as to my eligibility, as did several Oxford graduates to whom it was shown. I shall presently refer to Prof. Clifton's "warning."

The examination was to begin on Oct. 7, at 9 A.M. On presenting myself, a gentleman whose name I do not know, told me that the Physics papers would not be given out before Oct. 10, that if I felt inclined to work the paper given to candidates for the *Mathematical* Fellowship I might do so, and credit would be given for Mathematics in the event of two men being equal in the Physics examination. I shall not comment on this promising arrangement, or on the fact that the candidates for the Physics fellowship had not till then heard of the Mathematical paper. Our informant told me that there were grave doubts as to the eligibility of outsiders. He certainly gave me to understand that these doubts extended to *all* who were not Oxford graduates. I understood that some Cambridge men had presented themselves also; that the question of our eligibility was about to be settled with the Registrar of the University, and that if I called on the Warden between four and five in the afternoon (the time mentioned in the original notice) he would be provided with the results of the deliberations.

At 4.30 I found the Warden about to go away somewhere. I had an audience of about two minutes; was asked what College I belonged to (meaning in Oxford).—Not an Oxford man, I answered.—Then he was afraid I was ineligible. I then informed him that I was the graduate of the Queen's University, to whom he had written in June. I suppose he had very little time for apologies, but he let me know, before leaving, that he had misinterpreted the results of some late commission when he wrote in June, and that I need have no hope.

I have stated the grounds for my former general statement. If Prof. Clifton is certain that graduates of Dublin and Cambridge are eligible, we must rely on his information being most correct, but I am troubled to know who is answerable for my being left in ignorance until now, and if anybody knows whether elections are never made of men who would really be ineligible by the laws of the University.

2. He insinuates a deception on my part, in not mentioning his "warning." I take it that Prof. Clifton has partly forgotten the matter of which he speaks. I wrote to him for leave to inspect the Physical Laboratory at Oxford, not certain that he was one of the examiners, but aware that he had charge of that institution and that the examination *must* be held there (see 3). I did not speak of my eligibility.

There is no doubt about the fact that great difficulties are thrown in the way of outsiders, but I should have been wrong if I had laid any blame on Prof. Clifton for taking the only course open to him. The case is simply this: according to the present Physics arrangements at Oxford, outsiders preparing for the October Fellowship examination at Merton could not without giving the greatest imaginable trouble to Prof. Clifton get any opportunity of inspecting the apparatus.

After stating that he was unable to afford me the desired opportunity, he asked if I had ascertained about my eligibility, informing me that the warden or sub-warden was the proper person to apply to. I immediately wrote *that I had already made such an inquiry*, stating the result.

I now infer that he, after receiving my letter and aware that I had made the proper inquiries, allowed both the Warden and myself to remain in ignorance of the grievous mistake. On receiving no answer I felt perfectly certain that the information received from the Warden was correct.

When I last wrote to NATURE I felt grateful to Prof. Clifton for his inquiry, incomplete and worse than useless "warning" as it had been. Surely no one will think that I had any right to introduce his name.

3. He says it was by no means certain that the Practical Physics examination would be held in the Physical Laboratory. Will he assert that in any one of the nineteen colleges of which he speaks, or in the nineteen collectively there is apparatus for conducting such an examination?

He wonders why it should be necessary to inspect the particular apparatus to be employed in the examination. I do not know if Prof. Clifton was really one of the examiners for the fellowship, but surely he cannot have thought about the matter without being aware of the immense importance of a previous acquaintance with the apparatus such as Oxford men are sure to have. I heard by accident in July that there was no delicate apparatus, nor were proper arrangements made for exact experiments in Static Electricity. Can Prof. Clifton not understand that to an outsider such information might be of the greatest importance.

"What arrangement of telescope stand is there for measuring wave-lengths?" "Is there a Soleil's instrument for measuring the angle between the axes in biaxial crystals?" "Will the arrangements for observing deflections of a needle enable us to employ the logarithmic decrement?" These questions and a hundred others as important were constantly distracting me during the four months of preparation.

My letter to Prof. Clifton was, I believe, modest, and showed my respect for him as a man who had done a great work in his attempt to create a Physics School at Oxford. My request was not "unreasonable." I did not know that his presence was necessary during an inspection of the Physical Cabinet of the University. I maintain too, that he has no right to assert that I must feel very uncertain about my own practical knowledge.

