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TONY SWAIN AND THE SCENE TODAY

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Abstract—Tony Swain's scientific career is outlined and his contribution to plant science evaluated.

The previous contributors to this symposium have discussed major areas of phytochemistry that were of interest to Tony Swain and to which he made distinguished contributions. He was author or co-author of over 150 original papers and reviews and editor or co-editor of 11 volumes concerned with different aspects of phytochemistry [1–11]. It was, however, as Founding Editor of *Phytochemistry* in 1961 and of *Biochemical Systematics and Ecology* in 1973 that he made his most important and lasting contribution to phytochemistry in this country and overseas. These two journals, now ably edited by Jeffrey Harborne, Peter Waterman and their associates, provide a service to the phytochemical community which did not exist before. As well as bringing into being appropriate journals in which to publish original research and reviews, he was also one of those who conceived the idea of broadening the basis of the Plant Phenolics Group and creating the Phytochemical Society—which Society, later to become the Phytochemical Society of Europe, has been so successful in bringing together phytochemists and giving them a forum at which to present and discuss their work. Before the advent of the Phytochemical Society, those of us who are interested in the chemistry of plants necessarily attended the meetings of the larger chemical, biochemical or biological societies. We represented a minority interest at such meetings, however, and our papers often seemed to quality for the last session of the last day when attendance was poor and time for discussion minimal. Meetings of the Phytochemical Society were very different, providing the interest, stimulation and contacts that had not been available before. In founding the journals and taking a leading role in the establishment of the Phytochemical Society, Tony Swain played a major part in giving phytochemistry the clear identity and organised infrastructure that it enjoys today. We also see his influence alive and well in the many institutions and laboratories where his former colleagues and students now occupy influential positions of their own.

Tony had a varied career. He worked at the Agricultural Research Council Low Temperature Research Station at Cambridge for sixteen years. He then spent three years as Scientific Adviser to the Cabinet Office in Whitehall. This was followed by two years in the United States as Visiting Professor firstly at Yale and then at Harvard. He returned to England in 1970 as Director of the ARC Laboratory of Biochemical Systematics at the Royal Botanic Gardens Kew. In 1975 he was appointed Chairman of Biology in Boston University and on his retirement in 1987 he came to Kew once more as an Honorary Research Fellow. At various periods he was also Visiting Professor of the Universities of Hull and Reading and at King's College London. He was concerned not only with fundamental research in biochemistry, ecology and systematics but also in the practical application of phytochemistry in agriculture and medicine. He encouraged collaboration between people and institutions, he was a good teacher and above all, a scientist committed to the free exchange of information and ideas.

To many of us, our most abiding memory of Tony is of his cheerful enthusiasm and his gift of imparting that enthusiasm to others. He had a consuming curiosity about all aspects of biology and chemistry. Meetings that he attended were never dull and he could be relied upon for original ideas and discussion. A reference I once wrote for him contains the following passage. "Dr Swain has an original and lively mind which makes him a stimulating teacher and colleague. His knowledge of biology is very broadly based and he is keenly aware of new possibilities and developments. He is a great enthusiast and even when one

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does not agree with what he says all sorts of ideas come out of the ensuing arguments which overflow classroom, common room, coffee shop and street.'' When I wrote that I was thinking of the excellent lectures that he gave when he was Visiting Professor at King's College London and the arguments that they engendered. You have already heard of Tony's theory that the dinosaurs disappeared because they were poisoned by alkaloids present in the recently evolved angiosperms [12]. In support of this theory he demonstrated that the tortoises that he kept at Kew could not detect alkaloids added to their food, whereas rodents could. My students delighted in this theory but not all were convinced; some maintained that if the hypothesis were correct then the tortoises should have disappeared too. While I leave you to decide on the merits of the arguments, there was no doubt as to the interest that his lectures stimulated nor to the way in which the students responded to his friendly, cheerful and occasionally unorthodox, approach.

His interest in ecology was not limited to dinosaur diets, however, and as Gillian Cooper-Driver is also contributing to this symposium, I shall remind you that Gillian and Tony showed that the bracken growing in Richmond Park was polymorphic with respect to cyanogenesis [13]. They also showed that it was the acyanogenic stands of bracken that were grazed by deer and sheep. His account of these experiments, like the dinosaur theory, gave rise to much student interest and even more speculation as to what possible selective advantage or advantages the acyanogenic form might have. It should be stressed moreover, that the concept of plant secondary compounds having an ecological role was not as widely accepted then, as it is today. I can myself remember a distinguished chemist, when questioned about the significance of alkaloids in plants, replying that they had no significance and were merely the product of biological exuberance. Tony never subscribed to that view and was always anxious to identify possible selective advantages that secondary compounds might confer on the plants that contained them.

