bad species, there still remains a large balance in its favour. It has been better examined than any other part of the warm Atlantic, but still we may attribute this preponderance mostly to the favourable natural conditions, principally the coral formation of large portions of its island shores. On the coast of Africa there is not only no coral, but league after league of muddy shore, making a marine desert so far as Algæ are concerned. The Indian Ocean comes next, with 514 species in 139 genera. It possesses an enormous coast line, to a considerable extent favourable to the growth of Algæ (though including long desert stretches); but the bulk of the records are from Ceylon, Mauritius, and the Red Sea, while a very large proportion of the region is unexamined. As in the West Indies, there is also here a considerable proportion of bad species, principally *Sargassa*, from the Red Sea. From the Cape we have 429 species in 141 genera. This remarkable total, from so short a coast line, is obtained from Miss Barton's list in the *Journal of Botany*, 1893. The flora previously recorded in books amounted only to 242 species in 99 genera, and this addition to its flora has resulted from her examination of the British Museum Herbarium, and her naming of the admirable collection made by Mr. Boodle, and also those made by Mr. Scott Elliot and Mr. Tyson. The most noteworthy observation on these aggregates is the proportion of species to genera. In the warm Atlantic the genus averages well over 5 species; in the Indian Ocean the proportion is nearer 4 than 3 species to the genus; while at the Cape it is almost exactly 3. This is instructive when we remember, as I have elsewhere pointed out (Trans. Biol. Soc. Liverpool, vol. v. p. 177), that while the Arctic Algæ average slightly more than 2 species only to the genus, the West Indies and Australia average rather more than 5 and less than 5 respectively. I estimate that the north temperate Atlantic yields an average of about $4\frac{1}{2}$ species to the genus, and the difference between this and 3 species per genus found at the Cape is to be attributed primarily to the short coast line of the Cape, and in a less degree to its Algæ being less known. The calculation of such averages and proportions appears to me to be justified only when applied to the whole flora, and becomes more dangerous and apt to mislead when applied to portions of it, since particular groups in all the floras have been subjected to unequal treatment by collectors and describers, and we may perhaps trust to these personal errors neutralising each other when the complete totals are compared.

The warm Atlantic and Cape have 85 genera and 114 species in common, while the Indian Ocean and Cape have 86 genera and 89 species in common. That the number of genera in common should be so nearly exactly similar is interesting, and to discover whether they are the same genera in many cases it is only necessary to turn to the last table, where the Algæ common to all three regions are given to find that 72 genera are common to all three. Some years ago I hazarded the speculation that, while the genera of the tropical Atlantic and those of the Indian Ocean were largely the same, the species were, in a high proportion, different ("Catalogue of Marine Algæ of the West Indian Region"). We can now see that they have no less than 103 genera in common out of a total of 139 occurring in the Indian Ocean and 162 in the warm Atlantic. They have certainly more species in common, viz. 173, but these must be considered relatively to the two totals of 514 in the Indian Ocean and 859 in the warm Atlantic, when my expectation will appear to be fairly borne out. Nevertheless, I confess to having anticipated an even greater diversity of species. That the absolute number of genera occurring at the Cape should be by two greater than those of the Indian Ocean completely puzzles me. I cannot fully account for it on any theory. While the number of species in common between any two of the floras is greater than the number of genera (though in one case only three more), the number of species, as might be expected, in common to all three—viz. 59—is less than the genera—viz. 72. Again I should have expected to find relatively fewer species in common.

