

an oil consisting principally of pinene; this is also the case with about thirteen other species, which together form Group I. in this system of classification. In the succeeding groups, the lateral venation of the leaves becomes gradually more complex, a marginal vein appears, and at the same time the oils produced undergo what may be called a corresponding change; thus pinene is partially replaced by cineol, until, as in the *Eucalyptus globulus*, which the authors appear to regard, probably in deference to its commercial value, as the highest evolutionary product of the genus, this constituent amounts to 60 per cent. of the oil obtained. In the course of this evolution there have appeared several side issues furnishing oils in which cineol is replaced by aromadendral, piperitone, geranyl acetate or citronellal and pinene, wholly or partially by the terpene phellandrene, and in each of these groups, also, there exists a corresponding leaf structure.

Interesting as is this correlation of morphology and constituents in the *Eucalyptus* species, it may be pointed out that a knowledge of the constituents of a plant is never likely to play such an important part in systematic botany as the authors appear to believe, since there are already known numerous instances of plants which, grown under different climatic conditions, show no morphological change, yet exhibit remarkable variation in constituents, and, on the other hand, plants which are not at all closely related, frequently contain the same colouring matters, alkaloids, &c., so that the necessary specific constancy of constituents, which alone would make such criteria useful, is wanting. The authors lay stress on observations made by them as to the absence of marked variation in the composition of oils yielded by the same *Eucalyptus* species grown in different districts of Australia, but the evidence of constancy in this respect would be greatly strengthened if it could be shown to hold for the same species grown outside Australia; for an investigation of this kind ample material now exists in foreign plantations.

The principal feature of the volume is, however, the publication of results obtained in the examination of the oils yielded by practically all the *Eucalyptus* species indigenous to Australia. A short description of the oil obtained, with its physical constants and those of its principal fractions, is appended to the botanical description of each species, and in order to render these more readily available, they are tabulated in special appendices.

The evidence adduced by the authors of the occurrence in the *Eucalyptus* oils examined of the normal constituents cineol, pinene, phellandrene, &c., is, as a rule, unexceptionable, but occasionally there are lapses which perhaps are due more to the magnitude of the authors' task in recording such a mass of facts than to their lack of scientific thoroughness, e.g. a minute difference in the levorotation of two fractions seems insufficient evidence for the assumption that aromadendral exists in the oil of *E. corymbosa* (p. 26); similarly, the coincidence of the melting point of the nitroschloride of the terpene of *E. botryoides* with that of pinene nitroschloride is not conclusive evidence of the presence therein of pinene, and it is usual in such a case to prepare in addition the nitro-piperide or similar derivative. The evidence given for the occurrence of a valeric acid ester in *E. umbra* (p. 37) is worthless, whilst the lemon-like odour of a particular fraction of the oil of *E. fraxinoides* scarcely warrants the assumption that it is due to citral without characterisation of this aldehyde by the preparation of at least one of its readily obtained derivatives. The authors also appear to be unaware that the reaction (p. 235) which they employ for the identification of geraniol, viz. its oxidation to citral by chromic acid, is equally well given by the isomeride linalool. The formation of an alcohol (cineol) of the composition  $C_{10}H_{18}O$  (p. 223) by the oxidation of an aldehyde (aromadendral) of the composition  $C_{10}H_{14}O$  is, if it really occurs—and on this point the evidence is slender—a unique reaction, and requires further investigation. It seems unfortunate, also, that whilst the specific rotation and solubility of the oils have invariably been determined, the authors did not utilise their unique opportunity to record such useful constants as the refractive index and dispersion. Exception must also be taken to the use of the name eucalyptol in place of cineol in a scientific publication of this kind.

The volume, as a whole, is remarkably well printed, and the plates depicting leaves of the typical groups clearly exhibit the characteristic features to which attention is drawn in the text.

The mere collection of the material necessary for an elaborate investigation of this kind is a task of considerable magnitude, and when there is added to this the tedious experimental work involved in the investigation of a large number of oils of similar composition, some idea may be obtained of the industry and perseverance the authors have expended on this work. The results should be of inestimable advantage to the colony far-sighted enough to encourage the prosecution of such investigations.

