ON THE CHARACTERISTICS OF A UNIVERSITY.

THE beginning of a new academical year is one of those periods of sudden change which must leave its mark for good or bad on every university and college in the land. Well-known faces of those who have been prominent in work or sport are missing. New recruits are taking, with halting steps, their first lessons in the drill which is soon to become so familiar. In a few days they will be undergoing their "baptism of fire" in struggles wider and keener than any in which they have yet been engaged; and in which each, according as he bears himself, must either add to or diminish, be it by ever so little, the position which his college holds in the eyes of the world. At such a period we naturally halt for a moment, and before we face the future, cast our eyes backward.

One conspicuous change has taken place in the past session. Sir John Donnelly has retired from the permanent headship of the Department of Science and Art, and has been replaced under new conditions by Captain Abney. It would be contrary to all the wholesome traditions which govern the conduct of servants of the Crown if I attempted to discuss these important events. I will therefore only say, in words which are colder than my feelings, that we wish our late chief long life, health and happiness in the rest to which the strenuous service of many years has entitled him; and that we welcome as his successor one who is not only a distinguished public servant, but a distinguished man of science.

Two losses, I must mention, of men who, though unknown to each other, were both known to many of us. Both had, in different ways, deserved well of the college. Both have passed away since the last term ended. But though alike in these respects, their fates were strangely different.

Sir Edward Frankland, for long Professor of Chemistry in this college, had touched the topmost rungs of the ladder of scientific fame. The Royal Society bestowed upon him its highest honour—the Copley Medal. The French Academy of Sciences had given him the highest distinction it can confer upon one who is not a Frenchman, by placing his name on the select list of eight foreign members. Happy in the work of his life, he was no less happy in the opportunity of death. The end came, without long previous suffering or slackening of mental power, in the midst of the holiday haunts which must, as life faded, have recalled some of its brightest hours. The Royal College of Science will remember him as one of the earliest and the most distinguished members of its staff.

The other name I would mention is that of one who was recently numbered among our students. Ernest Harrison gained the Associateship in Physics a year ago, taking the first place in the final examination. He had previously won a scholarship at Trinity College, Cambridge. His career here gave reason to believe that his future would be successful; but his early death has quenched the hopes of his teachers and his friends. The fact that he has died a very young and therefore a comparatively unknown man, makes it all the more the sad duty of us who knew him to record the promise of his youth.

Turning from the past, the changes which loom largest in the immediate future are the erection of the new buildings and the creation of what will in effect be a new university. Of the former I will only say that they will be on a scale not unworthy of the largest city in the world; but the establishment of a teaching university must be so pregnant with good or ill that I shall offer no apology for returning, by a somewhat different line of approach, to a subject on which Sir Norman Lockyer dwelt last year.

Let us then, in the first place, ask what are the chief notes which distinguish from all others the mode of preparation for the work of life which should be characteristic of a university.

Put shortly, I take it that two notes are predominant above all the rest. The first is that a university is a place where education is combined with the advancement of knowledge; the second, that the teaching of a university is based upon the principle that knowledge is desirable for the influence which knowledge and the search for knowledge exert upon ourselves, and not merely for the power which they confer of improving our external surroundings. The first of these characteristics distinguishes the university from a school; the second from a workshop or a college with purely technical aims.

[1] Address delivered at the opening of the Royal College of Science, October 5, by Prof. Rücker, F.R.S.

I shall say very little on the fact, which no one will dispute, that it is the duty of a university to advance knowledge. To do us justice, we of the Royal College of Science have not been unmindful of this duty. It is impossible to speak of the present or more recent past, but I may be permitted to say that a college which has numbered Huxley, Stokes and Frankland among the members of its staff will have forgotten all the teaching of its earlier history if it ever fails to satisfy the first test of fitness for a university status. I only hope that the schemes which are being mooted for founding new research professorships do not veil an attempt to place in other hands that part of the work of the London colleges which is specially characteristic of a university. London needs a multiplication of teachers on a sufficiently large scale to enable them to conduct both teaching and research, not the creation of separate castes of teachers and investigators.

Let me turn next to the second note of a university, viz. that it insists that knowledge has a value apart from the commercial or utilitarian objects for which it may be used.