When one comes to analyse these totals, the process must be carried on in a more guarded fashion. One expects, as shown above, to find fewer species to the genus at the Cape than in the tropical floras, but one hardly expects to find that the genera of *Florideæ* at the Cape are by five more numerous than in the warm Atlantic, and by 15 more than in the Indian Ocean. There are no less than 95 genera of *Florideæ* at the Cape, with 295 species, while the 90 of the warm Atlantic contain nearly 200 more species! Matters are much the same in the case of the *Phæophyceæ*, and we have come to the *Chlorophyceæ* to redress the balance in the case of the warm Atlantic. They just fail to bring it level in the case of the Indian Ocean. It has been remarked above that the genera which the two tropical floras have in common with the Cape are almost identical in number. The analysis shows that the figures are very steady, viz. 58 each of *Florideæ*, 14 and 15 of *Phæophyceæ*, 11 each of *Chlorophyceæ*, and two each of *Protophyceæ*. The table shows the tropical character of such a group as the *Siphoneæ* very markedly. There are 99 species in 23 genera in the warm Atlantic, 72 species in 16 genera in the Indian Ocean, and only 20 species in 7 genera at the Cape. It is interesting to observe that the whole of the 16 genera of *Siphoneæ* in the Indian Ocean are represented in the warm Atlantic. It has no peculiar generic type of its own in this tropical group. While the genera of this tropical order are thus practically identical, the species are in a very high proportion different. Only 29 are possessed in common out of the two totals of 99 and 72. In the comparison of the two tropical floras there is the coincidence that the genera and species of *Siphoneæ* agree exactly in numbers, viz. 16 and 29, with the total of all the *Phæophyceæ*—a thing without significance, however.

The interest that is attached to the above comparison is mainly this. We have here two tropical marine floras cut off from each other by a permanent continental area, and communicating only *viâ* the Cape. That these floras have been periodically mingled at the epochs of warmer climate at the Cape seems a reasonable conclusion with regard to a group of such antiquity as the Algæ, and the proportions of species in common and genera in common between the different regions, and among all three may have a significance in this respect to students of distribution (*cf.* the totals of *Siphoneæ*, a peculiarly tropical order). I have elsewhere (Trans. Biol. Soc. Liverpool, vol. v. p. 178) commented on the fact that, "while in the Arctic and Australian regions the *Phæophyceæ* far outnumber the *Chlorophyceæ*, in the tropical West Indian flora the proportion is very markedly reversed, and the green Algæ outnumber the olive-brown. One is tempted to put this down to the strong illumination of the tropical sea, but another reason is to be found in the fact that a number of the Antilles richest as regards Algæ are subject to irruptions of fresh and brackish water from the Orinoco floods—a condition that would operate in the same direction." We can now check this speculation by a comparison with the figures for the Indian Ocean, mainly derived from such localities as the Red Sea, Ceylon, Mauritius, &c., in no case affected by the question of fresh-water floods. The figures for the Indian Ocean are very nearly the same for both groups—24 genera and 117 species of *Phæophyceæ*, and 26 genera and 121 species of *Chlorophyceæ*—thus showing indirectly that the irruptions of fresh water are, in all probability, potent in the case of the West Indian Algæ. One is much struck by the strength of illumination of the bottom in a shallow coral sea, but the filtering action by sea water of the rays of light, and the interception first of those rays that are most efficient in the work of assimilation—conditions modifying the pigments of Algæ—are the same in all seas.[1] The practically tideless character of the Antilles would also make for a preponderance of green over olive-brown forms.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Bristol Medical School, which was established early in this century, has, since the establishment of University College, Bristol, about seventeen years ago, been affiliated to it, but remained under the direction of a separate governing body. Within the last few months the two institutions have been amalgamated and placed under one Council, and the Medical School now constitutes the faculty of medicine in the College.

THE Council of University College, Bristol, have raised to the status of Professor, in the Faculty of Arts and Science, Mr. F. R. Barrell, Lecturer in Mathematics, and Mr. A. P. Chattock, Lecturer in Physics, and have also appointed Dr. Edward Fawcett, late Senior Demonstrator of Anatomy in the Yorkshire College, Leeds, to the Professorship of Anatomy in the Faculty of Medicine.

[1] Recent research on other pigments by Prof. Marshall Ward makes it appear to me more probable that, in the case of the marine Algæ, the pigments are rather shields against the excess of blue rays than adaptations to heighten the susceptibility of chlorophyll to the diminished supply of the others.

