but to secondary education generally." The work completed during the past year on the County Council Farm at Hutton has been very successful, both as regards the instruction given and the amount of research work carried out. It seems rather anomalous that while Preston devotes no part of its share of the Customs and Excise Fund to the purposes of education, yet, as the report shows, the County Committee make a grant of £650 a year to the Harris Institute in that town. Surely the borough authority will not abstain much longer from following so good an example.

WE learn from the February number of the *London Technical Education Gazette*, that seventeen secondary schools in different parts of the metropolis have been aided by grants from the Technical Education Board of the London County Council. These grants have been very useful in encouraging the establishment of laboratories and science lecture-rooms in schools which have hitherto been without these advantages, and in improving the equipment and teaching in schools in which practical science has been taught. We notice with much satisfaction that in a large number of these schools physical laboratories have been provided, and that every facility is being given for the study of practical physics as well as chemistry. Too much stress cannot be laid upon the incompleteness of that practical science teaching which confines the student's attention to elementary qualitative analysis, and we note that it has been already found that "the influence of the Board's grants is as much apparent in the character of the teaching given in the several schools as in the appliances available for such teaching." The old method of teaching practical chemistry is giving place "to a more rational system, in which the laboratory and the lecture-room are brought into close relation, and in which the importance of measurement is insisted upon as the basis of all scientific work." Two at least of the schools receiving aid are for girls. A laboratory and lecture-room in James Allen's Girls' School, Dulwich, and a laboratory for practical science and school of domestic economy at the Camden School for Girls, have been equipped at the cost of the Board. The London Committee are, in this matter, as in so many others, setting the country local authorities an example which we hope soon to see emulated. The development following upon these grants can be seen at a glance from the statistics collected by the Board's science inspector, and published in these columns on February 13 (p. 357).

The cost of the new technical school at Salford, which is to be shortly opened by the Duke and Duchess of York, is likely to amount to £70,000. This amount is in excess of the anticipated cost, and the original loan of £55,000, sanctioned by the Local Government Board, is to be augmented by a further one of £13,500. Even then the difficulty of the expenses of maintenance will have to be faced. The experiences of the Salford Committee show only too plainly the necessity for legislation to prevent the appropriation of accumulated funds from the technical education grants of former years for ordinary purposes in the district. The Technical Instruction Committee of Salford had up to March 1894, been holding in reserve moneys received under the Local Taxation (Customs and Excise) Act of 1890, but the corporation becoming involved in financial difficulties, laid hands on these moneys, which amounted to £12,000. It is now left to the Committee to meet a heavy annual expenditure out of their revenue from the rate of a penny in the pound, the fees, grants, and other sources of income.

As a supplement to last week's account of what has been done for the support of education by some of the London Livery Companies, it is interesting to note the efforts in the direction of (probably) the only surviving provincial Company of the same type—the Master, Wardens, and Commonalty of Merchant Venturers of the City of Bristol. The supreme importance, for a commercial and manufacturing people, of what is now known as "technical instruction" seems to have been realised in Bristol earlier than in most other parts of England; for as long ago as 1856 there was founded in that city the Bristol Diocesan Trade School (afterwards called the Bristol Trade and Mining School), for the express purpose of providing sound and systematic education for the industrial classes. The school, being appreciated by those for whom it was intended, soon acquired a more than local reputation, and steadily grew in numbers, up to the limit which its buildings and its finances imposed. In 1880, when this limit had been reached, it happened that the Merchant Venturers—whose work of creating, and governing for centuries, the port of Bristol was then accomplished—resolved to devote their energies for the future to the furtherance of education; and, seeing the position of the Trade and Mining School, and the great value of the kind of teaching which it supplied, agreed to adopt it. Accordingly, at an outlay of some £45,000, they provided it with new buildings, upon a larger site, and with a more complete equipment; they also undertook to maintain it and develop it upon existing lines; and they gave it their own name. The Merchant Venturers' Technical College, as it is now called, has a junior department, a senior department, and a multitude of evening continuation classes; so that any boy, or young woman, destined for an industrial occupation of whatever kind—whether as architect, engineer, designer, chemist, dressmaker, or the like—may both begin and finish his or her entire education within its walls. The total number of students now exceeds 2000. In keeping with the special object of the institution, its curriculum is limited to comparatively few of the main branches of knowledge, and necessarily leaves out many of the most important. It hardly touches, for instance, the fascinating realm of literature, ancient and modern, or the subjects of music, medicine and law; and it ignores altogether the whole range of the mental and moral sciences. But ample provision for the teaching of all these exists, or can be made, in the other schools and colleges which Bristol is so fortunate as to possess, and thus the Merchant Venturers are enabled to occupy, with undivided attention, their own restricted field of operations, and to carry out, with ever-increasing thoroughness, their scheme of industrial or technical education sketched out forty years ago. Not a term passes without some addition to the apparatus with which their College is equipped, and hardly a session without provision for some newly-recruited trade or class; and it is an open secret that, as soon as the necessary land can be acquired, the extent of the buildings, and the convenience and efficiency of every department, will be very largely increased. It may well be supposed that no effort will be spared to enable the College to keep the lead, which it has hitherto held, in matters pertaining to technical instruction, or to ensure that, in this respect, it shall remain without a successful rival in the West of England. The Merchant Venturers, like their brethren in London, have a position to justify, a character to maintain, a distinguished past which they must not disgrace; and it is likely that, in the new work to which they have set their hands, they will evince the same activity and perseverance, and the same prudent liberality in furnishing means for the attainment of their ends, as characterised them in olden times, when their ventures were mostly for their own private gain, rather than, as now, for that of the community.

