more than 4 per cent from the mean. Minor fluctuations due to graininess of the plate were smoothed out, but no feature of the spectrum which appeared in all four plates has been omitted in the average curve. The effect of graininess is small, as may be seen in the microphotometer tracing (Fig. 2).

The intensity distribution shows that the Raman spectrum of rocksalt consists of a continuum with superimposed maxima of small intensity relative to the continuum. The most prominent 'line' in the spectrum, at 234 cm.$^{-1}$, rises only about 50 per cent in intensity above the continuum. The observed half-width of this line is 8 cm.$^{-1}$, whereas the half-width of the mercury line at 2576 A. is less than 1 cm.$^{-1}$, when the correction, 3 cm.$^{-1}$, is made for the slit-width. The other maxima recorded rise above the continuum by amounts varying from 10 per cent to 1 per cent. It is therefore practically impossible to interpret the spectral distribution in terms of a limited number of discrete lines as required by the Raman theory. On the other hand, the intensity contour is, at least qualitatively, a striking confirmation of the Born theory. The positions of the maxima are also in good agreement with the calculations of Born and Bradburn. This is shown in the accompanying table, where the calculated maxima in the more intense frequency branches have been related to the peaks found experimentally. The designation of the frequency branches is that used by Born and Bradburn. Of especial interest are the broad maximum at 415 cm.$^{-1}$ near the calculated position for $2\omega_1$, and the two low-frequency maxima at 34 and 53 cm.$^{-1}$, corresponding to the two groups of difference tones. It should also be noted that the internal consistency in the assignment of the frequencies is improved when the frequencies in the pairs ω_3, ω_4 and ω_5, ω_6 are taken as not quite equal to one another. These inequalities are in accordance with the calculation of the rocksalt frequencies by Kellermann[5], but are neglected in the simplified treatment of the Raman spectrum by Born and Bradburn.

Observed maxima (cm.$^{-1}$)	Branch	Calculated maxima[1] (cm.$^{-1}$)
415 (broad)	$2\omega_1$	428
346 (broad)	$\omega_1 + \omega_3$, $\omega_1 + \omega_4$	373
314	$2\omega_2$	317
299	$2\omega_3$	
285	$\omega_3 + \omega_4$	296
275	$2\omega_4$	
256	$\omega_2 + \omega_5$	259
234	$\omega_2 + \omega_6$	
174 (broad)	$2\omega_5$, $\omega_5 + \omega_6$, $2\omega_6$	198
55	$\omega_1 - \omega_3$, $\omega_1 - \omega_4$	78
	$\omega_2 - \omega_5$, $\omega_2 - \omega_6$	76
31	$\omega_3 - \omega_4$, $\omega_5 - \omega_6$	16

Observed and calculated maxima in the Raman spectrum of rocksalt.

The shifts found by us for the nine higher frequencies are in good agreement with Krishnan's measurements. However, there is no evidence on our spectrograms for the other ten frequencies reported by Krishnan and assigned by him to the second-order spectrum.

Born and Bradburn have already shown that there is good qualitative agreement between their calculated intensities and the microphotometer tracings of Rasetti and Krishnan. No attempt has been made to fit their calculations to our intensity curve by an adjustment of the coupling constants, since a good quantitative agreement would probably be found only with a more complete calculation of both the frequency distributions and the Raman intensities.

We are indebted to Prof. E. C. Bullard for directing our attention to this problem.

[1] Born, M., and Bradburn, M., *Nature*, **156**, 567 (1945); *Proc. Roy. Soc.*, A, **188**, 161 (1947).
[2] Born, M., *Nature*, **157**, 810 (1946); **159**, 266 (1947).
[3] Krishnan, R. S., *Nature*, **156**, 267 (1945); **157**, 623 (1946); **159**, 266 (1947); *Proc. Ind. Acad. Sci.*, A, **26**, 419 (1947).
[4] Rasetti, F., *Nature*, **127**, 626 (1931).
[5] Kellermann, E. W., *Phil. Trans. Roy. Soc.*, A, **238**, 513 (1940).

