

close examination. None but teachers of public elementary schools are eligible, and these must have regularly attended a course of practical lessons in a registered class under a teacher approved by the Institute. Notwithstanding these restrictions, 615 candidates presented themselves at the first examination held by the Institute, and of these 350 passed, 195 obtaining the Teacher's Certificate.

The report contains full statistics of the results of the examinations in each of the 61 subjects included in the programme, and it also shows the results in each of the 210 towns where the examinations were held. Of the centres outside London, Manchester sent up the largest number of successful candidates, whilst Glasgow, Dundee, and Leeds come next in order. The report calls attention to the fact that the proportion of candidates to the population is far less in London than in Manchester, whilst the hope is expressed that the larger facilities for technical instruction which will be available within the next few years will lead to an increase in the number of students and of candidates for examination. This increase will no doubt take place with the opening of new polytechnic institutions; but we venture to think that the real improvement in technical education cannot be correctly measured by any mere increase in the number of candidates for examination. It depends much more upon the character and quality of the instruction which the candidates receive. The great defect of our present organization is the poverty in knowledge and practical experience of the teachers of our science and technical classes. Some improvement in the qualifications of teachers, and in the conditions of their training, is needed before progress can be measured by the increase in the number of students in attendance, or of candidates for examination.

We notice that in future the Institute proposes to award two kinds of certificates—the one kind to students who have regularly attended a course of instruction under an approved teacher, and the other to candidates who may present themselves for examination without giving any evidence as to their training. In this way the Institute proposes to combine the functions of a teaching and an examining body. The certificate indicating that the candidate has received some training at a school of recognized position will doubtless acquire a distinct value; but much will depend upon the ability and the reputation of the teacher under whom the candidate may have studied.

Of the many alterations in the new programme the most important is the addition of a practical part to the examination in mechanical engineering. This examination of the Institute has never seemed to us wholly satisfactory, as overlapping, to too great an extent, the examinations of the Science and Art Department in applied mechanics, machine construction, and steam. But in future the examination will consist of two parts, one of which will be distinctly specialized with a view to the candidate's occupation. Moreover, in the honours grade, candidates will be required to undergo a practical examination in either machine designing or workshop practice. At the last examination in this subject 966 candidates presented themselves, of whom 536 passed. It is satisfactory to note the continuous increase in the number of candidates in plumbers' work, a trade in the successful practice of which every householder is interested. In this subject a high standard for passing is wisely maintained. Of the 816 candidates who presented themselves, 235 came up for the practical part of the examination, and of these only 85 succeeded in passing in both parts of the examination, and are qualified for certificates.

There is little doubt that the statistics furnished in this report go far to show that a high value is attached by artizans and their employers to the Institute's certifi-

cates, and that the progress of technical education has been advanced by the cautious and judicious manner in which the Institute has conducted this department of its operations.

#### ROBERT GRANT.

IN Robert Grant, who at the ripe age of seventy-eight died at the place of his birth, Grantown-on-Spey, on October 24, 1892, science loses one of her ablest historians. His education was interrupted by a serious illness, which confined him to his bed from his fourteenth to his twentieth year. With surprising energy, however, on his recovery he set about the study of mathematics and the acquisition of ancient and modern languages. After studying for a time at King's College, Aberdeen, he went to London to collect materials for a history of physical astronomy. Thence he proceeded to Paris in 1845, where for two years he attended the lectures of Arago at the Observatory, and those of Leverrier and others at the Sorbonne. Returning to London, he lost little time in beginning the great work with which his name will always be associated. It was published in numbers, the first of which appeared in September, 1848, but it was not until March, 1852, that the whole work was issued. It bears the title "History of Physical Astronomy from the Earliest Ages to the Middle of the Nineteenth Century, comprehending a detailed account of the establishment of the Theory of Gravitation by Newton, and its development by his successors; with an exposition of the progress of research in all the other subjects of Celestial Physics." Most completely do the contents of the volume fulfil every expectation raised by this comprehensive programme. The fame of its author was at once established. Four years later he received from the hands of the late Mr. Manuel J. Johnson, President of the Royal Astronomical Society, the gold medal, then for the first time awarded for literary service to astronomical science. One paragraph of the address delivered on that occasion may here be quoted as characterizing most justly the work as well as its author: "Throughout the book no one can fail to be struck with the rare skill, integrity, and discernment the author has displayed in tracing the successive stages of progress; or with the scrupulous care he has taken to assign to each of the great men whom he reviews their proper share in the common labour. Nowhere is this more conspicuous than in the discussion relative to the discovery of the planet Neptune. By a simple narration of facts he has placed the history of that great event in so clear and so true a light, that I believe I am not wrong in saying he has gained an author's highest praise under such circumstances—the approval of both the eminent persons concerned." Even now, forty years after its publication, the "History" has lost none of its value as a mine of information, and as a delightful guide to those who desire to make a closer acquaintance with the astronomers of the past, as well as their works.

