

factories at Barbados and Antigua were gradually taking shape. The diseases of cacao were receiving careful attention, and amongst subsidiary industries the best method of converting lime juice into citrate of lime was being investigated; attempts were being made to establish a trade in sweet potatoes between Barbados and London, to grow Irish potatoes for the London market, and to develop the onion industry in Antigua, Montserrat and Dominica; and plantations of the Central American rubber (*Castilloa elastica*) had been started at Trinidad and Tobago. A bee expert had been employed for several months to visit and advise bee-keepers, and lately an illustrated pamphlet containing information respecting bee-keeping in the West Indies had been published. Very favourable conditions existed in many of the West Indian colonies for raising horses, cattle and small stock, and efforts were being made to improve native breeds by the importation of stallion ponies, Maltese jacks and jennies, pedigree bulls, pigs, sheep, goats and poultry. The direct fruit trade recently established between Jamaica and the United Kingdom by means of a subsidised steamship service had proved entirely successful, and it was difficult to over-estimate the possibilities in this direction, in which many of the smaller West Indian islands might participate.

Agricultural education had formed an important part of the work done; courses of lectures in agriculture were being delivered in all parts of the West Indies to school teachers, and by this means the subject was being introduced into the primary schools. In the higher grade schools and colleges it was sought to establish lectureships in agricultural science; a lecturer had been provided by the Department at Barbados and Jamaica, and favourable reports had been received upon the results of their work. Seven agricultural scholarships had been founded, and it was hoped soon to be able to increase the number in order to afford opportunity to the most promising boys in the smaller islands to obtain sound agricultural teaching. Agricultural schools at St. Vincent, Dominica and St. Lucia had been established, at which seventy boys were being maintained for three or four years free of cost to their parents and carefully trained in the science and practice of agriculture. Attached to the schools were experiment stations, where the boys carry on all light operations and raise a portion of their own food. A series of lectures to planters had been given in Barbados the full text of which would shortly be published. Agricultural shows under the auspices of the Imperial Department of Agriculture were now regularly held at seven of the islands, and these shows were gradually drawing attention to the better cultivation and preparation of produce and bringing prominently into notice the varied resources of the islands.

Besides the journal of the Imperial Department of Agriculture (*West Indian Bulletin*), of which the last number of the second volume was in the press, twelve pamphlets, containing in the aggregate 417 pp., had been published since the last conference. These pamphlets contain information specially applicable to tropical conditions, and 30,000 copies are in course of being distributed. The principal subjects dealt with are:—"The General Treatment of Insect Pests" (first and second editions), "Scale Insects of the Lesser Antilles" (part i.), "Cultivation of Vegetables," "Hints for cooking Sweet Potatoes," "Bee-keeping in the West Indies," "Manures and Leguminous Plants at Barbados, 1898-1901," "Hints for School Gardens," "Seedling and other Canes in the Leeward Islands, 1900-1901," "Seedling and other Canes at Barbados, 1901." Of "Nature Teaching" (pp. 12 and 199) 2000 copies have been published and nearly all distributed. The Department contemplates the publication of a fortnightly paper, to be called the *Agricultural News*, containing hints and advice on all points of interest to the West Indies.

The sugar industry was the first subject taken up for discussion by the Conference; short papers were read by those engaged in sugar-cane experiments in the various colonies, summarising the progress made during the past year; a discussion ensued in which the agricultural representatives took an important part. While no seedling could be put forward at present to displace the old and well-tried varieties, it was felt that the progress made encouraged the view that the production of seedlings was destined to play an important part in the future existence of the sugar-cane industry in the West Indies. The accounts given of recent manurial experiments confirmed the importance of active nitrogenous manures, but tended to show that in many soils phosphatic manures did not increase the yield. The general consensus of opinion was

in favour of supplementing the experimental station plots by trials upon a large scale on the estates, and this method has been already adopted in several colonies.

