

UMA PRASANNA BASU

(1903-1969)

Elected F.N.I. in 1946

DR. UMA PRASANNA BASU, a distinguished Organic Chemist of India died of stomach cancer on December 1, 1969, one year after he retired as Director, Bengal Immunity Research Institute, Calcutta. Dr. Basu will long be remembered for his contributions to medicinal chemistry and pharmaceutical sciences.

EARLY LIFE AND EDUCATION

Basu came of the well-known 'Basu Mazumdar' family of Lakshmankaty in the district of Borisal (now Bangladesh). He was born in 1903, the younger son of Bepin Behari Basu. The boy was brought up in a disciplined atmosphere under the strict attention and guidance of his parents. He had his early education in the Madaripur High School whence he passed his matriculation examination in 1920. After passing I.Sc. from the City College, Calcutta, he joined the Scottish Church College, Calcutta, for his B.Sc. degree. Later, he took his M.Sc. degree in Chemistry from the University of Calcutta in 1926, standing first in first class. During these years he was inspired by Sir P. C. Roy and Prof. H. K. Sen and continued his research in Chemistry as a Scholar of the University. He received his D.Sc. degree in 1935. Basu had a brilliant academic and research career. He received in 1928 the '*Rash Behari Ghosh Scholarship*' in Applied Chemistry of the University College of Science, Calcutta. He secured the '*Nagarjuna Prize*' and a '*Gold Medal*' for the best piece of research work in chemistry in 1930, the '*Griffith Prize*' in 1930 and the '*Sir Asutosh Mukherjee Gold Medal*' in 1931. Subsequently, for his researches on the synthesis of certain nitrogenous ring systems as found in Nature, he was awarded the coveted '*Premchand Roychand Scholarship*' in 1936 and the '*Mount Medal*' in 1938.

PROFESSIONAL CAREER

Dr. Basu began his professional career as a temporary teacher in the Department of Chemistry, University College of Science and Technology in 1931 and was later Research Fellow and Honorary Lecturer. Subsequently, as advised by Sir P. C. Ray, he joined the Bengal Immunity Co. Ltd. as its Chief Chemist and Officer-in-Charge of its Research Laboratory. Here, he came in contact with the then Managing Director of the Company, Captain N. N. Dutta who was a man of great vision and a high exponent of the Indian Pharmaceutical Industry. Realising the importance of research for the development of the Industry, Captain Dutta





U. G. Prasad



founded the Bengal Immunity Research Institute in 1947 and specially assigned to young Basu the functions and responsibilities of its Director. Here, Basu was able to initiate investigations into various aspects of 'Drug Research' and was able to make, in collaboration with his colleagues, significant contributions to pharmacy chemotherapy, and pharmaceutical and industrial chemistry. It was with Basu's initiative that B.I. Research Institute soon developed into an important centre for 'Drug Research' where devoted research workers could pursue their scientific investigations in a calm and peaceful atmosphere with all possible facilities at their disposal. With the whole hearted cooperation, advice and assistance of his colleagues like the organic chemist T. N. Ghosh, the biochemist G. C. Esh, and the pharmacologist. A. N. Bose, Dr. Basu could raise the standard of research to such a high level that the Govt. of India recognized the B.I. Research Institute as a centre for higher training and research in synthetic organic chemistry, pharmaceutical chemistry, biochemistry and nutrition and pharmacology.

Impressed by Dr. Basu's activities at the Bengal Immunity Research Centre, Dr. S. S. Bhatnagar, the then Director-General of the CSIR, initiated a Research Project on '*Antimalarial Compounds*' under the leadership of Dr. Basu, in 1951. Later, in 1952, five more CSIR schemes were sanctioned to the BIRI as a recognition of his leadership qualities. Subsequently, these schemes were amalgamated into a 'Chemotherapeutic Research Unit' at the BIRI with Dr. Basu as its Investigator-in-Charge.

Dr. Basu's efforts led the Institute to be recognised as a centre for advanced research by the Universities of Calcutta, Jadavpur and Panjab. Many workers at the Institute guided by him received doctorates from the Calcutta University.

CONTRIBUTION TO SCIENCE

Dr. Basu's researches cover a wide field. His work may be classified under the heads: (i) Synthetic Organic Chemistry, (ii) Drugs and Chemotherapy (Antimalarials, Antitubercular, Antispasmodic and Antifilarial compounds, Organometallic and Organo-therapeutic compounds, Pharmaceuticals, Plant Products etc.; (iii) Analytical chemistry; (iv) Industrial problems; and (v) Reviews. His 300 original scientific papers and more than 100 reviews amply testify to Dr. Basu's versatility and encyclopaedic knowledge in the fields of science, education, research and industry.

