Royal Sovereign was finished. There was nothing very startling in Mr. Deadman's paper, which was none the less a useful record of facts. During the discussion, however, Mr. Crompton sounded a very stirring note. He roundly told the whole body of important dockyard officials and Admiralty officers present, including even the Director of Naval Construction, that they were altogether behind the age in the matter of electricity, that the French and German navies were far ahead of them, to say nothing of other powers, and that generally the English Government was the most benighted and non-progressive Government in all the world, so far as the matter of electricity was concerned; for they paid twice as much as they ought to do for an article that was not half as good as it should be. That was the purport of Mr. Crompton's speech, if not the exact words he used, and one cannot but acknowledge that he did not speak altogether without a text. It is hard to fully account for the want of enterprise in the Royal Navy, but there is one point to which we might draw attention. The paper read at the meeting was by a naval constructor, and electricity is, we understand, within the Constructor's department. Now electrical engineering is essentially an engineering question, and its consideration requires engineering knowledge and ability of a very high order. In the early days nothing kept electric lighting back more than the bad engineering that was associated with it; and thus it will always be so long as engineers are not employed in carrying out the plans which are founded on the researches of those more highly scientific investigators, upon whose experiments and deductions the practical applications are founded.

The next paper read was Mr. Corner's contribution, in which he described the lighting and hauling apparatus used at Portsmouth. These may be divided into the hydraulic installation, the compressed-air appliances, and the ordinary steam cranes. There are in the dockyard ninety-six boilers, which burn about 10,000 tons of coal per annum, but what proportion of this is used for lifting and hauling we do not know. In the hydraulic department there are nearly two miles of pressure pipes varying from $1\frac{1}{2}''$ to $4''$ in diameter. There are also some independent installations, as well as the coaling arrangements for the fleet at coaling point. There are here ten 30 cwt. cranes, and three 10 ton tips, with necessary capstan weigh-bridges. The more modern lifting and hauling appliances are by compressed air, the air being compressed to 60 lbs. With this pressure there is little or no trouble with frost, only a little forming at the exhaust in very damp weather, and altogether the pneumatic system seems to be preferred to the hydraulic. It must be remembered that the power required is variable, and this of course brings the advantage of the pneumatic system, in the matter of working expansively, to the fore. We understood Mr. Corner to say, during the discussion, that when the hydraulic motors and the air-engines were both worked at their full power the water system was the most economical, but working linked up, under the prevailing conditions, the air system was the best. The condensation of steam in the pipes is the objection to the steam motor when situated at some distance from the boiler, otherwise steam would be the best vehicle. The other papers read do not call for any special notice at our hands, their titles giving a sufficient indication of their scope, and there being no features of especial novelty in the matters they described.

A number of excursions had been arranged, and were carried out in a very satisfactory manner. On the first day, Tuesday, the 26th ult., the members visited the Dockyard, and were welcomed by the Admiral Superintendent in person. On Wednesday the Portsmouth Sewage Works were visited, and a trip was made to the Clarence Victualling Yard at Gosport. On Thursday a trip was made to Southampton, where the Docks were inspected, and a visit was paid to the Union Steamship Company's new engineering shops. There was an alternative visit to the Ordnance Survey Office. In the afternoon a visit was paid to the London and South Western Railway Company's new carriage and wagon shops at Eastleigh. Friday was devoted wholly to frivolity, the only item on the programme being a steamer trip round the Isle of Wight. On Saturday a good many of the members went to Brighton to visit the locomotive works of the London, Brighton and South Coast Railway. Largely owing to the exceptionally fine weather the meeting was a great success, and, for pleasantness, may rank with the Dublin meeting of three or four years back.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The fifth summer meeting of Oxford University students commenced on July 29, and will continue till August 27. The general outline of the programme has already been noticed in these columns, but we may notice here that the popularity which has attended these gatherings shows no signs of diminishing. It was announced by the Provost of Queen's College, who presided at the inaugural lecture given by Mr. John Addington Symonds, that upwards of 1250 students had come to attend the lectures it was proposed to deliver. In welcoming the students to the meeting, Dr. Magrath remarked that last winter 60,000 students (including 10,000 artisans) regularly attended the extension lectures of the various universities engaged in the work. There had been 312 courses of Oxford lectures. He also commended the co-operative societies of the North, and particularly the Co-operative Union, and mentioned the individual liberality of Mr. Dixon Galpin, who had founded scholarships for students from Dorset to attend this summer meeting. The munificence of Mr. Galpin had been supplemented by the Dorset County Council. A University Extension College had been recently established at Reading, under the presidency of Mr. MacKinder, an example which he hoped would be followed at other centres.

On Monday a conference was held in the Union Debating-room, under the presidency of Mr. J. G. Talbot, M.P., to consider the relations between the County Councils and the University extension movement. The president invited the lecturers under various County Councils to express their opinion as to the advantages, prospects, and difficulties which they had met or encountered in the course of their peripatetic teaching. His own opinion was that one very successful result of these lectures would be the amalgamation of the classes and the masses, and he noticed that one of the candidates to whom a County Council had awarded a scholarship was in the position of an agricultural labourer.