In this capacity a university maintains, or ought to maintain, a constant protest against the view that a man and his knowledge are to be measured by their money value alone. This view was never more clearly expressed than by Colonel Diver, according to whom the aristocracy of New York consisted "of intelligence, sir, . . . of intelligence and virtue. And of their necessary consequence in this republic—dollars, sir." It is needless to deny that "dollars" are often the reward of intelligence and virtue. In the case of most men, the search after them must necessarily be a matter of importance; but this fact is too often used to make preparation for the business side of life the only or the chief end of education.

As I was writing these lines a number of *Literature* reached me, in which there is a review of a work by an assistant professor of the history and art of teaching in the Harvard University. This gentleman proposes to have "commercial courses" in all the schools. The purpose of these courses is to be, not merely "to train a youth to an appreciation of the functions of business and business practice in our modern life," and not merely to "inform him as to the history of industry and trade," but also to "awaken in him a profound interest in business as such," and to "train him to keep his eyes open to business possibilities."

Before I have done you will understand my reasons for agreeing with the reviewer that this is a "hideous educational programme." For the moment I will content myself with saying that it is based upon a one-sided view of life. There can be no question but that the business element is important, but a university is a corrective to the tendency to regard money as the only standard of value. This it does by inviting us to study and to care for things which we must admit are important and beautiful, but which we may not be able to convert into coin.

But, you may ask, if this is so, will not the admission of technical colleges such as is, in part, our own, be inconsistent with your idea of a university?

To this I answer that, while it is possible that the desire to master the practical applications of knowledge might crush the desire to know things which are worthy to be known though not of immediate commercial advantage, the men who are managing the best technical colleges are aiming at leavening the technicalities of a profession with the love of knowledge. Example will illustrate what I mean better than precept. The late Dr. Hopkinson was a successful engineer, sought after to superintend great undertakings. Busy in the office and the law courts, he nevertheless was always investigating the secrets of nature, and wrote his name large in the *Transactions* of the Royal Society. Many others, whom in this room I need not mention, are animated by the same spirit. I think, therefore, that the welcome which several of our universities have extended and are extending to such men and to their students is a legitimate recognition of the fact that they have effected a real extension of the boundaries of the region in which the love of knowledge for its own sake prevails. It would be a disaster if the spirit of business and commerce were to dominate a university. It will be a triumph if the love of science and the love of culture were spread from the technical college to the machine shop and the factory.

And this brings me to my next point, to another and more subtle question, in some respects similar to that we have been discussing.

In life there is a competition, not merely between commercial

and intellectual interests, but between different intellectual interests themselves; and a characteristic of a university education is that by some means or other it aims at conveying, not merely accurate knowledge on some one subject, but a healthy interest in all forms of mental effort. This wider range, this general cultivation, should distinguish the university scholar from him who has merely mastered the technicalities of a profession. A man may be a good lawyer or tradesman, he may have grasped a branch of pure science or succeeded in a scientific profession, and yet be careless and ignorant of all that does not bear upon the central interest of his life. The blending of expert and general knowledge, of professional skill in some one subject and of intelligent interest in others, is not to be accomplished by obeying formal rules, such as those which must be followed in producing a given chemical compound. Each one of us must decide for himself what particular combination represents for him the maximum of gain and the minimum of loss; but the true university as distinguished from the professional or technical school is for ever preaching that man is many-sided, that the light of heaven reaches him through many windows, and though to some of us the call may come to sacrifice all else to gain one supreme end, yet it is well to count the cost and to remember that the loss may outweigh the gain.

In speaking of sacrifice I am not now referring to the ordinary habits of industry and self-control which are essential to success in any physical or intellectual struggle. I am dealing rather with that sacrifice which is so often made without any sense of loss, the surrender of all effort to understand the appeal made by nature or art to one or other of our higher intellectual powers.

A man may be so interested in painting or in music that he loses all sense of the divine curiosity which impels the man of science as he strives to unravel the plan of the universe. The seeker after truth may allow the dry light of science to wither the sensibilities which can be touched by art alone. He may purchase the higher knowledge at the cost of the higher emotions.

Let us then consider for a few moments the principles which should direct our choice, and the help which a University of London can give us in choosing.

