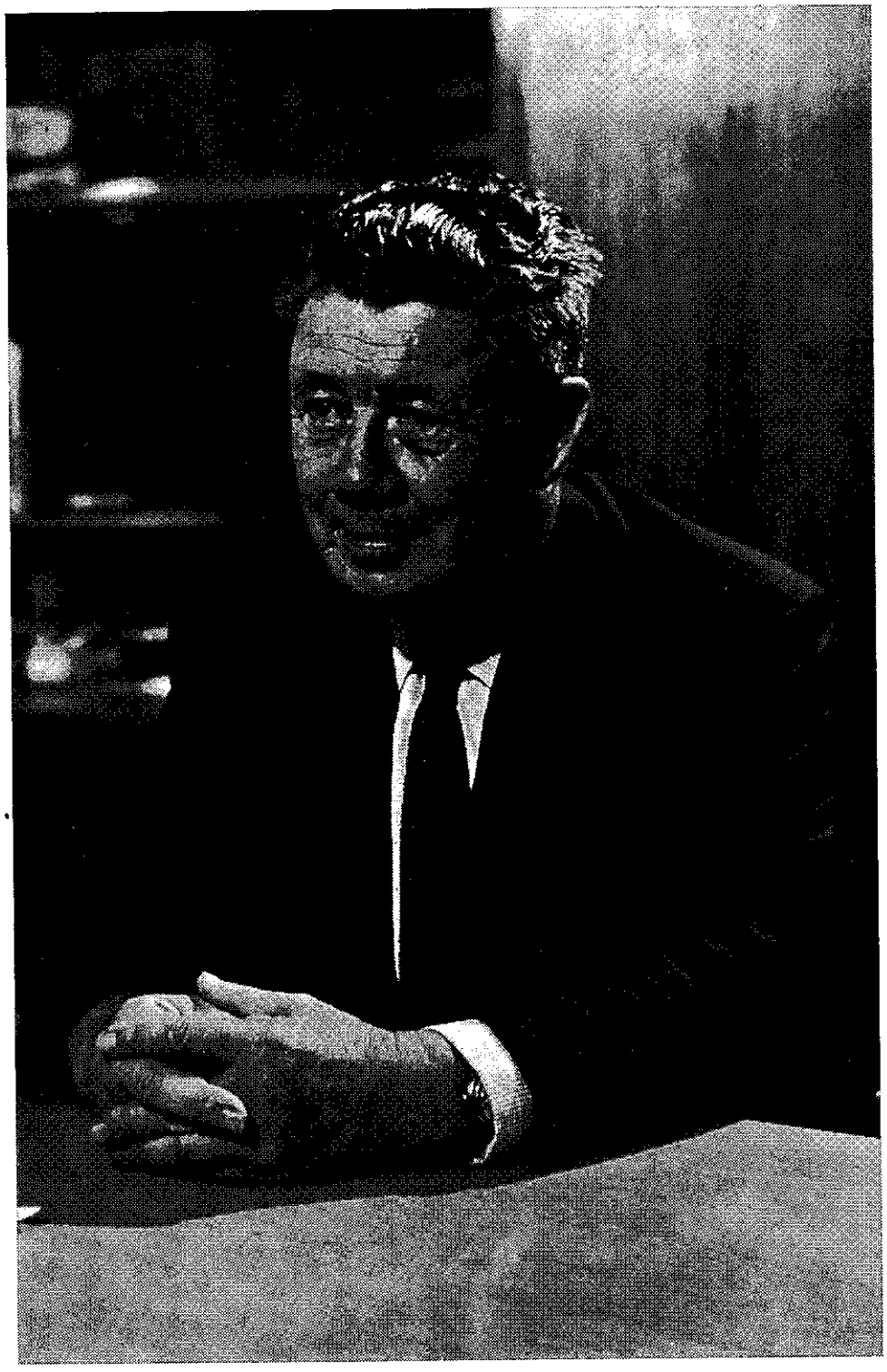

Dr. J. GRIFFITHS DAVIES, C.B.E., B.Sc.(Hons.), Ph.D., D.Sc. 1904-1969.

