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ACADEMIC REMINISCENCE:

**Recollections of J B S Haldane
and some other war-time evacuees and
visitors at Rothamsted**

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A number of scientific groups and individuals were evacuated from London to Rothamsted after the outbreak of war to avoid the air raids that were daily expected but did not come devastatingly until later in the conflict, though University College was damaged in the early raids. Some of our visitors were accommodated in the newly completed South Wing of the Main Building, the top floor of which was to accommodate the Soil Microbiology and Biochemistry Departments. However, the microbiologists remained *pro tem* in the old Mason Laboratory whilst our fine new labs were occupied by the British Leather Research Association and a Public Health Group.

They did not stay long and in 1941 we moved into our new laboratories but then almost immediately welcomed our second wave of evacuees. This consisted of J B S Haldane, Hans Kalmus, J M Rendel, Ursula Philip, Elizabeth Jerymn and Helen Spurway from the Genetics Department, University College and A C Fabergé from the Galton Laboratory. Harpenden was over-full of Londoners and accommodation was very difficult to find. The Haldane group solved this problem by renting a house and setting up a kind of commune, the satisfactory running of which owed much to the superlative culinary skills of Nushie Kalmus.

At the laboratory we shared the available space as best we could. Most of the floor space of our preparation room was occu-

ped by Haldane's large square steamer used to sterilise the milk bottles of molasses medium on which yeast was grown to feed *Drosophila*. The fly cultures were grown in our 25°C room and imparted to our end of the department a sweet and sickly aroma. Gerald Thornton, the urbane head of Soil Microbiology was a good host (as befits an authority on symbiosis) and ensured the smooth running of our shared facilities. As a junior and somewhat overawed member of his staff who shared his room I recall the many discussions held there with Haldane on genetics, evolution and related statistical matters, often joined by R A Fisher, also evacuated to Rothamsted from the Galton lab, Haldane's high pitched voice contrasting with Fisher's mellifluous diction, Fisher sucking his pipe and Thornton chain-smoking a brand of mild cigarette specially made for him. At this time microbiology and genetics provided interesting problems for the mathematician and statistician, on the one hand those of polygenetic inheritance and evolution and on the other the unusual distributions encountered for example when counting bacteria by the ratio method. These discussions were sometimes joined by Darlington and Mather out for the day from the John Innes Institute at Merton.

Before going to University College, Fisher had been a member of Rothamsted staff where with Yates he developed statistical methods used in medical and agricultural research. Dating from this earlier period Fisher was a particular friend of Thornton. Both were Oxbridge and both were Anglicans. They collaborated in studies on the inheritance of sinistrality in the snail and on the accuracy of bacterial counting procedures and Thornton helped Fisher by housing his jungle cock silky pullets used in studies on dominance, and in 1932 were together involved in an abortive attempt to get the Eugenics Society to sponsor proper scientific research.

Whilst an evacuee Fisher was a member of Thornton's Home Guard platoon. It was said that Fisher had to be disarmed because his extreme myopia made him a greater menace to his fellow Guardians than to any invader that might have penetrated as far as Harpenden. Fisher and Haldane held contiguous chairs at University College, in Eugenics and Genetics respectively, and it was through Fisher's and Thornton's good offices that Sir John Russell invited the Haldane group to Rothamsted.

It was at this time that Kalmus collaborated with Lettice Crump of our department in writing a successful Pelican Book on Genetics, which Kalmus dictated to Miss Crump during the long hours of fire-watching at the lab. He also invited many 'Rothamstedians' to take part in tests for taste discrimination, colour blindness and syndactily, in the group work on human genetics. Another work connection was Fisher's involvement in blood group genetics and consequent interest in serological work recently begun at Rothamsted, by Nina Kleczkowska on strain differentiation in *Rhizobium* and her husband's use of immunological methods to identify plant viruses. As an economy measure the same rabbits were used in both lines of work and when the time came for the rabbits to be sacrificed there was great competition for who should have the carcasses (the meat ration was seven penn'orth per person per week, now about 3p).

Kalmus continued to live in Harpenden after the rest of the group had returned to London, commuting daily to University College. He maintained a close connection with Rothamsted especially with the Bee Department where he had joint projects on bee behaviour and physiology. He was a man of extraordinarily wide interests and accomplishments. Rendel eventually went to Australia, Dr Philip to Newcastle and Fabergé to America. Elizabeth Jerymn married Mr Bamji of the Chemistry Department and

for a while she statuesquely graced the department in her colourful saris before leaving with her husband to study medicine.

