

MESSRS. GALLENKAMP AND CO., LTD., have favoured us with a copy of their catalogue of spectroscopes, spectrometers, vacuum tubes, induction coils, and other accessories essential to modern spectroscopical research. After examining the publication carefully we recommend all who are engaged or interested in such work to acquire a copy, for it is plentifully illustrated, the instruments are described in detail, and instructions are given as to how they should be set up for the best use in various researches. The accessories for the production of spectra, such as tubes, burners, coils, and cells, are very numerous, and the firm makes a speciality of vacuum tubes to which we have previously directed attention (vol. lxxi., p. 448). The "C" type of tube, in which the illuminated gas is viewed end on in a capillary tube, without the interference of the electrodes, is now made in Uviol glass and with ground-in quartz windows, so that investigations of the ultra-violet part of the spectrum may be carried out with the various ultra-violet spectrographs figured and described in the catalogue.

SOME results of trials of the new transmission gear for marine turbines constructed for Mr. George Westinghouse to the designs of Rear-Admiral George W. Melville and Mr. John H. Macalpine appear in *Engineering* for December 3. In this gear the reduction of speed from 5 to 1 is attained by the use of double helical spur wheels and pinions mounted in such a manner as to secure an even distribution of the bearing pressure between the teeth. The full load to be transmitted is 6000 horse-power at 1500 revolutions of the pinion shaft, and a special hydraulic brake was employed in the tests to take up the load. A few of the results are given in the following table:—

B.H.P. delivered by gear ...	3712	4156	4576	5036	5486	5927
B.H.P. of turbine ...	3771	4197	4623	518	5567	6057
Efficiency, per cent. ...	98.7	99	98.9	98.7	98.5	98.7

This efficiency is very remarkable, being as good as has been recorded with the best cut gears of ordinary dimensions. An endurance test of the gear at full load has also been carried out, extending from 3.15 on Saturday afternoon until 7.15 the next Monday morning. During the last thirty-four hours of the run the temperature of the gear remained constant, and there was every indication that the trial could have been extended indefinitely. The performances of this gear on board ship will be looked for with interest, both as regards the working of the gear and the anticipated economy which will result by running both turbine and propeller at their best speeds.

THE conditions of award of the prize of 1000*l.* offered by Mr. Alexander for a British-built aeronautical engine have now been issued. We extract the essential conditions from *Engineering*, as follows. The engine must develop not less than 35 brake-horse-power, and not exceed 245 lb. weight; that is, 7 lb. per horse-power, including all parts necessary for running, cooling apparatus, and accessories. Arms suitable for bolting down to a testing bed are included in the weight, and such arms must be arranged so that the motor-shaft is not less than 16.13 inches above the test-bed. The points on which the award will be given are:—(a) weight and petrol consumption; (b) trustworthiness and steadiness of running; (c) wear of working parts; (d) security against fire; (e) air-resistance offered by motor. Each motor will be tested on a 24-hours' run, and if the stoppages during this time exceed three, or if the total time of stoppage exceeds thirty minutes, the motor will be disqualified. The balancing will be taken into consideration, and the engine will also be tested at an inclination of 15 degrees, first one way and then the other, an hour's run each way being given. A thrust of 175 lb. will

be applied during the tests to represent the thrust of the propeller. The tests will be made in an air current of thirty miles per hour. The regulations comprise subsidiary details, but the above are the essentials. The tests will be carried out at the National Physical Laboratory under the sole control of the advisory committee, and entries may be made not earlier than February 1 and not later than April 30 on entry forms which may be obtained from the secretary, advisory committee for aeronautics, Bushy House, Teddington.

MESSRS. LONGMANS, GREEN AND CO. have published a seventh edition of Prof. W. D. Halliburton's "Essentials of Chemical Physiology for the Use of Students." Scarcely a page of the book has escaped revision, and a new lesson on some typical organic compounds has been included in the book.

A THIRD edition of the "Elementary Treatise on Electricity and Magnetism," by Prof. G. Carey Foster, F.R.S., and Prof. A. W. Porter, has been published by Messrs. Longmans, Green and Co. The whole book has been revised, and many additions have been made. The final chapter has been re-written, and provides a good summary of recent progress in electrical science.

MR. M. KANADE, Baroda, India, has sent us a copy of a list of books he has compiled and classified according to the system, known as the decimal classification and relative index, devised by Mr. M. Dewey, director of the New York State Library. The catalogue does not make it quite clear how the books chosen for classification have been selected, but the scheme provided for the classification of the works in any library should prove useful.

