The New Science School at Clifton College.

IN the development of the teaching of natural science in schools, Clifton College has, from the earliest days, played a very important part. Fortunate in possessing a succession of sympathetic headmasters, and in securing the services of men like Debus, Worthington, Sir William Tilden, Shenstone, and Rintoul, Clifton rapidly acquired a reputation for sound scientific education, and exerted a powerful influence upon contemporary educational practice. Laboratories were built and well equipped, and there was a constant stream of visitors to see what were then the latest developments of the new movement.

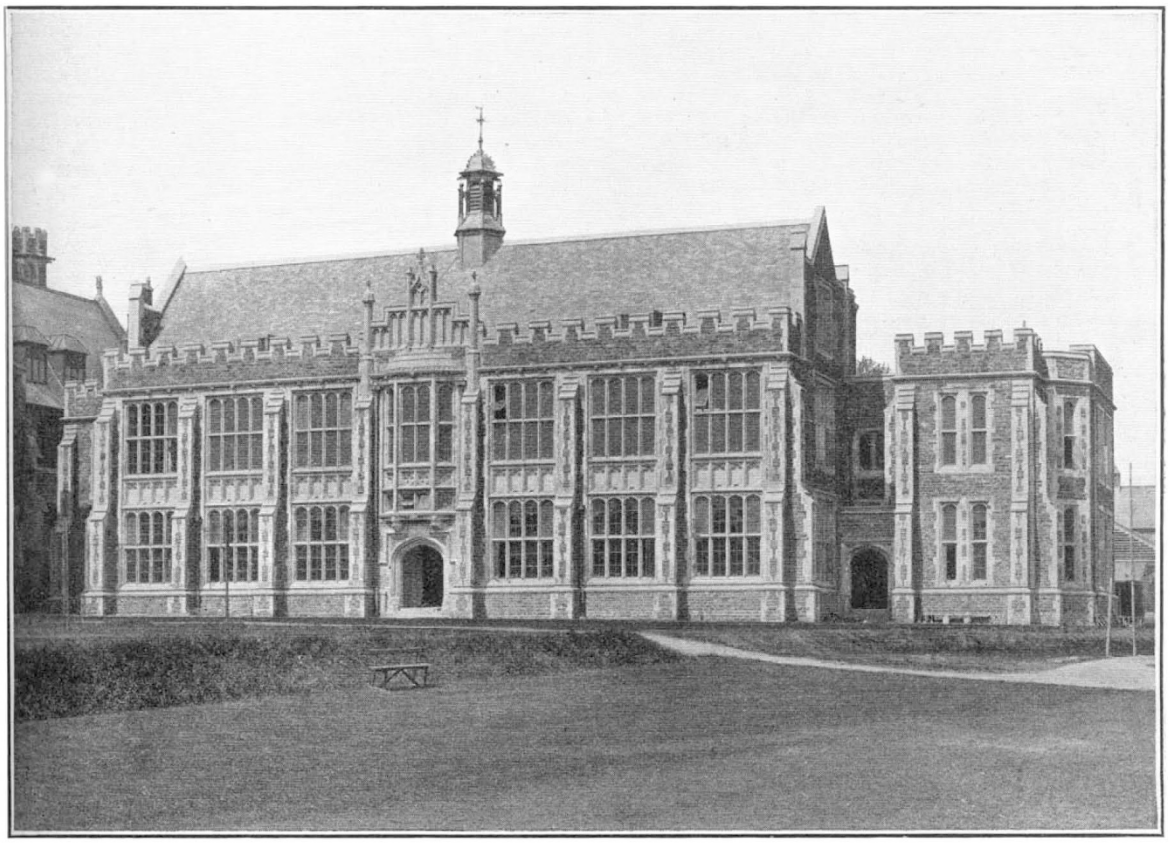

FIG. 1.—The new Science School, Clifton College.

