Extension of University Teaching, £1100; Middle-Class Schools Corporation (now Central Foundation Schools of London), £2500; National Association for Promotion of Technical Education, £150; Bedford College (Physical and Chemical Laboratories), £125; Toynbee Hall, Whitechapel, £125; Society of Arts, £504; Royal Architectural Museum and School of Art, £142; Bethnal Green Free Library, £141; Recreative Evening Schools Association, £340; Froebel Educational Institute, £100; Parmiter Foundation School, £100; University Settlement, Bermondsey, £25; Palæontographical Society, £21; Onslow College of Science, £250—making a total of £101,178. To scientific institutions in the provinces the grants for building equipment and general purposes amount to :—Yorkshire College, Leeds (textile industries, dyeing, and art departments, wholly founded and maintained by the Company), £34,000; Bradford Technical College, £4350; Huddersfield Technical School, £2000; Halifax Technical School, £2100; Keighley Technical School, £1300; Dewsbury Technical School, £825; Salt Science and Art Technical School, Shipley, £825; Bingley Technical School, £350; Batley Technical School, £250; Holmfirth Technical School, £250; Ossett Technical School, £200; Wakefield Technical School, £100. In addition to this, the Company grant to these institutions annually for maintenance a sum amounting to about £4000.

It is interesting to compare with the grants named in the foregoing, the estimate which the Technical Education Board of the London County Council have just submitted to the Finance Committee of the Council, as to the sum required by them for the year ending March 31, 1897. The net probable expenditure will amount to £120,000, of which £9000 is for the equipment and £16,000 the maintenance of technical departments of polytechnics. The other items are £9680 for Shoreditch, Wandsworth, and other technical schools, £20,000 for technical departments of public secondary day schools (including allowance for the fees of the Board's county scholars £70,500), £4000 for higher education, £26,070 for county scholarships, £14,440 for art teaching (including art scholarships), £8985 for science teaching (including science exhibitions and pioneer lectures, technology, and manual instruction), £4200 for domestic economy, £1500 for commercial subjects, £1000 for museums, and £5550 for expenses of administration (including cost of inspection). In 1893-94 the Board's expenditure was £46,000, in 1894-95 £63,000, and in 1895-96 £91,000. The chief causes of the increase are assigned to the development of the board's scholarship system, which has nearly reached its limit, and is costing nearly £40,000 per annum; the increase in the amount of evening educational work carried on in accordance with the Board's regulations, and therefore eligible for the Board's grants; the very great increase in the number of students who are studying science practically, as shown by the recent report of the Board's science inspector, and the consequent expenditure incurred in equipping and maintaining laboratories; the opening of new polytechnics, and the development of the technical departments of other polytechnics, and the establishment of new institutions.

In one respect the Livery Companies are in advance of the Technical Education Board, and that is in the encouragement given to research. The funds of the Technical Education Board are used to create and foster classes and institutions concerned with technical instruction, and probably the Board does not feel at liberty to give any direct assistance to research in the way that some of the Companies are doing. But, at the same time, the Board is doing work which should eventually result in an increase in the ranks of investigators, and it is to be hoped that the time is not far distant when the polytechnics will make those contributions to knowledge which are the only sure indications of scientific advancement.

ZOOLOGICAL NOMENCLATURE.

AT the meeting of the Zoological Society on Tuesday, Mr. P. L. Sclater, F.R.S., introduced a discussion on the following rules for the scientific naming of animals, compiled by the German Zoological Society.

A. General Rules.

(1) Zoological nomenclature includes extinct as well as recent animals, but has no relation to botanical names.

(2) Only such scientific names can be accepted as are published in print, in connection with a clear description either by words or figures.

(3) Scientific names must be in Latin.

(4) Names of the same origin and only differing from each other in the way they are written are to be considered identical.

(5) Alterations in names otherwise valid are only permitted in accordance with the requirements of Sections 13 and 22, and further for the purpose of purely orthographical correction when the word is without doubt wrongly written or incorrectly transcribed. Such alterations do not affect the authorship of the name.

(6) Of the various permissible names for the same conception only the one first published is valid (Law of Priority).

(7) The application of the Law of Priority begins with the tenth edition of Linnæus's "Systema Naturæ" (1758).

(8) When by subsequent authors a systematic conception is extended or reduced, the original name is nevertheless to be regarded as permissible.

(9) The author of a scientific name is he who has first proposed it in a permissible form. If the author's name is not known, the title of the publication must take its place.

(10) If the name of the author is given it should follow the scientific name without intervening sign. In all cases in which a second author's name is used a comma should be placed before it.

