its application to the needs of newly emergent independent nations".

In an article describing his recent tour of Africa and reporting on his first-hand examination of the practical results of apartheid in South Africa, Mr. Frank Giles, the *Sunday Times* (London) foreign editor, has written (*Sunday Times*, March 9):

"In Johannesburg I talked with many politically-minded Africans, some of them the leaders or representatives of the banned African parties—the African National Congress and the Pan-African Congress—some of them prosperous lawyers, doctors or business men. Taken as a whole, they represented an average of intelligence and capacity far higher than can be met with in most of the newly-independent African States in the rest of the continent, a fact due principally to the higher education of many Africans in South Africa's excellent and hitherto multi-racial universities.

"From now on, however, the African will have to go to the newly-established 'tribal colleges' for Bantu only, where the educational effort is concentrated on what the Government conceives to be suitable subjects for Bantu study. None of the Africans I met had anything but the profoundest scorn for these 'bush universities', designed, so they maintained, to ensure that the African never rises above a certain level: 'We are not interested in a return to tribalisation but in advances that Western civilisation can bring'."

On March 8, the chancellor of the University of Natal, Dr. Denis Shepstone, unveiled a plaque erected by the students at the main buildings of the University in Durban. The plaque is intended to commemorate the death of academic freedom through the imposition of racial segregation in South African universities. It bears the inscription: "The right of this university to determine who shall be admitted as students was taken away in May 1959, and restored . . .". Dr. Shepstone, in his speech, referred to the curtailment by legislation of the autonomy and academic freedoms of South African universities. In thus prohibiting non-White students the Government had curtailed one of the basic freedoms of university autonomy, namely: "Who may be taught". He also appealed for "dedication to the idea of open universities". The ceremony was attended by members of the University Council, the Senate, Convocation, the teaching staff and many students.

NEW PHYSICS BUILDING AT QUEEN MARY COLLEGE, UNIVERSITY OF LONDON

By Prof. G. O. JONES

Professor of Physics and Head of Department

On January 23, the new building for the Department of Physics at Queen Mary College was formally opened by Sir Harrie Massey, in the presence of nearly 200 senior members of universities, Government and industrial offices and laboratories, local schools and other organizations. Deputizing at short notice for Sir Nevill Mott, who was prevented by illness from attending, Sir Harrie—describing himself as the "wrong half of Mott and Massey"—gave a racy exposition of some of the realities of modern university physics. The great virtues of practising science in university departments were that teaching and research were then united, that there was continuous rejuvenation by the flow of young people through the university and that one's choice of research was free. But the enormous growth and change in physics since the War posed serious difficulties for modern departments. The growth of physics made satisfactory teaching in three or four years an increasing problem, since physics was a basic professional training, called for by technologies of all kinds. The changes in the techniques of physical research and the increase in team-work added problems which demanded that the University physicist should have adequate financial, technical and administrative support.

Reasonable amenities were essential for the large staffs who would work in modern departments of physics, and the design of buildings could contribute greatly. In declaring the new building open, Sir Harrie expressed the opinion that it was both workmanlike and attractive and would provide opportunities for "fun at a high cultural level".

The new building (Fig. 1) is designed for an annual student intake in the special honours course of 50. There will be 40–50 full-time postgraduate research students working for the Ph.D. degree, an academic staff of about 20, 6–10 postdoctoral research Fellows or research assistants and about 40 technical, secretarial and other staff. The building was erected in two stages. The first stage, a large eight-storey block, consisting mainly of teaching laboratories and lecture rooms, was completed in 1960. The final stage, a three-storey wing consisting mainly of research rooms, was completed in 1962.

In order to reduce traffic through the building, the main lecture theatre has been placed where it can be entered directly from the entrance hall. It seats about 140 in a steeply raked terrace and is furnished in beech and mahogany with upholstered tip-up seats. An unusual feature is a set of double-glazed wooden louvres covering most of one side of the theatre. To the audience looking towards the lecturer only the woodwork can be seen. Walkers in the corridor outside can, however, look directly into the theatre, and the lecturer can look outside. Two very large revolving chalk-boards are power-operated and cleaned. There are full facilities for showing slides and films from a projectionist's console and service points for demonstration experiments.

A preparation room for lecture demonstrations is adjacent to the main lecture theatre. It connects also with two smaller lecture rooms, seating about 60 and 80 respectively, one directly, and the other by service lift.

The five upper floors of the building house the teaching laboratories, nearly the whole of one floor normally being allocated to the needs of a given group of students. The laboratories have their own preparation rooms, optics rooms, photographic dark rooms, seminar rooms and small libraries for private study, but are very different from each other in detail. The third-year laboratory has also a large students' workshop and glass-blowing room, and a computing room.

