

Plant physiologist and humanist

A birth centenary tribute to Prankrushna Parija

In the botanical and educational firmament of yester-year, Prof. Prankrushna Parija was unique and occupied a pride of place. Parija's qualities singled him out from his contemporaries as a teacher, educationist, administrator and humanitarian *par excellence*.

To some of us, students doing the honours course in botany in the early forties, his name was familiar from the well-known Blackman-Parija paper on the respiration of apples, which appeared in the *Proceedings of the Royal Society* in 1928 and was widely quoted in textbooks on plant physiology. In fact, not one, but three papers appeared in a series in the *Proceedings of the Royal Society*, the first by F. F. Blackman and P. Parija, the second by Parija, and the third by Blackman. Of the several research students of Blackman, there were at least four who were from India: T. Ekambaram, R. S. Inamdar, P. Parija and Shri Ranjan, and though Parija did not submit a thesis for the PhD degree, unlike Ekambaram and Shri Ranjan, it is the Blackman-Parija paper that came to be remarkably well known.

The physiological story of the apple pictured is one running through the successive phases of adolescence, maturity and senescence. Apples in storage, which pass through the senescence phase, were investigated. The work led Blackman and Parija to note that senescence is a fundamental change in the organization of the tissue, what they called 'a lowering of the normal organization resistance'. Essentially, this led to a faster rate of hydrolysis of reserve and semi-reserve substances, and greater production of substrate for respiration and consequent increased carbon dioxide production. With starvation, respiration dropped. The analysis of data on respiration in air and in nitrogen by Parija led to the observation that CO₂ production by oxygen respiration (OR) was less than that by nitrogen respiration (NR). The point of interest is that respiration of an apple, in a current of ordinary air, as they stressed, was an integration of two independent but opposite forces that characterized senescence. Typically, there are (i) the

starvation drift (at 22°C) lowering respiration continually, and (ii) the lowering of organization resistance increasing respiration. Parija had earlier studied respiration of cherry laurel leaves. The question was: Do the two organs, the leaf and the ripening fruit, strikingly so different from one another, manifest the same principles of respiration? In the case of ripening fruit senescence was the dominant stage of ontogeny, whereas evergreen leaves remained in a state of maturity for a considerable period of time. The seminal 1928 papers of Blackman and Parija, along with additional data and discussion, were later published posthumously in a book



entitled *Analytic Studies in Plant Respiration* (Cambridge University Press) by F. F. Blackman in 1954. The work is considered a landmark in the study of plant metabolism.

I first met Professor Parija in 1945 in Madras and was introduced to him by the late Professor M. O. P. Iyengar, the distinguished algologist, an intimate friend of his with whom he stayed whenever he came to Madras. Soft and gentle in his conversation, there was an aura of kindness about him and a dignity and demeanour that reflected simplicity, sincerity and affection. When I again met him some years later he remembered and recalled the meeting at

Madras. Further meetings amply confirmed my first impression. Several facets of Parija's early life and education, later development and career, the work in which he engaged himself, and the objectives and the ideals he set for himself—and for others—reflect what J. B. S. Haldane called 'the uniqueness of the individual'.

The only son of his parents, Biswanath and Jayanti Devi, Prankrushna Parija was born on 1 April 1891 in a joint family in the small village of Iccharpur, not far from Cuttack in Orissa. Though low-paid, his father chose to serve in the distant but princely state of Mayurbhanj as a forest guard; obviously, he was an adventurous man. On his infrequent visits home, the father helped the son imbibe a love for plants, and the son liked animals too. And immeasurable love flowed from the mother for her only son. The early training Parija received from the village schoolmaster in Chatasali, clearly traditional, with stress on memorization, helped him in later life to remember hundreds of his students and their parents or guardians by their names. He had learnt Hindu mythology, ethics and the Puranas even when young. His proficiency in Sanskrit may not be known to everyone and we might reckon it and his love of Oriya language and literature were a product of his early schooling. He was to have learnt land record-keeping from a distant relative at the end of primary education, but his father happened to come on leave at the crucial time and Prankrushna was admitted into the Balikuda Middle School. Finishing the four-year programme in three years and standing first in the all-Orissa examination, he earned a scholarship of rupees four per month. After passing the final entrance examination of Calcutta University with first position in Orissa (seventh in the university), Parija entered Ravenshaw College, Cuttack, with a scholarship of rupees 20 a month. His education was supported throughout by scholarships that he earned by his total commitment to his studies. His study in Cambridge from 1914 was supported by a Government of Bihar scholarship and he won

the Frank Smart Prize at Cambridge University by securing the first rank with a first class in Part II of the tripos examination. Following his return from Cambridge in 1922, Parija was married to Sundramani. They were happily married for 56 years.

