

pear- or kidney-shaped or more or less irregular, rod-shaped, and branched. They are readily stainable, generally motile, and fairly resistant. They may multiply by fission or budding, are formed from vegetative cells or from the symplasm, and may give rise to vegetative cells or to the symplastic stage. (3) Exospores, unstainable regenerative bodies. (4) Endospores, produced by vegetative cells or by regenerative bodies. Conditions for formation are similar to those for the formation of regenerative bodies. (5) Arthrospores, easily stainable, but withstand drying better than heating. They are formed by the segmentation of vegetative cells and transformation of the joints into fairly resistant spherical bodies. (6) Microcysts, very similar to arthrospores. They are formed by vegetative cells growing and becoming spherical with a thickened membrane. After a rest period they may become vegetative cells, germinate like spores, or may break up into two, three, or four segments, which become vegetative cells. In addition to their reproductive function exospores, endospores, arthrospores, and microcysts are, in the first place, resting-stages.

Besides the formation of the symplasm a second mode of interaction between the protoplasmic bodies in bacterial cells has been observed. This consists in the union of two or more cells, and is termed "conjunction" by the author. Conjunction is most common in cultures two to four days old, and generally precedes the formation of gonidia, reproductive bodies, exospores, and endospores.

The publication brings together an overwhelming amount of evidence as to the existence of the various forms distinguished by the author. The arrangement of these forms in the life-cycles of the bacteria is a point on which further information is desirable, but this will, doubtless, be provided in the later publication in which the observations of the author are to be dealt with in detail. From the point of view of the student of bacterial morphology the publication must be regarded as one of first-rate importance. The general worker on bacteriological problems will also find in it much information of a highly valuable nature, and doubtless will be able to confirm the existence of many of the forms observed from the results of his own experience.

Miners' Lamps.¹

OF late years there has been a tendency on the part of makers of miners' safety lamps to employ thin sheet-metal, perforated with holes of small diameter, to serve the same purpose as wire gauze—that is to say, with holes large enough to admit of the passage of the necessary volume of air through them, but small enough to arrest the passage of flame. It will be recalled that the lamp invented by George Stephenson depended upon perforated sheet-copper for its impermeability to flame. A further innovation that has recently been gaining ground is the addition of a short glass cylinder, known as the "combustion tube," to the lower end of a metal chimney suspended directly above the flame of the lamp. This contrivance promotes a better circulation of air in the lamp, keeps the products of combustion separate from the incoming air, and, as a consequence, produces a brighter flame and enhances the lighting power of the lamp.

Metal chimneys have long been employed with this object, notably in the Mueseler lamp—the only kind of safety lamp permitted in Belgian mines—but as the bottom of the metal chimney cannot be brought lower down than the top of the flame without obstructing

the light, the benefit derived from their use is limited. In this respect the glass extension is distinctly beneficial.

Having regard to the changes of this kind which were taking place in the construction of safety lamps, the Home Secretary appointed the Miners' Lamps Committee in 1919 to inquire into, and report on, various questions relating to safety lamps, and the Secretary for Mines re-appointed the same Committee in January, 1921. Up to the present the Committee has issued five Memoranda, of which the last two, Nos. 4 and 5, issued in the end of last year, deal with the use of perforated metal plates and chimneys respectively.

The experiments described in Memorandum No. 4 were made to ascertain the relative resistance to the passage of flame possessed by metal plates of various thicknesses perforated with holes of various diameters; and those described in Memorandum No. 5 to ascertain the relative resistance of chimneys of various lengths and diameters at top and bottom and extending to higher or lower levels above and below the wire gauze diaphragm by which they are supported.

The results are tabulated in both memoranda and in the letter to the Secretary for Mines which accompanies each the chairman of the Committee makes certain recommendations and suggestions founded on these results. The total cost of the Committee's inquiry to date (November, 1921) is given as 5550l.

¹ Mines Department. Miners' Lamps Committee. Memorandum No. 4: Record of research on the passage of flame through perforated plates and through perforated tubes of small diameter. Pp. 12+6 plates. (H.M.S.O.) 6d. net. Memorandum No. 5: Record of research on the passage of the flame of an explosion from within miners' lamps fitted with chimneys. Pp. 12. (H.M.S.O.) 6d. net.

Pébrine in Silkworms.

IN an interesting report on pébrine in silkworms in India (Memoirs Dept. Agric. in India, Bacteriological Series, vol. 1, No. 8, November, 1920, pp. 75, 26 plates), Mr. C. M. Hutchinson gives an account of experimental work on methods of infection. He found infected ova in the pupal ovary, and the infection is traced in the egg, larva, and pupa—and recounts the life-history of the causal organism, *Nosema bombycis*. The Pasteur method of searching for the organism, devised more than fifty years ago, consists in crushing the body of the moth in a mortar, and examining, under a magnification of about 600, a small fraction of the resulting powder in a drop

of water, to ascertain if the characteristic spores of *Nosema* are present. This method, according to the author, has not been attended in India with any approach to the measure of success which has been attained in Europe. The chances of non-detection of infected moths, and the risk of spreading the spores (due to careless application of the method) in the rooms used for examining the moths, are considerable—the author states that he has seldom failed to find *Nosema* spores in the floor dust from these rooms, even in cases where the floors were of concrete. In Europe a period of several months elapses between oviposition by the moth and hatching of the eggs, so

that the examination of the moths can be undertaken when they have undergone natural desiccation, and the Nosema, if present, is likely to be in the form of the readily recognisable spores. In India the eggs hatch out within eight days after they are laid, and during this period all the moths must be examined. Rapid desiccation prevents the Nosema forming spores, and the number of spores present in a rapidly dried moth may be so small as to escape detection by the Pasteur method. The author's revised method, depending on the fact that infection is chiefly in the chyle stomach, is to remove with needles a portion of this organ to a slide, rub it up in water, and examine it microscopically. Incidentally he remarks on the inefficiency of the copper sulphate solutions usually employed for sterilising rearing houses and appliances in Bengal, but he found that formaldehyde, employed as vapour or in 1 per cent. solution, completely destroyed the infective power of Nosema spores. A hopeful line of inquiry seems to be opened up by experiments which indicate that resistance to infection is increased by hill rearing.