With regard to principles, it is impossible, as I have already said, to lay down any hard and fast rules. In this, as in so many other questions on which a practical decision must be made, two extreme courses are possible to follow, either of which is in most cases clearly wrong. I shall call before you a distinguished advocate of each, and allow them to plead in their own words.

The first policy may be called the policy of concentration, dear to the apostles of the gospel of self-help.

"The one prudence in life," says Emerson in his essay on Power, "the one prudence in life is concentration; the one evil is dissipation: and it makes no difference whether our dissipations are coarse or fine; property and its cares, friends, and a social habit, or politics, or music, or feasting. Everything is good which takes away one plaything and delusion more, and drives us home to add one stroke of faithful work. Friends, books, pictures, lower duties, talents, flatteries, hopes—all are distractions which cause oscillations in our giddy balloon, and make a good poise and a straight course impossible. You must elect your work; you shall take what your brain can, and drop all the rest. Only so can that amount of vital force accumulate which can make the step from knowing to doing. . . 'Tis a step out of a chalk circle of imbecility into fruitfulness."

And yet what counsel is this! To you the happiness or sorrows of your friends are to be mere distractions which make a straight course towards the conclusion of your own task impossible. Politics—that is the well-being of your country; books, the whole world of literature; music and pictures, all these are mere playthings and delusions, which you are to cast aside with all other childish things, and now that you are a man you are to care only for doing your own stroke of faithful work.

It is nothing to you that you are viewing with callous indifference the faithful work of others. "At sundry times and in divers manners" the noblest of our race have been striving to express the best that was in them by poetry and prose, by line and colour, by oratory and music. You are to care for none of these things. They are dissipations—not indeed of the coarsest kind—but dissipations none the less, dissipations which distract you from your own sustained and self-conscious endeavour to do something which may perhaps entitle you to rank among the meanest of those whose works you spurn. And then, when the work is done, the discovery made, the memoir published, what wonder if they in turn regard it with a disdain not less than your own? what wonder if Charles Lamb, along with Court Calendars, Directories, Draught Boards, bound and lettered on the back, and Almanacs, should place scientific treatises in his list of Biblia A-Biblia; or Books which are not Books?

Turn now to the other extreme policy, that which regards it as our wisdom to aim, not so much at one high end which can be attained only by an intense concentration, as at the "fruit of a quickened, multiplied consciousness."

No one has put the case in support of this philosophy more eloquently than Walter Pater in the celebrated conclusion to his "Studies in the History of the Renaissance."

The passage is too long to quote in full, but he tells us that the service of culture to the human spirit "is to startle it into a sharp and eager observation.

"Every moment some form grows perfect in hand or face; some tone on the hills or sea is choicer than the rest; some mood of passion or insight or intellectual excitement is irresistibly real or attractive for us—for that moment only.

"Not the fruit of experience, but experience itself is the end. A counted number of pulses only is given to us of a variegated, dramatic life. How may we see in them all that is to be seen by the finest senses? How can we pass most swiftly from point to point, and be present always at the focus where the greatest number of vital forces unite in their purest energy?

"To burn always with this hard gem-like flame, to maintain this ecstasy, is success in life. Failure is to form habits; for habit is relative to a stereotyped world; meantime it is only the roughness of the eye that makes any two persons, things, situations, seem alike.

"While all melts under our feet, we may well catch at any exquisite passion, or any contribution to knowledge, that seems by a lifted horizon to set the spirit free for a moment, or any stirring of the senses, strange dyes, strange flowers, and curious odours, or work of the artist's hands, or the face of one's friend.

"Not to discriminate every moment some passionate attitude in those about us, and in the brilliance of their gifts some tragic dividing of forces on their ways, is, on this short day of frost and sun, to sleep before evening."

Beautiful words! But as their music fades from the ear, as the brilliance of the "hard, gem-like flame" is quenched by the light of day, can we accept their teaching? Not to do but to feel, not to achieve but to enjoy, is the rule of life to be deduced logically from these premisses. If some great work is to be attempted, it is for the sake of the experience, for the joy of the effort and the success, and not for the sake of the work itself. Even "the enthusiasm of humanity" is classed by Pater among the "high passions," which are valuable chiefly for "the quickened sense of life" they impart; and beyond and above them all is placed art, not because it leads to a noble end, but because it professes "to give nothing but the highest quality to your moments as they pass, and simply for those moments' sake."

