A botanist who studied the flora of a railroad embankment from a train would no doubt get his work done quickly ; but he would not be likely to discover any new species of plant.

Pharmacology has, of course, many other tasks. There is much to be done in the study of the absorption, metabolism and excretion of drugs. This branch of pharmacology is particularly dependent on contact with biochemistry, since it uses biochemical techniques.

There is a great deal to be done, too, in connexion with the toxic effects on man of the substances used for killing insects, and of the substances used to 'improve' foods. The drugs used in therapeutics undoubtedly also have many toxic effects still to be discovered. The methods available for detecting such toxic effects are not very satisfactory. It is particularly important that someone should improve the methods available for proving that drugs will not have toxic effects when given over long periods.

Another task for pharmacologists is to collaborate n the clinical trial of new remedies. During the past few years, there has been much advance in this field. Most people now realize the importance of careful design in therapeutic experiments and of the need for controls. Well-designed experiments have been carried out on diuretics, on the drugs used in the treatment of tuberculosis, common colds, motion sickness and headaches, and of many other such conditions. The techniques used are essentially similar to those used in bioassay, and it is good to see that pharmacologists are taking an active part in this work.

Pharmacology, however, is not only the handmaid of therapeutics ; it is a science in its own right, and has many other tasks to perform. The most important one is to find out how drugs act. This probably involves finding out how living tissues act. Pharmacologists have contributed much to this. At the recent international meeting of pharmacologists in Montreal there was a discussion about autonomic ganglia, and a discussion about renal transport mechanisms. In both these fields pharmacologists have contributed much to physiology.

Many pharmacologists also use biochemical techniques, but it would be a mistake to suppose that pharmacology will ever become entirely dependent on biochemical techniques. Some biochemists have become successful pharmacologists, but the transformation cannot take place very rapidly ; it is often more satisfactory when a man who starts as a pharmacologist acquires biochemical techniques in order to solve pharmacological problems. Pharmacology also depends on the techniques which are used in microbiology for the study of bacteria and protozoa ; these play an important part in that branch of pharmacology which is called chemotherapy. A pharmacologist must also be prepared to use the techniques of pathology and statistics when his problems require it.

Pharmacologists have contacts with many other sciences. They can develop in many different directions and are particularly well placed for getting new ideas. Some of their new ideas have a very stimulating effect on allied sciences. The physiological importance of acetylcholine, of the enzymes which destroy it, and the drugs which inhibit these enzymes were discovered by pharmacologists, but have provided a stimulus for the biochemists. The sulphonamides were a pharmacological discovery, but they have provided work for the bacteriologists.

The main contribution of pharmacology to fundamental knowledge has come from the development of the techniques of bioassay. The application of such techniques to the estimation of hormones in blood and urine is playing an important part in clinical endocrinology, and pharmacologists have much to do in this field. That branch of knowledge which is called autopharmacology has, however, yielded more important results. All our knowledge of the physiology of histamine, acetylcholine, epinephrine and *nor*epinephrine depends upon bioassay. The methods used are founded upon the work of Dr. J. J. Abel, Dr. Otto Loewi, and Sir Henry Dale, and this branch of knowledge is still growing. Some people do not realize how precise some of these methods are. In recent years it has been found that propionylcholine is present in animal tissues as well as acetylcholine. It is a comfort to reflect that the pharmacological methods which were used twenty years ago to study the substances released in the superior cervical ganglion of a cat and in some other tissues were specific enough to distinguish between these two esters. We can, therefore, rest assured that the main substance released in this ganglion is not propionylcholine ; there is still no reason for doubting that it is acetylcholine.

Eventually these pharmacological methods will be replaced by chemical methods ; but I hope that this process will not take place too quickly, since new pharmacologically active substances are still being discovered in the study of methods of estimating the old ones. When we have chemical methods, this process will be inhibited.

OBITUARIES

The Right Rev. E. W. Barnes, F.R.S.

Bishop Barnes was born on April 1, 1874, in Birmingham and died on November 29, 1953, in Hurstpierpoint. Educated at King Edward VI High School, Birmingham, he entered Trinity College, Cambridge, as a mathematical scholar and graduated as second wrangler in 1896. He was placed in Division 1, Class 1 of Part II of the Mathematical Tripos in 1897 and was awarded the First Smith's Prize in 1898. In the same year he was elected a Fellow of Trinity College, where in due course he became junior dean, lecturer and tutor. As a lecturer he was clear and concise ; as a tutor, though somewhat aloof and regarded as rather unapproachable, he was a wise and careful guide. He developed a rich humanity later, particularly after his marriage in 1916 to the daughter of Sir Adolphus Ward, Master of Peterhouse. He was elected a Fellow of the Royal Society for his researches in pure mathematics. His chief contributions were fundamental studies on the hypergeometric function and on gamma-functions, but he also wrote valuable papers on Legendre and Bessel functions. At the dinner of Section A (Mathematics and Physics) of the British Association during the Birmingham meeting in 1950, he made a happy speech, giving his recollections of his life in Cambridge and of his relations with mathematicians ranging from Cayley to Eddington.