Mr. Hall, who had been a University Lecturer under the Surrey County Council, cautioned the meeting against entertaining any exaggerated views of the actual information that he had been able to convey to the agricultural labourers. He himself was satisfied if he could awaken a desire for knowledge in the rural mind and convince the extremely conservative agriculturist that he had something to learn.

Mr. Sells, of the Yorkshire College, Leeds, described the activity of that portion of the Victoria University, and believed that in the North they were in advance of the Oxford movement in meeting the actual and practical wants of the labouring section of the community. Coal-mining was taken up by them with eagerness, and the agricultural lecturers carried about with them the actual implements of husbandry in order to bring the matter practically before their audience. The discussion was continued by Mr. Sadler, secretary to the Delegacy, who said that alliances had been entered into with twelve large counties in the past year, and they should be proud of the achievement. In his opinion they ought to give a stimulus to learning to the masses, and for this reason they ought also to combine with the elementary teachers. Help should also be given to individuals, and it was necessary to secure the services of good men, by enabling the scheme to compete with other professions in the matter of the remuneration offered.

Mr. MacKinder (University Extension Lecturer) and Dr. Magrath agreed in deprecating any fixed cut and dried plan for the whole country, but thought that the scheme should be varied to meet the different circumstances of the various County Councils. At the same time, each County Council should have a definite policy.

SCIENTIFIC SERIALS.

THE *Quarterly Journal of Microscopical Science* for March 1892, contains:—On a new branchiate Oligochæte (*Branchiura sowerbyi*), by Frank E. Beddard, M.A. (plate xix.). This annelid, found in mud from the "*Victoria regia* tank" in the Royal Botanical Gardens, Regent's Park, London, is remarkable for the unusual contractility of its body, which suggested a leech or flat worm rather than a Chætopod. It consists of about 120 segments. When magnified the orange-coloured digestive tract traversed by the bright blood vessels is seen, and

at the posterior end of the body there is a series of delicate dorsal and ventral processes; these latter are segmentally arranged, developed in pairs upon the last sixty segments or so of the body. There is no connection between the setæ and these processes, as in Bourne's Chætobranchus, also found in the same tank. This worm is referred to the Tubificidæ, without having any certain affinities to any of the known genera.—On the formation of the germ-layers in *Crangon vulgaris*, by W. F. R. Weldon, M.A. (plates xx. to xxii.). The author's conception of the early development differs widely from that of Kingsley.—On the pigment cells of the retina, by I. S. Boden and F. C. Sprawson. The retinal pigment cells are not, as usually represented, invariably hexagonal; in specimens taken from the eyes of sheep, ox, rabbit, kitten, pig, hen, and frog, while hexagonal cells were the most numerous, heptagonal cells were frequently found and scattered at intervals. Cells with four, five, eight, nine, ten, and eleven sides were found.—Observations upon the development of the segmentation cavity, the archenteron, the germinal layers, and the amnion in mammals, by Dr. Arthur Robinson (Plates xxiii. to xxvii.). There is a general description of the development of the ova of the rat and mouse up to the period of the completion of the blastodermic vesicle, and a comparison with the results obtained by Fraser, Duval, and Selenka: there is a description of the formation of the mesoblast and of the chorda dorsalis, followed by a comparison of the ova of the rat and mouse with the ova of other mammals and the lower vertebrates and by a description of the formation of the amnion and a discussion of the relation of amnion formation to "inversion," and by a description of the formation of the cœlom.

June.—Contains:—On the primitive segmentation of the vertebrate brain, by Bertram H. Waters, B.A. (Plate xxviii.); concludes that the fore-brain is composed of at least two well-marked neuromeres, possibly of three; that the mid-brain consists of two neuromeres, from which there is every reason to think that the third and fourth nerves take their origin, and hence these deserve to be recognized as segmental structures; and that the hind brain consists of six neuromeres. On the oscula and anatomy of *Leucosolenia clathrus*, O.S., by E. A. Minchin, B.A. (Plate xxix.). In this sponge, in the fresh and healthy condition, not only are there oscula, "but in the full-sized specimens larger oscula than in any other Leucosolenia known to me, whether from pictures or in the flesh." These oscula are provided with a sphincter, and can be so tightly closed as to escape notice. Hœckel's four varieties of the sponge are only different states of contraction.—Researches into the embryology of the Oligochæta, No. 1: on certain points in the development of *Acanthodrilus multiporus*, by Frank E. Beddard, M.A. (Plates xxx. and xxxi.).—On the Innervation of the Cerata of some Nudibranchiata, by Dr. W. A. Herdman and J. A. Clutt (Plates xxxii. to xxxiv.). If the cerata of Nudibranchs cannot all be said to be true epipodia innervated by the pedals, it would seem equally impossible to regard them in all cases as pallial outgrowths supplied by the pleural ganglia. It is possible that they may have been epipodial in origin, although there be now, in some, a connection with pleural nerves.—Notes on Elasmobranch development, by Adam Sedgwick, M.A. (Plate xxxv.). On the paired nephridia of Prosobranchs, the homologies of the only remaining nephridium of most Prosobranchs, and the relations of the nephridia to the gonad and the genital duct, by Dr. R. v. Erlanger (Plates xxxvi. and xxxvii.).