If the doctrine of concentration leads to ignorance of the work of others, the doctrine of the multiplication of states of consciousness leads to the neglect of what you yourself may do. Nay, more; it leads to the paradoxical result that you laud and magnify the achievements of those whom, nevertheless, you count as having failed in life, if their work, like most of the best work of the world, has been brought to the birth with bitter travail; and if, in the effort to achieve, they have sacrificed the joys to be found in "strange dyes, strange flowers, and curious odours."

If you have to choose one philosophy or the other, to adopt one rigid rule of life, I take it that the nobler among you would follow Emerson rather than Pater, would prefer to do "one stroke of faithful work" rather than to maintain a life long ecstasy. But this is not one of the cases in which no compromise is possible, in which we must vote "Yea" or "Nay," and must put aside wholly one teaching or the other. It may be a great thing to make the efforts and sacrifices which are required in adopting an extreme position, but it is a still higher achievement to maintain through life the intellectual balance necessary for the policy of the "golden mean."

I am not concerned to deny that radically different views

underlay the teaching of Emerson and Pater, but nothing is more certain than that neither Emerson nor Pater meant the passages I have read to be taken in the literal sense which might be ascribed to them. Even in the teaching of science it is sometimes necessary for the teacher to aim at being clear rather than correct; to force home the appreciation of the nature of some central truth by stating it as boldly as possible, and by sacrificing the pedantic exactitude which would insist that in its very first presentment it must be hedged about with every qualification and safeguard which long experience could suggest.

This was not the policy of the American teacher. Having set the mind in motion he left to its natural "after working" the discovery of qualifications and safeguards.

"Emerson," says Mr. John Morley, "has not worked out his answers to these eternal enigmas, for ever reproducing themselves in all ages, in such a form as to defy the logician's challenge. He never shrinks from inconsistent propositions. He was unsystematic on principle. 'He thought that truth has so many facets that the best we can do is to notice each in turn, without troubling ourselves whether they agree.'"

No better evidence of the truth of this remark could be adduced than Emerson's treatment of the relative importance of special knowledge and general culture. We have heard him on the one side. Let us listen to what he has to say on the other.

"He only is a well-made man who has a good determination. And the end of culture is not to destroy this. God forbid! but to train away all impediment and mixture, and leave nothing but pure power. Our student must have a style and determination, and be a master in his own specialty. But, having this, he must put it behind him. He must have a catholicity, a power to see with a free and disengaged look every object."

Nor by putting "behind him" did Emerson mean that the student was to devote all his earlier years to one form of intellectual effort: and that when this had brought him competence or fame, he might turn for relaxation to what he had hitherto neglected—to art or science or literature, as the case might be.

"Culture," he says elsewhere, "cannot begin too early. In talking with scholars I observe that they lost on ruder companions those years of boyhood which alone could give imaginative literature a religious and infinite quality in their esteem."

He who has pored too closely and too long over one study cannot in a moment cast aside the fetters which the years have woven round him, and rise up, like Samson, a terror to the Philistines. The intellectual sectarian cannot by a sudden act of will or process of conversion become the intellectual catholic. As well might he hope that the muscles which have been disused for years should suddenly rival the sturdy frame of the athlete, that the bent back should become straight, and the vision of the wearied eyes keen. Mental, like physical powers, are atrophied by disuse. The arts of seeing something of many things and all of one must be cultivated at the same time, or side by side.

And Pater, like Emerson, trusted to the intelligence of the reader not to mistake the strong presentment of one side of a question for a judicial decision on the whole case. So shocked was he when it was pointed out to him that his teaching might be taken too literally, that he actually suppressed the magnificent passages I have read to you lest his meaning should be misunderstood.

For each of us, then, the safest path lies somewhere between these limits, though thousands lead dull or unsuccessful lives because they shape their course perilously near to one or other of them. My object to-day is to warn you against the two extremes, not to attempt to lay down rules which shall point out the best course between them, rules which could not serve for all characters and dispositions alike. Do not forget that nothing considerable is achieved without concentration. Remember that he who holds himself free to cast aside every interest which does not directly bear on the central object of his life purchases this freedom "with a great price."

