Table 2. ENHANCEMENT OF THE ANTIBACTERIAL ACTIVITIES OF AMPICILLIN OR BENZYL PENICILLIN AGAINST GRAM-NEGATIVE BACTERIA IN THE PRESENCE OF METHICILLIN OR CLOXACILLIN

	Minimal inhibitory concentration ($\mu\text{g/ml.}$) (Serial-dilution in broth; inoculum, one drop of an overnight broth culture)					
	Ampicillin	Ampicillin with methicillin*	Ampicillin with cloxacillin*	Benzylpenicillin	Benzylpenicillin with methicillin*	Benzylpenicillin with cloxacillin*
<i>Escherichia coli</i> R136	25	25	2.5	> 250	125	25
<i>Escherichia coli</i> T340	2.5	2.5	2.5	50	50	5.0
<i>Escherichia coli</i> R9	5.0	5.0	5.0	50	50	5.0
<i>Aerobacter aerogenes</i> A	>100	5.0	50	50	50	50
<i>Aerobacter aerogenes</i> R92	10	10	<5.0	—	—	—
<i>Proteus vulgaris</i> A	50	10	2.5	25	2.5	10
<i>Proteus mirabilis</i> R26	5.0	5.0	5.0	25	5.0	5.0
<i>Proteus mirabilis</i> R34	1.25	1.25	1.25	50	50	5.0
<i>Paracolon</i> A	10	2.5	2.5	50	50	25

* Methicillin or cloxacillin were present at a concentration of 10 $\mu\text{g/ml.}$ These penicillins were inactive against the test organisms at concentrations up to 50 $\mu\text{g/ml.}$

activity against any of the bacteria at concentrations of up to 50 $\mu\text{g/ml.}$, and the concentration of 10 $\mu\text{g/ml.}$ used in the tests was chosen as being one which can be readily obtained in the serum in human beings with normal dosage.

It will be seen from Table 2 that a striking degree of synergism could be demonstrated with certain strains of bacteria. For example, against *Escherichia coli* R136 ampicillin was inhibitory only at a concentration of 25 $\mu\text{g/ml.}$, and cloxacillin alone at a concentration of 10 $\mu\text{g/ml.}$ was without effect. In combination with 10 $\mu\text{g/ml.}$ of cloxacillin, however, ampicillin was inhibitory at 2.5 $\mu\text{g/ml.}$ Similar synergistic effects were seen with various strains of *E. coli*, *Aerobacter aerogenes* and *Proteus* sp.

In general, synergism was observed more frequently with benzylpenicillin than with ampicillin, and this may be associated with the fact that ampicillin is more stable than benzylpenicillin to the penicillinases produced by certain Gram-negative bacteria^{1-3,6}. As a result of this, certain organisms are sensitive to ampicillin but are relatively insensitive to benzylpenicillin and it was with this group of bacteria that synergism with benzylpenicillin was most marked. However, although the minimum inhibitory concentrations of benzylpenicillin were in certain cases diminished considerably in the presence of a penicillinase-stable penicillin, they were in general no lower than those obtained with ampicillin alone. Moreover, no one combination of penicillins was consistently more synergistic than any other, and there was a distinct variation from strain to strain, so that with certain bacteria synergism was more marked with methicillin than with cloxacillin, while with other strains the converse was the case.

It was observed that in certain cases inhibition of penicillinase was not reflected in the results of the minimum inhibitory concentration tests because of intrinsic insensitivity of the organisms, penicillinase playing little part in the resistance of these bacteria. In other cases where synergism was apparent in the serial-dilution tests, the amounts of penicillinase produced were too low to permit inhibition of the enzyme to be studied by the methods used. Moreover, quantitative differences would also arise because fixed concentrations of 1 $\mu\text{g/ml.}$ of methicillin or cloxacillin and 10 $\mu\text{g/ml.}$ of ampicillin and benzylpenicillin were used in the enzyme investigations, whereas in the serial-dilution tests concentrations of ampicillin,

and benzylpenicillin from 1 $\mu\text{g/ml.}$ to 500 $\mu\text{g/ml.}$ were combined with a concentration of 10 $\mu\text{g/ml.}$ of methicillin or cloxacillin.

