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New Architecture – III

Physics at Queen Mary College

G. O. Jones

EAST LONDONERS can hardly fail to have noticed the new eight-storey building (figure 1), topped by a curiously shaped dome,[1] which has appeared in Mile End Road on the site of the former St Benet's Church. This is the new building for the Department of Physics, completed in 1962 as part of the programme of expansion of Queen Mary College. Many will have wondered what sort of thing is done in a modern physics building and – perhaps – why the building need be so large, and what is inside the dome.

In first discussing the building with the Architects (Playne & Lacey & Partners) about six years ago, we began by thinking, not about tons of concrete, or square feet of floor space, but about the people who would work in the building. Our main ideas, as later realized in the finished building, were the following. The activity of a modern university science department is shared about equally between the teaching of undergraduates and the prosecution of advanced research in the subject (in the present building there are nearly a hundred people permanently at work besides undergraduate students) and it is important to plan carefully for both. We decided that research and teaching were to be physically fairly well separated, but that they should interact. In a sense, there are two interacting 'departments' in the building. The parts which the undergraduate student knows best are the entrance hall and the main lecture theatre on the ground floor (figure 2), and the lift which leads to his own teaching laboratory for practical work somewhere at the top of the building. The rest of the building – research laboratories, workshops, service rooms, library, staff rooms and offices – he hardly sees at all in his first two years. Only in his third year, when he will visit many more staff rooms for tutorials, and may even join in some of the department's research,

[1] The dome was added after the building was completed, and does not appear in the Architects' sketch.

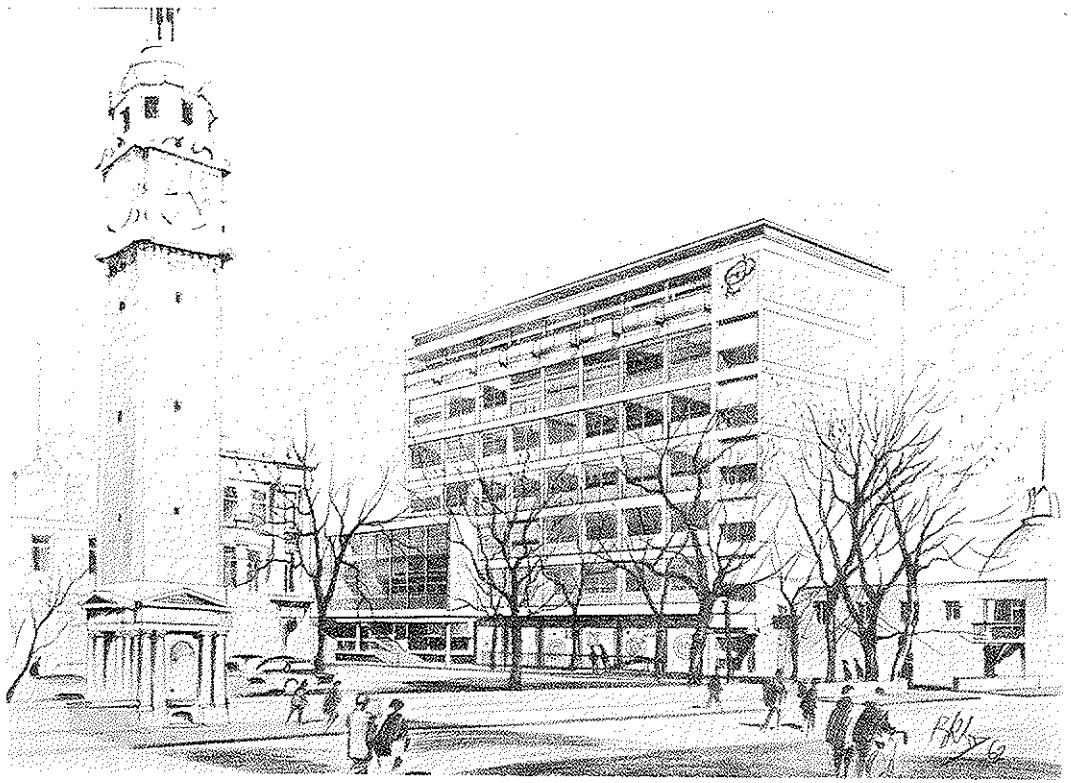

FIG. 1. Architects' drawing of the new physics building at Queen Mary College. (Original in the possession of Queen Mary College.)