London, Oct. 28 JOHN PERRY

Simple Diffraction Experiment

THE apparatus for this experiment consists of a slit and a grating. A slit may be made by ruling a line on a piece of smoked glass. The grating is made by slightly greasing the thumb and forefinger (there is naturally sufficient on the hot and moist hand), and by drawing a piece of clean glass through them so as to obtain alternate parallel light spaces and greasy lines on both sides of the glass; out of several trials a grating may be made which when used in the following manner will give very pretty results.

The grating being placed close to the eye, the slit (with its direction parallel to that of the lines on the grating) is held up before some bright light, as of a candle, and looked at, as if the grating did not exist. Very beautiful and numerous spectra may then be seen ranged on each side of the slit.

The vitreous surface of window glass does not seem to give such good gratings as a worked and polished surface, as for instance that of a weak spectacle lens.

Oxford H. L.

Publication of Learned Societies' Transactions

IN NATURE, vol. viii. p. 506 Mr. Röhrs wishes that our learned societies would publish their papers separately. I have urged this before in NATURE, but unsuccessfully. With Transactions such as those of the Royal Society, the present system is almost an absurdity, for papers on most incongruous subjects are bound up together, and the cost is too great. When once a paper is printed, the Council seem to think that there is nothing more to be done, and do not in any way try to make the work known. All papers should be sold separately as cheaply as possible, and on publication, should be advertised in the scientific journals.

If this were done, we should not have men like Prof. Sylvester writing as follows:—"I owe my thanks to M. Radau and the editor of the Annals of the Ecole Normale Superieure for having been at the pains to disentomb the little known conclusions contained therein from their honourable place of sepulture in the Philosophical Transactions." W. B. GIBBS

EXAMINATIONS OF THE SCIENCE AND ART DEPARTMENT IN BIOLOGY

THE syllabus of the Biological subjects in which examinations are held by the Science and Art Department, has undergone considerable modifications in the edition of the Directory which has been recently issued. Animal Physiology, Elementary Botany (including Flowering Plants only), are subjects which at present appear to be best adapted for the purposes of school instruction. They stand, therefore, in no necessarily logical relation to the other two which are grouped together under the head of General Biology. These involve the use of the compound microscope, and some amount of microscopic manipulation. They are therefore better fitted for rather more advanced, or at any rate, older students than the first stages of the subjects first mentioned.

The two subjects included under General Biology have a common first or Elementary stage. After passing this, the candidate may proceed at choice, either with the zoological or the botanical side.

The following extract from the syllabus will show how this arrangement is intended to work, and will afford the best idea of the direction which the examination is likely to give to elementary biological study. It does all that a written examination can do to encourage practical work, and discourage the prevalent habit of cramming from text-books :—

SUBJECTS XVI. AND XVII.—GENERAL BIOLOGY

First Stage or Elementary Course

Questions will be confined to the following subjects with which the candidate will be expected to show practical acquaintance.

1. The form and size; the results of optical, chemical, and mechanical analysis; the mode of growth and multiplication; the conditions of life; and the results, direct and collateral, of the living activity of *Torula*, *Protococcus*, *Amœba*, *Bacterium*, and of the colourless corpuscles of the blood of man.

2. The structure and mode of growth of *Penicillium*; its mode of multiplication; the development of *hyphæ* and *mycelium* from *conidia*: the conditions and results of the living activity of this mould.

3. The structure and mode of growth of *Chara*; the differentiation of axis and appendages, of nodes and internodes; the structure and arrangement of the nucleated cells of which the body of this plant is composed. The process of cell-division and its laws; protoplasmic movements; Chlorophyll; asexual propagation; sexual propagation. Development of the pro-embryo and of the embryo.

4. The structure and mode of growth of a Fern. The differentiation of cells into tissues. Epidermis, parenchyma, fibres, ducts, spiral vessels. The Frond as a respiratory and alimentary organ; air-passages; stomata. Asexual multiplication. Sporangia and spores. Development of spores; structure of the Prothallium. Structure and functions of Archegonia, Antheridia and Antherozoids. Development of the embryo.

5. The anatomy and physiology of a flowering-plant, with especial reference to the morphology of the stem and root. Leaves and their modifications. The structure of pollen and ovule. The process of impregnation and the development of the embryo. The resemblances and differences between flowering-plants and ferns.

6. The anatomy and physiology of the frog. The general disposition of the parts of the body, and the plan of structure characteristic of the frog as a vertebrated animal. The structural characters of the tissues of which the body is composed and their ultimate resolution into nucleated cells.

The physiological properties of the tissues.

The form and structure of the chief organs and the modes in which their functions are performed.

The development of the embryo and the metamorphoses of the larva.