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 16.—"The Physiological Action of the Nitrites of the Paraffin Series considered in connection with their Chemical Constitution. Part II. Action of the Nitrites on Muscular Tissue and Discussion of Results." By J. Theodore Cash, M.D., F.R.S., Professor of Materia Medica in the University of Aberdeen, and Wyndham R. Dunstan, M.A., Professor of Chemistry to the Pharmaceutical Society of Great Britain.

Continuing the examination of the physiological action of various pure organic nitrites of the paraffin series (Part I.; Roy. Soc. Proc., 1891), the authors have studied their effect on striated muscular tissue. When the vapours of these nitrites come into contact with the muscle a paralysant effect is observed. All the experiments were made with the triceps and gastrocnemius of *Rana temporaria*. The muscle was contained in a specially constructed air-tight chamber. A very extensive series of experiments was necessary in order to obtain reliable contrasts. The amounts of the nitrites employed varied between $\frac{1}{30}$ and $\frac{1}{400}$ c.c.

Several series of concordant results have thus been obtained which lead to two different orders of activity, viz. (1) with reference to the extent to which equal quantities of nitrites shorten the resting muscle, and (2) with reference to the rapidity with which the shortening is produced. The order of activity of the nitrites as regards the extent of the shortening they induce is as follows:—(i.) Iso-butyl, (ii.) tertiary amyl, (iii.) secondary butyl, (iv.) secondary propyl, (v.) propyl, (vi.) tertiary butyl, (vii.) butyl, (viii.) α-amyl, (ix.) β amyl, (x.) ethyl, (xi.) methyl. The order representing the speed with which shortening occurs is (i.) methyl, (ii.) ethyl, (iii.) secondary propyl, (iv.) tertiary amyl, (v.) primary propyl, (vi.) tertiary butyl, (vii.) secondary butyl, (viii.) α-amyl, (ix.) β-amyl, (x.) primary butyl, (xi.) iso-butyl.

The effect of these nutrites in interfering with the active contraction of a stimulated muscle has also been studied, and it has been ascertained that very minute doses, insufficient to cause passive contraction, interfere in a marked degree with the active contraction, and cause the muscle to fail in responding to stimulation, whilst the companion muscle, contained in a closed chamber free from nitrite vapour, still responded to stimulation.

The remainder of the paper is devoted to a discussion of the connection between the various phases of physiological action and the chemical constitution of the nitrites which gave rise to them. The principal conclusions which have been arrived at are briefly as follows:—The physiological action of these nitrites is not solely, and in some cases not even mainly, dependent on the amount of nitroxyl (NO_2) they contain.

In respect of all phases of physiological activity, the secondary and tertiary nitrites are more powerful than the corresponding primary compounds. This is to be chiefly attributed not to the direct physiological action of the secondary and tertiary groups, but to the great facility with which these compounds suffer decomposition mainly into the alcohol and nitrous acid. In respect of the acceleration of the pulse, the power of the nitrites is directly as their molecular weight, and inversely as the quantity of nitroxyl they contain. They, therefore, fall into an order of physiological activity which is identical with that in which they stand in the homologous series. This same relationship holds, though less uniformly, in their power of reducing blood-pressure, and of inducing muscular contraction.

This order appears to be the result not so much of the direct physiological influence of the substituted methyl groups as of the increased chemical instability which their presence confers on the higher members of the series. In respect of the duration of subnormal pressure, as well as of the rapidity with which muscular contraction ensues, the activity of the nitrites is expressed by an order which is for the most part the reverse of that representing their power in accelerating the pulse, reducing blood-pressure, and contracting muscular fibre, this order being in general contrary to that of the homologous series. In these respects the more volatile nitrites of low molecular weight which contain relatively more nitroxyl are the most active. It appears probable that these simpler nitrites more readily attach themselves to certain constituents of blood and muscle, and thus act more quickly than the higher compounds, whilst their greater stability causes their effects, *i.e.*, reduction of blood-pressure, &c., to endure for a greater length of time than that of the higher and more easily decomposed bodies.

A large proportion of an organic nitrite is changed into nitrate in its passage through the organism, and is excreted as an alkali nitrate in the urine.

The results which have been gained by this research have an important bearing on the therapeutic employment of the nitrites. It is proposed elsewhere to consider what the outcome of this investigation is for practical medicine.

PARIS.

Academy of Sciences, July 25.—M. d'Abbadie in the chair.—Some new observations on the employment of the calorimetric shell, by M. Berthelot. Different bodies must be treated differently, according as they are fixed, volatile, or gaseous. For fixed compounds, solid or liquid, the ratio between the weight of the combustible and the weight of oxygen ought to be such that the gas which remains after combustion contains at least 60