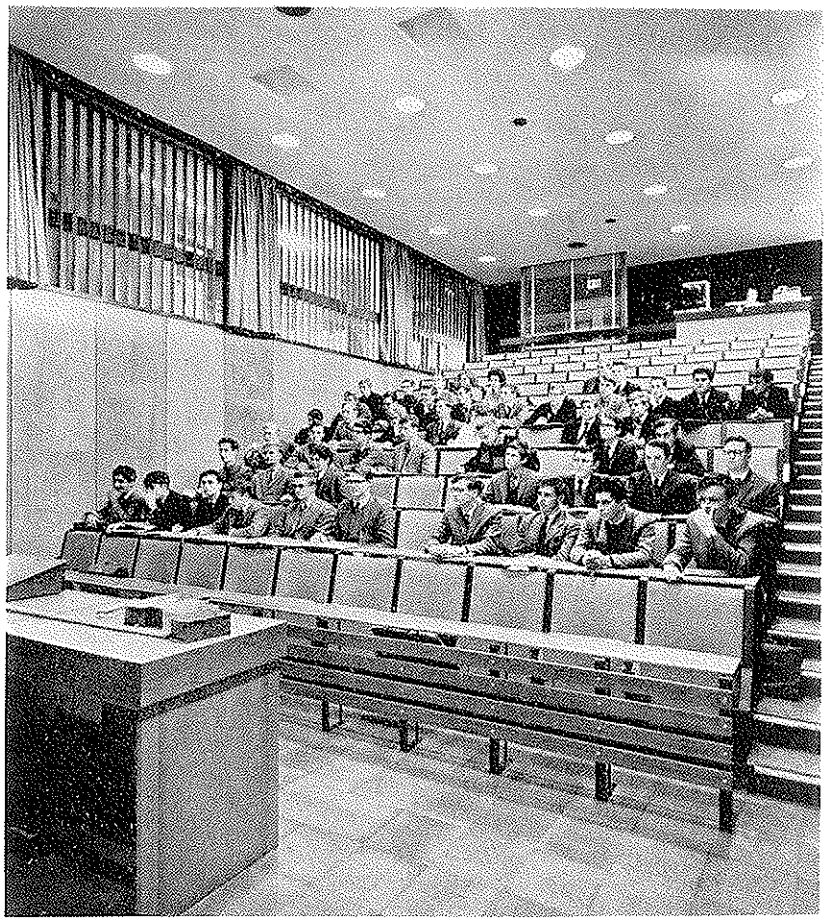

FIG. 2. Main lecture theatre in the new building. (From a photograph in the possession of Professor G. O. Jones.)

does he fully realize that another 'department' exists in the building. If after obtaining his first degree he is lucky enough to be selected as a postgraduate research student, he will live and work in this other department. Then he will know best the lower floors, and in particular, a three-storey 'research wing', or perhaps one of the rooms in a vertical column at one corner of the building where members of the academic staff who supervise the teaching laboratories have their research laboratories.