At this time the College far out-distanced other schools in accommodation for science teaching, but, like many other pioneers, it has since been left behind by those to whom it pointed the way. Some expansions and improvements were made from time to time, but finally the buildings became so much out-of-date and inadequate to the needs of the school that new and extensive premises were a necessity. When, thanks to the initiative of Mr. Norman Whatley, the present headmaster, the problem was at length seriously taken in hand, it was resolved to erect an entirely new science block, worthy of the tradition of the school, and one, too, which should restore to Clifton its former position in the van. Old Cliftonians responded generously to the call for funds, and sufficient was soon forthcoming to allow the council to proceed with the scheme. A stroke of good fortune came at once, in that it proved possible to secure the services as architect of Mr. Alan E. Munby, whose genius in this particular *genre* is well known to scientific workers. The total cost of the scheme is estimated at £50,000; and Mr. Whatley was able to announce at the opening of the building by the Prince of Wales on June 2 that four-fifths of this amount, or £40,000, had already been given. This satisfactory result is due almost entirely to the unaided efforts of the Right Hon. J. H. Whitley, Speaker of the House of Commons, who has interested himself personally in the scheme from the outset.

The new buildings are the outcome of a number of alternative designs. The preservation of the Close for games was regarded as all-important, and this accounts for the somewhat recessed position of the buildings, which cover a considerable ground area. The frontage to the Close is shown in Fig. 1. Few modern science buildings are erected in the Gothic style, but in this instance it was felt that the architectural surroundings of the College left no possible alternative, and by the adoption of a late period in this style, the difficulty of securing the ample natural light necessary has been met satisfactorily. Bath-stone has been employed, with local stone for general walling, as used in other college buildings.

The design comprises two principal floors with a partial basement and partial second storey. The extreme length of the building is some 160 ft. and the breadth about 64 ft. As shown on the plan (Fig. 2), there is a central block, which contains the laboratories and their adjuncts, with two wings of two storeys only, devoted to four lecture-rooms. This plan illustrates the first (chemistry) floor, as

presenting more technical details than the ground floor, the plan of which is similar.

PHYSICS.

The old accommodation consists of one laboratory and two lecture-rooms. The latter will just suffice—with difficulty—for the theoretical classes, but the laboratory and storage places are greatly overcrowded. Classes much too large, for the laboratory follow one another continuously, so that the distribution and collection of apparatus seriously curtail the short time available for work, and no experiment can be left set up to be finished later. The school is well equipped with apparatus for this single physical laboratory, but lack of space and the vibration of the floor render the use of the more delicate instruments practically impossible. In the new Science School the ground floor is devoted to physics, and comprises two elementary laboratories on the frontage, 40 ft. by 32 ft., on either side of the central entrance. The latter gives access to a corridor, at the ends of the water, gas, and electric current are brought to convenient points on the walls. The adjoining store-room can be darkened for use as an optical room. All the working rooms are provided with gas, water, and steam supplies, and, as is necessary in the teaching of modern physics, liberal electrical supplies, including main and low-voltage alternating current, and direct current distributed from a battery in the basement by a switchboard specially designed to give to each room separately a full range of voltages with equal distribution of loads among the cells of the battery. All pipes and other bench fittings are non-magnetic. Firm supports to carry heavy mechanical apparatus have been built into the walls and ceilings at convenient places. The flooring of the whole of the physics section is of maple blocks on concrete, to ensure complete absence of vibration.

CHEMISTRY.

The first floor (illustrated in Fig. 2) is devoted mainly to chemistry, but there is also a biological

