

purposes of Koch's and Hansen's processes is also discussed. It is obvious that the organisms to be feared in a brewery are those which will flourish in wort or beer, and that the mere knowledge of the number of bacteria in any given water as revealed by gelatine plate cultures is but of little use. Hence Hansen and his pupils reject for such examinations gelatine-peptone, substituting sterilised wort and beer as a culture material. An interesting table is given showing the different bacteriological results obtained in the use of gelatine-peptone, gelatine to which wort had been added, wort alone, and beer. For example, whereas a particular brewing-water yielded by gelatine-peptone about 8000 colonies per c.c., the majority of which were bacteria; gelatine mixed with wort gave about 14, all being moulds; in wort 5.4 were found, consisting of bacteria and moulds, whilst sterilised beer gave only 0.8 for the c.c., and only moulds. Holm points out that to estimate the value of a water for brewing purposes a note should also be made of the rate at which the organisms develop in the wort or beer, for should signs of growth only declare themselves after four or five days in the laboratory under favourable conditions of temperature and in the absence of competing forms, it is not unnatural to expect that their vitality, under the more rigorous conditions imposed during brewing operations, would be so far impaired that their development, if taking place at all, would only be accomplished with great difficulty. Although instances occurred in which even after the lapse of seven days growths first made their appearance, yet in the majority of cases the incubation of the wort-flasks for one week was sufficient. Holm is of opinion that the use of other culture materials besides wort is unnecessary, as all the organisms which successfully develop in beer can also grow in wort. Moreover, it was found that in the process of sterilisation to which the beer was submitted a considerable proportion of its alcohol was lost, thus diminishing its natural bactericidal properties. A beer containing 5 to 6 per cent. of alcohol, after sterilisation, had this reduced to 2.8 per cent., although it even then proved a very unfavourable medium for the development of ordinary water bacteria. As a practical outcome of his experiments Holm emphasises the necessity of a careful selection of the site for the erection of the water-reservoir attached to a brewery. The reservoirs of the old brewery at Carlsberg are placed in the immediate vicinity of the storehouses for grain and malt, consequently in this water a far larger number of moulds were met with than in the water examined from differently situated reservoirs supplying the laboratory and another brewery. But although moulds usually predominate, yet they are not so much to be feared as the bacteria, more especially those which are found in the fermentation chamber, for although they are unable to assert themselves to any considerable extent in the beer preserved in the store cellar, yet when it is drawn off and thus aerated, and the temperature raised by its transference to bottles or small casks, these organisms can develop with an astonishing rapidity, and produce great mischief.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Dr. Shore, of St. John's College, late Examiner in Physiology, has been elected a member of the Special Board for Medicine; Dr. A. Macalister, F.R.S., St. John's, has been appointed an elector to the Professorship of Chemistry; Dr. Ferrers, F.R.S., Master of Gonville and Caius, an elector to the Plumian Professorship of Astronomy; Prof. Newton, F.R.S., Magdalene, an elector to the Professorship of Anatomy; Dr. Phear, Master of Emmanuel, an elector to the Professorship of Botany; Dr. R. D. Roberts, Clare, an elector to the Woodwardian Professorship of Geology; Mr. P. T. Main, St. John's, an elector to the Jacksonian Professorship of Chemistry, &c.; Mr. R. T. Glazebrook, F.R.S., Trinity, an elector to the Professorship of Mineralogy; Mr. F. Darwin, F.R.S., Reader in Botany, an elector to the Professorship of Zoology and Comparative Anatomy; Mr. W. D. Niven, F.R.S., Trinity, an elector to the Cavendish Professorship of Physics; Dr. Phear, an elector to the Professorship of Mechanism; Prof. Liveing, F.R.S., St. John's, an elector to the Downing Professorship of Medicine; Dr. P. H. Pye-Smith, F.R.S., an elector to the Professorship of Physiology; and Sir G. M. Humphry, F.R.S., an elector to the Professorship of Pathology.

NO. 1216, VOL. 47]

SCIENTIFIC SERIALS.