7. The anatomy and physiology of the freshwater Polype.

8. The anatomy and physiology of the Lobster or Cray-fish.

9. The anatomy and physiology of the fresh-water Mussel.

10. The anatomy and physiology of the Sea-anemone.

Second Stage or Advanced Course of Subject XVI.

(Division of Animal Morphology and Physiology.)

Questions may be set in all the topics enumerated under the first head, and in addition on :—

The leading facts relating to the anatomy and physiology of the skeleton, of the brain, and of the cerebral nerves; of the organs of the higher senses; of the alimentary, circulatory, respiratory, renal, and reproductive apparatus, in the Lamprey, in an osseous fish (Pike or Cod), bird (Pigeon, Fowl, or Duck), in a quadrupedal mammal (Sheep, Rabbit, Dog, or Cat,) and in Man.

2. The morphology of the vertebrate skull and limbs, as exemplified by the *Vertebrata* already mentioned, and by the Dogfish, Horse, Bat, and Porpoise.

3. The general outlines and process of the development of the chick within the egg.

4. The characters of the orders of the *Vertebrata*.

5. The broad facts relating to the geographical and geological distribution of the *Vertebrata*.

6. The anatomy and physiology of insects, as illustrated by Blackbeetle, a Bee, a Butterfly, and an Aphis.

7. The anatomy and physiology of an Earthworm and of a Leech.

8. The anatomy and physiology of a Fluke and of a Tape-worm, and the history of their development.

9. The anatomy and physiology of the *Rotifera* and of the *Polyzoa*.

10. The anatomy and physiology of a Sea-urchin (*Echinus*) and the history of its development.

11. The anatomy and physiology of a Snail and of a Whelk, and of a Cuttlefish, Squid, or *Octopus*.

12. The morphology of the *Hydrozoa*.

13. The anatomy and physiology of the *Infusoria*.

14. The anatomy and physiology of sponges, *Foraminifera* and *Radiolaria*.

Honours.

In this examination questions will be set at the discretion of the Examiner, who will have regard to the state of Zoological teaching in the country and the means of acquiring information.

Second Stage of Advanced Course of Subject XVII.

(Division of Vegetable Morphology and Physiology.

Questions may be set in all the topics enumerated under the first head, and, in addition, on—

1. The principal modifications in the minute anatomy of the axis in flowering plants.

2. The nature of the parts used for support in climbing plants.

3. The various modes of agamogenesis in flowering plants.

4. The leading facts in the development of the parts of a flower, including that of the pollen, ovule embryo sac, endosperm (albumen), and embryo.

5. The morphology and relations to one another of the parts of the flower and fruit throughout the classes Dicotyledons and Monocotyledons, more especially as exemplified in the following genera :—

Ranunculus, Nymphæa, Capsella, Viola, Stellaria, Malva, Geranium, Ilex.

Eunonymus, Vicia, Rosa, Saxifraga, Lythrum, Epilobium, Anthriscus.

Lonicera, Senecio, Campanula, Erica, Solanum, Plantago, Lamium.

Polygonum, Urtica, Viscum, Fagus.

Orchis, Iris, Potamogeton, Allium, Arum, Lemna, Typha.

Carex, Triticum.

6. The various adaptations by which cross-fertilisation is effected in Flowering plants.

7. The modes by which seeds are diffused.

8. The broad facts of the geographical distribution of Flowering plants.

9. The distinctive characters and origin of the Arctic-alpine flora, and the floras of oceanic islands.

10. The morphology and physiology of the vegetative and reproductive organs in Pinus, Taxus, and Juniperus.

11. The geographical and geological distribution of the genera of Gymnosperms.

12. The morphology and physiology of the vascular cryptogams, more especially with reference to the following types :—

Selaginella, Pilularia, Lycopodium, Equisetum, Polypodium, Lastrea, Osmunda.

13. The morphology and minute anatomy of the Carboniferous Lycopodiaceæ.

14. The morphology and physiology of Mosses and Liverworts as exemplified by Polytrichum (or Funaria) and Marchantia.

15. The morphology and physiology of Algæ as exemplified by—

Fucus, Ceramium, Saprolegnia, Spirogyra, Closterium, Ulva, Volvox, Protococcus, Palmella.

16. The modes of reproduction in Fungi as illustrated by—

Agaricus, Peziza, Penicillium, Peronospora, Mucor, Uredo, Saccharomyces (yeast).

17. The processes of plant nutrition, comparing also their modifications in Fungi, Neottia, and different parasitical plants.

18. The ash constituents of plants and their distribution in th tissues.

19. The influence of heat and light upon plants.

Honours

Questions at the discretion of the examiner, who will have regard to the state of botanical learning in the country, and the means of acquiring information.