In order to assess the possible clinical value of such synergism, a survey was carried out with 350 freshly isolated clinical strains of Gram-negative bacilli. In these experiments, strains of bacteria which had been found to require more than 5 $\mu\text{g/ml.}$ of ampicillin or benzylpenicillin for inhibition were tested for sensitivity to these penicillins alone and in combination with 10 $\mu\text{g/ml.}$ of methicillin or cloxacillin. Of the total of 350 isolates, 62 per cent (217 strains) were inhibited by ampicillin alone, at a concentration of 5 $\mu\text{g/ml.}$ or less. With the strains which required a concentration greater than 5 $\mu\text{g/ml.}$ for inhibition, 9 per cent (12 strains) showed a significant degree of synergism, but only in 4 per cent (5 strains) of these isolates was this effect adequate to reduce the minimal inhibitory concentrations to values of 5 $\mu\text{g/ml.}$ or less. With benzylpenicillin the situation was similar. As would be expected, sensitivity to benzylpenicillin alone was not so frequent as was the case with ampicillin and only 18 per cent of the isolates (63 strains) were sensitive to concentrations of 5 $\mu\text{g/ml.}$ of this penicillin or less. Of the strains requiring greater than 5 $\mu\text{g/ml.}$ of benzylpenicillin for inhibition (287 strains) a significant degree of synergism was demonstrated with 17 per cent (49 strains), but in only 6 per cent (17 strains) was the minimum inhibitory concentration reduced to 5 $\mu\text{g/ml.}$ or less. Therefore, although synergism is clearly demonstrable with certain strains of Gram-negative bacteria, these constitute only a small proportion of the bacteria encountered routinely, and the degree of synergism would seem to be inadequate for this to have useful clinical application.

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OBITUARY

Prof. F. M. Haines

FREDERICK MERLIN HAINES, who died on December 29, aged sixty-five, was born in 1898, the son of Frederick Haselfoot Haines and Eva Mary Haines, of Winfrith, Dorset. He was educated privately and at Exeter School, graduating at the University of London as a student of the late F. E. Fritsch, at East London (now Queen Mary) College, who appointed him to his staff in 1921. He was awarded the D.Sc degree for his work on plant

transpiration under high pressures, and became reader, succeeding his former professor in the chair in 1948. During his tenure, the Department was extended, the physiology research laboratory, workshop, darkrooms and cytology laboratory added, and the first expensive equipment the Department had ever possessed, namely, a lathe and several research microscopes, purchased. Yet he was disappointed in his hopes of encouraging physiological research. Haines found himself with the necessity

of teaching a basic minimum of chemistry, physics and mathematics single-handed to prospective physiologists. For a few years he made the effort to accomplish the impossible task; lack of equipment, of adequate teaching space, of co-ordination with other Departments and, of course, lack of staff, brought his hopes to an end. He eventually gave up the effort to teach a special physiology course beyond what was required for Part I of the Final Examination. This meant that his only research students came from outside the department. Although he is gratefully remembered by these, and his intercollegiate courses were much appreciated, he really was disappointed in his efforts to promote physiology in the College. He was probably mistaken in keeping the intake of students down to the space available, yet his extraordinarily good judgment of potential ability was shown by the high proportion of first-class students, including two who in successive years headed the University list, among the small numbers he admitted.

Haines's personal gifts were remarkable. He was a notable landscape painter and cunning caricaturist and author of a book *Tone and Colour in Landscape Painting*. His portrait of Fritsch hangs in the departmental library together with one of himself by his friend Chamberlain. He had a gift for acting and was prominent in his local dramatic society. He was a good performer on several instruments including the violin and violoncello, and had a large collection of records mainly of Mozart and pre-Mozartian composers. He was an excellent engineer and in his workshops at home had made his radiograms and the tape recorders on which he recorded himself playing all the parts of a quartet, and was probably the only

botanist to address the College Electronics Society on the subject of the construction of recording instruments. During the Second World War, when the College had been evacuated to Cambridge, he gave much of his time to the servicing and driving of tractors and other machinery on a large farm in the neighbourhood. He was keenly interested in reptiles and amphibia of which he at one time had a considerable collection, ultimately given to the Zoo. He was an expert photographer and possessed cameras and lenses for every kind of situation. He had a good knowledge of European languages.

