crystal-optics by his conception of the optical indicatrix; Maskelyne and Lewis, professors of mineralogy at Oxford and Cambridge respectively, famous for their crystallographic work,—to mention only some of those who are no longer with us.

The work of these men reflects that of the Society. Always there have been pure mineralogical papers dealing with mineral types or mineral groups, topographic papers concerning areas at home and abroad famous for their unique or abundant minerals, and petrographic papers dealing with the naturally occurring associations of minerals. These have depended upon chemical analysis, measurement of crystals, and determinations of optical characters as revealed by the microscope and other optical instruments.

In addition to this there have been a number of papers devoted to the mathematical aspects of crystallography, to the expression of internal structure by outward form, to the physiology of mineral growth, repair, and destruction, to the minerals used as gems or for other economic purposes, their associations and genesis, and of later years to the atomic and molecular structure of crystals as revealed by X-ray analysis.

The organ of the Society, the *Mineralogical Magazine*, has appeared regularly throughout the life of the Society and, in addition to original communications read at the meetings, has contained abstracts and reviews, and lists of new mineral names. During the last few years (since 1920) the Society has published sections of mineralogical abstracts. These give concise accounts of mineralogical papers and works published elsewhere, and have been of the greatest service to all workers in mineralogy, crystallography, and petrology. Indeed, the Society has never been more active than at present, and there is every promise of a brilliant and useful future.

Classification of Amœbæ.[1]

THE purpose of the memoir before us is to set forth a description of 39 new species and 11 new genera of Amœbæ and to propose a classification of Amœbæ. That a revision of the systematics of Amœbæ is desirable is unquestioned. The author has endeavoured to obtain a secure basis for his revision by prolonged observation of the various species, several of which have been raised in cultures from a single example. Variations within the species such as have been frequently assumed and even asserted to occur by some writers were not found, and the author states that most free-living amœbæ can be recognised specifically at least as readily as ciliates or beetles. No special difficulty is met with in classifying about three-fourths of all the known species of Amœbæ, but the remainder are small species the morphology of which has not been studied with sufficient care for the purpose. The supposed shapelessness of Amœbæ has led to previous attempts to classify species wholly with respect to nuclear characters, but the author states that such a systematic basis is no more defensible here than it would be in other protozoa. The genus Protamœba has been defined as lacking nucleus and vacuoles; the author suggests that the enucleate daughters which occasionally arise during fission of an amœba have provided the basis for this genus, the validity of which he therefore doubts, and Gloidium has scarcely a better standing.

Prof. Schaeffer differentiates pseudopodia into determinate and indeterminate. The former grow to a more or less definitely limited size and are then withdrawn; they are generally conical and composed of clear protoplasm only, and they are usually extended only on an advancing part of an amœba. Indeterminate pseudopodia are not restricted as to size; they direct locomotion and may grow large enough to form the entire amœba. They are more or less cylindrical and filled with granular protoplasm.

In putting the question "How many good species of Amœbæ are now known?" the author states that it is not yet possible to give a definite answer. The large, free-living species hitherto described amount to about 85; the parasitic and culturable species are about 70, and with the new species described in the present paper the total number approaches 200. A natural system of classification of the amœbæ must be based on the larger species, and it is with these the author chiefly deals. The changes of form exhibited by an amœba are characteristic and provide the basis for a natural classification. He regards Trimastigamœba, a minute amœba which can take on a flagellate condition, as the most primitive genus.

Prof. Schaeffer describes the different conditions—natural and cultural—under which he has observed his material. He states that no species has yet been found to live and reproduce in both fresh and salt water, though one species can be transferred from sea water to fresh water without apparent injury, and will live about ten days, but reproduction was not observed. More species of amœbæ and more individuals are to be found in tidal pools rich in diatoms than under any other conditions.

The author discusses problems of nomenclature and considers that 'Amœba' must go and be replaced by 'Chaos,' and that the Amœba first called 'der kleine Proteus' (Roesel, 1755) is the same as *Proteus diffluens* Muller and the correct name is *Chaos diffluens*. On submitting this conclusion to about a score of representative American zoologists, the majority expressed their general agreement, but the author wisely remarks that it might be desirable to bring the case before the International Commission for consideration and decision.

The main part of the volume is devoted to careful descriptions of the species, and these are supported by excellent lithographed figures. The memoir forms a most important contribution to the systematic study of Amœbæ.

[1] "Taxonomy of the Amebas, with Descriptions of Thirty-nine new Marine and Freshwater Species." By Asa Arthur Schaeffer. Papers from the Department of Marine Biology of the Carnegie Institution of Washington. 115 pp. 12 plates. Washington, 1926.

Ventilation in Factories.

THE importance of a proper system of heating and ventilation in factories for the comfort and health of the workers need not be emphasised. Considerable difference of opinion as to the correct system probably exists amongst engineers, so that a scientific examination of various common methods should prove of value in selecting that one which the workers find most satisfactory. Dr. H. M. Vernon and T. Bedford[1] have recently made a physiological study of the ventilation and heating in certain factories.

[1] Medical Research Council: Industrial Fatigue Research Board. Report No. 35: A Physiological Study of the Ventilation and Heating in certain Factories. By H. M. Vernon and T. Bedford; assisted by C. G. Warner. Pp. iv+82. (London: H.M. Stationery Office, 1926.) 3s. net.

