. Moreover, the radiant is only at a satisfactory height for the plentiful display of its meteors just before sunrise. At 9 p.m. in the latitude of Greenwich the point of radiation is only fourteen degrees above the northern horizon. Observations are best made, therefore, in the early evening between 5 p.m. and 6 p.m., or during the few hours before sunrise.

The meteors are generally fairly bright, with long, rather swift flights and flaky trains. They are decidedly conspicuous objects, and easily identified from members

of the secondary showers of the epoch, which are not abundant or individually rich. This year the gibbous moon will slightly interfere with observations before midnight, but the morning hours, if atmospheric conditions allow, ought to provide a very suitable time for witnessing the spectacle.

W. F. DENNING.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE annual meeting of the Mathematical Association will be held on January 12, 1909, at King's College, London. Addresses will be delivered by Dr. H. T. Bovey, F.R.S., rector of the Imperial College of Science and Technology, on the mathematical preparation for students who propose to take up technical work; by Mr. Alfred Lodge, on the introduction of the idea of cross-ratio and homography, and its connection with involution; and by Prof. G. H. Bryan, F.R.S., on a proposal for the unknown digit.

THE annual meeting of the Geographical Association will be held on January 6, 1909, at the London School of Economics. In the morning, at 11.30, short papers on practical problems will be read. Mr. J. Fairgrieve will deal with the weather report and the teaching of geography, Dr. A. J. Herbertson will give hints on hanging and storing maps, and Mr. J. A. McMichael will give a demonstration of the method of making models by serial sections. In the afternoon, after a business meeting, the president, Mr. Douglas W. Freshfield, will deliver his address, Dr. H. R. Mill will lecture on the rainfall of the British Isles, and a lantern exhibition will be given of the set of views of the Dora Baltea, which has been prepared for the association by Mr. G. W. Palmer. The Geographical Association is, we are glad to find, continuing its excellent work in the direction of encouraging more scientific methods of teaching geography in schools. Monthly meetings for teachers and others are to be held on the last Friday evenings of January, February, and March next for the discussion of problems likely to assist teachers in their work, and in other ways the association is endeavouring to assist improved methods of geographical instruction. The honorary correspondence secretary, Mr. J. F. Unstead, 30 Greenholm Road, Eltham, is willing to give full particulars of the work of the association.

THE annual meeting of the recently formed American Federation of Teachers of the Mathematical and Natural Sciences was held at the Johns Hopkins University, Baltimore, on December 28 and 29. On the second day a joint meeting was held with the American Association for the Advancement of Science, at which numerous problems of science teaching were discussed. From Bulletin No. 1 of the federation, which has been received, we learn that seven associations have formally joined the federation. Fourteen others have the matter under consideration, and are expected to take action on it at their next meetings. Among pieces of work of obvious interest and importance which the federation proposes to undertake may be mentioned investigations and reports on such matters as the bibliography of science teaching and the history of science; the best means of publication for new material of interest to teachers of science; the best means of securing the most favourable conditions for science teaching, including a share in the shaping of college entrance requirements. It is important to notice that the articles of the federation provide, not for the formation of a new national society of teachers of mathematics and science, but for a collective representation of existing local societies in matters of broad general interest. Each local society, of which there are many in the United States, preserves its independent identity and methods of work. Already the federation has begun work by undertaking the compilation of a bibliography of the literature on the teaching of science and mathematics. The work is being done by cooperative effort, part having been assigned to each of the federated associations. A committee on bibliography has been appointed, with Prof. Richard E. Dodge, of Teachers' College, New York, as chairman. The list to be prepared is to "include books, articles in periodicals, scientific journals or association reports, including foreign contribu-

tions, if any." The object is to prepare a bibliography of contributions to science teaching in the last decade "that will be a working basis for any teacher of science, and especially for any in an institution with limited library facilities." Since reviews of recent publications on science teaching are valuable in making up programmes of study, this bibliography should be an aid in this way, and should encourage the study of the literature of the subject. For convenience and effectiveness in covering the whole field of science teaching, specialists have been appointed to undertake the work in six subdivisions. The federation has already a membership of more than 1600, and is the most representative body of teachers of science in America.

**SOCIETIES AND ACADEMIES.**  
LONDON.

**Royal Society, June 25.**—"Note on the Instability of Tubes subjected to End Pressure, and on the Folds in a Flexible Material." By A. Mallock, F.R.S.

When a straight rod is subjected to end compression it is stable for small lateral displacements unless the compressing force exceeds a definite limit, depending on the elastic constants of the material of the rod and its length and cross-section dimensions.

If this limit is exceeded the rod is unstable, and the least departure from straightness grows under the action of the force, the axis of the rod then taking the form of

assumed by the deformed tube depends on the ratio ( $h/r$ ) of the thickness of the walls to the diameter, and will be such that the potential energy of the combined bending and shearing involved may be a maximum.

If the crushing is continued until the tube is greatly reduced in length the folds are seen to develop into the symmetrical shapes shown in the photographs (Figs. 1, 2, 3), for which  $n=1, 2,$  and  $3$  respectively. For  $n=1$  the folds are circular in plan and independent of  $\theta$ ; when  $n=2$  the plan of the folds is a square, and when  $n=3$  the plan is hexagonal.