MUSEUM OF THE HISTORY OF SCIENCE, OXFORD

NEARLY twenty-five years ago the Lewis Evans Collection of historic scientific instruments was opened at Oxford by the Earl of Crawford and Balcarres, president of the Society of Antiquaries. The collection consisted chiefly of astrolabes, dials and mathematical instruments, and was at once augmented by the transfer of many interesting pieces of 'philosophical apparatus' from many of the Oxford colleges. Dr. R. T. Gunther, the curator, was most assiduous and persuasive in acquiring interesting exhibits, and it was not long before the collection had outgrown the Musæum Ashmoleanum in which it had so suitably been placed. In 1935 the Lewis Evans Collection became the Museum of the History of Science, and the need for further space was met by the promise that the whole of the Old Ashmolean Building would be transferred to the Museum in 1942, thus trebling the space available. Unfortunately, Dr. Gunther did not live to see this promise fulfilled, for he died in March 1940, leaving the Museum and his fourteen volumes of "Early Science in Oxford" as a lasting memorial to his labours for the history of science. The War delayed the occupation of the Museum's new galleries; and even after the Ministry of Labour had vacated the building, it was necessary to instal a new system of lighting and heating. Thus it was not until October 11 of the present year that the collections were permanently arranged and, by a happy concurrence, opened by the present Earl of Crawford and Balcarres, chairman of the National Art Collections Fund.

The ceremony was held in the Divinity School. The curator, Dr. F. Sherwood Taylor, outlined the past history and future plans of the Museum, very much as they are here described. The vice-chancellor of the University, the Very Rev. Dr. John Lowe, then welcomed the Earl of Crawford and Balcarres. He deplored the divorce between present practice and past history, which, he said, has nowhere been so complete as in the domain of science. He believed that in order to get a long-term view of what is being done, it is helpful to know how it all grew up, and declared that it is in accordance with the general traditions of the University that the long period of preparation and development which has led up to the modern practical pursuit of science should not be neglected, and that it has been the policy of the University to foster and increase so far as possible this interesting collection.

Lord Crawford said that the progress made since the first opening, twenty-five years before, was a memorable achievement. It marked another stage in the gradual re-opening of the museums of Great

Britain, which has proved to be a slow, painful and laborious process. Many of these still remain closed, and for ten years the public, and especially the younger generation, has been deprived of what they should enjoy—the greatest and oldest possessions of the country. He hoped that authority would remember that far greater progress has been made abroad. Returning to the subject of the Museum, he remarked on the beauty of the scientific instruments of the past, in which utility and beauty are happily married. The stream of tradition which made objects of use into objects of beauty also has never moved so sluggishly as to-day.

The company then proceeded to the Old Ashmolean Building, and Lord Crawford opened the door with the massive and beautiful key made for it in 1683.

The Museum is now laid out on three floors. The top one, the former Musæum Ashmoleanum, is devoted to the history of time-telling, and of physics other than optics. The ground floor, once the School of Natural History, contains optical instruments, most of which are derived from the collection of Dr. Reginald Clay, acquired during the War, while others come from the Radcliffe Observatory or the Shepherd Collection of the Royal Astronomical Society. The basement, which from 1683 until 1857 contained the Chemical Laboratory, is appropriately given over to chemistry and medicine; the Daubeny collection of chemical apparatus, deposited by Magdalen College, is the principal exhibit. A guide to the collections in their new form is now available*.

The work is not yet completed. The removal of the brick piers and girders which disfigure the basement is projected, as is also the provision of adequate library and lecture-room furniture; and there is, of course, an unlimited prospect of research.