JOHN GRIFFITHS DAVIES (1904-69)—AN EPITAPH IN GRASS

R. MILTON MOORE

It is rare indeed these days for research workers to become identified with more than a narrow segment of a scientific discipline. It is rarer still to become an acknowledged leader in such a broad field of enquiry as grassland science which embraces so many disciplines. Yet John Griffiths Davies achieved this distinction not only in Australia the land of his adoption, but in every country interested in the science of feeding animals on grasslands. Perhaps even more remarkable is his identification with the beginnings of pasture improvement in so many and diverse environments in Australia.

Born and educated at Aberystwyth, the small Welsh university town that was to become the intellectual centre of a new philosophy about grasses and grasslands, Jack Davies came under the influence of Professor Sir George Stapledon, the spearhead of a movement for a more scientific approach to grassland farming. Davies completed his Ph.D. at the age of 22—his thesis a genetical study of *Dactylis glomerata* and his first paper a short note to Nature on chromosome numbers in this species[1]. Despite his own early research interests and Stapledon's emphasis on the breeding and selection of pasture grasses—an emphasis reflected in the many elite strains that have originated at the Welsh Plant Breeding Station— Davies' imagination was fired more by Stapledon's wholistic approach to the improvement of poorly productive Welsh pastures than by any of the more specialized disciplines contributing to that end. This integrated approach appears also to have been Stapledon's real and fundamental interest and was certainly the one he communicated most effectively and lastingly to his young disciple.

When in 1927 the late Dr. A. E. V. Richardson, Director of the Waite Agricultural Research Institute wanted a grassland scientist to undertake research on pastures in South Australia it was natural that he should seek one in Wales. Davies was recommended by Stapledon and had no hesitation in accepting when offered the post. This was the kind of challenge he wanted then and was to continue to seek during his lifetime.

Wearing a bowler hat on disembarkation at Adelaide was the first and probably the only occasion that Jack Davies felt out of step with the Australian environment. He was to adapt quickly to the Australian way and indeed became more Australian in spirit than many native born. This too, was a leaf from the Stapledon book. Sir George, an Englishman had learnt Welsh to communicate more effectively with Welsh farmers and Jack Davies, a Welshman was to embellish his English (not then his first language) with the more colourful Australian idioms.

For the next 42 years Davies was to devote his professional life entirely to the development of more productive pastures in diverse Australian environments. His association with the late Professor H. C. Trumble was to be a fruitful one for pasture research in South Australia and was to make the Waite Institute a leading centre of pasture research in temperate Australia during the early thirties. It was here that Jack Davies began to develop his philosophy and to give more precise definition to his ideas of pasture improvement. Briefly they may be stated thus: find the right species, amend soil nutrient deficiencies and evaluate the resultant pasture in terms of animal production. It is noteworthy that in one of his earliest works in Australia he measured the output of *Danthonia* grazing lands in terms of both grass yields and animal products[6]. It was Davies who, perhaps more than any other individual worker, developed the concept of an integrated study of the soil-plant-animal complex—a concept that was to be defined more precisely during his years at Canberra and one now characteristic of most Australian research on grasslands.

Work in South Australia with A. H. Sim on cutting frequencies and their effects on productivities, persistencies, and nutritive values of native species[3] and with A. E. Scott and K. M. Frazer on the responses of native grazing lands to superphosphate[6] convinced Davies that greater production was possible from pastures of sown species[4, 7] than from grazing lands of native species. His experiments had shown that native species individually responded poorly to fertilizers and tended to be replaced by volunteer annuals as soil fertility levels were raised. Henceforth he was to seek to replace native grazing lands by sown pastures wherever the environment permitted. Having such a philosophy it was natural that he should begin to think of the many and varied Australian environments in which pasture development might be possible and that environments already growing productive combinations of pasture species should be of less interest to him than those that were not.