HER Majesty's Commissioners for the exhibition of 1851 have made the following appointments to science research scholarships for the year 1893, on the recommendation of the authorities of the respective Universities and colleges. The scholarships are of the value of £150 a year, and are tenable for two years (subject to a satisfactory report at the end of the first year), in any University at home or abroad, or in some other institution to be approved of by the Commissioners. The scholars are to devote themselves exclusively to study and research in some branch of science, the extension of which is important to the industries of the country. The list of scholars and of the nominating institutions is as follows:—Herbert William Bolam, University of Edinburgh; George Edwin Allan, University of Glasgow; James Wallace Walker; University of St. Andrews; Arthur Lapworth, Mason College, Birmingham; John Ellis Myers, Yorkshire College, Leeds; Arthur Walsh Titherley, University College, Liverpool; Edward Chester Cyril Baley, University College, London; John Cannell Cain, Owens College, Manchester; Ella Mary Bryant, Durham College of Science, Newcastle-on-Tyne; James Darnell Granger, University College, Nottingham; Mary O'Brien, University College of Wales, Aberystwyth; Frederick George Donnan, Queen's College, Belfast; James Alexander M'Phail, M'Gill University, Montreal; Norman Ross Carmichael, Queen's University, Kingston, Canada; William Henry Ledger, University of Sydney.

MISS MARIA M. OGILVIE, daughter of Dr. Ogilvie, of Gordon's College, Aberdeen, has passed the final examination for the degree of Doctor of Sciences of London University. The subject of her thesis was the "Geology of the Wingen and St. Cassian Strata in Southern Tyrol," published in the *Quarterly Journal* of the Geological Society for February.

THE electors to the Savilian Professorship of Astronomy will proceed to the appointment of a successor to the late Prof. Pritchard, in the couse of the ensuing Michaelmas Term. The duties of the Professor are defined by the following provisions of the statutes:—The Savilian Professor of Astronomy shall lecture and give instruction on theoretical and practical Astronomy. "Ne alia quapiam professione eodem tempore fungatur professor; nec munus observatoris Radcliviani, nec officium prælectoris alicujus in quovis collegio publice legentis cum munere suo conjungat." The Professor shall reside within the University during six months, at least, in each academical year, between the first day of September and the ensuing first day of July. He shall lecture in two at least of the three University terms. His lectures shall extend over a period not less in any term than six weeks, and not less in the whole than fourteen weeks, and he shall lecturetwice at least in each week. The University Observatory shall be open for eight weeks in each term, and at such other times and for such hours as the University may by statute determine. The Savilian Professor of Astronomy shall have the charge of the University Observatory, and shall undertake the personal and regular supervision of the same, and of the several demonstrators and other assistants employed therein, and shall be responsible for all the work carried on there. The emoluments of the Professorship as determined by statute are as follows:—He shall be entitled to the emoluments now assigned to the Professorship and derived from the benefaction of Sir Henry Savile, Knight, or from the University Chest; and shall receive in addition the emoluments appropriated to the Professorship by the statutes of New College. The total amount of all these emoluments is at present £850 a year. Applications, together with such papers as the candidate may desire to submit to the electors, must be sent to the Registrar of the University, Clarendon Building, Oxford, on or before October 31, 1893.

ARRANGEMENTS have been completed for the seventh session of the Edinburgh Summer Meeting, which begins on July 31, and lasts throughout August. Among the better known lecturers are:—M. Edmond Demolins, M. Paul Desjardins, Prof. Patrick Geddes (who will treat of contemporary social evolution), Prof. Lloyd Morgan (giving a course of comparative psychology—perhaps the first of its kind in Britain), and Mr. Arthur Thomson, discussing bionomics and evolution. A course on the history and principles of the sciences will be conducted by Prof. Cargill Knott, Dr. Charles Douglas, and others. A characteristic feature will be the series of studies entitled "A Regional Survey of Edinburgh and Neighbourhood." Among other subjects are Physiology, Modern History, Education and Elocution, and there will be practical classes in Botany, Zoology, and Geology. Work will be continued in the seminars and the studios, and a new departure is the course of Sloyd. While the student is obviously invited to serious work, a pleasant relief is promised in the shape of excursions.