Let us next inquire what a university can do to guide the student in his choice. And here I may say at once that in my opinion the methods which have been officially adopted have been open to grave criticism; and that even if this were not so, the secondary are at least as important as the primary effects of a university training.

The direct official method of promoting general knowledge has been to insist that the candidate must pass an examination in several diverse subjects either before or during his passage through the university.

No objection can be raised to regulations which insist that a student before entering the university shall have acquired the elementary knowledge and have undergone the intellectual training which may enable him to undertake more difficult studies; but cultivation is not attained by mastering Latin and Greek up to the point at which they become useful engines for cultivation, and then throwing them aside for life. To change the metaphor, studies so treated are, in the words of Mr. John Morley, "superfluous roots in the mind, which are only planted that they may be presently cast out again with infinite distraction and waste."

Mistakes such as these are due to the fact that though each subject of study when regarded as central is surrounded by others which are very different from itself, but which nevertheless prop and support it, these subsidiary subjects are (as a rule) not officially recognised in the examinations for a degree.

Every scientific man would agree that a student who can read French and German is better prepared for a scientific career than one who, with an equal knowledge of science, can read English only. Why not allow to the higher attainments greater weight? Again, there can be no doubt that a scientific essay or treatise written in good English tends more to the advancement of "natural knowledge" than if the facts and arguments are badly expressed. Why not recognise this fact, as the Department of Science and Art has now done, by giving credit in the Honour examinations for the style in which the essays of candidates are written?

By such steps we should, at all events, secure that the teacher of science who chooses to take some pains with the essays of his students, or who urges them to learn to read French and German easily, should not feel that his advice, however useful it might ultimately be, would damage rather than improve their chances of a high place in the examination for a degree in science. Thus, too, we should keep open in the student's mind avenues by which he might attain to some interest in language and literature for their own sakes.

I am well aware of the objections which might be raised to such a scheme; and though I do not myself attach great weight to them, I will now only insist that if they are valid that fact is an additional proof of the truth of a proposition, which I do not deny, viz. that it is not so much by directing the studies of each individual student, as by bringing together teachers and learners who are teaching and learning very different things, that, by a mental "law of exchanges," the interests of all are widened.

It is no doubt a weak point in a college such as ours that the range of instruction is limited to science and to some of its applications, and that thus you are all studying closely allied subjects. Union with other colleges in a university may help to remedy this defect. Meanwhile, all that can be done officially to promote general cultivation is small compared with what you can do for yourselves and for each other, and this because you are at liberty to embrace a wider range than any university would be justified in forcing upon you. Your success as specialists will largely depend upon your studies and your teachers. Your wider cultivation will chiefly be the work of your relaxations and your friends.

Do not misunderstand me. In general, a young man with no physical defect will and ought to take an interest and a part in athletics. In a great metropolis this is even more necessary than in the case of universities which, like Oxford, Cambridge, St. Andrews or Göttingen, are comparatively in the country.

I am proud to be the president of a Boat Club which this summer won a race in a Thames regatta. I have been treasurer of two scientific societies, and am glad to be now the treasurer of the United Football Clubs of the engineering departments of the London Colleges. I hope and believe that these are the germs from which the athletic clubs of the future university will spring. I hope and believe that the undergraduates of that university will not differ from all other groups of young Englishmen in that, while engaged in the cultivation of intellect and taste, they neglect the cultivation of thews and sinews. But if it be granted that college work and college sports must fill up much of the time of all of you, there are still spare but precious moments in which you cannot indeed master, but may ward off, complete ignorance of things which have little to do with your studies or your sports, but are none the less worth knowing and loving. You have college societies where such things are discussed

and debated. They are described in the excellent little pamphlet which has been put in every freshman's hand. You can at the least do what is in your power to attend and support them. You can take care that your undergraduate days do not pass without the great names of literature becoming more than names to you. Books can be had for the asking from public libraries, they can be bought for pence where they used to cost shillings. We owe to the generosity of Prof. Perry the nucleus of a college library containing books which are not scientific. He who now devotes to literary trash time which he might spend in learning something of one of the greatest literatures of the world has nobody but himself to thank if his reading vulgarises instead of refines him. Taste is educated only by tasting; and it rests with yourselves whether you will learn to appreciate the difference between the great masters of the pen and penny-a-liners, between the wit of a great humourist and the vulgarities of the funny corner of a second-rate newspaper.