He was ordained in 1902 and soon became widely known as a thoughtful, outspoken preacher. In 1915 he was nominated by Asquith as Master of the Temple, and despite his unpopular pacifist views he was chosen in 1918 by Lloyd George as a Canon of

Westminster; in 1924 he was selected by Ramsay MacDonald for the vacant bishopric of Birmingham, where he remained until his retirement on account of ill-health in 1952. From 1924 onwards he became more and more involved in controversies in the Church, fighting on behalf of truth as he saw it and as he fearlessly proclaimed it. His views are expressed in "Should such a Faith Offend ?" (1927), a series of addresses to such bodies as the British Association, the British Medical Association, the International Congress of Psychology and the Eugenics Education Society. The fact that he was invited by such bodies to address them indicates their appreciation of his position in the world of religious intellect and of his efforts to awaken the Churches to the need of facing up to the findings of modern science. His Gifford Lectures on "Scientific Theory and Religion" given in the University of Aberdeen (1927–29) develop this important side of his teaching; his later books, "The Rise of Christianity" (1947) and the Rede Lecture to the University of Cambridge (1949), "Religion amid Turmoil", involved him in serious disputes inside the Anglican community.

This is not the place to discuss the theological controversies in which Bishop Barnes took an active part, nor the position of the Broad Church party within the Anglican Church; but tribute must be paid to the complete honesty and love of truth which he displayed in his battle against much that he regarded as superstition. For him, truth was to be sought and followed even though some traditional dogmas of Christian belief had to be changed. He could and did state that science had preserved standards which organized religion had frequently failed to safeguard. Despite protests, he felt it his duty to proclaim this from inside the Church; his mission was to attempt to free Christianity from many late accretions.

In his intellectual approach to such questions, in his views that religion is essentially fellowship with the unseen and that the spiritual world is a type of reality lying outside the world of sense, Bishop Barnes must have found many outside the churches who were in close agreement with him. How far his deeply religious sense could bridge the gap between those outside and those within the churches it is not easy to say. But there is little doubt that any body which condemns men of his honesty and width of outlook is running a serious risk of alienating more and more serious thinkers from its fold.

Barnes was deeply concerned with the need to adapt Christian theology to meet the changed viewpoint resulting from the acceptance of evolution. He was at odds with both fundamentalism and sacramentalism for their failure to win the confidence of educated youth. The modern world demands that faith should be reasonable and not blind. Faith he defined not as submission to authority but as the product of our best, expressing itself in our relations with all our fellow men in all our human activities, not merely in those which we call religious. For Barnes, Christianity must be dynamic and not static; though it is the finest product of the religious evolution of the race, there must be freedom in it for further onward movement. As the conscience of man gradually develops in humanity, so must a factor of variability be allowed in the statements of our faith.

Barnes emphasized in his book "The Rise of Christianity" that the use of scientific methods in the examination of documents and early records, even when applied in the most radical way, did not affect what he regarded as the fundamentals of Christianity. The progress of knowledge has not forced us to admit imperfection in the view of God and of man's relation to God as given by Jesus, but it should compel some changes in the framework in which those views are expressed. In forming our attitudes to moral issues and to social problems which have arisen in the complex society of to-day, we must look to fundamental principles and not to set teaching of the past. The unity between the human mind and the processes of Nature is paralleled by a unity between the moral and æsthetic judgments of the human spirit and the Divine Spirit.

Barnes issued a double appeal—to the men of religion to adopt the outlook of science with its reverence for truth, and to the men of science to foster spiritual progress while preserving spiritual freedom.

F. J. M. Stratton

Prof. C. Białobrzeski

Like so many other prominent Polish intellectuals, Białobrzeski (pronounced Biauobjesky) was a descendant of the class of small gentry of the eastern borderland. Having finished his studies at the University of Kiev, he went to Paris and investigated in P. Langevin's laboratory the influence of radioactive radiations on solid and fluid dielectrics. Returning to Kiev, Białobrzeski graduated in physics and afterwards lectured in physics and mathematics. In 1914 he was invited to Cracov, where he was installed at the Jagellonian University as professor of theoretical physics, at the end of the First World War.

Meanwhile, Białobrzeski published in 1913 in the *Bulletin of the Academy of Science* of Cracov his main work, a paper on the equilibria of stars. It was customary up to that time to treat this problem as one of a sphere of gas in polytropic conditions. Białobrzeski introduced the pressure of radiation as a new factor. Owing probably to the outbreak of war in 1914, this paper remained little known, so that his results were, a few years later, rediscovered by Eddington. In 1920 Białobrzeski moved to the University of Warsaw, where he held the same chair, and created a flourishing school of research in theoretical physics. As he always believed in the co-operation of theory and experiment, he organized also, in his institute, a laboratory for the study particularly of spectra and dielectrics. He himself contributed in 1927 a further astrophysical paper discussing the role of fluctuations. Very early he became interested in the new quantum-mechanics and gave it a large part in his lectures.

This 'idealistic bias' brought Białobrzeski a lot of trouble in his last years. An idealist he was indeed, in the less technical, true, meaning of the word. He believed, as he showed in his popular writings, that the mission of science was to promote the moral progress of mankind. A marked aloofness and far from robust health did not prevent him contributing to the academic underground teaching during the German occupation. In the early months of the War, the Germans publicized the shooting of a namesake of Prof. Białobrzeski; and an obituary notice by Dr. M. Mathisson was then published in *Nature* (**145**, 132; 1940). The present notice is intended to be complementary to the former. During the relatively liberal spell, in 1947, he visited Great Britain. He died during September last at the age of seventy-five.

Z. Klemensiewicz