The main research area of the building is concentrated in the first floor. There is, however, a vertical column of staff rooms at one corner of the building, designed primarily for convenience in supervising teaching laboratories, and many of these are combined with research laboratories so that there is, in fact, research in progress on every floor above the ground-floor.

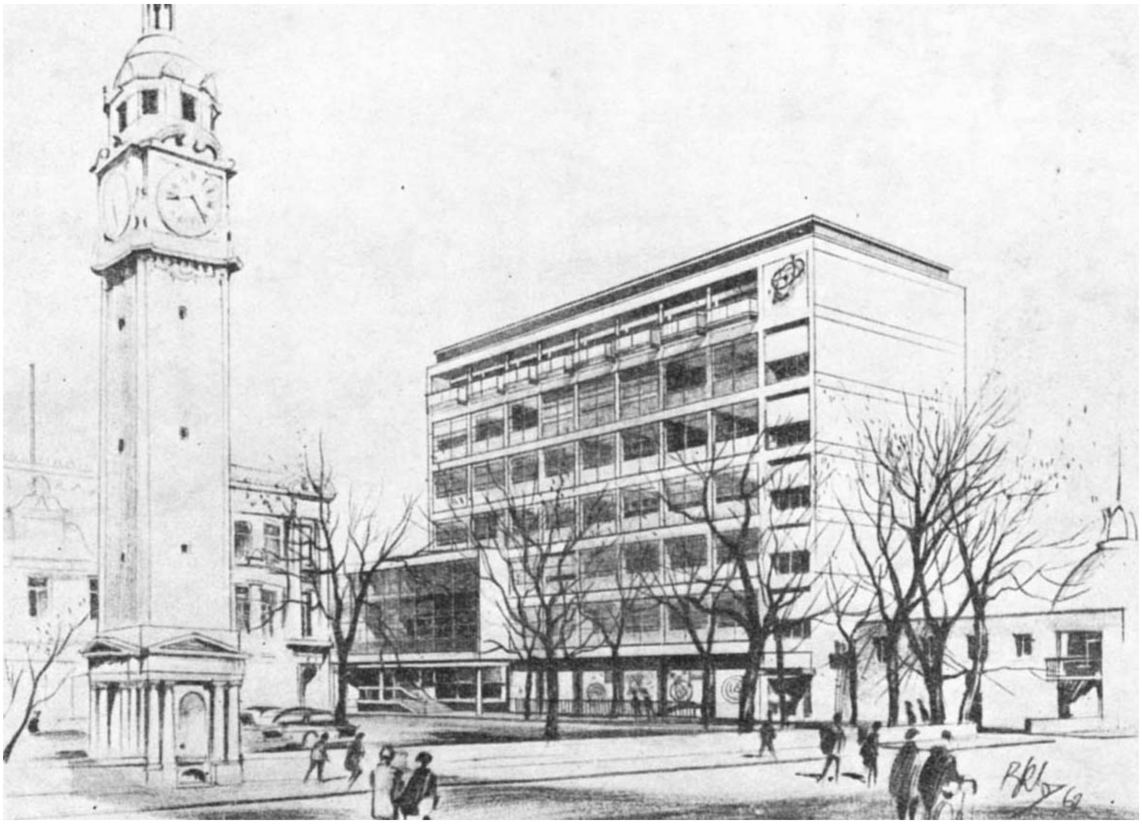

Fig. 1. Architects' sketch of the new physics building, Queen Mary College (University of London). (Architects: Playne and Lacey and Partners)

Fig. 2. The astrophysics laboratory on the roof of the physics building (by courtesy of *The Times*)

