

colleges, and the residential area for the teaching staff is beyond the hostels.

In addition to these, sites have been selected for the medical college and hospital, the colleges of agriculture and forestry, the college for women, a students union, a faculty club, a market, a post and telegraph office, botanical garden, stadium, gymnasium, swimming pool, and a colony for subordinates and servants. It is interesting to note, in regard to acoustics, that only large lecture theatres have been given acoustical treatment, and only those rooms where quiet is absolutely essential, owing to the heavy cost of acoustic materials.

One of the main causes of disease in India is said to be the impurity of drinking water; and the question of having separate drinking water for caste Hindus is also a problem for schools and colleges which cannot be ignored. To meet fully the special needs in this respect and minimize risk of infectious disease, modern drinking fountains are being installed throughout.

In regard to style, the author said that in other important countries of the world the science of architecture has made rapid progress, but in India he thinks they are sadly behind the times; and in spite of the money that has been and is being spent on educational institutions, he has seen nothing yet of real architectural value. "In fact some of the buildings are so poorly designed and so badly constructed that they are a blot on the landscape and invoke in the heart an unholy desire to pray for an earthquake or fire." The reigning Nizam, who has taken a keen interest in the new University, expressed the wish that, while possessing all modern facilities, it should have no Western elements in its architecture. Speaking of the arts college at the time of his Jubilee, His Exalted Highness said that "the architecture of this building represents a blending of the Hindu and Muslim styles, and the art and culture of both these races are reflected in the pillars and tracteries and carvings on the doors and walls. Thus the building symbolises the close contacts and friendly relations subsisting for centuries between the various classes of my subjects. . . . The Osmania University should not only be a repository of Hyderabad's best traditions, a model of its high culture; it should also aim at broadmindedness and mutual toleration and unity among the students, for in that ideal lies the well-being and the prosperity of this State".

The author has accordingly embodied the Hindu and Muslim cultural elements of all periods in the State, such as the Buddhist, Jain, Brahmanic, Bahmani, Kutub Shahi and Moghal. These have all been blended to form a composite whole, signifying the evolution of a new style which should distinguish His Exalted Highness's reign from all the other rulers in the history of the Asafjahi dynasty.

The arts college which, at the beginning of this year, was the only completed building in the scheme, covers an area of 250,000 sq. ft. and is designed to accommodate two thousand students. It is a two-storied structure, with basement, built entirely of local granite of pink and grey shades, with the inner walls plastered and the outer surface in ashlar masonry. All the rooms are finished in plain white lime plaster, except the entrance hall, where stucco is used. The dome surmounting the entrance hall is about 50 ft. in diameter, resting on corbel slabs. The entrance hall is built in reinforced cement concrete, and is 66 ft. from floor to ceiling. The main roof and intermediate floors and staircases are con-

structed in reinforced cement concrete. All the floors are paved with polished Shahabad stones from the regions of Tandur and Nawandgi in Hyderabad State, with the exception of the entrance hall, where the floor is red terrazzo. The most difficult and slow part of the work was the process of stone-dressing, as the local granite is of the hardest variety. The stone lintels over the massive columns of the ground floor verandah of the arts college weigh about seven tons each and are 18 in. in span. The stones used for the decorative cornices weigh  $2\frac{1}{2}$ - $3\frac{3}{4}$  tons each. The complete woodwork (including furniture) of the entire buildings is being carried out in the best Rangoon teak. 4,000-5,000 workmen were engaged during the first year or two of the construction work. In addition to local labour many stone-dressers and artisans were imported from southern towns such as Tanjore, Turkapalam and the Conjivaram, to assist directly with the work and also to train the local workers.

The whole scheme is expected to cost a little over two crores, and the author replies to some criticism on the ground that far too much money is being expended on the new University. Before he had seen some of the world's greatest educational centres he was inclined to agree that the cost should be kept low; but examples in other parts of the world convinced him that the University is a nation-building institution in the best sense of the term; the future of the younger generations and of the State itself will obviously depend on the type of University. It is concluded that if the people of India are to be brought physically and mentally to the same level as those of other civilized nations, it is vital that the new University, and others in India, should be built on the principles accepted and the standards fixed in other countries; and it is quite certain that Hyderabad is a big enough State to think of a big university worthy of itself and of its traditions.

## EAST AFRICAN ARCHÆOLOGY

FIVE distinct types of polished stone axe have been recognized in East Africa. Most of the specimens found were pecked and not ground into shape before being finally polished. No geographical significance can be attached to any of the five types; their distribution will probably be found to be very wide, though for the moment for obvious reasons they have mostly turned up where European settlement involving farming has taken place. A description of the various types, together with a list of some of the localities where they have been found, has been made available in a collection of reprints recently received\*. A general sketch map, too, is appended. Finally, a short note on the occurrence of the different types outside East Africa concludes the article.

Gorgora, on Lake Tana, was a former Italian military station. The rock-shelter is situated some 150 ft. up in the side of a conical hill of volcanic rock which rises abruptly from the plain some three miles from the Lake. The shelter is most inaccessible and can only be approached from one direction. It is some 15 ft. long by 8 ft. at the widest. Black soil rich in humus was found from the surface to a depth

\* "Notes on the Ground and Polished Stone Axes of East Africa", by Mary D. Leakey; "Excavations of a Rock-Shelter at Gorgora, Lake Tana, Ethiopia", by Colonel F. Moysey; "The Industries of the Gorgora Rock-Shelter, Lake Tana", by L. S. B. Leakey. Reprints of the *Journal of the East Africa and Uganda Natural History Society*, 17, Nos. 3 and 4 (77 and 78), 182-203.



of 4 ft.; then to the 9-ft. level there was a grey volcanic ash. At this level, concretions appeared, and these formations increased down to the 12-ft. level. Implements occurred throughout the deposits, and pottery was found to a depth of 3 ft. from the surface. There were no sterile layers.