Before considering his career subsequent to Adelaide there ought to be mentioned an aspect of Davies' research that is of significance to the understanding of his philosophy as a research director, a role that he was to play to the almost complete exclusion of all other research activities for the rest of his life. One of the earliest if not the first of his papers in Australia was on experimental errors associated with measurements of pasture yields[2]. He was one of the first to apply statistical controls to pasture experiments and, of even greater significance, he was one of the first to realise that the subject required specialists trained in mathematics. He claimed, incidentally, that it was he who steered Dr. E. A. Cornish, now Chief of the C.S.I.R.O. Division of Mathematical Statistics from pastures to mathematics.

This then, was his philosophy as a director of research—define the problem, provide research facilities both field and laboratory, and attack the problem with specialist research workers from several directions. Whatever one's discipline it had to be accepted in his team that the basic problem was already defined in broad terms and that in its final analyses it was a field rather than a laboratory problem.

Perhaps the most far reaching outcome of his South Australian period was his and Trumble's recognition of the potential value of the perennial grass, *Phalaris tuberosa* for pastures in south-eastern Australia[4].

In 1938 Davies was appointed to head a pasture research section in the Division of Plant Industry, C.S.I.R. (now C.S.I.R.O.) at Canberra. Before taking up residence at Canberra he visited the south-west of Western Australia and was instrumental in establishing a group of pasture scientists at Perth and a field station at Kojonup (since replaced by one at Baker's Hill). From this, the first of a series of regional research units established by Dr. Davies, has emerged much of our knowledge of annual pastures in a Mediterranean environment and of disorders in animals due to clover dominance.

Appointment to a Commonwealth organization provided greater scope for his undoubted flair for the pioneering aspects of pasture research. His own energy and enthusiasm and the success of his teams of research workers gained him further support and within twelve years Agrostology was the largest section in the Division of Plant Industry and Davies himself was Associate Chief of the Division. In addition to Kojonup, Davies established or was instrumental in having established research stations at Deniliquin in south-western N.S.W. for research on irrigated pastures, at Armidale in northern N.S.W. for research on temperate summer rainfall pastures, at Trangie, north-western N.S.W. for research on native grazing lands, and at Brisbane, for research on sub-tropical pastures.

In addition to one on the semi-arid *Stipa-Chloris* grazing lands at Trangie, Dr. Davies had a small group working on Mitchell grass grasslands at Cunnamulla, Queensland but the proportion of men and resources he devoted to native grazing lands in the lower rainfall areas was small. His justification was that although most domestic animals in Australia are run on native grazing lands[20] greater and more immediate returns were to be obtained by converting the higher rainfall grazing lands

to pastures. Efforts at improving production from grazing lands had been mostly unsuccessful. Dr. Davies' own talents and experience were agrostological rather than ecological and he was impatient to get on with the job of improving the improvable.

His publications in this period and later were mostly on the role of pastures in the Australian economy and or the potential for expanding pastoral production in Australia[9, 14, 16, 19]. There were reviews and conference papers[10, 11, 15, 17, 18, 19] too, and an occasional research paper[8, 12] but most of his energies were directed to the implementation of his concepts and ideas by providing his research groups with leadership and facilities. Much of the rationale for the subsequent development of pastures in southern Australia was provided by the findings of his research groups in Canberra and in Western Australia.

In 1952, Dr. Davies moved to Brisbane and took direct charge of the then small group of pasture scientists he had already established there. This move, although not of his own seeking at the time, was again in harmony with his philosophy of pioneering pasture development. His interests were in effecting big increases in production rather than in minutiae (his own expression) yielding small additional increases often at considerable cost in effort and money. Not that he disparaged such research—to his mind it was simply a question of priorities and in keeping with his view of Australia as a frontier country, development was the key word. He recognized too that developmental research was his strong point.