OUR ASTRONOMICAL COLUMN.

DANIEL'S COMET, 1909e.—A second observation by Prof. Daniel of the comet discovered by him on December 6 is reported by a telegram from the Kiel Centralstelle, and the following elements and ephemeris, computed by Dr. Ebell from observations made at Princeton (December 7), Northampton (December 8), and Nice (December 9), are published in Circular No. 116 from the Kiel Centralstelle:—

Elements.

T = 1909, December 5.6011 (Berlin).
 $\omega = 8^{\circ} 16' 42''$
 $\beta = 73^{\circ} 33' 08''$
 $i = 26^{\circ} 56' 90''$
 $\log q = 0.19674$

Ephemeris 12h. (M.T. Berlin).

1909	h.	m.	α	δ	log Δ	Brightness			
Dec. 13	...	6	18.1	...	+39 31.0	...	9.789	...	0.99
15	...	6	18.4	...	+41 6.2	...			
17	...	6	18.7	...	+42 38.8	...	9.794	...	0.96
19	...	6	18.9	...	+44 8.4	...			
21	...	6	19.0	...	+45 34.7	...	9.802	...	0.92

As the comet is travelling northwards through Auriga, nearly parallel to the line joining θ and β Aurigæ, it will probably remain observable in the northern hemisphere for some time.

The above elements show a likeness to those of comet 1867 I., but are, as yet, too uncertain to permit of any definite conclusions.

It will be seen from the ephemeris that the comet is now receding from the sun, and is becoming fainter; the unit brightness, at time of discovery, was given as 11.0.

HALLEY'S COMET, 1909c.—A further ephemeris for Halley's comet, based on the assumption that perihelion passage will take place at 1910 April 19.67, is published in No. 416 of the *Observatory* (December, p. 476), and extends to April 5.1 (Berlin Time). In the interval the comet will pass from Taurus, through Aries, graze the

northern limit of Cetus, and traverse Pisces. The short time that the orbit plane of the comet lies above the plane of the ecliptic is shown by the fact that the ascending and descending nodes are passed on January 17.9 and May 18.6, 1910, respectively; on the latter date the comet transits the sun. For seventy-eight days it remains inside the earth's orbit, being at unit distance from the sun on March 11.6 and May 28.7 respectively. At the beginning of March the comet will set about three hours after the sun, and will probably be unobservable from the end of the first week until nearly the end of April; then it will become observable before sunrise.

Numerous visual observations are now being recorded. Among others, Prof. Schorr reports that Dr. Graff saw the comet, with the $9\frac{1}{2}$ -inch equatorial of the Hamburg Observatory, on November 18, as an elongated nebulous mass, whilst Herr H. Thiele saw it with a $4\frac{1}{2}$ -inch comet-seeker. A number of observations are also reported in No. 4373 of the *Astronomische Nachrichten*. According to a *Daily Mail* correspondent, the Greenwich photographs show curious fluctuations of brightness. On November 22 the comet was of the tenth magnitude, whilst on November 30 it was of the twelfth, although on December 1 it was again brighter.

MARS.—In the December number of the *Observatory* the Rev. T. E. R. Phillips briefly reviews the various observations which have been made of the Martian features during the present opposition. His own observations indicate that the polar cap was not symmetrical about the pole of rotation, but was further from the south limb when the central meridian lay between longitudes 300° and 50° than when the other side was presented. The canals, generally, have not been well seen by Mr. Phillips, and only the Euphrates has been seen duplicated. He also refers to the lack of brightness in the white regions so well seen in 1903. Six drawings of the planet, by Mr. Phillips, accompany the note, and illustrate the various points to which the author refers.

OBSERVATIONS OF JUPITER.—In No. 4372 of the *Astronomische Nachrichten* Herren H. E. Lau and C. Luplau-Jannsen describe their observations of Jupiter made during the period January–May of this year. Numerous spots were seen in the different bands, the activity of the southern hemisphere in this respect during the recent oppositions apparently exceeding that of the northern. Band iv. appeared redder than hitherto, and the bright central line more irregular. In April a remarkable projection was seen on the southern edge of band v., darker than the band itself, but apparently partaking of the general motion of that region. Important changes took place in the visibility and form of the Great Red Spot between the end of January and the end of March, and on March 28 the spot itself could not be seen, although its place was partially occupied by a bright egg-shaped mass. A discussion of these changes and a number of measures of the various features also form part of the paper.