Dr. Leakey's analysis shows that the industries of the 12-, 11- and 10-ft. levels can be classified as Early Stillbay; those from the 9-, 8- and 7-ft. levels as Middle Stillbay; those from the 6-, 5- and 4-ft. levels as Upper Stillbay; those from the 3-ft. level as Magosian; those from the top 2 ft. of deposit as late Mesolithic or Neolithic. This industry includes some crude microliths, and appears to be derived from the earlier Magosian. A few simply decorated sherds were also discovered in this level. The industries from the older levels are fairly typical, but the 4-ft. level gives us a transition stage between the latest Stillbay and the Magosian. An analysis of the different types of artefact found is given, and the article is well illustrated.

The rock-shelter at Gorgora is obviously of some importance. Such transition industries as those of the top 2 ft. and the 4-ft. level are very interesting. The excavations are not yet completely concluded, and it is to be hoped that further investigations at this site and elsewhere in the neighbourhood will be undertaken at a not too distant date.

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## QUARTZ CRYSTAL MODEL

**D**IFFERENT types of deformation extend the range of frequencies that quartz plates can cover and a single plate may be used for totally different ranges when made to vibrate in different modes. To obtain most of these various modes of vibration the plates must be cut from the mother quartz at different angles with respect to the electrical, mechanical and optical axes of the quartz crystal. There are also special orientations which provide better frequency stability in cases of temperature changes, and these orientations are used where stringent temperature requirements apply.

A recent interesting article by F. Caroselli (*Bell Lab. Rec.*, 22, No. 9; May 1944) describes and illustrates a large fabricated model of a quartz crystal, employed for showing more clearly the angular relations of the various cuts of plates to the original mother crystal. The model has an outer shell about two feet high that shows the typical shape of quartz as it grows in Nature, and an inner display of crystal plates. The shell and display tiers are made of sheet lucite and the plates are lucite, roughened to appear like etched quartz. The plates include those used for oscillators and filters.

About the vertical axis the outer shell shows an array of faces that repeat three times in exact symmetry. This is the optical axis, and it is the only direction through quartz along which a light ray will travel without dividing into two rays of different velocities which are refracted by different amounts. The shell can be rotated with respect to the inner display so that its faces can assume three identical orientations with respect to the crystal plates. Three pairs of *X* and *Y* axes are marked on the apron of the model to demonstrate the trigonal symmetry of quartz.

Before constructing the outer shell of the model, formulae were developed from published crystallo-

graphic data to compute the angles between adjacent faces. All identical faces were made the same size by having the major apex faces meet in the vertical axis of the model. Minor apex faces were located at an arbitrary distance from this central axis.

The model illustrates cuts used in ranges varying from less than 1 kc. to 24,000 kc., and each one is particularly suited for a definite range of frequency. In addition, there are several different cuts operating over the same range but having some specific characteristic. On the top tier of the display there is a plate the coating of which is divided so that it will vibrate by flexing the major surfaces; and on the bottom tier are a number of plates of the same cut but with the coating divided to excite the third, the fifth or seventh harmonics of a longitudinal mode of vibration.

## COLOUR TELEVISION

**A** DEMONSTRATION was given a short time ago by Mr. J. L. Baird of his recent achievements of the reception of television in colour by a method which avoids the need for revolving disks and lenses; the apparatus is thus silent in operation and is claimed to be as efficient as the pre-war black-and-white receivers. The pictures in colour are also utilized to produce stereoscopic effects by the use of coloured viewing glasses, the left and right eye pictures corresponding to the left and right eye images.

For the reproduction of the received pictures a special cathode ray tube, termed a 'Telechrome', is used; this differs from the ordinary tube in having two cathode ray beams and a transparent double-sided screen. These two cathode ray beams are modulated by the incoming signals corresponding to the two primary colour pictures; and they impinge obliquely on opposite sides of the screen, these sides being coated with fluorescent powders of the appropriate colours. Thus the screen has formed upon its front face an image containing the orange-red colour components, and on its back face an image containing the blue-green components. When the screen is viewed normally from the front, these images are superimposed and thus give a picture in natural colour.

Such a two-sided tube has been developed with a screen, 10 in. in diameter, and was shown receiving a picture from a 600-line triple interlaced moving spot transmitter using a cathode ray tube in combination with a revolving disk with orange-red and blue-green filters. The tube gives a very bright picture due to the absence of colour filters and the fact that special powders are used giving only the desired colours, which are seen additively.

A method of using three colours has also been described in a patent specification. In this case, the back of the screen is ridged: the two sets of faces of the ridges are coated with blue and green powders respectively; and they are scanned by two cathode ray beams, modulated by the blue and green components respectively, of the incoming signals. The third beam, carrying the red picture components, impinges on the front of the screen as before. A new form of scanning is also being explored, using successive lines of different colour, with the object of reducing the colour flicker which is obtained when, as at present, the colour changes are by frame to frame only.