The proceedings included important papers by Mr. H. H. Cousins (Government chemist, Jamaica) and Mr. Joseph Shore (Jamaica), on "The Sugar Industry of Jamaica," and accounts of the life-history of the lady bird borer (*Sphenophorus sacchari*), by Mr. Maxwell Lefroy, and of "The Field Treatment of Cane Tops in reference to Fungoid Disease," by Mr. A. Howard.

On the second day, papers on agricultural education were read by Mr. A. B. McFarlane (principal of the Teachers' Training College, Jamaica), Mr. W. R. Buttenshaw (lecturer in agricultural science, Jamaica) and Messrs. J. E. Reece, J. A. Harbin and C. M. Martin, inspectors of schools at Barbados, Grenada and the Leeward Islands. An educational section, with the Bishop of Barbados as chairman and Mr. C. M. Martin as secretary, reported upon questions connected with agricultural teaching at primary schools. A chemical section, with Prof. J. B. Harrison (British Guiana) as chairman and Prof. J. P. d'Albuquerque (Barbados) secretary, reported upon chemical methods in sugar-cane work.

Papers were also read on "Suggestions for Regulating the Quality of Exported Fruit," by Mr. Sydney Olivier (Colonial Secretary, Jamaica), "The Preparation of Citrate of Lime," by Mr. Francis Watts (Government chemist, Leeward Islands), "Scale Diseases," by Mr. H. Maxwell Lefroy (entomologist to the Department), "Agricultural Boards," by Mr. Sydney Olivier, "The Preparation of Essential Oils," by Mr. Hart (Superintendent of the Botanic Gardens, Trinidad), "The Removal of Epiphytic Vegetation on the Stems of Cacao and Lime Trees," by Mr. A. Howard (mycologist to the Department), and "The Aloe Industry of Barbados," by Mr. W. G. Freeman (technical assistant to the Department).

J. P. D'ALBUQUERQUE.

#### THE LEONID SHOWER OF 1901.

IT now seems possible to give a brief review of the character of the Leonid shower which occurred last November, a considerable number of reports being available for the purpose. Certain other results obtained in various quarters of the globe doubtless still remain unpublished, but it is not likely that they will materially differ from those already before us.

In England the display of Leonids cannot be said to have been a conspicuous or a plentiful one, though it was decidedly stronger than in either of the years 1899 or 1900. Fortunately, the sky was clear on the nights following November 14 and 15, and a large number of observations were secured in different parts of the country. On the morning of November 15, Mr. H. Corder at Bridgwater watched the firmament for an hour and a half and saw 50 meteors, three-quarters of the number being Leonids, so that the hourly rate of their apparition was about 25. Mr. E. C. Willis, of Norwich, found the hourly number 22 on the same morning, while on the following morning it was 18. Mr. J. R. Henry, of Dublin, observing from 1h. to 3.30, saw Leonids as bright as the first and second magnitude falling at the rate of 12 per hour. The maximum was apparently attained just before the morning twilight began to overpower the fainter stars. The hourly numbers quoted above may be fairly considered to approximate the truth. It is true that some other observers saw fewer meteors, but as they were engaged in recording the individual paths, a considerable number must have altogether escaped their notice.

But the real maximum of the shower certainly occurred after sunrise in England; this is proved by observations from America, where the meteors were far more numerous, though the display was only of secondary importance. Mr. E. L. Larkin, at the observatory on Echo Mountain, S. California, counted 297 meteors on November 15, 4h. to 5h. a.m. (local time), so they were falling at the rate of 5 per minute. The maximum was at about 4h. 20m.-25m. a.m. One fireball left a streak for 14 minutes, and the meteors generally were very brilliant, two being estimated twenty times as bright as Venus, three ten times as bright, twelve five times as bright, and twenty-five equal to Venus. Forty were equal to Jupiter. At Ladd Observatory, Providence, the number seen was 2 per minute on the morning of November 15, while at several other places in the States the rate was 3 or 4 per minute between about 3h. 30m. and 5h. 30m. a.m.