A C Fabergé was very much a bird of passage. Though nominally a member of Fisher's group he spent much of his time in our department. He was called up into the Tank Corps and was the bane of his NCOs, not hesitating to point out that their range-finding procedures were Neanderthal or that the design of their track links was fundamentally flawed. He became involved in ballistic research and it was averred that he first measured the penetrating power of a bullet by counting the number of pages of the London Telephone Directory it would penetrate - a claim made with equal plausibility by Solly Zuckermann. He would turn up at the lab from time to time in a rather grubby uniform, and probably absent without leave, to pursue his scientific interests.

These included possibly the earliest attempts to section plant material for electron microscopic use by operating a rotary microtome at very high speed. This process mostly shattered the specimens into useless fragments but a few pieces could sometimes be salvaged that were sufficiently thin and intact for transmission work. The Rothamsted electron microscope came from the USA under a lease-lend arrangement

Another of Fabergé's endeavours was to design an escalator device to record honey bees as they left and entered the hive, and able to handle up to 10,000 movements a minute. This was frustrated by the bees quickly gumming up the moving parts with propolis. Fabergé grandfather was the famous Court Jeweller to the Russian Tsar and he may have inherited some of his forbear's remarkable manual dexterity and skills. Hugh Bunting recalls that Fabergé skills were mobilised to repair Yates' famous 'Millionaire' calculating machine that had inadvertently been dropped on to the floor. Fabergé also kept up his contacts with Merton,

against Darlington's express orders who forbade his entry to the lab. This did not deter Fabergé who simply broke in after hours.

In June 1941 the Genetical Society met at Rothamsted, using the Friends Meeting House nearby because our lecture room was occupied by an evacuee film unit (Diagram Films). Ursula Philip, Helen Spurway, and J M Rendel contributed papers on *Drosophila* and R A Fisher on selection for tail length in mice - not a Lamarckian study! Fisher wrote the minutes of the meeting and listed the 47 visitors present, a remarkable roll-call of the genetic luminaries of the time, including C D Darlington, W G Catchside, J S Huxley, F C Bowden, H G Thornton, C H Waddington, Dan Lewis, G H Beale, L LaCour, R R Gates, H Grunberg, E B Ford, and Irene Manton.

At this time I was studying strain variation and mutation in the nodule bacteria of red clover and noticed the great variation between individual plants in their responses, showing by simple breeding experiments that these differences were inherited. Not being specially trained in genetics I was much encouraged by the interest of Haldane and his staff. Without this support I doubt whether I would have had the temerity to undertake extensive plant breeding work in a soil microbiology department, especially in war time. Today it would certainly not have been allowed without prior approval of management plans, project costing and job assessment. Darlington saw this work at an early stage and though at first scathingly critical, as was his wont, he nevertheless accepted my papers for *Heredity* and was helpful editorially.

The Society for Experimental Biology also held a meeting at Rothamsted shortly after the end of the war (September 1945), at which Hans Kalmus gave two papers on the susceptibility of *Drosophila* to carbon dioxide. If my memory serves me correctly this was held in the Catholic Lourdes Hall across the Common from Rothamsted and J Luria from America talked about the genetics of

bacteriophages. The notion that a bacteriophage could have any genetics in the then-accepted sense of the word was much ahead of its time and not generally accepted by microbiologists, certainly not by Nina Kleczkowska who read a paper on the interaction of bacteriophage and nodule bacteria at the same meeting.

After the departure of the Haldane group, our next visitor, though not strictly a war time evacuee, was J H Quastel, a former colleague of Haldane at Cambridge who, incidentally supported Quastel's views on enzyme specificity. Quastel's group on soil enzymology included D Webley, microbiologist, P Mann, who later joined the Biochemistry Department, and Howard Lees who did the pioneering work on the technique of soil perfusion. Quastel was a very lively and stimulating neighbour who was by no means overawed by Rothamsted's reputation and was highly critical of some aspects of the station's work, which did not endear him to all members of staff. He became very interested in our work on the effects on root hair growth and curling plant hormones such as indolacetic acid produced by nodule bacteria, and in our incidental demonstration of their toxicity at very high dilution for broad leaved plants but not for cereals. At Quastel's instigation this led to an examination of a wide range of compounds, including the phenoxyacetic acids, and later to the persistence in soil of their chlorinated derivatives. These were studied extensively in collaboration with W G Templeman at Jealotts Hill (ICI) leading eventually to the development of 2,4-D, MCPA and other selective herbicides.