SCIENTIFIC SERIALS.

American Journal of Science, February.—Researches in acoustics, by A. M. Mayer. This paper, dealing with the variation of the modulus of elasticity with change of temperature, and the acoustic properties of aluminium, was read before the British Association at the Oxford meeting.—On the improbability of finding isolated shoals in the open sea by sailing over the geographical positions in which they are charted, by G. W. Littlehales. Suppose that A discovers, in the open ocean, a shoal r miles in radius, and determines the geographical position of its centre subject to extreme errors of m miles in longitude and n miles in latitude; and that B, who is able to establish his geographical position within the same limits of extreme error as A, attempts to find the shoal again by proceeding to the geographical position assigned to it by A, what is the probability that he will find it? The author works out this probability mathematically, and finds a general formula for it. If $r = 1$ mile, and m and $n = 10$ miles, B would stand one chance in 6173 of coming within two miles of the shoal. This shows that the reported non-existence of a charted shoal must be accepted with great care.—The counter-twisted curl aneroid, by Carl Barus. A curl aneroid, less than a metre long, provided with a mirror for registry, will indicate variations of atmospheric pressure of a thousandth of a millimetre of mercury, provided the mounting is sufficiently free from tremor, and the temperature is kept constant to a few thousandths of a degree during the interval of observation. The conditions are made much less severe if the coiled tube, after being twisted, is kept untwisted by a spiral spring. Effects of viscosity and rigidity may be thus compensated.

Wiedemann's Annalen der Physik und Chemie, No. 2.—Methods of determining dielectric constants, by W. Nernst. The author employs a bridge in which two branches are always equal; the third contains the dielectric trough, and the fourth a variable resistance and a variable capacity in parallel. Connecting two opposite terminals with a high-frequency induction coil, and the two others with a telephone, the latter is only silent when the resistance and the capacity in the fourth branch are equal to those of the dielectric in the third. An attempt to verify this by comparison with the electrometer method was foiled by the uncertainty of the latter.—A modification of the electrometer method, by J. F. Smale. This is based upon the attraction of a needle immersed in the dielectric by conductors kept at a constant potential. The conductors are two semi-ellipses nearly surrounding the flat needle of platinum, which is suspended by a quartz fibre. The deflection of the needle from its position of rest is proportional to the dielectric constant of the medium. A comparison with Nernst's method gave practically identical results.—An apparatus for varying self-induction, by Max Wien. This consists of a fixed and a movable coil. The fixed coil is subdivided into four, each of which can be placed in circuit, so that the self-induction can be abruptly changed. The interval between each abrupt change is filled up by moving the movable concentric coil about its diameter, by means of an arm travelling over a graduated circle. The range of the apparatus is very large, and self-inductions from 5×10^3 to 10^{10} can be measured.—Refraction and reflection of electric waves by water and alcohol, by A. D. Cole. For waves 300 to 600 cm. long, water has an index of refraction of 8·95, alcohol 5·20. Calculated by Fresnel's formula from the reflection of polarised rays, the refractive indices for wave-lengths of 5 cm. come out as 8·8 for water, and 3·2 for alcohol; so that alcohol shows a remarkably higher refraction for long than for shorter waves.—Lowest temperatures and the liquefaction of gases, by C. Linde. Air is liquefied exclusively by the action of its own expansion, each portion of the expanded air being conducted past the next expanding proportion, and cooling it down to a lower temperature. The apparatus is almost identical with that recently described by Prof. Dewar, but the author claims priority.—The wave siren, by Rudolph König. This paper contains the results of a minute and careful investigation of the behaviour of the air current in a wave-siren. The air is blown through a slit, which is lengthened or shortened by the curved edge of a plate rotating in front of it. Any tone is thus directly reproduced from its wave-form. The air current remains sharply defined to a distance of about 1 cm. from the slit, and the wave-plate need therefore not be mounted very close to it. There is no accumulation of air by the closed portions of the slit leading to irregularities in the tone, and the vortex effects at the edges are without any influence upon the tone. The loudness of the sound produced by a simple sine curve increases with the width of the slit, reaching a maximum where the width is half the wave-length. Most vowels can be correctly reproduced from their known wave-forms.

Bollettino della Società Sismologica Italiana, vol. i., 1896, No. 9.—Review of the principal eruptive phenomena in Sicily and the adjoining islands during the four months, May-August, 1895, by S. Arcidiacono.—Notices of Italian earthquakes (July-August, 1895), by M. Barratta, the more important being those of the Comacchio earthquake of July 30, and part of those of the Adriatic earthquake of August 8.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 30.—"On the Rhythmic Contractility of the Spleen." By E. A. Schäfer, F.R.S., and B. Moore.