The functions of the Museum are fourfold: first, to collect and preserve; secondly, to investigate; thirdly, to display; fourthly, to instruct. Historic scientific instruments are fast disappearing: it is but rarely that we find such things as Lewis Evans collected. The first need, therefore, is to collect what remains and to preserve it from damage. On this depends all the other functions of the Museum. Future generations may well investigate more acutely, display more brilliantly, teach far better—but they will almost certainly be less well able to collect. Instruments find their way to collectors and thence to museums; they are destroyed by fires or acts of war; there can never be any more of them and their price continually rises.

Our second function is to investigate. The history of scientific instruments is largely unwritten, and our contribution will be the issue of a comprehensive catalogue with historical notes. The first part to be issued will be that dealing with the time-telling instruments of the Museum, notably the dials, quadrants and nocturnals.

Our third object—to display—is not always in accordance with the first. A thousand polishings of a brass instrument will remove most or all of the inscriptions upon it, and in such cases there is war between those who desire to display the full beauty of these objects and those who would preserve them. We have unreservedly sought to preserve, having our eyes fixed upon a future of incalculable extent. Here again there is room for research into the question of the air-conditioned museum-case in which deterioration should be arrested.

* A Brief Guide to the Collections of the Museum of the History of Science. Pp. 59. (Oxford, 1949.) 2*s.* 6*d.*

The fourth purpose of the collections is instruction. Here again there is a conflict. Are we, given forty square feet of case for astrolabes, to show but a tenth of those we possess and fill the rest of the space with explanatory matter designed to instruct the student in the nature and use of that instrument? We have supposed that this, a specialist museum, is primarily a means of research rather than of instruction, and that our first need is to show everything that is of first-rate importance, and is not duplicated.

The Museum of the History of Science is not only a museum, for it is at present the centre of the teaching of the history of science at Oxford. Before 1939, Dr. Gunther had given a series of lectures on Oxford men of science to a number of the Colleges, but did not give any formal university lectures. During the War, courses in the history of science were provided for cadets; following upon this, the Curator and Dr. S. F. Mason and others have been giving formal courses of lectures on subjects connected with the history of science. At present these studies play but a very small part in the intellectual life of the University of Oxford; but when they come, as they must, to be recognized as of the first importance, the Museum of the History of Science will afford a rich source of material alike for the man of science, the historian and the philosopher.

F. SHERWOOD TAYLOR

PREHISTORIC AFRICA

SEVERAL new contributions to our knowledge of South African prehistory are to hand. Volume 4, Bulletin No. 13 of the South African Archæological Society contains a number of interesting articles. The Abbé Breuil describes some newly discovered rock-shelter paintings near Ladybrand, the technique of which is reminiscent of the Franco-Cantabrian art. Is it going to be found that prior to the already well-known rock-shelter paintings in the sub-continent there existed there an earlier, more naturalistic art? Breuil also discusses the age of the painted rocks and their authors. The last word has not been said on this subject.

Dr. C. van Riet Lowe contributes an account of some paintings recently found near Cathedral Peak in the Drakensberg, Natal. Judging by the few illustrations given, these would not appear to belong to an early series. Dr. B. D. Malan adds a short note on the Magosian at Howieson's Poort. The Magosian culture was first described by the present writer some years ago, the finds having been made by E. J. Wayland, then Government geologist in Uganda, at an ancient waterhole at Magosi in that country. Typologically the Magosian industry comprises very late Middle Stone Age elements with early Wilton additions. Indeed, one was tempted to see in it the birth of the Wilton culture out of a final Middle Stone Age cradle. The name, at any rate, has been accepted, and the existence of the Magosian culture is affirmed from British Somaliland to the Cape. The original collection from Magosi which was figured in the first description is housed in the Museum of Archæology and Ethnology at Cambridge. One can only hope that all the many Magosian discoveries in Africa are really Magosian. Frankly, I wonder whether the Howieson's Poort finds are quite the same thing, although I admit there are some similarities. Maybe, since I was there, other finds