turbines included) do not work so economically when running much below the power for which they are designed. For the long periods on which these boats are simply cruising about, the coal consumed is only that of the two small triple compound reciprocating engines, the steam turbines not being utilised, thus reducing their "cruising" coal consumption to a minimum which, when running at full speed, is only increased by the low consumption derived from the use of the steam turbine.

The marine steam turbine, forming, as it does, "one of the most striking developments in the history of marine engineering," is largely adopted by private enterprise; but, as *Engineering* points out, "it is a little surprising that at present no vessel is in progress fitted with turbine machinery and built for the Royal Navy."

MECHANICAL VENTILATORS FOR MINES.[1]

THIS report is the outcome of a large number of experiments conducted under the directions of a strong committee of eminent mining engineers. Its object was to obtain exact information concerning the relative efficiencies of various ventilating fans. In order to make the comparisons of real value, the experiments were restricted to collieries provided with two fans, each of which could be used in turn; the conditions were therefore identical in each case. Only three kinds of fans were compared, viz., the Guibal, the Schiele and the Waddle, with the result that the Guibal decidedly carried off the palm. But, as pointed out in the report, the conclusions arrived at are not beyond criticism, because the efficiencies were determined in each case by taking the ratio between the so-called "useful effect in air" and the indicated horse-power of the steam-engine used for driving the fan, without knowing how much power was consumed in overcoming the inherent resistance of the engine. Some experiments made in Belgium in 1899 were more satisfactory, because this point was taken into consideration. Here it was found that the Rateau fan had a decidedly higher mechanical efficiency than the Guibal.

The Committee has adhered to Murgue's time-honoured method of comparing the resistance of any given mine to that of an orifice in a thin plate. No doubt the idea of an imaginary "equivalent orifice" has served a useful purpose, but a simpler and plainer way of expressing the amount of resistance is that advocated by Hanarte; he reckons the resistance of a mine by the horse-power required to overcome it, and there is much to be said in favour of his proposal to classify mines according to this system.

Long pages crowded with figures bear testimony to the pains taken by the Committee to fulfil its task, and it is interesting to find that its observations afford a verification of the two fundamental formulæ of centrifugal ventilators. Mr. Walton Brown, the indefatigable secretary of the Institution of Mining Engineers, may be fairly congratulated upon the useful report which he has drawn up.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The 233rd meeting of the Junior Scientific Club was held on February 21. Dr. Hedin, of the Jenner Institute of Preventive Medicine, read a paper, chiefly an account of his recent researches, on "The Proteolytic Enzymes of the Animal Body."

MR. T. P. KENT, scholar of Christ Church, Oxford, and assistant master at Cranleigh School, Surrey, has been appointed professor of mathematics at Rondebosch College, Cape Town.

IN view of the date appointed for the coronation of their Majesties, the day examinations of the Board of Education, South Kensington, arranged to be held during the week ending June 28, will be held during the week ending July 5.

AN article on the use of ordnance survey maps in teaching geography, contributed by Sir Archibald Geikie to the February number of the *Geographical Teacher*, directs attention to the invaluable aid to the study of geography which these maps afford. In spite of the fact that the maps are adapted to instruction in the most elementary or the most advanced stages of geography, and are so cheap, they are but rarely used, and the geographical lesson is usually conducted in the unintelligent way with which we are all familiar. Hung upon the wall of the schoolroom, the maps encourage the study of home geography in the pupils, and give them facility in map-reading. Attention may then be directed to the information the maps contain as to the configuration or topographical features of the land, the system of contouring, and the method of plotting profiles or sections across a piece of ground. The teacher can then pass to the intelligent consideration of the causes of the varying physical features of the land, using for this purpose the maps of the Geological Survey, or can derive lessons on the influence of physical features upon the history and progress of the inhabitants of a country. Many other similar uses can be made of the maps, and by adopting them geography may be made a scientific study instead of a jumble of words, figures and phrases. It is to be hoped that Sir Archibald Geikie's paper will be read by every teacher who desires to make the geography lesson a means of cultivating the intelligence. Another paper in the *Geographical Teacher* which will assist this object is by Mr. A. M. Davies, on the geography of Greater London. Mr. James Bryce's address on the importance of geography in education, delivered at the recent annual meeting of the Geographical Association and already noticed (p. 284), appears in the same number of the magazine.

A REPORT of the discussion on reform in the teaching of mathematics, which took place at the meeting of the Mathematical Association on January 18, is published in the *Mathematical Gazette*. Prof. A. Lodge opened the discussion with a paper in which he advocated the introduction of a course of geometry similar to that taken in French schools. The chief points in the French text-books which he desired to see introduced are:—(1) The more orderly arrangement of propositions; (2) the entire separation of theorems from problems of construction, hypothetical constructions being used in proving a theorem; (3) the closer association of a proposition and its converse when both are true; (4) the adoption of arithmetical notions and algebraic processes; (5) the early introduction of simple loci; (6) insistence on accurate figures drawn by accurate and practical processes; (7) practice in exercises from the very beginning. In the subsequent discussion, Prof. G. M. Minchin, F.R.S., gave instances of the failure of boys to understand Euclid's language and methods, and also described desirable reforms in the teaching and nomenclature of dynamics and hydrostatics. The discussion was, however, mainly concerned with the teaching of geometry, and the general opinion of the speakers was that demonstrative geometry should be preceded by a course of work with ruler, compasses and protractor, in which simple measurements and constructions formed the chief part. This has been done for many years in Scottish schools and also in some elementary schools in England. One speaker expressed his surprise at the amount of work that could be done with a pencil, ruler, a pair of scissors and a piece of paper, and others referred to the value of illustrations of geometrical truths obtained with similar materials. It seems, however, to have been overlooked that this work has long been part of kindergarten teaching.

