Thus we are forced to reconsider now, for several reasons; Surely we should seize our opportunity and act boldly, with the kind of enterprise and initiative which British industry showed in the 1930's when it took the world lead in television development? At that time we had reached our first point of departure and broke away from earlier television history, with its mechanical standards, to develop a whole new electronics industry. We have surely reached a similar point to-day. For we have the colour-television question forced on us, we have integration with Europe (and we should not restrict this to Europe, but adopt a global view now, with the techniques likely to emerge during the next twenty-five years, being the period under consideration by the Committee); and we have the ether congestion problem; we have a host of new techniques as yet unused.

Something has to be done at this point. Cannot we again break away from tradition and think boldly? We go on transmitting nearly identical frames 50 times a second, to be viewed on traditional (though improved) cathode-ray tubes; Is there no alternative? We go on speaking of wave-bands and other Fourier-like concepts, rather than of probabilities and information-rates. Cannot we devise a new kind of camera with much lower noise figures, and then take advantage of coding schemes? Is it inconceivable to develop receivers with cheap 'memories'? Endless such questions can be raised; it is all very well for a mere academic like myself to raise them, but the overriding question is: Has British industrial inventiveness vanished in this field where once it was so prominent?

The main conclusions of the present report of the Television Advisory Committee may be illustrated by the following table, which defines the four 'bands' which are at present available:

Band	Range (Mc./s.)	
I	41-68	At present used by five B.B.C. channels. Half this range used by four I.T.A. channels. Not at present used, but propagation and other field-trials carried out.
III	174-216	
IV	470-582	
V	606-960	

Nearly half band V has been appropriated already for tropospheric scatter links, leaving only the range 606-800 Mc./s. for possible use for television.

Apart from France, Eire and Britain, 625 lines are standard in Europe, both east and west. It seems wise for us to adopt the same, for our broadcasts will become increasingly integrated with those of Europe (though this is too restricted in my view). The conclusion offered is that, if 625 lines be adopted, the number of alternative programmes offered to the public cannot be increased, unless we spill over into the experimental bands IV and V. Dreams of a third programme begin to fade.

However, the Technical Sub-Committee advises that if television be confined to bands I and III, we could have a third programme working on 625 lines if we limit our channel spacing to 7 Mc./s. This point seems to me to be crucial. For the European standard bands are not 7 but 8 Mc./s., which we are told is needed for full picture quality on 625 lines. How can we get 8 Mc./s. into a 7 Mc./s. pot, and so put three programmes where two stand at present? By compression.

This word 'compression' is not mentioned at all in the present report. Throughout, it is accepted without question that picture quality depends solely upon band-width; it does not. We may not expect the Committee to recommend specific systems of recoding for band-width compression; far too little is understood yet, but it is a thousand pities it has not recommended urgent studies of the subject. Television by present techniques is about as wasteful of band-width as can be; we still have not learnt the lessons of statistical communication theory.

Calculation of signal information redundancy is one thing; invention of techniques for utilizing the results is quite another. Many writers have referred to television signals as being ten-to-one, hundreds-to-one, redundant, but this is going much too far at present. But to compress band-widths in fractional ratios of 7/8 or even, say, 2/3 raises no fundamental difficulties; and there need be no complexity of apparatus in the receiver, for coder and decoder need not be 'mirror-images'.

British industry is doing little about this, to the best of my knowledge. It needs development of new types of low-noise camera and multiplier, of storage systems, of new kinds of time-base particularly. Moreover, the implications of such work extend into many fields other than television. Again, it is conceivably possible to develop systems which would be compatible with existing receivers (by substitution of parts only, such as time-bases).

Whatever changes are proposed, compatibility must be considered, as this report rightly stresses, because some £600 million is tied up in existing receivers in Britain alone. The capital invested in the whole industry is gigantic. This report emphasizes the view so commonly expressed, that 'higher picture quality' necessarily means greater 'detail' (that is, adhesion to realism). If only we could educate the public to accept certain visual conventions and forms, how much we might save by coding techniques! It is a curious divergence, that while modern art does just this, in its abstracting out of reality, our mass-cultures such as television forever seek greater realism like the Victorian painters. This process is to-day very expensive.

COLIN CHERRY

OBITUARY

Prof. W. H. Lang, F.R.S.

By the death of William Henry Lang on August 29 botanists have lost one of the most distinguished plant morphologists of this century. Born in 1874, Lang was educated in Glasgow and entered the University in 1889, where he studied science and medicine, graduating M.B., C.M., with high commendation in 1895. He had in the previous year while a medical student graduated B.Sc. with honours in botany and zoology. In 1900 he graduated D.Sc. and in 1932 the University conferred on him an honorary LL.D. In 1895 he was awarded a Robert Donaldson scholarship which enabled him to work on apogamy in ferns at the Jodrell Laboratory at Kew where D. H. Scott was then keeper. After returning to Glasgow he was appointed lecturer in Queen Margaret College in the University and continued research on ferns and on cycadean sporangia. His work on ferns was undoubtedly stimulated by his association with

Prof. F. O. Bower and his fellow lecturer and great friend Gwynne-Vaughan. He also worked on Hepaticae and published in 1901 a paper on apospory in *Anthoceros*: this was followed by other papers on *Cyatodium*, *Notothylas*. He continued research on Pteridophyta and made important contributions to our knowledge of the gametophytes of the Ophioglossaceae. In 1909 he produced an exceptionally interesting paper on a theory of alternation of generations in Archegoniatae, based on ontogeny, which led to an organized discussion on "Alternation" at the Linnean Society.