In No. 4373 of the same journal Dr. H. H. Kritzingler asks that all those observers who have unpublished measures of the position of the Red Spot will kindly communicate the same to him at 7, Hindersinstraße, Berlin N.W.

A SOLAR PHYSICS OBSERVATORY FOR AUSTRALIA.—The importance to solar physics of the installation of a properly equipped observatory in Australia can scarcely be over-estimated, and it is therefore with great pleasure that we learn, from the *Observatory*, that the labours of Dr. Duffield and others in this direction are likely ultimately to become fruitful.

At a meeting held on October 26 a number of prominent Australian officials discussed the matter, and His Excellency the Governor-General, Lord Dudley, in a carefully reasoned speech, pointed out the urgent necessity for the establishment of such an institution. He pointed out that a capital expenditure of at least 10,000*l.*, and an annual expenditure of about 1500*l.*, would be necessary, but if Australia is to use the exceptional advantages of position and climate which it possesses, and to take her place among the other nations in the progress of science, this opportunity should not be neglected. After discussing the matter at length, the meeting agreed to the following

motion:—"That the establishment of a solar observatory is desirable, and that the Federal Government be strongly urged to assume the responsibility of carrying it into effect." Already some 1000*l.* has been raised among private donors, and it has been officially suggested that the Commonwealth Government will materially help the fund, and, in the event of the effort being successful, provide for the maintenance of the observatory. From the opinions expressed by several influential Australian papers it appears very probable that this much needed institution will ere long become established.

THE HAMBURG OBSERVATORY.—We have received from the director, Prof. Schorr, the reports of the Hamburg Observatory for the years 1907 and 1908. In the latter is an account of the removal of the observatory to Bergesdorf and of the new instruments installed therein.

EPIHEMERIDES FOR PERRINE'S AND WINNECKE'S COMETS, 1909*b* AND 1909*d*.—Ephemerides for comets 1909*b* and 1909*d* are published in No. 4374 of the *Astronomische Nachrichten* by Dr. Ebell and Prof. Hillebrand respectively. As both these objects are faint, and south of the equator, it is not worth while reproducing the ephemerides here.

A CONTRIBUTION TO APPLIED BOTANY.¹

OWING, it seems, to the dilatoriness of some of the contributors, the annual report of the German Society of Applied Botany for 1908 has only lately appeared. The society, now numbering 260 members, held its sixth meeting at Strassburg early in August, and ought not to require twelve months for the publication of its report. A curious feature in it is the separation of the account of the discussion of the contents of a paper from the report of the paper itself. It would be more convenient if the two were combined, and the paper followed by the speakers' observations in each case. Thus "Diskussion zur Appel," early in the volume, refers to a paper by Appel at the end.

Wittmack directs attention to the confusion caused by the want of uniformity in the views expressed by experts on botanical matters, affecting especially the German Customs' Department. He recommended the appointment of a technical committee and the publication of its decisions in a special bulletin. This was subsequently found impracticable, and the society decided to utilise its annual report for such purposes as far as possible. As Wittmack's article itself indicates, the expert forces of Germany are so systematised in the various industries that there is little need for a new organisation.

In this report the amusing case of the "everlasting plant," *Selaginella lepidophylla*, is described in detail. Wittmack reported that the plant, as imported for sale as a curio, is dead. Brick, of the Hamburg Plant-protection Station, however, reported that the imported plants are often, as several botanists have shown, living. Any such living plant imported into Germany must pay a tax and be examined for freedom from vine-louse and the St. José scale-insect. Fortunately, common sense prevailed, and the plants are now allowed into Germany as curios.

Mez compares *Merulius lacrymans* with other forms of dry-rot, and shows that it, unlike, e.g., *Polyporus vaporarius*, prepares its way by moistening the timber with the "tears" it produces by its respiration, from the carbohydrates derived from the timber destroyed by it. The practical importance of this is great.

Klebahn describes experiments on the solvent action of root-secretions on "agriculture" and other phosphates. Wittmack defines the term "bulbs" as used horticulturally.

Voigt shows how seriously the contract cereal trade through Hamburg is affected by a correct application of the term "wild oats" in grain analysis, Hamburg and Berlin differing in their interpretation of it.

Muth contributes a comprehensive account of the varied part botany should play in the experimental work of agricultural stations, and shows that neither botany nor botanists occupy their rightful position at present in

¹ Jahresbericht der Vereinigung für angewandte Botanik. Sechster Jahrgang, 1908. Pp. xlii+294. (Berlin: Gebrüder Borntraeger, 1909.)