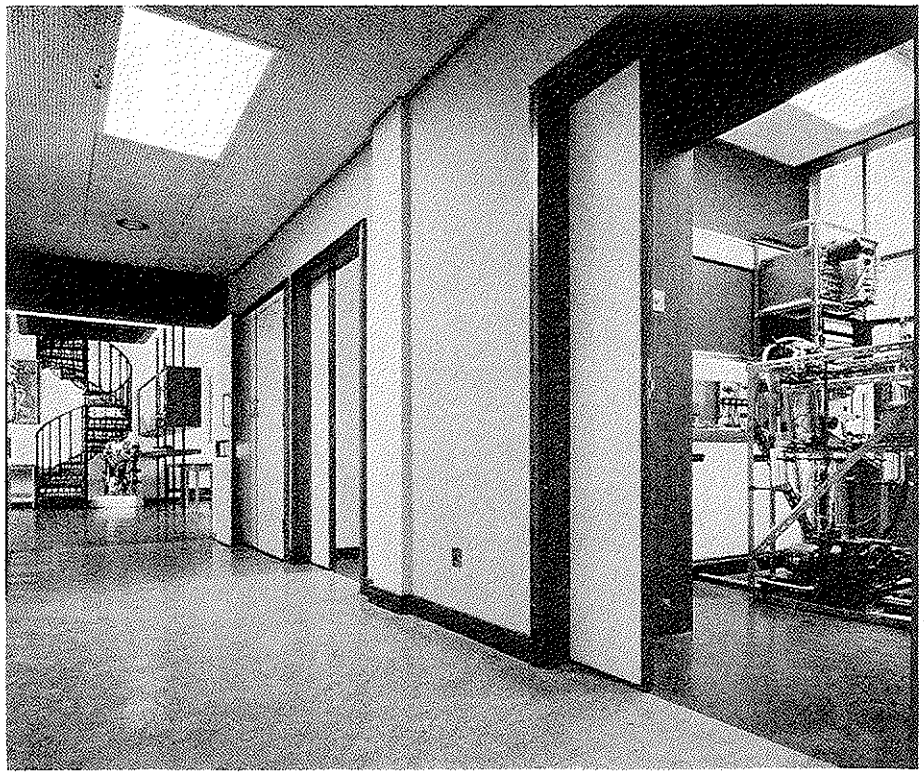

FIG. 3. View of the museum, showing the old helical staircase, some of the pictures in one of the Gallery 273 exhibitions, and scientific apparatus in a research room. (From a photograph in the possession of Professor G. O. Jones.)

Above all, we tried to keep in mind during our discussions that the new building was to be occupied by human beings, and to provide amenities which were humane as well as workmanlike. For example, each undergraduate 'year' has its own seminar room and small library. Technicians and other non-academic staff have their own small common room and, because technicians may sometimes be engaged in dirty work, they also have shower rooms. In the interests of humanity, several attractive artistic features have been introduced into the building, such as the photographic enlargement of a Leonardo drawing which dominates the main entrance hall. Wherever possible, rooms have been made attractive and light, with a great deal of wood in the decoration and furniture. Perhaps the main evidence of our preoccupation with the interests of the inhabitants of the building as human beings is the 'museum' (figure 3), which is situated in the centre of the research area of the building and very near most of the rooms where technical or academic staff work. A link with the past is the helical staircase, which may be seen in this photograph, and which has been preserved as the only visible relic of the Department's former existence in the main College building.

The museum serves as something of a social centre for the hundred or so 'residents' of the building (academic staff, technicians, secretaries, research students). Although it is not desirable that a college should be too much fragmented into departments, particularly at undergraduate level, there are good reasons why contacts within departments should be encouraged. Thus while the tendency within any college as a whole is for a 'horizontal' stratification to exist, separating academic staff, students, technicians, etc., but cutting across departments, there should also be a certain 'vertical' division into departments, so that a corporate spirit may develop in them, cutting across this stratification. Nearly everywhere the *department*, its purpose defined by the discipline which it serves, is the real unit in university administration and planning, and the fact has been recognised in the design of our building.

The approach towards designing the building which I have described is the opposite of statistical. Of course it had also to be designed correctly for the job it was to do. The Department was to take in fifty Special Honours students every year and lead them in three years to the B.Sc. degree. This requirement accounts at

once for three floors – one floor for each teaching laboratory with its ancillary rooms. The Department was also to teach physics to specialists in other subjects (such as chemistry or zoology) and was to teach physics to the small number of students studying for the less specialized General Honours B.Sc. degree. This accounts for another two floors. At 'peak' lecturing hours there are usually at least three formal lectures in progress in the Department; these have to be provided for. A department of this size, having in all about a hundred and forty Honours students specializing in physics, and about the same number of non-specialists, will have forty or fifty postgraduate research students working for the Ph.D. degree under the supervision of academic staff (20-25 in number). We had to provide rooms for them and services for the very varied types of experimental or theoretical study upon which they would work. We had to remember also that the course of physics – and even of university planning – is unpredictable, and to incorporate flexibility into the building. This we did mainly by having a great deal of variation in the sizes and shapes of rooms. Thus although the *types* of services, fittings, and furniture are standard throughout the building, hardly two of the rooms are identical. The main teaching laboratories are quite different from each other, so that we may, by changing their functions, provide for almost anything that may reasonably be demanded from us by changes in the patterns of university teaching or by the reports of Government committees of inquiry. We rejected, as somewhat inhumane, the method common in industrial establishments of providing for flexibility by the use of movable walls. Each of our rooms is a small empire, and wherever this is possible, it has someone's name on the door.