The authors have investigated the rhythmic contractility of the spleen, which was discovered by Roy (*Journ. Physiol.*, vol. iii.), and the influence of nerves, drugs, and animal extracts upon it. For this purpose the changes in its volume have been studied by aid of a specially constructed plethysmograph, so arranged as to afford the least possible obstruction to the blood-vessels entering and leaving the hilum. Under these circumstances, the spleen exhibits evidence of responding immediately by alterations in volume to every alteration in blood pressure, respiratory and cardiac, and *à fortiori* to such greater changes as are produced by compression of the aorta (contrary to Roy). This is even manifest when the organ is left connected with the rest of the vascular system by one artery and vein only. The conclusion which Roy arrived at, that the spleen is practically cut off from the arterial system, and that its circulation is maintained by its own contractions, is thus shown to be incorrect.

The rhythmic contractions are independent of the central nervous system.

They are excited to increased activity by intravenous injection of certain drugs and animal extracts which act specifically upon the organ. Indifferent fluids, such as normal salt solution, produce in moderate quantity no such effects (contrary to Roy).

Dyspnœa causes marked contraction of the spleen. This contraction is of central origin, for after severance of all nerves to the organ it is replaced by a passive dilatation, due to the rise of general blood pressure, followed by an increase in extent of the rhythmic contractions. Temporary cessation of the blood flow through the organ also has the effect of increasing their extent, probably because the splenic tissue is thereby deprived of oxygen.

The splanchnics contain not only nerve fibres which produce contraction of the spleen, but also others which cause dilatation.

There is no evidence that the vagi contain any centrifugal fibres which influence the volume of the spleen (contrary to Roy). Provided their inhibitory action upon the heart is neutralised by atropine, even the strongest stimulation of the peripheral end of either cut vagus produces no direct effect upon the spleen.

There is evidence of the existence of numerous afferent (sensory) fibres in the nerves supplying the spleen.

Entomological Society, February 19.—Prof. Raphael Meldola, F.R.S., President, in the chair.—Dr. D. Sharp, F.R.S., exhibited preparations of *Dytiscus latissimus* and *Cybister roeselii*, to show the so-called secondary wing, noticed by Meinert. He stated that this structure is only a part of the elytron, to which it is extensively attached, and that he considered that it corresponded with the angle at the base of the wing seen in so many insects that fold their front wing against the body. He could not consider that this structure afforded any support to the view that the elytra of beetles correspond with the tegulæ of Hymenoptera rather than with the front wings. He also exhibited specimens of Neuroptera, and pointed out that this secondary wing agreed in position and structure with a small lobe on the front wing of Raphidia. Mr. McLachlan, Prof. Meldola, and Mr. Gahan made some remarks on the subject.—Mr. C. G. Barrett exhibited, for Dr. H. G. Knaggs, cells of *Retinia resinana* formed of resin but lined with wax. A portion of the cell had been removed and the resin dissolved away with spirit, leaving a slight film of wax. Mr. Tutt stated that a secretion of wax had been detected by Dr. Chapman in *Parnassius apollo*. Prof. Meldola suggested that as Dr. Knaggs had shown how to separate the resin from the wax, it would be of interest to make a chemical investigation of the latter, since a sufficient supply of this material could easily be obtained. No insect wax, with the exception of that of the bee, had been submitted to investigation by chemists. Mr. Hampson and Mr. Blandford continued the discussion.—Mr. Gahan exhibited drawings of the dorsal segments of the abdomen of *Dyscritina longisetosa*, formerly described by Prof. Westwood in *Trans. Ent. Soc.*, 1881, a specimen of which was shown by Mr. E. E. Green at the last meeting of the Society. He regretted that no drawing, showing the ventral service, had yet been prepared.—Mr. B. A. Bower exhibited specimens of *Argyresthia atmoriella*, Bankes, taken in Kent, in June 1894, a recent addition to British Lepidoptera.—Mr. Green read notes on the habits of the Indian ant, *Œcophylla smaragdina*, Fabr. He said he believed that at some previous meeting of the Society, Mr. Ridley, of the Singapore Museum, made some remarks on this ant and its supposed habit of using its own larvæ as web-spinners in the formation of its nest, but he had not been able to find anything on the subject in the *Proceedings*. Mr. Green stated that he was now able to produce corroborative evidence from an independent source. The facts were noted by his friend Mr. W. D. Holland, of Balangoda, Ceylon, a most careful observer. Mr. Green exhibited the specimens referred to by Mr. Holland, and pointed out that the larvæ were still tightly grasped by the jaws of the ants, and he thought it probable that other web-spinning ants utilised their larvæ in the same way. Mr. Hampson said he could confirm this statement.—Mr. G. F. Scott-Elliot read a paper entitled "Notes on Flower-Haunting Diptera." The author pointed out that some of the higher types of Diptera