American Journal of Science, February.—Isothermals, isopiestic, and isometrics relative to viscosity, by C. Barus. The substance experimented upon was marine glue, and its viscosity at different pressures and temperatures was measured by a transpiration method, the substance being forced through steel tubes 10 cm. long and 0.5 to 1 cm. in diameter under pressures as high as 2000 atmospheres. It was found that in proportion as the viscosity of a body increases with fall of temperature, its isothermal rate of increase with pressure also increases. Speaking approximately, the rate at which viscosity increases with pressure at any temperature is proportional to the initial viscosity at that temperature, and, conversely, the rate of decrease with temperature is proportional to the actual temperature and independent of the pressure. An interesting result is that in high pressure phenomena at least 200 atmospheres must be allowed per degree Centigrade, in order that there may be no change of viscosity.—“Potential,” a Bernoullian term, by Geo. F. Becker.—Datolite from Loughboro, Ontario, by L. V. Pirsson.—A new machine for cutting and grinding thin sections of rocks and minerals, by G. H. Williams.—Stannite and some of the alteration products from the Black Hills, S.D., by W. P. Headden.—Occurrence of hematite and martite iron ores in Mexico, by R. T. Hill, with notes on the associated igneous rocks, by W. Cross.—Cæsium lead and potassium-lead halides, by N. L. Wells.—Ceratops beds of Converse County, Wyoming, by J. B. Hatcher.—Use of planes and knife-edges in pendulums for gravity measurements, by T. C. Mendenhall. The employment of a pendulum to which the plane is attached instead of the knife-edge presents several advantages. The plane may be accurately adjusted at right angles to the rod by simple optical methods. A pendulum carrying a plane instead of a knife-edge is vastly less liable to injury, and the knife-edge being no longer an integral part of the vibrating mass can be reground or replaced at will. The length of the pendulum is more capable of accurate determination, since the error introduced by the yielding of the edge under pressure is eliminated. The disadvantage due to the uncertain position of the axis of oscillation can be mechanically got rid of by a proper construction of the raising and lowering apparatus, and experiment shows that the period in the course of twelve sets of swings of an hour each does not vary by as much as one part in a million. The best angle for the knife-edge was found to be about 130°, the material used being agate.—Preliminary note on the colours of cloudy condensation, by C. Barus. If saturated steam is allowed to pass suddenly from a higher to a lower temperature in uniformly tempered, uniformly dusty air, a succession of colours is seen by transmitted white light which, taken in inverse order, are absolutely identical with the colours of Newton's rings of the first two orders.—Lines of structure in the Winnebago Co. meteorites and in other meteorites, by H. A. Newton (reprinted in this issue).—Preliminary note of a new meteorite from Japan, by Henry A. Ward.—Restoration of Anchisaurus, by O. C. Marsh (see Note, p. 349).

American Journal of Mathematics, vol. xiv. No. 4 (Baltimore, 1892).—The main object of the note on the use of supplementary curves in isogonal transformation, by R. A. Harris (pp. 291–300), is to show how the problem of representing one plane conformably upon another, using any real function of the variable, may be made to depend upon the problem of constructing supplementary curves from given tracings of the corresponding principal curves. It is well illustrated by four carefully drawn figures. In her memoir (pp. 301–325) on the higher singularities of plane curves, Miss C. A. Scott goes over ground to some extent previously occupied by Profs. Cayley and H. J. S. Smith in writing on the same subject (*cf.* also papers by Brill and Nöther in the *Math. Annalen*, vols. ix. xvi. xxiii.). Nöther's results are presented in analytical form, “involving no dependence on geometrical ideas even when geometrical terms are used.” The author brings out his results more clearly by making use of Dr. Hirst's method of quadric inversion. The text is accompanied by twenty-seven drawings of curves. Mr. W. H. Metzler, writing on the roots of matrices (pp. 326–377), employs a modification of Dr. Forsyth's method of proving Cayley's “identical equation” (“*Messr. of Mathematics*,” vol. xiii.) to prove Sylvester's law of latency and Sylvester's theorems. He also investigates the existence of roots of matrices for different indices, and in particular the roots of nilpotent matrices. A