Continuous records of air velocity and air temperature were taken by means of the hot-wire anemometer and the thermopile respectively. Vane anemometers to determine the directions of the air currents were also used, as well as the katathermometer for direct estimations of the cooling power of the air. The following may be considered the criteria by which a heating and ventilating system should be judged. The room should feel comfortably warm and fresh, yet be without draughts, the temperature at head level should be cooler than that at the level of the feet, and the incidence of sickness and ill-health should be a minimum.

The ideal temperature appears to be about 60° F.-63° F. The cooling power should be 7·0 in winter and about 6·0 in the hot weather, the difference being due to the acclimatisation of the body to the different seasons. These cooling powers can be attained with air velocities of 30 ft. per min. in winter and 50 ft.-100 ft. per min. in summer. The room feels 'too warm' when the temperature rises 4° F. and the cooling power falls one unit, and 'too cold' under the reverse conditions.

An important index of the actual temperature conditions is the temperature gradient from the floor level to the region of the head or higher. It is greatest when the heating system is placed above the heads of the workers: in fact, such a system is roundly condemned as leading to cold feet and hot heads and their accompanying discomforts, and should only be used in conjunction with a heating system at a lower level, when it is desired to avoid down draughts from skylights. The lowest gradient was found when the heating system was placed *under* the floor, and when at floor level it was nearly as satisfactory. The temperature used should not be too high, else the air currents induced become too rapid. It is important that these should be directed upwards, since expired air travels upwards, being lighter than room air, and hence with a down draught there is danger of the workers having to breathe each other's expired air, with the attendant risks of possible infection.

The system of ventilation which gave least draughts and yet most freshness to the air was one of natural ventilation by means of windows, with fan exhaustion in addition if necessary; the outlets for the latter should be situated 7 ft.-8 ft. above the floor. If a plenum system is installed, it should deliver the warm air near the floor from small inlets, and not from inlets situated above the heads of the workers; the latter leads to discomfort and is wasteful of energy. A plenum system delivering *cool* air above head level in conjunction with floor warming gives the most satisfactory type of heating when natural ventilation cannot be utilised.

The efficiency of any given system can be determined from the cooling power and its velocity and temperature components, together with a knowledge of the available window area and the extent to which it is utilised. The latter should be considered relative to the floor area and not to the cubic capacity of the room, since the ventilation is slightly better in a higher room than in a lower one with the same window and floor area.

Evidence is adduced in the report to show that the incidence of sickness is less in workrooms with a good ventilation and a satisfactory mean temperature. The report should, indeed, be studied by all who take part in the designing of modern factories.

International Agreements affecting Port Sanitary Work.

SIR GEORGE BUCHANAN gave a valuable address upon the above subject at the conference of Port Sanitary Authorities during the recent London congress of the Royal Sanitary Institute. He had recently attended on behalf of the British Government the fourth International Sanitary Conference at Paris, at which seventy nations were represented; and he considered that some good results had been achieved. The conference was held with the object of revising and bringing up-to-date the International Sanitary Convention, 1912, under which the various signatory governments agreed upon mutual action and common standards for dealing with the diseases liable to be carried on ships, including cholera, plague, typhus, smallpox, and yellow fever. The conference laid down some new lines of international action which are of great importance to British port sanitary authorities, on whom rests the daily burden of protecting their ports, as well as the rest of the country, from the risks from the importation of these diseases.

The deficiencies of the 1912 International Sanitary Conference have been obvious for many years. To take one example: a ship was only held to be 'infected' with plague when human cases of the disease had occurred during the voyage; but the most dangerous ship of all, with swarms of rats among which plague is prevalent, was not so classified and therefore came under no regulations.

In the new Convention an effort is made to increase the measures whereby countries may obtain all possible intelligence regarding the prevalence of certain infectious diseases. It gives further encouragement to the existing system of interchange of information regarding the incidence of infectious diseases by requiring the signatory governments to reply to any inquiries addressed to them, from the Office Internationale d'Hygiene Publique, for information on any subject affecting the risks of transmission of infectious disease from one country to another. Thus the Office Internationale will discharge the duty of acting as a kind of clearing house for information; and it is authorised to make agreements which will avoid duplication of effort.

In reference to plague, the establishment of new definitions by which a ship with plague-infected rats becomes an 'infected' ship, and a ship with an unusual mortality among rats, a 'suspected' ship, was readily agreed to, as was also the authorisation of measures to prevent rats reaching the shore directly or through merchandise. In ports designated as sufficiently equipped to undertake effective rat destruction, systematic measures will be required to be undertaken once in six months, and a certificate that this has been done, specifying methods and results, will carry the ship on to the next half-yearly period. The inspection officer is authorised to exempt from systematic measures when circumstances permit, and to issue an exemption certificate, which is also valid for six months.

In case of other diseases the measures required by the new Convention have been made to conform to our latest knowledge and experience; and all those applicable to the ship, passengers, and crew have been made strictly reasonable, the aim being to make them more efficacious and, where possible, less burdensome. Seeing how much of the world's immunity from pestilence is due to the measures outlined above, and to the spade work of the port sanitary authorities and their officials, the public has reason to be grateful to the representatives of the seventy nations for the valuable work they have accomplished.