A bicycle ride will be none the less enjoyable if you train yourself, not merely to travel far, but to take an interest in the sights and scenes through which you pass. For the sake of example, let me remind you that no country is so rich as England in the architecture of its village churches. It is no hard matter to learn to recognise the principal peculiarities of the architectural types which prevailed from the days of the Saxons to Sir Christopher Wren. The text-books are, I presume, to be found in the Art Library. But as soon as the elements of English church architecture are known, an old church ceases to be merely a picturesque object. It is an historical document which you yourself can read. You do not need the aid of the sexton to tell you which is the oldest part. You can make a good guess at when that aisle was added, or that window knocked in a wall obviously older than itself. A visit to a cathedral becomes an intellectual pleasure. Weariness at the drone of the verger as he recites his oft-repeated lesson is replaced by an alert desire to know if the authorities from whom he learnt it confirm or correct the rapid conclusions as to date or history to which you yourself have come.

I might multiply such examples. Nowhere in England can you so easily or so cheaply as in London hear and learn to appreciate the best music the world has produced.

The wet half holidays of an undergraduate's career well spent in the National Gallery would give you a familiarity with all the great schools of painting which few travellers attain.

Every day as you come to or leave your work you may pass through one of the greatest art collections in the world, and it depends upon you alone as to whether you shall or shall not learn anything from it.

Understand me clearly when I reiterate that I am laying down no rules. I have tried only to lay the problem before you. How to combine the proper care for pounds, shillings, and pence with the love of knowledge for its own sake; how best to balance your various studies; how to add to the concentration required for the mastery of a single subject the open eye and the refined taste which may lead you to appreciate arts which you cannot emulate, and things beautiful which you can neither copy nor produce; these are problems in which a university may help you, but can help you only if you are willing to help yourselves. I have to-day aimed at nothing more than at reminding you that each one of the mental forces we have discussed is essential to the equilibrium of intellectual life; that if you wilfully neglect any of them, or devote yourselves too exclusively to one, you will fall short, and, it may be, sadly short, of the ideal which the true university holds up to her sons.

FORTHCOMING BOOKS OF SCIENCE.

MR. EDWARD ARNOLD'S list includes:—"Dynamics for Engineering Students," by Prof. W. E. Dalby; "Physical Calculus," by Percy E. Bateman; "Text-book of Physical Chemistry," by Dr. R. A. Lehfeldt; "A Manual of Elementary Chemistry," by W. A. Shenstone, F.R.S.; "Magnetism and Electricity," by J. Paley Yorke; "A Manual of Botany," by David Houston; "A Manual of Physiography," by Dr. Andrew J. Herbertson; "A Text-book of Domestic Science," by Mrs. S. J. Shaw; "Elementary Natural Philosophy," by Alfred Earl; "Wood: its Natural History and Industrial Applications," by Prof. G. S. Boulger; "The Dressing of Minerals," by Prof. Henry Louis; and a new edition of "Animal Life and Intelligence," by Prof. C. Lloyd Morgan, F.R.S.

The list of Messrs. Baillière, Tindall, and Cox contains:—"Dictionary of French-English Medical Terms," by H. De Méric; "The X-ray Case-book for Noting Apparatus, Methods and Results, with Full Diagrams of the Human Body," by Dr. D. Walsh; "The Pathological Statistics of Insanity," by Francis O. Simpson; "Difficult Digestion due to Displacements," by Dr. A. Symons Eccles; "An Introduction to the Diseases of the Nervous System," by Dr. H. Campbell Thomson; "A Manual for Nurses," by Florence Haig-Brown. "The Artistic Anatomy of the Horse," by Dr. U. W. Armstead, illustrated; "Statistics of Food Adulteration and Suggested Standards," by C. G. Moor and C. H. Cribb; and new editions of "A Synopsis of the British Pharmacopœia, 1898," compiled by H. Wippell Gadd, with Analytical Notes and Suggested Standards, by C. G. Moor. "Practical Guide to the Public Health Acts. A Vade Mecum for Officers of Health and Inspectors of Nuisances," by Dr. T. Whiteside Hime; "Manual of Surgery for Students and Practitioners," by Drs. W. Rose and A. Carless; "Heart Disease, with Special Reference to Prognosis and Treatment," by Sir W. H. Broadbent, Bart, M.D., F.R.S., and Dr. J. F. H. Broadbent; "Practical Horse-Shoeing," by Dr. George Fleming.