The American volume is intended primarily to enable forest proprietors to identify the *Eucalyptus* species in their possession, and is therefore largely a compilation of the diagnostic characters of the fifty odd species which have been introduced into the south-western States. The author, however, devotes some space to extolling the ornamental and useful character of these trees, and points out their value, particularly as wind breaks, shade trees, improvers of climate and as sources of timber and essential oil. The virtues of the latter, when of American origin, are described in language somewhat reminiscent of the advertisements of transpantine proprietary medicines. The chemistry of the volume is occasionally at fault, as, for instance, when it is stated that (p. 13) "the exudations from the trees are in most cases *not* gums, but resins," and "the chief ingredient of the lemon-scented *Eucalypt* is *citronellon*" (p. 39). The volume is, like most of the publications of the U.S. Department of Agriculture, well printed and copiously provided with useful and artistic illustrations.

T. A. HENRY.

#### OPPOSITION OF MARS.

MARS is now brightly visible during the whole night, and well placed in the sky for observation. He occupies a position on the equator in Virgo, but the present apparition is not really a favourable one, the distance of Mars from the earth on the date of opposition (March 28) being nearly sixty millions of miles. The apparent diameter of the planet, as given in the *Nautical Almanac*, will be  $14''.6$ ; this is only half the value ( $29''.5$ ) which the planet presented in the best circumstances in August, 1892, and September, 1877. At those periods, however, the declination of Mars was more than  $24^\circ$  south of the equator, so that telescopic observations were rendered very difficult at stations in high northern latitudes. A comparison of the last few oppositions of this planet gives the following figures:—

| Opposition.                  | h.     | Apparent Diameter. | Declination. | Distance. Millions of Miles. |
|------------------------------|--------|--------------------|--------------|------------------------------|
| 1894, October 20 ... 10 ...  | $25.6$ | $+ 8.32$           | 40           |                              |
| 1896, December 10 ... 18 ... | $16.6$ | $+ 25.39$          | 52           |                              |
| 1899, January 18 ... 12 ...  | $14.4$ | $+ 24.42$          | 61           |                              |
| 1901, February 21 ... 18 ... | $13.8$ | $+ 14.36$          | 63           |                              |
| 1903, March 28 ... 20 ...    | $14.6$ | $- 0.7$            | 60           |                              |

Though the conditions under which Mars is now displayed compare unfavourably with those at a really good opposition, it is quite possible to distinguish a large amount of detail on the disc. The principal features are very dark and well pronounced, and may all be recognised under pretty high powers. Fortunately, Mars satisfactorily bears more extreme magnification than Jupiter. In studying the latter object with a 10-inch reflecting telescope, the writer has found a power of 252 very efficient and 312 ample for every purpose, but on Mars the most serviceable powers appear to be from 332 to 488.

The study of Mars is essentially different in character from that of Jupiter. The latter does not exhibit his real disc, but a series of vaporous, longitudinal currents, in which are floating a number of changing spots of various tints. Mars shows real surface markings, which appear subject to certain temporary differences due to atmospheric interference. In fact, the aim of an observer of Mars is to distinguish the outlines of the markings in a comprehensive

manner, as regards both their positions and forms, while the student of Jupiter occupies himself in taking transits of the various spots visible in order to ascertain the rotation periods of objects situated in different latitudes. The rotation period of Mars is much more exactly known than that of any other planet (the earth excepted), and Prof. Bakhuyzen's value for this is 24h. 37m. 22<sup>o</sup>66s., deduced from 220 years' observations.

It seems desirable to note the accurate times when certain well-defined objects on Mars cross the central meridian in order to test the correctness of the ephemeris (*Monthly Notices*, June, 1902). Such transits will be most precisely obtained by micrometrical measurement. The particular forms, relative prominence and positions of the various dark and bright markings require further careful record, and must always be regarded as the most important aims in the observational study of this object. A large number of excellent charts of Mars have been published affording a useful means of comparison, but the observer need feel no disappointment should he fail to discern the supposed double canals, the oases, or the thick network of interlacing lines which eminently distinguish some of the drawings and impart a very singular aspect to Martian topography. With the planet's diameter apparently very small, as at present, no observer can expect to secure comprehensive views of detail.

For obvious reasons the transit times of spots on Mars cannot be determined with the same accuracy as those of Jovian markings. The small disc of Mars, and its comparatively slow rate of axial motion, are responsible for this. In one hour rotation carries the surface of Mars through only 14<sup>o</sup>62', whereas on Jupiter the value is 36<sup>o</sup>7'. At intervals of about forty days the various features on Mars are presented at nearly the same times as before. Early in March that conspicuous marking known as *Syrtis Major* was favourably displayed in the evenings, and it will be similarly well seen near the middle of April.

W. F. DENNING.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. ALEXANDER PAINE, of the Jenner Institute, has been appointed lecturer in bacteriology at the Bedford College for Women.