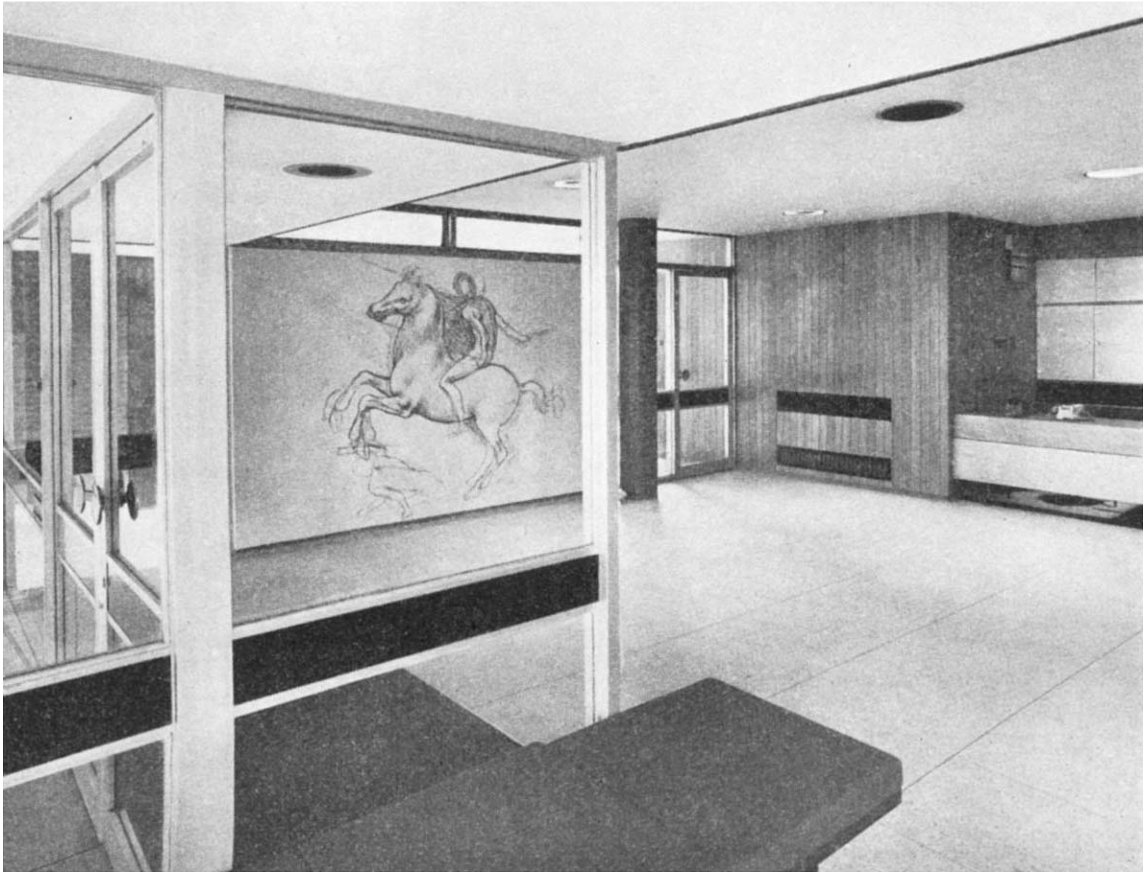

Fig. 3. A view of the entrance hall, showing a photographic enlargement of a Leonardo drawing

The research rooms have been made of many shapes and sizes in order to provide flexibility. There is at present a wide range of research carried on in the Department, the main studies being in low-temperature physics, sub-millimetre spectroscopy, nuclear magnetic resonance, high-energy nuclear physics, astrophysics at sub-millimetre wave-lengths, architectural acoustics and in other branches of solid-state physics, including the study of ferroelectrics and X-ray crystallography. Many of the theoretical studies in progress are related to the experimental programme. Students working in theoretical physics have a suite of small rooms, each accommodating two workers, near the main experimental research area.

There are a departmental library open to third-year undergraduate students and research workers, and a room for research seminars.

The main departmental offices are adjacent to the head of department's room and near those of senior members of the department, and the laboratory steward has a room and clerk's office adjacent to the main entrance hall.

The main service rooms are centrally situated, near the main research area of the building. They include a large main store, a suite of dark-rooms and rooms for specimen preparation, instrument repair, drawing, computing and a first-aid room. There are a large main workshop with an office for the technician-in-charge and subsidiary workshops for research students and for brazing. There are a large room for compressors and liquefiers which houses two Philips air liquefiers and an A. D. Little helium liquefier, and an office for the technician-in-charge. At semi-basement level there is a further set of service rooms which include two radioactive laboratories and a chemical laboratory.

Rooms and laboratories throughout the building share the same general design features. Throughout the building the built-in furniture is either of beech and sapele, or of beech and afromosia, matching the movable furniture in use. Wherever experiments are to be done, there are aluminium slotted strips and strips of soft wood attached to the wall at several fixed heights. Window walls are kept quite clear of services so that desks and tables may be used at the windows. Walls opposite windows, leading into the corridors, are provided with as many built-in cupboards as can be fitted.

Piped services are brought to service shelves which project from the walls at bench height. Among the unusual piped services are return lines for helium gas, waste lines for gases to be discharged at the top of the building, and lines for special high-pressure and low-pressure gas supplies (such as hydrogen and oxygen) and for high-pressure water.

To avoid flooding, all laboratories have drains at floor-level. A feature of many research rooms is that the doors, like those of railway train compartments, have large glass windows which can be lowered.