At Carlton College, Northfield, Minn., it was estimated that four observers might have counted about 1600 meteors per hour. There was a marked falling off in numbers on the morning of November 16. Yet at two stations, according to newspaper reports, the shower was quite striking on the latter morning, for at Los Angeles one observer is said to have counted 385 meteors in the hour between 4h. and 5h. a.m., while at Phoenix 200 were seen in half an hour. It is highly probable, however, judging from the character of the shower as recorded at other stations, that in the two latter cases the observations were really made on the morning of the 15th and not on the 16th as stated in the newspaper accounts, which are often erroneous in such matters.

The maximum of the display must have occurred at about 11h. 30m. a.m. G.M.T. November 15, according to some of the best American descriptions. Possibly it may have been attained even later than this, for the morning twilight must have affected the observations to some extent. If the time of greatest frequency was after that stated, the phenomenon at its best could only have been observed from the Pacific Ocean, and it is not probable that we shall get any satisfactory reports from this region.

Though the shower was pretty active, it does not appear that photography has afforded any material assistance in recording its features. Plates were exposed at many observatories, but trails were absent upon them except in one or two isolated instances.

In England a number of meteors were doubly observed during the Leonid epoch, and their real paths have been calculated. In the following table are given the heights, &c., of 8 Leonids, of 1 Leo Minorid, of 1  $\delta$  Leonid, and of a remarkably slow-moving meteor from Cetus:—

Date.	G.M.T.	Mag.	Height at beginning.	Height at ending.	Path.	Velocity per second.	Radiant point.						
1901.			Miles.	Miles.	Miles.	Miles.	$\alpha$ $\delta$						
Nov. 14	...	13 32	...	1 - > 1	...	85	...	52	...	66	...	Rapid	156 + 32
		13 37½	...	2 - 1	...	77	...	57	...	38	...	Rapid	152 + 30
		13 42	...	2½ - 2	...	81	...	67	...	67	...	55	174 + 20
		14 24	...	4 - 2	...	82	...	57	...	44	...	Rapid	152 + 25
		14 38	...	2 - 2	...	87	...	54	...	22	...	37	152 + 23
		15 7	...	3 - 1	...	95	...	55	...	60	...	Rapid	152 + 23
		15 23	...	> 1 - 2½	...	72	...	47	...	36	...	72	151 + 25
		16 0	...	1 - > 1	...	91	...	61	...	41	...	54	149 + 20
		16 7	...	1	...	86	...	60	...	35	...	Rapid	151 + 23
Nov. 15	...	13 8	...	1½ - 1	...	43	...	37	...	28½	...	7½	38 - 21
		13 48	...	2 - 2½	...	76	...	59	...	37	...	37	151 + 21

The mean height of 8 true Leonids was 81 to 56 miles and the mean radiant-position  $151^{\circ}2 + 23^{\circ}7$ .

The place of the radiant found by Mr. Winslow Upton at the Ladd Observatory, Providence, was on November 15 a.m.  $150\frac{3}{4}^{\circ} + 21\frac{1}{2}^{\circ}$ , and on November 16 a.m.  $151^{\circ} + 21\frac{1}{2}^{\circ}$ .

The next return of the Leonids will be regarded in an interesting light, for 1902 will afford the 1000th anniversary of the first record of the shower (902). The moon will be full at the middle of November, but as the meteors of this swarm are often brilliant, some of them are likely to be distinguished in spite of the illuminated sky. There were showers of Leonids in 902, 1002, 1202 and 1602, and the revival of the display in 1901 encourages the hope that something may be seen of it in 1902, though the parent comet will be about three and a half years past its perihelion.

W. F. DENNING.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The 231st meeting of the Junior Scientific Club was held on January 31. Two papers were read, one by Prof. H. A. Miers, F.R.S., Magdalen, on gold-mining in Klondike, and the other, by Mr. H. L. Tidy, New College, on some curious sounds. The officers of the Club for this term are:—President, Mr. H. H. Cooke, New College; biological secretary, Mr. E. Burstal, Trinity; chemical secretary, Mr. S. P. Grundy, Balliol; treasurer, Mr. E. L. Kennaway, New College; editor, Mr. H. D. Davis, Balliol.