Physics has changed very much since the second world war, and in order to keep up with the realities of modern physics we are forced to use in teaching a great deal of expensive equipment which before the war would not have been found even in research laboratories. For the academic staff the problem in teaching is to preserve the *ideas* of physics and not to allow them to be submerged by mere technique. It is not at all uncommon to find students arriving in the Department with great facility in some of the technical aspects of physics (such as electronics) but with little real understanding and knowledge. We have to keep up with modern developments without being hypnotized by them.

In research, the function of a modern science department is two-sided. It has a teaching aspect, since one of the purposes of university departments is the postgraduate training of scientists in the methods and techniques of research. Many of our postgraduate research students will find themselves in important research positions quite soon after leaving the university with Ph.D. degrees. But in training research students the academic staff also help themselves, and most of their research is, in fact, done through the help of their research students.

The research of a university department is very different from that of a government or an industrial department. Subject to the condition that the research carried out should be effective in the training of research students, the main criterion in choosing the subject for research is that it should be fundamentally important. We are not interested in 'sponsored' research – for Government or industry – unless, of course, the ideas come first from us and the sponsoring second. Fortunately, one of the main financial supporters of research outside normal university sources – the Department of Scientific and Industrial Research or 'D.S.I.R.' – has an enlightened policy in this matter. Most research students are supported by grants provided by the Government through this office, and no condition limits the subjects of their researches. Any senior research worker who needs more money for his work than his college or university can provide may make an application to the D.S.I.R. for a grant towards his research, and it is the quality of the worker and his subject, not its industrial or money-making potentiality, which counts. Needless to say, we are not interested in any work to which conditions of secrecy could be attached. Our results are published – as soon as the authors succeed in finding the time to write up their work – in the open scientific press. At present the Department of Physics publishes fifteen to twenty scientific papers every year, mainly in the fields of low-temperature and solid-state physics, nuclear physics, astrophysics, and theoretical physics.

Because we aim to be at the forefront of modern physics in research we need a great deal of modern equipment of great refinement, which is necessarily very expensive. The equipment now in use in the building is worth some hundreds of thousands of pounds. This is a further reason for the large increase in the number of technicians working in the Department. It is very easy

to be hypnotized by the 'black boxes' of modern science. We try not to fall into this trap and to remember that it is the problem and its answer which count.

Members of the staff of the Department have very many contacts outside and it is common to see scribbled on the white glass panels provided on the doors of each staff-room messages such as 'gone to Geneva' or 'gone to Harwell' with the date of return specified. The world of physics is very much an international one and the academic staff will know foreign physicists in their own fields at least as well as they know British physicists in other fields. They are frequent visitors to international conferences and, of course, we are therefore often the hosts to such conferences. Last summer the Eighth International Conference on Low Temperature Physics, which alights once every two years in a different part of the world, was held at Queen Mary College and organized by the Department of Physics. About 700 specialists in low-temperature physics attended. The Department arranged for their accommodation in London, for the printing in advance of the papers contributed to the Conference, and it also entertained the guests in an extensive programme which included a banquet at Mansion House, a concert at the College given by Philomusica of London, and a reception at Drapers' Hall. We even provided an organ recital, Morris dancers, a (traditional) jazz band and a lecture-recital on the bagpipe!

In designing the building it had been realized that we would be hosts to conferences and scientific meetings and some features of the building were introduced with this in mind. For example, the main lecture theatre has a double-glazed wall at one side with wooden louvres which allow people walking in a corridor outside to see what is going on without disturbing the audience. During the conference on Low Temperature Physics we remembered (as is universally recognized) that much of the real work of conferences is done *outside* the conference halls by people meeting each other informally. We therefore provided a free service of *good* coffee continuously throughout each day of the five-day Conference, in our museum. I am sure that many of the most valuable discussions of the week took place informally there.