SCIENTIFIC SERIAL.

American Journal of Science, February.—On geometric sequences of the coronas of cloudy condensation, and on the contrast of axial and coronal colours, by C. Barus.—On a new occurrence of sperrylite, by H. L. Wells and S. L. Penfield. A minute quantity of sperrylite, platinum arsenide, was found in a specimen of platiniferous copper ore from the Rambler Mine, Medicine Bow Mountains. Platinum is found in ores from all parts of the mine in quantities varying from ·06 to 1·4 ounces per ton.—A cosmic cycle, by F. W. Very.—Studies of Eocene mammalia in the Marsh collection, Peabody Museum, by J. L. Wortman. The present instalment deals chiefly with *Patriofelis ferox*, and contains a detailed criticism of the views recently expressed by H. F. Osborn.—On a miniature anemometer for stationary sound waves, by B. Davis. By sufficiently reducing the dimensions of the cups and vanes in the ordinary anemometer, it was found possible to determine the relation between the amplitude of vibration and the rate of rotation in

[1] Report of the Committee of the North of England Institute of Mining and Mechanical Engineers, and the Midland Institute of Mining, Civil and Mechanical Engineers. By Mrs. M. Walton Brown. *Transactions of the Institution of Mining Engineers* (vol. xvii. pp. 96+xvii plates).

a stopped organ pipe giving its first overtone. The cups used varied in size from 7·5 mm. to 4·5 mm., and the lengths of the arms from 20 mm. to 8 mm. The curves found correspond closely to the sine curves near the middle of the loop where the amplitudes of vibration have considerable magnitude.—The occurrence of fossil remains of mammals in the interior of the states of Pernambuco and Alagoas, Brazil, by J. C. Branner.—The estimation of copper as cuprous sulphocyanide in the presence of tin, antimony, arsenic and bismuth, by R. G. van Name. The accurate estimation of copper in the presence of the above-named metals was found to be practicable provided that certain precautions were taken as to the amount of free acid, ammonium bisulphite and sulphocyanide used.—The composition of yttrialite, with a criticism of the formula assigned to thalenite, by W. F. Hillebrand. The empirical formula of Hidden and Mackintosh for yttrialite is confirmed. The formula proposed by Benedicks for thalenite is to be regarded as doubtful.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Astronomical Society, February 14.—Anniversary Meeting.—Dr. J. W. L. Glaisher, F.R.S., president, in the chair.—The secretaries read the annual report of the council, containing obituary notices of deceased fellows and associates, reports of the work of observatories in Great Britain and Ireland and the Colonies, and notes on the progress of astronomy during the past year.—The president announced that the council had awarded the Society's gold medal to Prof. J. C. Kapteyn, of Groningen, Holland, for his work in connection with the Cape Photographic Durchmusterung and his researches on stellar distribution and parallax. The president delivered an address, setting forth the grounds upon which the award had been made. The address dealt chiefly with Prof. Kapteyn's great work in measuring and reducing the stellar photographs taken at the Royal Observatory, Cape of Good Hope, and in preparing the catalogue, which had been completed and published, forming three volumes of the *Annals* of the Cape Observatory. The actual photographing of the plates was begun by Dr. (now Sir David) Gill in 1886 and finished in 1890. Prof. Kapteyn spontaneously undertook the great work of measurement and reduction and the formation of the catalogue—a labour which occupied him more than twelve years. The catalogue contained 454,875 stars down to about the 9·5 magnitude, from −18° to the South Pole.—The president presented the gold medal to Prof. Kapteyn.—He also presented the Jackson-Gwilt bronze medal to the Rev. Thos. D. Anderson, for his discoveries of Nova Aurigæ and Nova Persei.