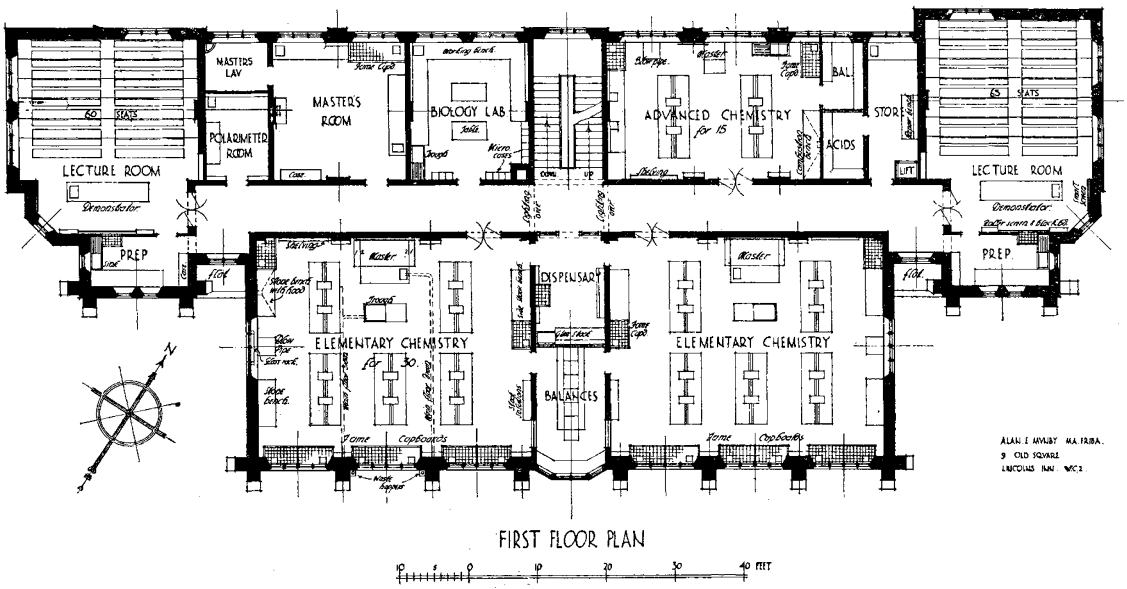

FIG. 2.—Plan of first floor of new Science School, Clifton College.

which are the two lecture-rooms with preparation rooms attached. Separate external approach to the preparation rooms is given by doors to the corridor terminations. On the other side of the corridor are, on the right, an advanced laboratory, 37 ft. by 20 ft., with adjoining store, and on the left of the central staircase a repair workshop 17 ft. by 20 ft., and a master's room 19 ft. by 20 ft. A research room and a photographic dark-room are also provided on this floor.

The two elementary laboratories are well lighted, and are spaced to give accommodation for classes of 30-36; they are large enough to store the necessary apparatus so that it is properly protected and easy to distribute. The apparatus drawers are uniform in size with those of the main physical store-room, so that a complete change of apparatus for each term's work may be effected with the minimum trouble and in a very short time. The benches are fixed, as the rooms will be used for large classes for short periods.

The laboratory for advanced work has been carefully designed to meet the requirements of higher certificate and university scholarship candidates. It has movable tables, to render it more elastic, and laboratory designed to accommodate 15 to 20 boys. In the general arrangement of the lecture-rooms advanced laboratory and elementary laboratories, this floor resembles the one below. The space occupied on the ground floor by the entrance hall is, however, usefully employed on the chemistry floor in providing a balance room and dispensary, common to both elementary laboratories. The dispensary, in which laboratory assistants are constantly on duty, serves as a distribution room and store for common apparatus.

The lecture-rooms will each hold sixty boys with ease and comfort; the average sets are of course only about half this size, but a large lecture-room enables two sets to be taken together upon special occasions such as lantern lectures or particular topics, and will also accommodate sectional meetings of the scientific society. Large lecture-rooms are also much pleasanter, in that the atmosphere of a small room, however efficiently ventilated, may become distinctly unfitted for boys during lectures on chlorine, phosphine, etc. In planning school laboratories and science rooms, too little consideration is often given to the fact that young people

are in general much more sensitive to fumes, poisonous gases, and other similar effluvia, than are many adults.

This important point has been borne in mind in the design of the elementary laboratories, where sufficient fume-cupboards have been erected (mainly along the windows) to provide for the whole class when working upon unpleasant substances. The cupboards are themselves efficiently ventilated, so that it is hoped that the air of the laboratories may remain fresh even in the most adverse circumstances.

In the balance-room the balances are enclosed in special cases built as part of the fittings. They are placed on stable benches, which are wide enough to take open exercise books immediately in front of the balances.

The advanced laboratory will provide good working accommodation for twenty boys. A stone slab, covered by an asbestos hood, will be used for combustions and similar work, while a Carius cupboard, fitted with concrete floor, tiled sides, sliding steel door and an interior light, is built under one of the fume-cupboards. A separate balance-room is attached to the laboratory. Steam, gas, electricity, and water are laid on to this as to all other working rooms. One feature worthy of special note is that all filter-pumps are worked, not from the general laboratory circuit, but from a separate main communicating with the town main in the adjoining road.

BIOLOGY.

At present, biology is taught mainly in the junior school and the lower forms of the senior school; the biological laboratory in the new building is a small room (to hold eighteen or so) for the accommodation of the class of First M.B. candidates. Should further space be required for biology in the future, a large room on the second floor, to be used temporarily for physical geography, has been built in such a way that its conversion to a biological laboratory could be carried out with very little difficulty or expense.