Personally, Haines was the kindest and gentlest of men, although the tolerant manner could conceal a deep-seated contempt for pretentiousness and pomposity; such qualities, however, aroused in him only the quiet laugh, never antagonism, for he always looked for the best in people and frequently did not see the reality. Students liked and trusted him and always went to him with their troubles; to medical students especially he gave up much time in help and guidance. He was loyal to his staff, to the College and to the University.

His originally athletic physique had been undermined by successive attacks of rheumatic fever which severely damaged the heart; repeated operations for mastoid resulted in partial deafness. These disabilities were cheerfully borne until their increasing severity led to his premature retirement in 1958.

He continued his many activities at Fordingbridge until the winter of 1963. His friends will remember him affectionately as he described himself in retirement: Merlin, "the wizard that was".

M. B. E. GODWARD

NEWS and VIEWS

Chemistry in the University of Kent at Canterbury : Prof. G. R. Martin

Mr. G. R. Martin, reader in radiochemistry in the University of Durham, has been appointed to the chair of chemistry in the University of Kent at Canterbury. Mr. Martin graduated from the Imperial College of Science and Technology in 1939 and, after working there under the direction of the late Prof. H. V. A. Briscoe and Prof. H. J. Emeléus, came to Durham in 1941 as research assistant to the late Prof. F. A. Paneth. From 1942 until 1946 he was engaged on work for the British atomic energy project, first at the Cavendish Laboratory with Dr. E. Bretscher and later in Montreal. In 1946 he returned to Durham as an Imperial Chemical Industries Research Fellow, and was closely concerned with the establishment of the Londonderry Laboratory for Radiochemistry in 1947 and, since the late Prof. Paneth's retirement in 1953, with its direction. During his time in Durham, Mr. Martin has had two main research interests: on one hand, he has been concerned with the application of radiochemical techniques to problems in gas-phase chemical kinetics and to analytical chemistry, and on the other, problems of a more characteristically nuclear interest have been approached by essentially chemical methods. He has been particularly interested in fast neutron induced reactions (especially the fission of heavy elements) and in the application of techniques for the measurement of millimicromole quantities of helium to neutron standardization problems and to the study of the diffusion of gases in metals. He has served as consultant to the Atomic Energy Authority and other governmental establishments.

Psychology in the University of Aberdeen : Prof. Elizabeth D. Fraser

DR. ELIZABETH FRASER has been appointed Anderson professor of psychology in the University of Aberdeen,

and thus hers is the distinction of being the first woman professor in the history of this ancient University. Dr. Fraser was educated at Fortrose Academy and the University of Aberdeen, where, before she left in 1943 to become a scientific officer at the Air Ministry, she obtained both the M.A. and Ed.B. degrees. At the Air Ministry, besides consistently categorizing V.1 flying bombs as motor-cycles, thereby risking her own neck and those of other now-eminent psychologists, she was concerned with air-crew selection. After the Second World War, she spent a year helping to pioneer a psychological service for the Cornwall Education Authority before returning to the Psychology Department in Aberdeen. Her early research was into the effect of home environment on educational progress. This work, now published under the title *Home Environment and the School*, makes a real contribution and anticipated the present lively interest in this question. At this time she was a member of an interdisciplinary group investigating the effect of lysergic acid and mescaline on human behaviour, and it was this work which led to her present research interest in individual differences in normal perceiving. Dr. Fraser is not only a most effective teacher, she is also very much concerned with this aspect of her job, and thus she is a worthy successor to the late Prof. Rex Knight (obituary, *Nature*, 198, 1142; 1963), who built the Aberdeen Psychology Department on foundations securely laid by men like Thomas Reid, Alexander Bain and G. F. Stout.

Employment of Scientists in Britain

In a written answer in the House of Commons on January 31, the Minister for Science, Mr. Q. Hogg, stated that he had authorized the Research Councils to pay university departments an additional £200 per annum in respect of each holder of a postgraduate research studentship or fellowship, and the procedure for awarding research grants was being re-examined, while steps had been taken