(11) Class (*classis*), Order (*ordo*), Family (*familia*), Genus (*genus*), and Species (*species*) are conceptions descending in rank one after the other, and are to be taken in the order here given. These terms should not be employed in a contrary or capricious relation or order.

B. Rules for Designating Species.

(12) Every species should be designated by one generic and one specific name (binary nomenclature).

(13) The specific name, which should be treated always as one word, should depend grammatically upon the generic name.

(14) The same specific name can only be used once in the same genus.

(15) In the case of a species being subdivided, the original name is to be retained for the species which contains the form originally described. In doubtful cases the decision of the author who makes the separation shall be followed.

(16) When various names are proposed for the same species nearly at the same date, so that the priority cannot be ascertained, the decision of the first author that points out the synonym should be followed.

(17) In the case of species with a cycle of generation of different forms, the specific term must be taken from an adult form capable of reproduction. In these cases, as also in species in which polymorphy occurs, the Law of Priority must be observed.

(18) The author of the specific name is the author of the species.

(19) The author's name should be placed in brackets when the original generic name is replaced by another.

(20) Hybrids should be designated either by a horizontal cross between the parents' names, or by these names being placed one above the other with a line between. The parents' sexes should be stated, when known. The name of the describer of the hybrid should be added, preceded by a comma.

C. Rules for the Names of Subspecies and other Divergences from Typical Species or Subspecies.

(21) When constant local forms, varieties, strains, &c., require special names, these names should be placed after the specific name. The rules for such names are the same as those for specific names.

D. Rules for Generic Names.

(22) Names of genera should be substantives, and of the singular number. They should be one word and be written with a large initial letter. If a subgenus is used, its name (which follows the same rules as a generic name) should be given in brackets after the generic name.

(23) A generic name is only valid when a known or a sufficiently characterised species (or several species) is referred to it, or when a sufficient diagnosis of it is given.

(24) The same generic name can only be employed once in

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zoology. Nor can names already proposed as subgeneric be employed also as generic names in another sense.

(25) When several generic names are proposed for a genus at nearly the same date, so that their priority cannot be settled, the name for which a type-species is given is to be preferred. In all uncertain cases the decision of the author who first arranges the synonymy is to be followed.

(26) When a genus is separated into several genera the old name must be retained for the type-species. If this cannot be positively ascertained, the author who splits up the genus must select one of the species originally in the genus as the type. When a subgenus is raised to generic rank the subgeneric name becomes the generic name.

E. RULES FOR THE NAMES OF THE HIGHER SYSTEMATIC GROUPS.

(27) Names for higher systematic groups of animals must have a plural termination.

(28) Names of families and subfamilies must henceforth be taken from the name of one of the genera belonging to the group, and formed from the stem of that name, with the addition of *-idæ* (plural of *-ides* [Gr. *-ειδης*], masc.) for the families and *-inæ* (fem.) for the subfamilies.

Mr. Sclater pointed out the principal points in which these rules conflict with the Stricklandian Code commonly used in this country. These were three in number, namely :—

(1) The German Rules (Sect. 1) disclaimed any relation to botany, so that, according to them, the same generic names might be used in zoology and botany. This was contrary to the Stricklandian Code (Sect. 10).

(2) Under Sect. 5 of the German Rules the same term was to be used for the generic and specific name of a species. if these names had priority. This was contrary to the Stricklandian Code (Sect. 13).

(3) The German Rules (Sect. 7) adopted the tenth edition of the "Systema Naturæ" (1758) as the starting-point of zoological nomenclature, whereas the Stricklandian Code (Sect. 2) adopted the twelfth (1766).

After a few remarks from the President (Sir W. H. Flower), Mr. Hartert spoke in favour of the modifications proposed in the German Rules. The debate was continued by Prof. Lankester, Mr. H. J. Elwes, Dr. D. Sharp, Mr. Blanford, Dr. H. O. Forbes, and others, but no final resolution was adopted.

SCIENCE IN THE MAGAZINES.

THE eleventh instalment of Mr. Herbert Spencer's admirable series of papers on "Professional Institutions" appears in the *Contemporary*, the profession of which he traces the development this month being that of the painter. Mr. Spencer does not concern himself with the rude drawings made by prehistoric man, but deals rather with the development of pictorial art from the point at which the early civilised stage is connected with the uncivilised, illustrating his arguments by reference to the remains and records of historic peoples. The first step in the development appears to have been the painting of the image of a dead man, to be placed on his grave. Priests painted as well as carved these effigies ; in fact, an examination of available evidence shows that "pictorial art in its first stages was occupied with sacred subjects, and the priest, when not himself the executant, was the director of the executants." Painting was originally subordinated to sculpture, which fact accounts for its relatively slow development. It became secularised in the later stages of Grecian life. Mr. Spencer traces these changes, as well as the differentiation of the lay painter from the clerical painter, and the differentiation of lay painters from one another.