THE New York *Nation* says that on June 14, at the University of Virginia, for the first time in its history, a certificate of attainment qualifying for graduation (in the School of Pure Mathematics) was given to a woman, Miss Caroline Preston Davis. Miss Davis, while excluded from the lectures, had taken successfully the same examinations on the same day with the male students, but "in a separate room"; and, at the request of the Chairman of the Faculty, the graduating class in a body handed the certificate to her.

SOME years ago (writes the Allahbad *Pioneer Mail*), the Senate, or the Syndicate, of the University of Madras promulgated a rule that any examiner who failed to send in his marks by a certain fixed date would be fined 20 rupees for each day's delay. The Syndicate, however, refrained from acting on this remarkable rule until this year, when its sense of humour was too strong for it, and it determined to carry its little joke to its conclusion. A number of examiners were accordingly fined. One gentleman earned a fee of 210 rupees, but he was fined 200 rupees, and received a pay bill for 10 rupees. Entering into the spirit of the thing, he returned this amount to the Registrar as a present to the University, and possibly it will be invested, and the proceeds devoted to the purchase of an infinitesimal medal, as the custom is. But, seriously, it is most regrettable that the Syndicate should deliberately degrade its examiners in this way. Surely it is possible to find a sufficient number of gentlemen who can be trusted to do their work with such promptness as is compatible with fairness to the candidate, and more than this the Senate cannot desire. If an examiner is guilty of great delay, the remedy is simple—do not appoint him again. But to treat an examiner like a careless domestic is as insulting to him as it is undignified on the part of the University.

MR. F. W. GAMBLE, B.Sc. (Victoria), formerly Bishop Berkeley Research Fellow in Zoology, has been appointed to the post of Assistant Lecturer and Demonstrator in Zoology in the Owens College, Manchester

BISHOP BERKELEY Research Fellowships has been awarded by the council as follows:—H. B. Pollard, M.A. (Oxon.), in Zoology; Albert Griffiths, M.Sc. (Vict.), in Physics; J. A. Harker, D.Sc. (Tübingen), in Physics; Bevan Lean, B.A., B.Sc. (Lond.), in Chemistry; and a Fellowship has been renewed to Stanley Dunkerley, M.Sc. (Vict.), in Engineering.

SCIENTIFIC SERIALS

Bulletin of the New York Mathematical Society, Vol. ii. No. 9, June, 1893.—The mechanics of the earth's atmosphere is a collection of translations by Cleveland Abbe (published by the Smithsonian Institution, 1891, 324 pp. 8vo). An account of it is furnished by R. S. Woodward (pp. 199–203). The volume contains twenty papers, all but two of which were published originally in the German language. The opening paper is by Hagen (1874), then follows the classic memoir by Helmholtz (1858), with five others by the same author. Then comes the extension of one of the last cited papers by Kirchhoff (1869); we then have five memoirs by Oberbeck, a paper by Hertz (1884), three papers by Bezold (1888–1889), a paper by Lord Rayleigh (1890, on the vibration of the atmosphere), and papers by Margules (1890) and Ferrel (1890). It will be readily inferred from this outline that Mr. Abbe has performed a work of prime importance to mathematical meteorologists. Dr. T. S. Fiske (pp. 204-211) also gives an outline sketch of mathematical investigations in the theory of values and prices, by Dr. I. Fisher (reprinted from the Transactions of the Connecticut Academy, July, 1892). The number closes with a few brief notes and a list of recent publications.

Wiedemann's Annalen der Physik und Chemie, No. 6.—On the determination of electrical resistances by means of alternating currents, by F. Kohlrausch. This is a minute study of the errors involved in measuring liquid resistances with alternate currents and the telephone. For potassium chloride solution between clean platinum electrodes, the error by which the resistance of the liquid was found too great remained below 1 per cent. so long as the product of the resistance in ohms and the surface of the electrode in sq. cm. did not fall below 250. In cases of high resistance, say 100,000 ohms, where MM.