Synthetic Organic Chemistry

During his early research career, Basu synthesised some Bz-hexahydro-isoquinolines. He adopted the Guareschi synthesis of pyridines and its modification by Knoevenagel and Fries to the synthesis of Bz-hexahydro-isoquinolines. In the first example, ethyl cyclohexanone carboxylate was condensed with cyanoacetamide to yield a bz-hexahydro-isoquinoline derivative. In the second example, oxy-methylene cyclohexanone was treated with ammonia and the resulting amino-methylene compound condensed with ethyl aceto-acetate in the presence of sodium. The resulting substance on hydrolysis yielded the corresponding acid, which was



easily decarboxylated and converted into isoquinoline by distillation with zinc dust. This constitutes a novel method of synthesis of isoquinoline derivatives and assumes importance in view of the fact that many alkaloids occurring in Nature are found to be isoquinoline derivatives, some of which possess medicinal properties.

6-Methyl-2:3 dihydro- β -pyridindine, which can be regarded as a derivative of the hypothetical compound termed β -pyridindine in analogy with β -quinindene has been synthesised and this constitutes synthesis of a new ring system. A new method of synthesis of 1:2 diaminopropionic acid derivative has been achieved. The action of zinc on ethyl alpha-bromohippurate has yielded an oxazine derivative, the hydrolysis of which leads to the formation of 1:2-dibenzamidopropionic acid. The latter acid responds to Dakin-West reaction and eliminates carbon dioxide when reacted with benzoyl chloride in presence of pyridine, yielding α - β -dibenzylaminopropiophenone. Subsequently, Basu carried out extensive investigations on the synthesis of acridine, isoquinolines, quinolines, quinolizines, phenanthridines, piperazines, triazines, triazoles and some heterocyclic biguanides and sulphonyl urea derivatives with diverse pharmacological activities. Towards the end of his career, he became interested in the synthesis of a class of compounds by linking isoquinoline ring with a quinoline moiety some of which have shown pronounced antiprotozoal as well as spasmolytic properties.

Drugs and Chemotherapy

Extensive researches, directed towards development of potent antimalarials have been carried out by Basu and his collaborators. The work which began in 1937 dealt at the outset with the synthesis of a large number of new acridine derivatives some of which are structurally related to Atebrine. Further work was carried out on the synthesis of 8-aminoquinoline derivatives as possible antimalarials. A few in this series were already known, such as plasmoquine, pentaquin etc. and although they have curative properties in malaria, possess undue toxicity. As such, efforts were directed towards synthesis of some more effective products by altering the side alkylamino chain, retaining the basic character of 8-aminoquinoline unchanged in plasmoquin. A large number of derivatives were synthesised in the laboratory. One compound, compound 'C', which is chemically 7-chloro-4-(4'-hydroxy-3°-diethylaminomethyl) anilino-2-methylquinoline, possesses significantly high antimalarial activity and on the basis of clinical trials, a patent on compound 'C' was granted. In another scheme on the synthesis of 'New Antispasmodics in the Isoquinoline Series', Dr. Basu and his collaborators successfully synthesised the "Compound AI57" which is N, N-bis-(3-methyl-1-isoquinoly)- α -methyl- β -phenethylamine triphosphate possessing pronounced antispasmodic activity. The investigation on sulphonamides has revealed that acetylation of the amide grouping of *p*-aminobenzene sulphonamide considerably widens the activity of sulphanilamide's therapeutic efficacy of sulphaninyl benzamide in bacillary dysentery.

Basu's works on the isolation and structural elucidation of the plant principles from (i) *Centella asiatica* (Isothankunic acid, thankunic acid, Asiatic acid, than-



kuniside and isothankuniside) and (ii) *Bacopa monniera* (Monnierin) and ephedrine from *Sida* species deserve special mention. The synthesis of some aryl sulphonamido-1, 2, 4-triazoles, phenyl semicarbazides and substituted thiosemicarbazides and their transformation to certain 5-membered heterocycles was carried out with a view to finding out a suitable oral antidiabetic drug. The compound AF23, (N-Diethyl carbamyl-4'-biguanide piperazine hydrochlorids and AF85 Piperidino-carbamyl piperizing hydrochloride) synthesised by Basu and his collaborators was found to be promising as filaricide. He made some significant contributions in plant chemistry by isolating pharmacologically active principles from *Rauwolfia serpentina* and active principles containing hyoscyamine and those known to contain antifertility principles. In the study on organometallic series attention was directed towards gold, silver and bismuth compounds. The sodium bisulphite derivatives of the Schiff's bases from sodium arsenates have been found to be more stable and less toxic than atoxyl.