Short descriptions of the chief discoveries of Edison and Tesla are given in *Scribner*, by Mr. E. B. Andrews, in the course of his "History of the Last Quarter-Century in the United States," his article being a continuation of previous ones contributed by him to the same magazine. "Edison," he remarks, "is famous less for originality than for dogged patience and subtle insight, enabling him to fructify others' devices. . . . A more original genius than Edison, veritably a wizard, is his young disciple, Nikola Tesla, who was born in Servia, and found employment with Edison on landing in America." *Scribner* also contains an illustrated article on "Carnations," by J. H. Connelly.

Under the title "Ways and Means in Arid America," Mr. W. E. Smythe contributes to the *Century* an account of the influence irrigation has exerted upon the development of Kansas and her sister States during the past fifteen years. The adoption of irrigation in a territory which had hitherto depended entirely upon the rainfall "extended the known limits of arid America hundreds of miles to the eastward [of Garden City] and more than one thousand miles north and south, thus adding to the empire of irrigation all the western portions of the Dakatos, Nebraska, Kansas, Oklahoma, and Texas, together with eastern Colorado." Mr. Smythe's description of what has been achieved during the past few years in these States, and in several widely separated localities in America, is a valuable object-lesson for farmers and fruit-growers.

The following are among other articles of scientific interest in the reviews and magazines received :—"The Increase of Insanity," by Mr. W. J. Corbet, in the *Fortnightly*, and an article in the *Humanitarian*, on "The Multiplication of the Unfit," by Mr. Arnold White, having much the same teachings; "The Baltic Canal, and how it came to be made," by Mr. W. H. Wheeler, in *Longman's ;* "The Development of Dodos," in the *National*, in which Miss Mary Kingsley shows some of the effects of European culture on the West African, her paper supporting the views expressed at the British Association meeting last year, when a formal discussion took place on the results of interference with the civilisation of native races ; "The Tintometer," and "An Old Geography," in *Chambers's Journal ;* "Niagara Falls and Water Power," by Mr. Alex. Richardson, in *Good Words*.

SMITHSONIAN INVESTIGATIONS.

MR. S. P. LANGLEY'S report of the operations of the Smithsonian Institution during the year ending with June 1895, has come to hand. The report includes a general account of the affairs of the Institution during the period it covers, and also descriptions of the work accomplished in the U.S. National Museum, the Bureau of Ethnology, the Bureau of International Exchanges, the National Zoological Park, and the Astro-physical Observatory. We extract from it the following brief statement with reference to three investigations carried on under the supervision of the Institution :—

The investigation of the infra-red spectrum has been continued in the Astro-physical Observatory during the past year with increased energy, and Mr. Langley says that though only provisional results have yet been published, which are intended merely to show the character and progress of the work, it is because the means of giving greater exactness are constantly growing, so that the result it is now hoped to present will be given with the aim of a still higher standard of precision ; an aim which it may be trusted will be considered a legitimate cause for the delay in the appearance of the final results.

It is stated that a larger number of bolographic records has been obtained than in any previous year, and that these continuous observations have been accompanied by further improvement in the apparatus, a higher standard of accuracy, and a nearer approach to the completion of the research ; but that they have also shown beyond a doubt that the limit of accuracy which is desirable can never be reached in the present most unsuitable, provisional site, which is subject to every kind of disturbance due to the neighbourhood of the streets of a busy city.

Prof. E. W. Morley's investigations on the density of oxygen and hydrogen, referred to in previous reports as aided in part by the Institution, have been completed, and his memoir has been published. The atomic weight of oxygen may be called the base upon which practically our entire system of atomic weights rests, and a small error in its measurement becomes large by multiplication in the higher parts of the atomic weight scale. Hence its accurate determination is of fundamental importance. In his investigation Prof. Morley has studied the problem by two methods : (1) By the synthesis of water, in which he, for the first time, has achieved completeness by actually weighing the hydrogen, the oxygen, and the water formed, whereas all his predecessors took one or another of these factors by difference. (2) By the density ratios between oxygen and hydrogen. In this method he has weighed the gases of greater purity and in larger quantity than hitherto, and he has in some instances operated without the intervention of stopcocks, and therefore with no possibility of error due to leakage. He has also, as a correction to the density ratio,

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