Electrical supplies are brought to service panels immediately above the service shelves. A feature of these supplies is that a very large number of 240-V a.c. points are supplied for 13-amp fused plugs, and relatively few points for other supplies, which include 240-V d.c., 12-V a.c., 1 kc/s a.c., 415-V 3-phase a.c., and spare lines. Considerable care has been taken to avoid electrical interference. All the steelwork of the frame of the building was carefully bonded during construction. Filters are provided on all the electrical supply systems—particularly at joints—in order to reduce pick-up from outside and to prevent interference generated within the building from

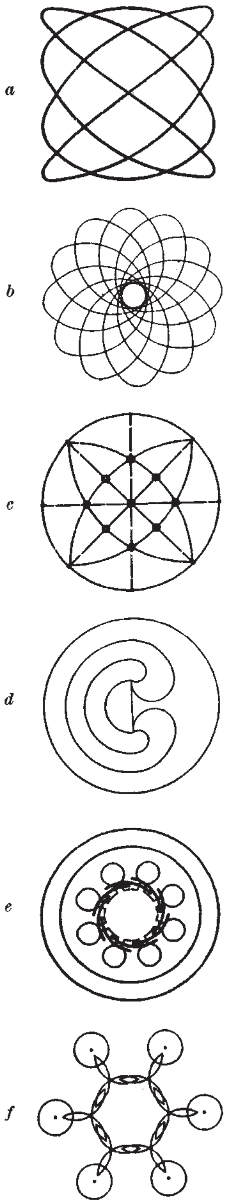

Fig. 4. Designs used for the tile patterns
a, a Lissajous figure; *b*, path of a particle in a precessing orbit; *c*, the stereographic projection of a cubic close-packed structure; *d*, spreading of dislocations from a Frank–Read source; *e*, a cavity magnetron; *f*, the electron-orbital scheme of benzene

being distributed. Special care has been taken to shield the supply cables. A limited access special earth is provided in selected laboratories quite separate from the ordinary a.c. earth. No commutator motors or other devices producing sparks are allowed in the building. All heavy electric motors and devices requiring large currents (such as workshop machinery) are supplied separately direct from the sub-station. The laboratory a.c. outlets are fed via a voltage stabilizer. Some laboratories have tungsten lighting, although fluorescent lighting is generally used.

One room extending over two floors is designed for high-voltage apparatus and completely screened, with a shuttered opening leading to an adjacent research room at the upper level.

On the roof of the building there is a laboratory (Fig. 2) designed for astrophysical experiments at millimetre wave-lengths. The roof of this laboratory carries a revolving dome housing a 60-in. reflecting telescope.

Where there is heavy vibration, as in the main workshop and in the liquefier and compressor room, the whole floor is mounted separately from the rest of the building. Two first-floor rooms have especially strengthened floors for heavy equipment, and one, in which a *Varian* 3-ton magnet is installed, has a removable wall and window so that heavy equipment may be hoisted directly into position from outside the building.

A feature of nearly all rooms is that the pipes and cables are brought in behind panels or above the false ceilings and cannot be seen. Moreover, alterations and additions to services can be made without defacing the building. The delivery area for the building is a yard with entrance at lorry tail-board height to the goods lift which serves all floors. Gas cylinders are stored in the yard with underground connexions to the main distribution points inside the building. There is also an underground store here for acids and solvents. All the air supplied to the building is cleaned by filtering.

A great deal of thought has been devoted to the problem of making the building comfortable and pleasant as well as efficient. Among the decorative features are a photographic reproduction of a drawing by Leonardo da Vinci in the entrance hall (Fig. 3), a mural painting by Feliks Topolski in the research wing, a sculpture by Mr. T. B. Huxley Jones on the exterior of the building, and a series of tile patterns decorating the lower part of the exterior, based on physical ideas derived from several branches of physics (Fig. 4).

Technicians working in the department have their own common room and locker rooms with showers. A pleasant amenity is the departmental museum, situated in the middle of the research area on the first floor, which is used as a meeting place and tea-room for all permanent occupants of the building. The museum houses a scientific exhibition and is also used as an art gallery, open to the public and advertised in the artistic press as Gallery 273. The changing exhibitions in this Gallery provide an interesting background for those who work in the building.

CARCINOGENESIS AND CANCER PREVENTION

By Dr. P. R. J. BURCH

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THE most important application of theories of carcinogenesis is to the problems of cancer prevention and therapy. It is generally believed[1] that a viral ætiology should open up the possibility of prophylaxis through immunization. By contrast it is thought[2] that somatic mutation hypotheses are 'pessimistic' because, to quote Burnet[3]: " . . . Everything suggests that, somatic cells being what they are, the impact of the environment must inexorably lead to an accumulation of mutant cells, some of which will have malignant descendants if life persists long enough".

Unfortunately, evidence analysed in previous articles[4,5] makes it reasonably certain that most human malignancies have a genetic basis. It is highly probable that somatic