Queensland was to give him an unequalled opportunity of applying his ideas. Here, was a large tract of undeveloped country receiving more than 25 inches of rain annually with a wide latitudinal spread—an environment or series of environments offering a variety of challenges. There were years of struggle, disappointment and frustration yet in a short space of time Davies and his colleagues had established world-wide reputations in tropical and sub-tropical pasture research. Many new species of grasses and legumes were introduced some of which are now being used in pastures for the first time in any country.

Success followed success and in 1959 the Brisbane group of grassland scientists were given Divisional status and Davies became the first Chief of the Division of Tropical Pastures. The name of the Division, his own choice, is a reflection of his single-mindedness and of his desire to concentrate his efforts on one objective.

During his early years at Brisbane, Davies had returned briefly to active field research and in association with colleagues published papers on the productivities of tropical grasses and legumes[22, 27, 31, 32]. But his main written contributions continued to be reviews and interpretations of the research findings of his group[21, 23, 24, 30] and philosophical papers[25, 26, 28, 30, 33, 34].

As solutions or partial solutions to the problems of sub-tropical pastures were found, Davies again sought the challenge of the less known. A new laboratory for pasture research in the dry tropics was established at Townsville in 1962. Before he died he was planning its enlargement. His last big undertaking was the establishment of a cattle research station near Mundubbera to enable sub-tropical pastures to be evaluated more precisely and in terms of beef production—a fitting climax to a career devoted to a large extent to the proving of pastures by the grazing animal.

Jack Davies' life and career in Australia coincided with the period of greatest expansion of sown pastures in southern Australia. The north is on the threshold of a similar and perhaps even more spectacular advancement. Figures quoted by himself and Eyles[28] show that in 23 years to 1962 the Australian sheep population rose by 38%, total wool production by 64%, wool production per head by 18% and mutton and lamb production by 81%. During the same period cattle numbers increased by 35% and beef and veal production by 50%. Their forecasts are for a further ten-fold increase in beef cattle and a further three-fold increase in sheep numbers. It probably would not be disputed that Davies' contributions to making these increases possible have exceeded those of any other individual.

What kind of a man was he and how was he able to achieve so much? Much will have been gleaned from what has already been said but there are aspects requiring elaboration. He probably would have described himself as an agrostologist—a designation he liked and one that he retained in his laboratories when it had long since been abandoned by others. To him it focussed attention on the primary interest of the grassland scientist—grass, using the word in its widest connotation to include all the components of a pasture. He wanted his research teams to be constantly reminded of their main objective.

A central point of his philosophy was the concept of the legume as the source of nitrogen for the pasture community. Invariably the first aim of his research groups was to find adapted legumes and to meet their nutrient and *Rhizobium* requirements. It was not until shortly before his death that his faith in the legume—*Rhizobium* system as a sole source of nitrogen for pastures in all circumstances began to waver. He conceded somewhat reluctantly that there may be situations in tropical and sub-tropical areas where fertilizer nitrogen might be used with profit—a concession evoked by cheaper nitrogen and by a difficulty not encountered in temperate areas, of maintaining legumes in grazed tropical grass-legume communities.

There is no doubt that Jack Davies had a flair, an élan for pasture research. It is of interest to recall that his brother the late Dr. William Davies a former Director of the Grassland Research Institute at Hurley, England and a cousin, Professor Martin Jones, were also distinguished grassland scientists.

One of Davies most remarkable capacities was his ability to grasp the essence of a grassland problem even in environments previously unfamiliar to him. It was this capacity that made him such a welcome visitor to other lands and his reputation in many countries, notably Taiwan, Brazil, Argentina, Pakistan and several African States stands as high as it does in Australia. He pursued his objectives with faith, energy and an unflagging enthusiasm—an enthusiasm so infectious that chemists, microbiologists, agronomists and ecologists became fired with a zeal similar to his own. This, the simplicity of his approach, and the tremendous team spirit he engendered were the bases of the success of his research teams. He was tremendously loyal to his staff—"the team" as he affectionately called them—and expected, one might even say demanded unstinting loyalty in return. This again was part of his philosophy—teamwork is essential and if a team is to work there must be mutual trust and loyalty.