The chemistry floor includes, in addition to the rooms already mentioned, a polarimeter room and a room—partly office, partly private laboratory—for the head of the science department. By reducing the corridor height on this floor some cross lighting and ventilation has been made possible.

THE SCIENCE LIBRARY.

The most attractive room in the building is the library, on the second floor. A large and airy room, it is floored and fitted throughout in oak. It may, perhaps, be claimed without exaggeration that the emphasis now laid in schools upon the humanistic aspect of science has been largely due to Clifton influence; and it is therefore not surprising to find that the science library at the College includes a rich selection of classical scientific books and memoirs, which will at length find a home worthy of them.

The Royal Observatory, Greenwich.

ANNUAL VISITATION.

THE annual visitation of the Royal Observatory took place on the afternoon of Friday, June 3; the usual Saturday date being changed owing to the Whitsun holiday.

The Astronomer Royal presented his report, which deals with the work of the observatory for the year ended May 10, 1927. The usual observations of the sun, moon, planets, and fundamental stars are being continued with the Transit Circle; also of stars brighter than mag. 8·0 between N. Decl. 32° and 64°, and the stars selected for comparison with Eros at the opposition of 1931. The corrections to Brown's Tables of the moon in 1926 were +6·5″ in longitude, and −0·8″ in latitude; they have been slowly diminishing since the Tables were first used, in 1923. Mr. Cullen has made a redetermination of the declinations and proper motions of the brighter stars, from observations made with the instrument during the whole interval since its erection in 1850. He finds for the correction to Boss $+0{\cdot}33'' + 0{\cdot}0068''\,(t - 1925{\cdot}0)$.

The Altazimuth has also been used in recent years to find the correction to Boss's declinations from observations in the Prime Vertical; the values found are +0·29″, +0·44″, +0·45″, +0·51″ at declinations 45°, 35°, 25°, 15° respectively. These are intermediate between the values given by Raymond and Eichelberger.

The Cookson Floating Telescope has been borrowed from the Observatory of Cambridge for a third period of seven years; it is used for determining latitude variation and the constant of aberration. The reductions for the second seven years are nearly completed.

Fourteen completed determinations of stellar parallax have been made during the year with the 26-inch refractor, bringing the total up to 330.

The 30-inch reflector has been used for a determination of the effective temperatures of stars of early type; the results for twenty-two stars have recently been published in the *Mon. Not. R.A.S.* The instrument has also been used by Mr. Merton for photographing comets Comas Sola, Stearns, Pons-Winnecke, and Grigg-Skjellerup.

Plates are being taken with the Astrographic Equatorial for determining proper motions by comparison with those taken twenty-five to thirty years ago. The work is now nearly complete from declination 65° to 71°. Dr. H. Groot is also examining the astrographic plates for detecting double stars on them. He has found 187 pairs with separation less than 5 seconds in the zones 65° to 71°. Mr. Merton mounted two aeroplane lenses of 20 inches focus, working at F/5·6 on the tube of the astrographic telescope. These have proved very useful for photographing comets; it was with a similar lens that Mr. F. J. Hargreaves photographed comet Grigg-Skjellerup in advance of Harvard and Yerkes Observatories.

The sun was photographed on 251 days; most of the missing days are filled by photographs taken at the Cape or Kodaikanal; solar activity has been considerable, but with marked depressions at times. Between May and January there were ten naked-eye groups; but since January there have been no very large spots. Messrs. Ross have supplied new enlarging lenses for both the photoheliographs, which improve the definition at the sun's limb.

The late Mr. W. H. Wesley made drawings of the corona from the Greenwich expeditions' photographs of 1898, 1900, 1901, 1905; also from Mr. McClean's of 1908. Miss A. M. D. Crommelin made similar drawings of the eclipses of 1914, 1919. These have been reproduced in the *Philosophical Transactions*, Series A, vol. 22. Mr. Davidson and Col. Stratton have discussed the photographs obtained in Sumatra in 1926. The results will shortly appear in the *R.A.S. Memoirs*.

A party from the observatory will visit Giggleswick for the eclipse of June 29. The programme includes comparison of the intensities of certain calcium lines,