In reply to a question in the House of Commons on Monday as to the approximate date of the introduction of the Education Bill promised in the King's Speech, Mr. Balfour said he was unable to give a date, but he hoped the Bill would be introduced before Whitsuntide.

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CORRESPONDENCE classes in various branches of engineering have been successfully carried on in the United States for several years. Prof. Andrew Jamieson, late professor of electrical engineering at the Glasgow Technical College, has now established similar classes in Glasgow for students of electrical and mechanical engineering. We are glad to notice that all students are advised to take a course of practical mathematics before devoting themselves to other subjects.

THE annual general meeting of the Association of Technical Institutions was held on Friday last in London. Lord Avebury, the president for the ensuing year, delivered an address in which he showed that the system of technical and higher education in Germany had been to the industrial advantage of the nation. If Britannia is to rule the waves she must be able to rule the steam engine and dynamo as well. Resolutions were adopted to the following effect:—(a) That this Association strongly approves the general principles on which the Government Education Bill of 1901 was based, and trusts that the Government will carry a Bill embodying these principles, with such amendments as may prove necessary, in the next session of Parliament. (b) That the Bill should prescribe that the residue under section 1 of the Local Taxation Account (Customs and Excise) Act, 1890, including any balance thereof which may remain unexpended at the end of the financial year, shall be applied for the purposes of education, and shall be administered by the education authority. (c) That an extension of the rating power by only 1d. in the pound, as was proposed in the Bill of 1901, would be wholly inadequate—especially in the case of the county boroughs—to defray the necessary additional charges in respect of secondary education which would fall upon the local authorities. (d) That it should be made a condition of the application of the residue under section 1 of the Local Taxation (Customs and Excise) Act, 1890, to the purposes of secondary education in general, that adequate provision shall first have been made for technical instruction, as was done in clauses one (1) and two (1) of the Duke of Devonshire's Education Bill of 1900. (e) That the Government should at once introduce and pass a Bill placing primary, secondary and technological education under the supervision of one local authority appointed as a rule for an area not less than that of a county or a county borough.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 23.—“On the Causation of the so-called ‘Peripheral Reflex Secretion’ of the Pancreas. (Preliminary Communication.)” By W. M. Bayliss, D.Sc. and Ernest H. Starling, M.D., F.R.S.

Introduction.—It has long been known that the introduction of acid into the duodenum causes a flow of pancreatic juice, and it has been shown recently by Popielski, and by Wertheimer and Le Page, that this flow still occurs after nervous isolation of duodenum and pancreas. Wertheimer also mentions that the flow can be excited by injection of acid into the jejunum, but not by introduction of acid into the lower part of the ileum. These authors conclude that the secretion is a local reflex, the centres being situated in the scattered ganglia of the pancreas, or, in the case of the jejunum, in the ganglia of the solar plexus (Wertheimer).

Results.—The secretion excited by introduction of acid into the jejunum cannot be reflex, since it occurs after extirpation of the solar plexus and destruction of all the nervous filaments passing to the isolated loop of jejunum. It also occurs after intravenous injection of 0.01 gramme atropin sulphate. It must therefore be due to direct excitation of the gland cells by a substance or substances conveyed to the gland from the bowel by the blood stream.

The exciting substance is not acid. Wertheimer has shown that injection of 0.4 per cent. HCl into the blood stream has no excitatory influence on the pancreas.

The secretion must therefore be due to some substance produced in the intestinal mucous membrane under the influence of the acid, and carried thence by the blood stream to the gland. This conclusion was at once confirmed by experiment.

When the mucous membrane of the jejunum or duodenum is exposed to the action of 0.4 per cent. HCl a body is produced which, when injected in minimal doses into the blood stream,