Among the honours that came to him were, the Federal Presidency of the Australian Institute of Agricultural Science 1951-2, its Medal in 1957 and a Foundation Fellowship in 1959. He was awarded an honorary D.Sc by the University of New England in 1958, received the first Britannica Australia Award in Natural and Applied Sciences in 1964, was Vice-President of the Sixth International Grassland Congress, was nominated for the Presidency of the 11th International Grassland Congress, and was a member of the Continuing Committee of the International Grassland Congress 1960-64. Dr. Davies was awarded a C.B.E. in the 1969 New Years Honours List.

His achievements perhaps may be best summarised by quoting from the eulogy delivered by Professor G. A. McClymont at the conferring of his honorary degree at Armidale. "It is given to few men in their lifetime to develop a new philosophy of approach to a major scientific and economic problem, to put that philosophy into practice, see it so widely accepted that it becomes difficult for later workers to conceive that it was not always so accepted and see the practical application of that philosophy result in measurable benefits to mankind. John Griffiths Davies has been one of such few". This was before the results of his work on tropical pastures were fully discernible.

Jack Griffiths Davies was a colourful personality, an odd mixture of down-to-earth Australian and emotional Welsh, occasionally morose and uncertain but mostly

28. DAVIES, J. GRIFFITHS and EYLES, A. G. (1965)—Expansion of Australian pastoral production. *J. Aust. Inst. Agric. Sci.* **31** (2): 77-93.
29. DAVIES, J. GRIFFITHS (1966)—Pasture improvement in the tropics. Proc. 9th int. Grassld. Congr., Sao Paulo, Brazil, 1964, pp. 217-20.
30. DAVIES, J. GRIFFITHS and EYLES, A. G. (1966)—The organization of research and communication of results. *In* "Tropical Pastures". Ed. W. DAVIES and C. L. SKIDMORE. Faber and Faber London.
31. JONES, R. J., DAVIES, J. GRIFFITHS and WAITE, R. B. (1967)—The contribution of some tropical legumes to pasture yields of dry matter and nitrogen at Samford, south-eastern Queensland. *Aust. J. Exp. Agric. Anim. Husb.* **7** (24): 57-65.
32. JONES, R. J., DAVIES, J. GRIFFITHS, WAITE, R. B. and FERGUS, I. F. (1968)—The production and persistence of some grazed irrigated pasture mixtures in south-eastern Queensland. *Aust. J. Exp. Agric. Anim. Husb.* **8**: 177-88.
33. DAVIES, J. GRIFFITHS and JONES, R. J. (1969)—Permanent pastures for the tropics and sub-tropics. *In* "Handbuch der Landwirtschaft und Ernährung in den Entwicklungsländern", ed. P. von Blankenburg and H. D. Cremer. Eugen Ulmer, Stuttgart.
34. DAVIES, J. GRIFFITHS and JONES, R. J. (1969)—Fodder crops for the tropics and sub-tropics. *In* "Handbuch der Landwirtschaft und Ernährung in den Entwicklungsländern", ed. P. von Blankenburg and H. D. Cremer. Eugen Ulmer, Stuttgart.
35. JONES, R. J., DAVIES, J. GRIFFITHS and WAITE, R. B. (1969)—The competitive and yielding ability of some sub-tropical pasture species sown alone and in mixtures under grazing at Samford, south-east Queensland. *Aust. J. Exp. Agric. Anim. Husb.* **9**: 181-91.
36. DAVIES, J. G. and HUTTON, E. M. (1970)—Tropical and sub-tropical pasture species. *In* "Australian Grasslands", ed. by R. Milton Moore. A.N.U. Press, Canberra.