When one looks at the scene today, one realises how much Tony's journals and the Phytochemical Society of Europe have helped and supported phytochemists both in the past and at the present time. The environment in which phytochemists work has changed, however. Some of us recognise how fortunate we were to be working at the time when both the Phytochemical Society and phytochemistry were young. Within the academic world we were provided with sufficient funds to meet our basic research requirements and it was generally accepted that the acquisition of knowledge for its own sake was a worthy and proper objective. We chose topics for research, guided only by our own personal interests and enthusiasms. We could redirect our efforts and change our goals if a fortuitous and unexpected finding suggested the existence of a more exciting road than the one we had set out on. Today, a researcher may have to seek financial support from whatever sources are available, and the need to tailor a grant proposal to conform with the guidelines of a potential sponsor can fundamentally influence the direction of his or her research. If that sponsor has a commercial interest in the outcome of the research then, unsurprisingly, freedom to discuss findings and publish results may also be curtailed. Academic institutions, which are themselves under much greater financial pressure than in the past, may be tempted to increase research income by appointing and promoting staff in subject areas known to attract high levels of outside funding rather that in subject areas of equal importance but lacking comparable support.

Another development with which phytochemists now have to contend is the uncritical use of citation data to evaluate the quality of scientific papers, their authors, and indeed the journals in which they are published. It is assumed that if a paper is cited a great many times then that paper must be better than a paper receiving fewer citations. This assumption is quite irrational; a good paper published in a fashionable and popular subject area which boasts one thousand active authors may expect to be cited ten times as frequently as an equally good paper in a less fashionable area in which only one hundred authors are publishing regularly. Similarly, a useful broadly based review containing no original work may be cited many more times than a highly significant original paper in a specialist field. Phytochemistry is a relatively minor discipline, and to make unfavourable comparisons between publications in phytochemistry and those in major fields on the basis of unedited citation data, is an unjustified as it is unhelpful. That pressure has, on occasion, been put on staff to publish in journals with high citation ratings rather than in journals appropriate to the subject of the publication, indicates the naïve way in which citation data are accepted in some quarters.

Despite the bureaucratic and financial hurdles that face phytochemists today, they now have at their disposal equipment and techniques which were not available to earlier workers. These have made the rapid screening of extracts and the isolation and characterisation of plant compounds a great deal easier; with corresponding benefits to systematics and ecology. There has been a renewed interest, particularly in Japan, in the chemistry of plants used in traditional medicine. At the same time, the identification of novel toxins in food plants and evidence that dietary components such as glucosinolates and flavonoids may protect against heart disease or cancer, have emphasised the need for a greater understanding of the way in which the chemical composition of plants and plant products can affect human health. While attempts to use tissue culture techniques for the production of secondary compounds have met with limited success, the development of methods for altering the biosynthetic capabilities of whole plants by introducing genes from other organisms holds out enormous

possibilities. Such methods have already been used in diverse ways: the modification of ethylene biosynthesis to control fruit ripening, the synthesis of vaccines of medicinal value and the creation of crop plants rich in particular nutrients are examples. The possibility of whole ranges of "designer plants" capable of synthesising specific drugs, nutrients, fuels or chemical intermediates, as and when needed, is an intriguing one. It will not be easy, but it is a challenge that would have appealed to Tony and a challenge that can only be met by that free exchange of ideas and interdisciplinary co-operation that he always championed. The scene today is undoubtedly an exciting one. As realisation of our total dependence on the plant kingdom grows, so too will the appreciation of plant scientists by society. Phytochemists will find an increasingly significant role in the identification and development of renewable plant resources and in other areas of science and medicine. They will need, however, to work with others on an interdisciplinary basis if they are to make the most of their knowledge and skills. They must also write and lecture for the non-scientists of the community if their fundamentally important work is to be understood and supported as it deserves. Tony's ability to exchange ideas not only with scientists but with politicians, educationists, publishers, and indeed any who came his way, was one of his great strengths and contributed much to what he achieved. It also contributed to the interest and pleasure that his work so obviously gave him. He would have welcomed the opportunities that present themselves today just as he would have welcomed the challenge of making a good case in support of his chosen area of research. In the present competitive environment, enthusiasm and original ideas must be accompanied by a willingness and ability, which he had in abundance, to convince others of the fundamental importance of plants and their chemistry.

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