University and Educational Intelligence.

BIRMINGHAM.—A post-graduate course of lectures on "Medical Aspects of Crime and Punishment" has been arranged.

The council of the University has appointed Mr. Alfred Piney to be lecturer on pathological histology.

Acting on the recommendation of the Senate, the council has approved of the following grants in aid of research for the current year:—Physics, 100l.; chemistry, 250l.; and zoology, 200l.

The Vice-Chancellor, Treasurer, Principal, and Vice-Principal have been appointed representatives of the University for the Conference of Universities to be held in London on May 13 next.

CAMBRIDGE.—On the recommendation of the General Board of Studies it has been decided that Mr. C. G. Lamb shall be appointed reader in electrical engineering, and that, subject to confirmation by the Special Board for Mathematics, Sir Gerald Lenox-Conyngham shall be appointed reader in geodesy.

It is proposed to confer the honorary degree of Sc.D. upon Baron A. A. A. von Hügel, Trinity College, late curator of the Museum of Archæology and Ethnology.

A visiting fellowship of the annual value of 2000 dollars, tenable for not more than three years, has been founded at Princeton University by Mr. William Cooper Procter for residential study and investigation in the Graduate College of Princeton University. An unmarried male graduate who is a citizen of this country, and not more than thirty years of age, is eligible for appointment, and the visiting fellow must give himself wholly to study and investigation in one of the purely liberal arts and sciences while holding the fellowship. Applications must be made to the Vice-Chancellor not later than the end of March.

It is notified that the Royal Commission for 1851 has decided to establish certain senior studentships of the value of 400l. a year, for which nominations may be made by the University of Cambridge, amongst others. Applications will be made through the professor or head of a laboratory or department under whom the candidate has already carried out research.

The Royal Agricultural Society has offered for the Agricultural School at Cambridge the income of the Hills Bequest for the investigation of the value and uses of the rarer forms of ash in the cultivation of crops.

LEEDS.—The council of the University has appointed Mr. A. Wormall demonstrator in biochemistry.

LONDON.—The following doctorates have been conferred:—*Ph.D. (Science)*: Mr. H. T. Flint, for a thesis entitled "Integration Theorems of Four-dimensional Vector Analysis"; Mr. R. J. Ludford, of University College, for a thesis entitled "Studies in Gametogenesis: Pt. 1, Contributions to the Study of the Oogenesis of Patella, containing the Mitochondria and Gogli Apparatus in relation to Vitellogenesis in Patella; Pts. 2 and 3, Dictyokinesis in Germ-cells, and the Gogli Apparatus during Cell-division"; Mr. H. Moore, for a thesis entitled "The Season-cracking of Brass and other Copper Alloys"; and Mr. S. H. Tucker, for a thesis entitled "Carbazole."

ST. ANDREWS (UNITED COLLEGE).—The Gray prize in logic for an essay on Kant's "Deduction of the Categories" to Mr. Norman McLeish, and the Tyndall Bruce logic prize for an essay on "The Conception of Substance" in Descartes, Locke, Berkeley, and Hume to Mr. Norman McLeish.

THREE fellowships, each of the yearly value of 200l., tenable for two years, are offered by the University of Wales to graduates of that University. Information respecting the fellowships can be obtained from the Registrar, University Registry, Cathays Park, Cardiff. The latest date for the receipt of applications for the fellowships is May 31 next.

MR. L. P. W. RENOUF, assistant lecturer in zoology in the Technical College, Bradford, has recently been elected to the professorship of zoology in University College, Cork. Prior to his appointment at the Technical College, Mr. Renouf was lecturer and examiner in zoology in the University of Glasgow and director of the Bute Laboratory and Museum.

THE annual general meeting of the Association of Technical Institutions will be held at the Leathersellers' Hall, St. Helen's Place, London, E.C., on Friday and Saturday, March 3 and 4. On the Friday morning the president, Viscount Burnham, will introduce the president-elect, the Right Hon. Walter Runciman, who will deliver an address. Papers to be presented are:—"Diplomas," Dr. Clay; "Certificates for Evening Students," Principal Hogg; and "A Mechanical Engineering Diploma," Brig.-Gen. Mowat. Sir Alfred Keogh, Rector of the Imperial College of Science and Technology and a past-president of the association, will attend the meeting on Friday afternoon and speak on the subject of diplomas for higher technical education and work of a university standard.

THE report for 1921 of the Association of Science Teachers contains the findings of a sub-committee appointed to consider the new regulations relating to the examination for the clerical class of the Civil Service. Referring to the science syllabus, the committee is of opinion that, in view of the fact that pupils of secondary schools are expected to take the First School Examination at the age of 16½ years, it is to be regretted that the science syllabus in the Civil Service regulations is not more in accordance with that adopted for the First School Examination; further, that teaching along the lines laid down in the new Civil Service syllabus would tend to the acquisition of a superficial knowledge of useful facts in modern science without necessarily affording a training in scientific method. The report also includes an account of the general meeting of the association held in London on January 3 last, and referred to in NATURE of January 12, p. 57.