In Messrs. G. Bell and Sons' list we find:— Comparative Physiology," by G. C. Bourne; "Physiography," by H. N. Dickson; "Chemistry," by Prof. James Walker; "Mechanics," by Prof. G. M. Minchin, F.R.S.; "Electricity and Magnetism," by Prof. Oliver J. Lodge, F.R.S.; "Elementary General Science," by D. E. Jones and D. S. McNair. "A Short Course of Elementary Plane Trigonometry," by Charles Pendlebury.

In Messrs. A. and C. Black's list are:—"Newton's Laws or Motion," by Prof. P. G. Tait; "A Text-Book of Zoology," by Prof. E. Ray Lankester, F.R.S.

The list of Messrs. Blackie and Son, Ltd., includes:—"Among the Birds in Northern Shires," by Charles Dixon; "A Book of Birds," by Carton Moore Park, illustrated.

Messrs. W. Blackwood and Sons promise:—"Practical Nursing," by Isla Stewart and Dr. Herbert E. Cuff; "Physical Maps for the Use of History Students," by Bernhard V. Darbishire; "A Manual of Classical Geography," by John L. Myres; "Exercises in Geometry," by J. A. Third.

Messrs. Gebrüder Borntraeger (Berlin) will publish:—"Eine Landschaft der Steinkohlen-Zeit," by Dr. H. Potonié.

Mr. T. Burleigh announces:—"Our Common Cuckoos, other Cuckoos and Parasitical Birds," by Dr. Alexander Japp.

The announcements of the Cambridge University Press include:—"Scientific Papers," by Prof. P. G. Tait, vol. ii; "The Scientific Papers of John Couch Adams," vol. ii, edited by Prof. W. G. Adams, F.R.S., and R. A. Sampson; "Scientific Papers," by Lord Rayleigh, F.R.S.; "Scientific Papers," by the late Dr. John Hopkinson, F.R.S., in 2 vols.; "Scientific Papers," by Prof. Osborne Reynolds, F.R.S.; "Aether and Matter," a development of the relations of the aether to material media, including a discussion of the influence of the earth's motion on the phenomena of light; being one of two essays to which the Adams prize was adjudged in 1899 in the University of Cambridge, by Dr. Joseph Larmor, F.R.S.; "Aberration," a study of the relations between the ether and matter: being one of two essays to which the Adams prize was adjudged in 1899 in the University of Cambridge, by G. T. Walker; "The Theory of Differential Equations," part ii., ordinary equations, not linear, by Prof. A. R. Forsyth, F.R.S., in 2 vols.; "The Strength of Materials," by Prof. J. A. Ewing, F.R.S.; "A Treatise on the Theory of Screws," by Prof. Sir Robert S. Ball, F.R.S.; "A Treatise on Geometrical Optics," by R. A. Herman; "Zoological Results based on material from New Britain, New Guinea, Loyalty Islands and elsewhere, collected during the years 1895, 1896 and 1897, by Dr. Arthur Willey, part iv., illustrated; "Fauna Hawaiiensis, or the Zoology of the Sandwich Islands," being results of the explorations instituted by the joint committee appointed by the Royal Society of London for promoting natural knowledge and the British Association for the Advancement of Science, and carried on with the assistance of those bodies and of the Trustees of the Bernice Pauahi Bishop Museum, edited by Dr. David Sharp, F.R.S.; vol. ii., part i., Orthoptera, by R. C. L. Perkins; vol. ii., part ii., Neuroptera, by R. C. L. Perkins; "Fossil Plants," by A. C. Seward, F.R.S., vol. ii.; "Electricity and Magnetism," by R. T. Glazebrook, F.R.S.; "Crystallography," by Prof. W. J. Lewis; "Military