Entomological Society, February 5.—The Rev. Canon Fowler, president, in the chair.—The president announced the appointment of Mr. F. D. Godman, F.R.S., Prof. E. B. Poulton, F.R.S., and Dr. D. Sharp, F.R.S., as vice-presidents for the session.—Prof. Poulton exhibited with lantern a series of slides belonging to Prof. Meldola, made from actual specimens by the three-colour process, illustrative of mimicry in British and exotic Lepidoptera and Hymenoptera. He also exhibited the several specimens from which the lantern slides had been prepared.—Mr. C. G. Barrett exhibited a series of the perfect insect of *Glottula fusca*, Hpsn., together with ears of maize (locally called mealies), showing the damage done by the well-grown larva of the species, which lives in the first place in the stem, eating the pith from the ground, and afterwards attacking the cobs, and eating from the inside into the bases of the unripe grains, which then change colour and shrivel up. He also exhibited specimens and figures to illustrate the life histories of South African Heterocera, received from Miss Frances Barrett, Buntingville, Transkei, South Africa.—Mr. W. L. Distant exhibited two specimens of Coleoptera which he received alive from the Transvaal—one *Anthia thoracica*, Thunb., now dead, the other *Brachycerus granosus*, Gyll., still living. These insects had been sent him by Mr. Robert Service, of Dumfries, who received them from Sergt. Peter Dunn, of the volunteer company of the Scottish Borderers. The genus Anthia extends to the southern Palæarctic region, and there seems little doubt that these species could be easily acclimatised there. All they require at home is the run of a good palm or orchid house.—Mr. R. Adkin exhibited a series of *Acidalia aversata*. The parent moth (a banded female, the male parent not being known) was taken at Lewisham in June, 1900. Of the resulting larvæ, about one-half fed-up rapidly and produced imagines in the autumn of the same year—a very unusual circumstance; the remainder hibernated and produced imagines in June of the following year, thus occupying the normal time in completing their metamorphoses. The proportion of individuals following the female parent in the two portions of the brood was almost equal.—Mr. G. C. Champion exhibited long series of *Leptura stragulata*, Germ., and *Strangalia pubescens*, Fabr., from the pine-forests of Aragon and Castile, showing the great variation in colour of the two species in these districts, whereas the allied forms occurring in the same places, viz. *L. rubra*, Linn., *L. distigma*, Charp., *L. unipunctata*, Fabr. and *L. sanguinolenta*, Linn., were perfectly constant; also *Dermestes aurichalceus*, Küst., which he and Dr. Chapman had found everywhere in abundance in the old nests of the processionary-moth (*Cnethocampa processionea*, Linn.) on the pines in these forests.—Dr. T. A. Chapman exhibited in illustration of his paper, on a new subfamily of Pyralidæ, living larvæ of *Hypotia corticalis*, Schiff, as well as preserved larvæ, pupa-cases, imagines, and prepared wings to show the neuration of that species.—Mr. Edward Meyrick communicated descriptions of new Australasian Lepidoptera.—Mr. W. F. Kirby communicated a Report on a collection of African Locustidæ, chiefly from the Transvaal, made by Mr. W. L. Distant.

Geological Society, February 5.—Mr. J. J. H. Teall, V.P.R.S., president, in the chair.—The matrix of the Suffolk Chalky Boulder-Clay, by the Rev. Edwin Hill. The author has been examining with the microscope washed residues from Boulder-Clays. He is able to group together the specimens from localities along a belt of country from Lowestoft to Bury St. Edmunds, as containing granules of Secondary clays and limestones. Other specimens contain granules which may be the same kind decomposed, others granules of other kinds; all these lie outside the belt occupied by the group, though some are very near it. The results lead to the conclusion that the materials of the matrix in the Suffolk Chalky Boulder-Clay were not brought from the east or north, but from inland, and not from so far inland as the Coalfields. Their sources therefore lie on a limited belt, bordering the Boulder-Clay area.—On the relation of certain breccias to the physical geography of their age, by Prof. T. G. Bonney, F.R.S. The author has endeavoured in this paper to collect from published accounts and his own observations the evidence which certain well-known and important beds of breccia afford as to the physical conditions prevalent when they were formed. Reasons are given for concluding that the Rothliegende (and probably the Triassic) breccias are indicative of a continental climate, due to a great extension of land or more probably the existence of a mountain-region on the west—winters with severe cold and snow, but rather hot and arid summers. The Caithness breccias are perhaps more analogous to the stone-rivers of the Falkland Islands, but they also indicate a rather low temperature; while the Flysch-breccias land us in the following dilemma, namely, that either similar temperatures existed in Switzerland, and that there was also an important highland district, of which no remnant can be found, within a short distance of the breccia-beds, or they must be the product of a range not inferior to the present Alps, which also has completely disappeared, and would be (for reasons given) very difficult to locate. But, even in the latter case, it must be admitted that a temperature if not lower, at any rate not higher than the present, prevailed in central Europe late in the Eocene period.

Zoological Society, February 4.—Prof. G. B. Howes, F.R.S., vice-president, in the chair.—Dr. Chalmers Mitchell read, on behalf of Mr. E. Degen, a paper entitled "Ecdysis, as Morphological Evidence of the original Tetradactyle Feathering of the Bird's Fore-limb, based specially on the Perennial Moult of *Gymnorhina tibicen*." The material on which the paper was based consisted of a large series of specimens of the Gymnorhina, obtained at regular intervals throughout the moulting-period, and the author had thus been able to give a very complete account of the perennial replacement of the feathers, avoiding the errors due to observations on the altered habits as produced by captivity. The author showed that the moulting of the wing-feathers took place in definite groups, and indicated a composite origin of the modern feathering.—A communication from Prof. W. Blaxland Benham contained some notes on the osteology of