His appointment in the same year as first occupant of the Barker chair of cryptogamic botany in the University of Manchester provided him with much greater opportunity for research. Prof. F. E. Weiss, who occupied the chair of botany, was a most sympathetic and helpful colleague, and Lang had practically no administrative work. He gave lectures, only to the honours students, on cryptogams. In 1910 he went on an expedition with A. G. Tansley to Ceylon and Malaya to study tropical Cryptogams. On returning he continued work on the morphology of the Ophioglossaceae and between 1910 and 1914 published four papers in the *Annals of Botany*. In 1914 and 1915 there appeared in the *Memoirs of the Manchester Literary and Philosophical Society* his "Studies in the Morphology of *Isöetes*", probably one of the most difficult subjects on which he had worked. The complex anatomy of the plant and its curious method of growth presented particularly difficult problems. Lang's descriptions are for the most part clear and unambiguous, but it requires close concentration on the part of the reader to follow his com-

parisons between the stelar morphology of *Isöetes* and that of other Pteridophyta. It was perhaps his most notable work up to that date.

The discovery by Dr. W. Mackie, of Elgin, of petrified plants in an astonishingly good state of preservation in chert of Middle or Lower Devonian Age in Aberdeenshire had far-reaching results. The investigation of the Rhynie fossils was carried out by Kidston and Lang. They commenced publication of their results in 1917 in the *Transactions of the Royal Society of Edinburgh* and completed it in 1921, when they gave an account of their discovery at the meeting of the British Association in Edinburgh. These memoirs on the Rhynie plants are models of accuracy in description and restraint in phylogenetical speculation. Lang was aware of the importance and significance of these discoveries and their bearing on problems of evolution and comparative anatomy, but wisely left it to others to indulge in speculation on the course of evolution of vascular plants. Later discoveries by him and others of complex Silurian and Lower Devonian plants fully justify the restraint shown by Kidston and Lang, whose names will always be associated with this, the most important contribution of the century to our knowledge of early plant life.

Those who were privileged to know and work in the same laboratory will remember him as a most exceptionally gifted man with many and varied interests not only in science but also in literature and the Fine Arts. He was extremely friendly and helpful, and his junior colleagues have reason to remember him with great respect and affection.

JOHN WALTON

NEWS and VIEWS

Physiology at Birmingham: Prof. H. P. Gilding

PROF. HENRY PERCY GILDING, who is retiring from the chair of physiology in the University of Birmingham, graduated at Oxford in 1923 and in the same year entered on a distinguished undergraduate and postgraduate career at St. Bartholomew's Hospital Medical College where, while the Department of Physiology was without a professor, he had charge of the teaching of physiology and the administration of the Harvey Laboratories. In 1928 he was a Fellow of the Rockefeller Institute, New York, where he carried out research with Dr. Peyton Rous. He returned to London to join the Physiology Department at University College and in 1932 was appointed reader. At University College he continued his researches on the circulation of the blood and on lymph and his interest in the applications of physiology was shown by his tenure of a research post with the Medical Research Council and the Thomas Young lectureship in clinical physiology at St. George's Hospital Medical School. When he was appointed to the chair of physiology in Birmingham in 1933, Gilding made great use of the opportunities given to him for planning and organization in the building of the new Medical School. He is well known for his interest in medical education, and when teaching in the new School was established, he initiated the scheme of integrated teaching of physiology and anatomy by co-operation between the two Departments which has attracted so much attention.

When the Goodenough Committee was considering developments in medical education he played an active part in obtaining increased facilities for honours courses in physiology for medical students. A great demand for his services as an external examiner is not only a consequence of this interest but also a tribute to his personal qualities. He has for many years given useful service to the Physiological Society as a member and chairman of its Committee, as its treasurer and as its representative on the Council of International Abstracts of Biological Sciences. He served as a member of the Council of the British Association and was recorder and later president of its Section I (Physiology). Gilding saw much active service in the First World War which interrupted his undergraduate career and he was for a time a prisoner of war.

Prof. Ian E. Bush

DR. IAN E. BUSH has been appointed to succeed Prof. Gilding. He went from Bryanston School to Pembroke College, Cambridge, and was awarded first class honours in Natural Sciences Tripos Part 2 (Physiology) in 1949. The grant of a Medical Research Council scholarship in 1949 enabled him to work in the Physiology Laboratory, Cambridge, until 1950, when he moved to the National Institute for Medical Research, where he stayed until 1952. The degree of Ph.D. (Cantab.) was conferred in 1952. A Commonwealth Fund Fellowship provided the opportunity for him to travel to the United States, where he