For some time Mr. Grant edited the "Monthly Notices" of the Royal Astronomical Society, and was a member of their Council. In conjunction with the late Admiral Smyth, he translated and edited Arago's "Popular Astronomy" (2 vols. 1855 and 1858). Meanwhile his health had so far improved that in 1858 he was able to go through a course of observational astronomy at Greenwich Observatory. In the following year, on the death of Prof. J. Pringle Nichol, he was appointed Professor of Astronomy, and director of the Observatory in the University of Glasgow.

As a member of the party that went to Spain in the troop-ship *Himalaya*, to observe the total solar eclipse of July 18, 1860, Prof. Grant, from his station near Vittoria, had the satisfaction of seeing a portion of the chromosphere, the existence of which as a thin layer en-

veloping the photosphere he had abundantly demonstrated in the winter of 1850-51, from a discussion of all the observations extant ("History," pp. 395, 396). It can excite no surprise that Prof. Grant assumed the red layer and also the prominences to shine by reflected light, when it is recollected that the sun's light and heat were then supposed to originate wholly in the photosphere while the nucleus was thought to be so cool as possibly to be habitable. When Prof. Grant took charge of the Glasgow Observatory the only useful instrument he found was the transit-circle by Ertel and Son, of Munich, but through the liberality of a few friends, chiefly in Glasgow, a nine-inch Cooke Equatorial was added to the Observatory some years afterwards. After thoroughly testing the transit-circle the new director commenced a series of observations of Mercury, Neptune, the minor planets, and a selection of stars from the British Association Catalogue. Gradually, however, his attention was concentrated entirely on the stars, the list being correspondingly expanded. The observations of planets were communicated from time to time to the *Astronomische Nachrichten* or to the "Monthly Notices."

The stellar observations were published at the expense of her Majesty's Government in 1883 in the well-known "Catalogue of 6415 Stars for the epoch 1870, deduced from Observations made at the Glasgow University Observatory during the years 1860 to 1881, preceded by a Synopsis of the Annual Results of each Star arranged in the order of Right Ascension."

In the introduction will be found a discussion of the Proper Motions of 99 stars. A very complete and appreciative review of this work from the pen of Prof. Auwers of Berlin appeared in the *Vierteljahrsschrift der Astronomischen Gesellschaft* (19 Jahrgang). The Glasgow star places were at once looked on with confidence by the numerous observers of comets and minor planets. One point connected with the Catalogue deserves special mention, viz. that, although the observations from which it is derived extend over a space of twenty-one years, the work appeared within two years of the close of the series. This promptitude excites the greater admiration when we learn that, exclusive of Prof. Grant's personal share in the work, no less than thirteen young assistants at various times took part in the observations, and two others in the computations. Many of these personal changes, each of which brought its quota of extra work to Prof. Grant, were no doubt in some measure due to the smallness of the allowance provided for assistance, viz. £100 per annum. Prof. Grant, however, was the last man to waste his energies in useless complaint, and dismisses this point with the remark that "in recent years the work of scrutinizing, reducing to a common epoch, and combining together the vast mass of the observations of the catalogue, extending over a period of more than twenty-one years, has pressed very heavily upon the slender resources of the observatory." The important time service of the City of Glasgow was originated by Prof. Grant some thirty years ago, and continues in operation up to the present moment. In 1855 he received from the University of Aberdeen the degree of M.A., followed by that of the honorary LL.D. in 1865, in which latter year he was elected a Fellow of the Royal Society of London. For three years he presided over the Philosophical Society of Glasgow, to whose proceedings he made various contributions. It may also be noted that among his writings are two remarkable letters proving beyond a shadow of a doubt the spurious character of the pretended Pascal correspondence. These letters were printed in the *Comptes Rendus* by special permission of the French Academy.