DR. BLEIBTREU, of Bonn, has been appointed to the chair of physiology at the University of Greifswald in succession to the late Prof. Landois.

THE authorities of the Clark University, Worcester, Mass., have arranged again this year to hold a summer school from July 13-July 25, where university students, teachers, lecturers in pedagogy, and others may take courses of work in psychology, biology, pedagogy, and anthropology. The lectures and demonstrations will be under the direct supervision of President G. Stanley Hall and other professors of the University.

A TELEGRAM through Laffan's Agency from New York, dated March 28, states that Mr. Carnegie has presented an additional 310,000*l.* to the Carnegie Institution at Pittsburg, bringing up his total donations towards the cost of the buildings and their endowment to 1,570,000*l.*, exclusive of the 400,000*l.* given for branch libraries of the institution, for fossil excavations in Wyoming, and for other purposes. In addition to this, Mr. Carnegie has promised from 600,000*l.* to 1,000,000*l.* for a new technical institute.

IN a recent paper read before the Society of Arts on "Education in the Netherlands," Mr. J. C. Medd remarks that in Holland "few things in recent years have been more striking than the development in nature-study. It is taught universally in schools of every grade, urban and rural, for its great educational value in developing certain faculties, especially those of observation, quite apart from its value as a preparation for science, or in its possible relation to rural pursuits. . . . Text-books are seldom used. Plants and flowers, gathered by the children themselves, are studied objectively, and their structure explained."

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THE calendar for the session 1902-3 of the University College of Sheffield provides numerous interesting facts concerning the work of the college. For instance, the new endowment fund started in 1895, and the scheme of which was later enlarged when, in 1897, the original Firth College was constituted by Royal Charter a university college, has now reached about 42,000*l.* The calendar shows that the scattered and inadequate nature of the buildings has long been a serious hindrance to the college. Funds have been raised towards the erection of new buildings on a single site for the whole college, and it is hoped a beginning will be made during the current session. Further donations for this purpose are much needed.

THE first volume of the report of the U.S. Commissioner of Education for the year 1900-1901 contains, as usual, a great wealth of material for the student of educational problems. It is impossible here even to enumerate the articles contained in the 1216 pages which the volume contains. Among those of more immediate interest to readers of NATURE may be mentioned the Commissioner's introduction; the review of education in Central Europe—in which due prominence is given to university and technical education; the account of the International Association for the Advancement of Science, Arts, and Education; the address of the director of the U.S. Geological Survey on the relations of the national Government to higher education and research; the Carnegie Institution of Washington, with a list of the most notable gifts of money by Mr. Carnegie for libraries and other educational purposes—this list shows that Mr. Carnegie has given away in this manner more than thirteen millions sterling; and the chapter on higher commercial education. There can be no doubt the Bureau of Education is not only assisting American education by the issue of these reports, but that of all the great countries of the world.

THE retirement of Sir William Abney from the principal assistant-secretaryship of the Board of Education, South Kensington, was marked on Tuesday by the presentation to Lady Abney of his bust in bronze, the work of Prof. Lautéri. Sir John Gorst made the presentation, and in the course of his remarks he referred to the great influence Sir William Abney has exerted upon educational progress in this country. The bronze bust presented to Lady Abney is a token of the esteem in which Sir William Abney is held by his colleagues and a mark of regret at his retirement. The valuable work now being done in schools of science owes its initiative almost entirely to Sir William Abney, who is responsible for the development of scientific instruction in schools since he took charge of the work of the old Department of Science and Art. With a man like Sir William Abney at the head of affairs, proper provision was secured for the study of science in schools under his control, and the work of these schools has forced other secondary schools to find a place in the curriculum for rational scientific instruction. It is impossible to estimate the great influence which Sir William Abney has thus exerted upon scientific education in this country, but all who know his work understand that his retirement deprives science of one who has always promoted her educational interests.

### SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 5.—"The Electrical Conductivity of Solutions at the Freezing Point of Water." By W. C. D. Whetham, F.R.S.

The paper contains an account of experiments which bring to greater concentrations a series of measurements on the conductivities of dilute solutions at the freezing point, communicated to the Royal Society in February, 1900.

The earlier experiments were conducted in a platinum cell, with the object of eliminating any solvent action of glass. Any such action would be quite inappreciable at the concentrations used in the experiments now to be described; resistance cells of glass were consequently used, and the labour of observation was much reduced.

The measurement of the electrical resistance was performed exactly as in the earlier set of experiments. The current from one or two dry cells was alternated by means