In my own estimate, at least, the museum occupies a central role in the life of the new building. An important part of the activity of the Department – although research students may not always realize it – is the series of colloquia and research seminars given

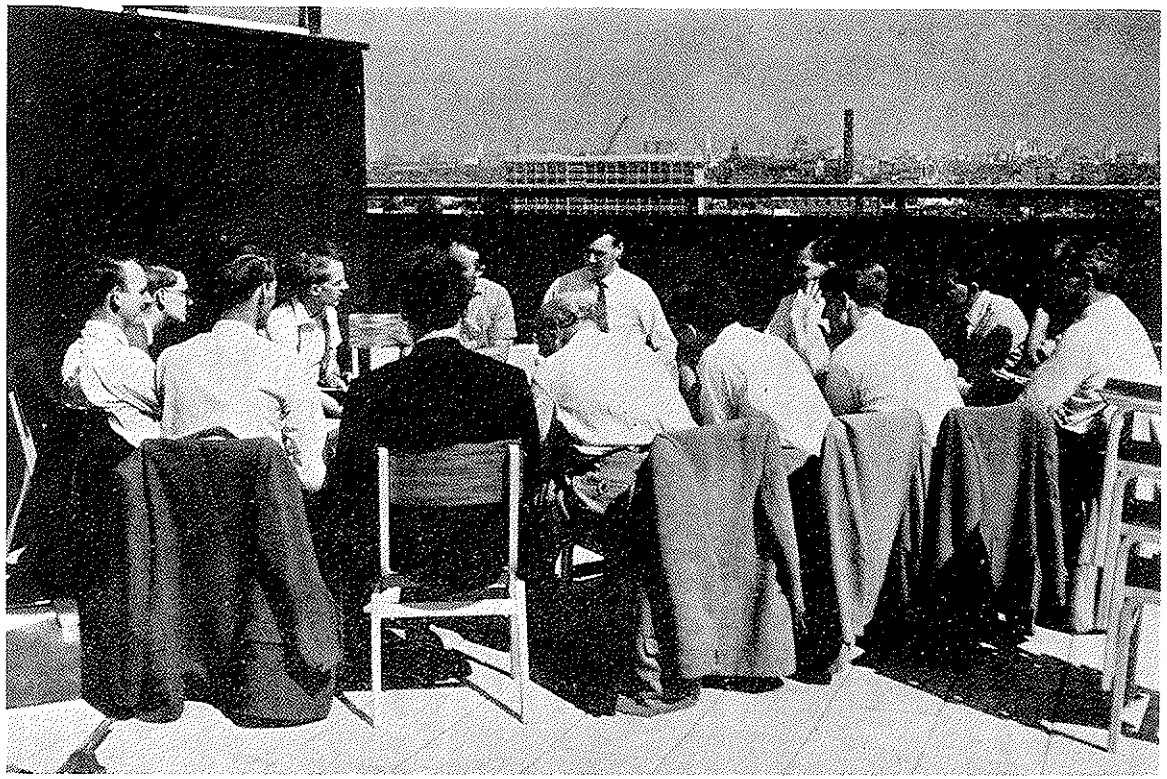

FIG. 4. Members of the academic staff holding a meeting on the roof. (From a photograph in the possession of Professor G. O. Jones.)

either by ourselves or by visiting speakers, and these are always timed in such a way that the speakers and other visitors may meet us before the meeting for tea in our museum. Former members of the Department know that they will meet nearly everyone in the museum at this time, and it is very unusual to see no visitors to the Department sharing the daily tea break. Indeed, a great deal of departmental business is conducted at this time because everyone knows that he will then have the chance of meeting nearly every member of the Department.

The museum has recently become rather better known in East London, because it houses Gallery 273, a small art gallery advertised in the artistic press and open to the public, in which one-man shows are run with the help of the Upper Gallery of Whitechapel Art Gallery. The gallery has many visitors from inside and outside Queen Mary College, and provides an interesting and changing background for us who work in the building. I hope that readers of *East London Papers* will make a visit to this gallery an excuse for seeing something of our new building.

Finally, let me refer to two of the questions put at the beginning of this article. The dome on the roof contains, surprisingly enough, a telescope. Although we do not often see the sun in London, and staff meetings on the roof – such as the one shown in figure 4 – are rather uncommon, it is still possible to make astrophysical and astronomical observations at very long wavelengths – the very far infra-red or short radio waves. We have made a special study of these wavelengths in the Department for other purposes and, about two years ago, we began to make observations of the sun, moon, and atmosphere.

Need the new physics building be so large? Although I have hardly mentioned the scientific or technical details of our work in this article, I hope I have shown that the work of a modern science department is complex and many-sided. Such a department cannot be small, not only because it would be uneconomic, but because it would not 'go'. I think our Department is about the right size, and I hope it will provide opportunities for many years (to quote Sir Harrie Massey's remarks at the official opening) for 'fun at a high cultural level'.