For vacations, we are told, Parija used to walk the distance to and from his village—about 36 miles. To minimize the monotony of walking alone, he would gather company, whom he would also engage by narrating funny stories. These were a part of his sense of belonging to the community with which he interacted in a positive way. That their uplift was one of his major interests is evident from the great work he did later as an educationist and public servant. The funny stories he told were rooted in his fine and remarkable sense of humour.

For several years beginning 1914, Parija was in Cambridge, where he first worked on respiration of cherry laurel leaves and later was employed by the British Government to investigate the best method of storing apples. The latter led to the Blackman-Parija papers. On his return to India in 1921, when he was just 30, he was appointed professor of botany at Ravenshaw College, Cuttack, in the prestigious Indian Educational Service, a post he held till 1938. As a teacher, Parija took his students with him in the teaching process and inspired them. As for research, he initiated research on plant respiration and a number of other areas such as the control of aquatic weeds—primarily water hyacinth—, transpiration and heat resistance in plants, experimental plant morphology, physiology of rice, and ecology of freshwater and marine algae. The work he initiated at Ravenshaw College and the training and the inspiration many students received from him have been major inputs in the development of plant physiology as a discipline in India. The experimental induction of flood resistance in rice plants and the survey of algal flora and work on mass culture of algae and utilization of algal resources are both examples of research rooted in the philosophy of self-reliance which Parija practised.

As professor (1921–38), as hostel warden, as college principal (1938–43), and finally as the first vice-chancellor (1943–48) of Utkal University, Parija

stood for truth, integrity, discipline and beauty, and all that he did was marked by his extraordinary pragmatism, wisdom and humanism. To his students he was more than a teacher, quite firm and uncompromising in matters of discipline, honesty and punctuality, but yet compassionate and humane to the core and always affectionate. His kindness in helping financially many a needy student is well known. It is not surprising then that there are even senior persons in public life today who remember with gratitude the help they received from the professor—they believe they owe their present status entirely to him! There was a note from him to his sons and daughter that, on his death, there be no rituals except recitation from the scriptures: any sum that might be spent on rituals be instead donated for the education of the needy. I have it from his daughter that he washed his own clothes, made his own morning tea and shared it with the sweeper and his personal attendant who were also early risers. He believed in the dignity of work and established a Student Labour Bureau through which students could work and earn and so help themselves. He even introduced the then somewhat novel idea of students becoming presidents of the college union: his faith in student potential was such. Indeed, some of the students who were presidents of the union later distinguished themselves in public life, something of which Parija was proud. Parija himself was secretary, and then president, of the Indian Students' Majlis during his Cambridge days, and quite clearly his was a temperament and attitude that was not so narrow as to be content with looking at respiration of apples alone! During his term as secretary and president in Cambridge, he had many distinguished people address the Majlis: Balgangadhar Tilak, Sarojini Naidu, the Rt Hon. Srinivasa Sastry and M. A. Jinnah were among them. Tilak was also his personal guest. It was quite natural then that Parija established in Ravenshaw College an annual extramural lectureship to which distinguished persons were invited: Sarojini Naidu, C. V. Raman, Birbal Sahni and others. Here then was a man who knew what he should do for education, for science, and, equally important, for the uplift of the students and the people, the community.

The impact of Parija's work, confined to Ravenshaw College to begin with, gradually spread far beyond Cuttack and Orissa as he was invited to, and did, play his role as scientist, educationist and administrator in the larger context of the development of the country. Following his vice-chancellorship of Utkal University, Parija was pro-vice-chancellor, Banaras Hindu University (1948–51), and pro-chancellor (1951–55) and vice-chancellor for a second time (1955–66) of Utkal University. His first term as vice-chancellor was a turbulent period marked by agitations and strikes by students in the wake of the civil disobedience movement, but students and politicians who sympathized with them had to yield to this stern disciplinarian. And yet, he was most loved and respected by everyone, especially in his home state, for the development of which he had given of his time throughout. He was even elected to the membership of the legislative council, but Parija found that that was not the place for him. Times had changed; he was disillusioned.