SERVICE TO PHARMACEUTICAL INDUSTRY AND LEARNED SOCIETIES

Dr. Basu contributed significantly to the development of various pharmaceuticals required in the industry. Some of them may be mentioned here: (a) newer methods of formulations such as Protein Hydrolysate Injection, Adrenaline Malate Injection, Fat-soluble vitamins in stable aqueous media, and others; (b) standardisation of Hydnocarpus oil, groundnut oil, glycerine, activated charcoal, ethyl oleate; (c) postulation of norms and standards of containers for pharmaceutical use by glass manufacturers; and (d) technical know-how for the large-scale manufacture of drugs like chloroquin phosphate, Isonicotinic hydrazide, Phenformin hydrochloride, Antacids (Magnesium trisilicate, Magnesium hydroxide), Calcium lactobionate and others.

Dr. Basu's work on the stability of vitamin A acetate in solution has helped in the fixation of International standard. His synthetic work on acridine, iso-quinoline and quinoline derivatives has been quoted in standard reference books. His significant contributions to antimalarials, sulphas and antidiabetics brought Dr. Basu to international recognition. His work on the side products in the largescale production of chloroquin and isoniazid was particularly important.

Dr. Basu contributed significantly to the development of pharmaceutical industry in India. He was Member of the Drugs Technical Advisory Board, Ministry of Health for 18 years and was in the Defence Council (Chemical) during World War II. The Ministry of Health nominated him as Member of the Indian Pharmaceutical Delegation to Europe and the U.S.S.R. in 1955. He was also Member of the Indian Counterpart team of the Russian Delegation for establishment of the Indian Pharmaceutical Industry and of the Drugs and Equipments Standard Committee in 1963. In the Council of Scientific and Industrial Research, he was Member of the Malaria Chemotherapy Committee as well as of the Drugs and Pharmaceutical Research Committee. He was a Member of the Development Council of Drugs and Pharmaceuticals, Ministry of Commerce and Industry, Government of India,



of the Indian Council of Technical Education and the Scientific Board of the National Council of Education and Research, Ministry of Education, Govt. of India. He was also Member of the Governing Body of the Central Drugs Research Institute, Lucknow.

Dr. Basu played an active part in the development of Scientific Institutions, Societies and Organisations in India and was also associated with a number of similar societies in U.K. and U.S.A. He served the Indian Chemical Society as a Member of the Council and Board of Associate Editors and also as its Vice-President. As Secretary (for 17 yrs) and President of the Institution of Chemists of India, he worked for the recognition of the Associateship as equivalent to M.Sc. by the Ministry of Education, Government of India and thereby provided opportunities to Indian Science graduates for developing their professional careers. Dr. Basu was Vice-President of the Indian Association for the Cultivation of Science.

Dr. Basu was a Member of the Governing Bodies of the ICMR and the Indian Statistical Institute and of the Advisory Board of the Indian Institute of Technology, Kharagpur. He was President of the Science Club of India and the Indian Pharmaceutical Association and Vice-President of the Indian Association for the Cultivation of Science and Immunity Scientific Association. He presided over the Chemistry Section of the Indian Science Congress in 1952-53 and served the Association as General Secretary for four years and during this tenure he moved for the registration of the Association and for its permanent Headquarters and Office buildings. He was Chairman of Pharmaceuticals and Fine Chemicals Sub-Committee. He was a Member of: 1) The 'Chemistry Sub-Committee' of the Indian Pharmacopoeia Committee; 2) The 'Chemical Planning Committee' of the Planning Commission (1963); 3) 'Chemical Division Council' of the Indian Standards Institution; and 4) the Asiatic Society, in the Council of which he served for many years.

He served the West Bengal Government as a Member of: 1) Board of Industries; 2) State Pharmacy Council; 3) Medicinal Plants Committee, etc.

Dr. Basu also served as the Editor of the '*Chemical Industry News*' of the Indian Chemical Manufacturers Association as Editor-in-Chief of the *Journal of Science Club* and in the latter capacity he tried to popularise science through his writings.

HONOURS AND AWARDS

In recognition of his scientific achievements, Dr. Basu was awarded the '*Barclay Medal*' (Asiatic Society), '*H. K. Sen Memorial Medal*' (Institution of Chemists of India) and '*Acharya P. C. Ray Memorial Medal*' (Indian Pharmaceutical Association). He was President of the Indian Pharmaceutical Congress, 1969.

HIS QUALITIES

Dr. Basu was always full of vitality and energy. It is true to say that his life was varied, active and a very happy one. He was a man of great personal charm and



simple dignity. His warm, friendly humour endeared him to every one and his friends will remember him for his generosity and good companionship. He had an astonishing memory and to the end he remained physically and mentally alert.

He is survived by his wife, one son and four daughters.

G. C. ESH

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