In manner Prof. Grant was singularly vivacious, and to the last he greeted with the warmest enthusiasm every fresh discovery in the science to which his life was devoted.

R. C.

#### NOTES.

THE following is the list of names recommended by the President and Council of the Royal Society for election into the Council for the year 1893. The ballot will take place at the anniversary meeting on November 30:—President, The Lord Kelvin, D.C.L., LL.D.; treasurer, Sir John Evans, K.C.B., D.C.L., LL.D.; secretaries, Prof. Michael Foster, The Lord Rayleigh, D.C.L.; foreign secretary, Sir Archibald Geikie, LL.D.; other members of the Council, Captain William de Wiveleslie Abney, C.B., Sir Benjamin Baker, K.C.M.G., LL.D., Prof. Isaac Bayley Balfour, William Thomas Blanford, Prof. George Carey Foster, Richard Tetley Glazebrook, Frederick Ducane Godman, John Hopkinson, Prof. Joseph Norman Lockyer, F.R.A.S., Prof. John Gray McKendrick, William Davidson Niven, William Henry Perkin, LL.D., Rev. Prof. B. Price, The Marquess of Salisbury, K.G., Adam Sedgwick, Prof. William Augustus Tilden.

AN international subscription for a testimonial to M. Pasteur on the occasion of his seventieth birthday on December 27 is to be opened by the French Academy of Science. Many men of science in all parts of the world will be glad to have this opportunity of expressing their high appreciation of M. Pasteur's labours.

SOME time ago we announced that Baron Nordenskiöld proposed to edit a number of very remarkable letters and memoirs of Carl Wilhelm Scheele, who died in 1786. It has now been decided that the one hundred-and-fiftieth anniversary of the birth of this great Swedish chemist, on December 9, shall be made the occasion of a brilliant celebration in his native country. A monument to Scheele is to be unveiled in Stockholm.

THE Naturforschende Gesellschaft of Danzig are issuing invitations to the celebration of the 150th anniversary of their foundation on January 2 and 3, 1893. The meetings will take place on the Monday evening in the Friedrich-Wilhelm-Schützenhaus, and on the Tuesday morning in the large hall of the Landeshaus, and the proceedings will wind up on the latter day with a dinner at 4 p.m. in the Schützenhaus.

PROF. EDWARD PRINCE, of Glasgow, has been offered the important post of Commissioner and General Inspector of Fisheries for Canada by the Dominion Government, and has accepted the office. Prof. Prince is well known as an authority in Fishery Science. He holds the chair of Zoology in St Mungo's College, Glasgow, and is President of the Anderson's College Scientific Society, and Vice-President of the Glasgow Natural History Society.

It is announced that the King of Italy will open in person the International Medical Congress, which is to be held in Rome next year. An English committee is being formed to do what it can to secure the success of the Congress.

THE New York Academy of Sciences has organized a Biological Section, which is to hold monthly meetings. The opening meeting, at which Prof. H. F. Osborn presided, was held on October 17.

THE Victoria University has issued a list of University Extension lectures which are to be delivered in the course of the session 1892-93. They are to be given at many different centres, and include a wide range of subjects, among which various departments of physical and natural science hold a prominent place.

LIVERPOOL has sustained a real loss by the death of Mr. T. J. Moore, the late curator of the Liverpool Derby Museum. Mr. Moore had a wide knowledge of various branches of science, and did much to foster popular interest in the results of scientific inquiry. He died on October 31.