It may be noticed that the instability always shows itself first at one end, and that since the reaction against end pressure decreases as the deformation goes on, each fold is completed in succession, the next not becoming marked until the reaction is increased by the previous fold resting against the last but one.

**November 5.**—"Note on Tidal Bores." By Lord Rayleigh, O.M., Pres.R.S.

It was shown long ago by Airy that when waves advance over shallow water of depth originally uniform, the crests tend to gain upon the hollows (see also "Scientific Papers," vol. i., p. 253, 1899), so that the anterior slopes become steeper and steeper. Ultimately, if the conditions are favourable, there may be formed what is called a bore. Ordinary breakers upon a shelving beach are of this character, but the name is usually reserved for tidal bores advancing up rivers or estuaries. Interesting descriptions of some of these are given in Sir G. Darwin's "Tides" (Murray, 1898).

Although the real bore advances up the channel, we may for theoretical purposes "reduce it to rest" by superposing an equal and opposite motion upon the whole water system. We have then merely to investigate the transition from a relatively rapid and shallow stream of depth  $l$  and velocity  $u$  to a deeper and slower stream of depth  $l'$  and velocity  $u'$  (Fig. 1). The places where these velocities and depths are reckoned are supposed to be situated on the two sides of the bore, and at such distances from it that the motions are there sensibly uniform. The problem being taken as in two dimensions, two relations may at once be formulated connecting the depths and velocities. By conservation of matter ("continuity") we have

$$lu = l'u'; \tag{1}$$

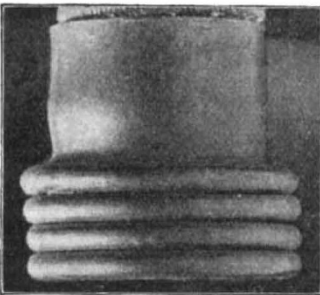


FIG. 1.

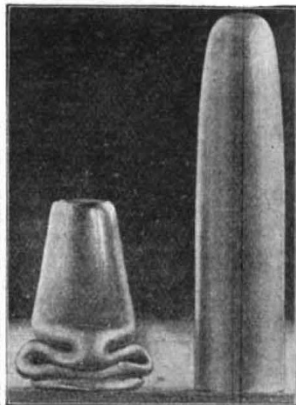


FIG. 2.

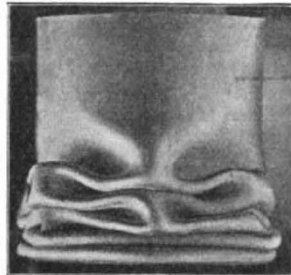


FIG. 3.

one of the well-known elastic curves, and this is the only form which a solid rod can take in the circumstances.

With tubes and plates, however, the case is different, for with the tube the ratio of the thickness of the walls to the diameter of the tube has to be considered as well as the ratio of the diameter to the length. Thus a tube the length of which is insufficient to produce instability involving a bending of the axis may become unstable by the crumpling up of the walls, the axis itself remaining straight.

In the case of solid rods the governing condition is the constancy (to the first order) of the length of the axis; with tubes and plates it is the constancy to the same order of the area of the mid-wall surface. Considering the case of tubes in rather more detail, take the axis of the tube as  $z$  and let its unstrained radius be  $r_0$ .

Under end compression the surface may become unstable by deformation into any of the cylindrical harmonics of the type

$$r = r_0 + a \cos n \theta \cos \frac{2\pi}{\lambda} z,$$

where  $\theta$  is the angle which  $r$  makes with a fixed diameter of the tube and  $\lambda$  the length of the fold parallel to the axis. The order of the harmonic which will naturally be

posed to be situated on the two sides of the bore, and at such distances from it that the motions are there sensibly uniform. The problem being taken as in two dimensions, two relations may at once be formulated connecting the depths and velocities. By conservation of matter ("continuity") we have

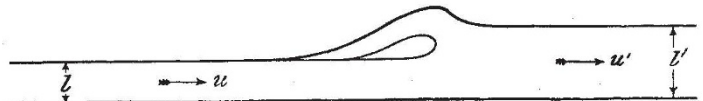


FIG. 1.

and since the mean pressures at the two sections are  $\frac{1}{2}gl$ ,  $\frac{1}{2}gl'$ , the equation of momentum is

$$lu(u-u') = \frac{1}{2}g(l'^2 - l^2); \tag{2}$$

whence

$$u^2 = \frac{1}{2}g(l+l').l/l, \quad u'^2 = \frac{1}{2}g(l+l').l/l'. \tag{3}$$

The loss of energy per unit time at the bore is thus

$$lu(\frac{1}{2}u^2 + \frac{1}{2}gl) - lu'(\frac{1}{2}u'^2 + \frac{1}{2}gl') = lu \cdot g(l-l) \frac{l^2 + l'^2}{4l'l}. \tag{4}$$

That there should be a loss of energy constitutes no