Many honours came to Parija and it is neither possible nor necessary to list all of them. Nevertheless, one would like to record here that he was a foundation fellow of the National Institute of Sciences of India (now Indian National Science Academy) and of the Indian Academy of Sciences. He was president of the botany section of the Indian Science Congress in 1930, and its general president in 1960. He was vice-president of the tenth International Botanical Congress, Edinburgh, 1964. He was member, and invariably chairman, of numerous national committees: his chairmanship of the Standing Committee on General Education, Expert Committee of the Government of India on the Reorganization of the Central Agricultural Research Institutes, and the Language Commission of India are examples of the immense confidence reposed in him in these diverse roles. He was a recipient of honorary doctorates from several universities and of Padma Bhushan from the Government of India in 1955.

Though Parija's beginnings were in the village and were humble, and he retained and cherished the simplicity of the villager and faith in traditional values, culture and language throughout, it is interesting that in school, college,

university and in public life he moved among some of the distinguished sons and daughters of India. He learnt from great teachers and had as his classmates several who distinguished themselves in one way or other. In the Calcutta University intermediate class, Satyendra Nath Bose, Maniklal De, Meghnad Saha and Jnan Chandra Ghosh were his class fellows, besides Nikhil Ranjan Sen, Jnanendra Nath Mukherjee and N. K. Sidhanta. In the BSc class, Bose and Saha opted for mixed mathematics, Ghosh for chemistry, and Parija for botany. With no provision for an honours course in botany in the university, Parija had to do an honours course in mathematics and his teachers were Jagadish Chandra Bose (physics), Pra-

fulla Chandra Ray (chemistry), and D. N. Mullick and Bankim Das Mukherjee (mathematics). In Cambridge his contemporaries included Srinivasa Ramanujan, Chintaman Dwaraknath Deshmukh, Birbal Sahni, Afzal Hus-sain, John Mathai and Y. N. Sukhtankar. As a botanist, he was very close to Sahni and Iyengar, and one might say with confidence that, despite the highly distinctive and original work in which each of them was engaged, they were united in a common sense of values and ideology and formed, in my view, a remarkable trinity of the period. Sahni even described a fossil, *Enigmo-carpon parijai* after Parija: Parija accompanied Sahni on the trip during which the fossil was collected.

Parija was no ordinary botanist or scientist. He had an interest in languages, literature and culture and had been president of the Utkal Sahitya Samaja. His was a multifaceted personality that found expression and satisfaction in the diverse things in which he involved himself—to do the best in all possible ways for the community and for the needy. Parija died on 2 June 1978. His life and work have a message for everyone, and for the future.

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ACADEMY NEWS

Indian Academy of Sciences elects new fellows

Arakeri, Vijay H., Department of Mechanical Engineering, Indian Institute of Science, Bangalore



He conducts experimental studies in fundamental aspects of hydrodynamic cavitation inception and noise. His other areas of study include marine propeller hydrodynamics and self noise investigations related to sonar applications. His current interests are related to observations on stability of two-phase plumes and application of ultrasonics in hydrodynamic cavitation control and enhancement of nucleate boiling heat transfer.

His research interest is primarily in the field of physical chemistry of condensed matter. He has made important contributions on various problems including chemical

Bagchi, Biman, Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore



reaction dynamics in solution, solvation dynamics of charged species in complex dipolar liquids, electron transfer reactions in solution, collective orientational and dielectric relaxation in dense liquids, dynamics of liquid-solid phase transition, and molecular relaxation in supercooled liquids and glasses.

Balasubramanian, K. K., Department of Chemistry, Indian Institute of Technology, Madras.



His areas of research include molecular rearrangements, heterocyclic chemistry, organic photochemistry, carbohydrate chemistry and electro-organic chemistry.

Banerjee, Kalyan, National Institute of Virology, Pune



His specific areas of interest are epidemiology and immunology of virus diseases.

Barma, M., Theoretical Physics Group, Tata Institute of Fundamental Research, Bombay



He works in the areas of condensed matter physics and statistical mechanics. His research interests include phase transitions in spin models and correlated electronic systems, finite size effects in Fermi systems, and disordered systems and percolation networks.

His field of specialization includes gastroenterology and enteric infectious diseases.

Bhan, M. K., Department of Paediatrics, All India Institute of Medical Sciences, New Delhi

His field of specialization is structural biology. His major research interest is to correlate sequence-dependent DNA



Brahmachari, S. K., Molecular Biophysics Unit, Indian Institute of Science, Bangalore

His field of specialization is structural biology. His major research interest is to correlate sequence-dependent DNA