Another distinguished visitor to the Pedology Department whom many will remember was V M Goldschmidt FOR MEM R S who was snatched from occupied Norway by the Royal Navy after escaping en route to an extermination camp in Poland. He reached England in a poor state of health and recuperated as a guest of the Director, Sir William Ogg. Our visitors took part in the

Station colloquia and those who could be so persuaded gave courses of lectures in their own fields. Those I most recall were given by Fisher and by Goldschmidt and no greater contrast could be imagined between these speakers. Fisher's course on statistics began auspiciously. We were charmed by his flawless English and felicitous diction and at first his clear exposition of statistical principles. Then rather abruptly during the second or third lecture, depending upon our numeracy, we lost contact with the track of his discourse and his audience shamefacedly drifted away, and eventually the course was abandoned. David Finney also recalls the onset of incomprehension among those to whom his lectures were directed, and in fact in a following course made good this shortcoming.

In contrast, Goldschmidt's lectures - although delivered in a thick middle-European accent - were fully understandable and of great interest although many of his audience would previously have had only the vaguest notion of what were the rare elements or how they were distributed in soils.

My last recollection of Haldane and Helen from their Rothamsted days was our meeting on Newton Abbot railway station. They were waiting for the London train having taken part in experiments on themselves on the physiological effects of high gas pressures. Shortly before the war the 'Thetis' submarine disaster showed how little was known in this field and the need for research of the kind then being done by the Haldanes. We were waiting for a train to Mortonhamstead, before the Teign Valley Line was closed by Dr Beeching, not the best loved of I C's sons.

After the war I only occasionally met Haldane at scientific meetings, one hilarious occasion being a session on paranormal phenomena organised by the S E B at Queen Mary College in January 1950, where Haldane speaking from the back of the hall was the chief sceptic; he also presented a paper entitled 'Are paranor-

mal phenomena compatible with materialism?' My last sad recollection of Helen Haldane was on a visit to ICRISAT, Hyderabad, India in 1977. I phoned Helen and asked if Peter Dart and I could visit her. She lived alone in a large house surrounded by a walled garden that housed her menagerie of animals that were a genetic interest to her. At the heavy iron gate we were met by her man-servant and a pair of snarling jackals. We talked in the library surrounded by Haldane's large collection of books fast succumbing to the effects of a tropical environment. Helen took no newspapers and had no radio or TV but showed some interest in the news we brought of the outside world. Our talk was mostly of times past and the doings of old friends (and enemies). She showed us her dogs, her amphibia, hybrid peacocks and a family of tortoises. Helen sat on her desk stabbing it absent-mindedly with a scalpel as we talked and sipped our whiskeys. We left in time to be engulfed in the raucous stinking evening traffic of Hyderabad and were held up for an unconscionable time in a monumental jam outside a cinema. It was not long afterwards that we heard of Helen's untimely death.

The Imperial College Plant Physiological Laboratory at Rothamsted normally staffed by F J Richards and Summer postgraduates, became for the duration of the war the home of Helen Porter, O V S Heath, W Schwabe, M Holdsworth, J Edelman and V Martin, and each Wednesday was visited by its Director F G Gregory. As an ex-I C student I joined the lab on Wednesday for tea and talk. Plant nutrition and developmental physiology were its main concerns, especially photoperiodism. Rothamsted's first simple phytotron was constructed in its greenhouse. To make the work more relevant to food production the original research programme on cut flowers was replaced by research on bracken control and on the bulbing and bolting of onions (at that time most onions were imported). Heath has reminded me that my wife and

I helped him to plant his first experimental onion sets. The I C people interacted with those of Rothamsted's departments, for example on porometer design and function with Penman (Physics) and Orobanche flowering with Nutman (Microbiology). After the war the I C lab was transferred to Victor Stansfield's photographic section.

This may be the place to comment, as have others, on the importance of the station tea-break as a social lubricant and a daily forum for scientific discussion. Until early in the war we were all summoned to tea and cakes at Red Gables at four o'clock of the afternoon by an assistant walking the corridors and ringing a hand bell. Later this procedure was abandoned because it was stuffily thought to be in some way demeaning and undemocratic. Eventually as Rothamsted became larger a tea break for the whole station became impracticable, departmental teas increasingly taking its place - a retrograde step even substituted mugs, generally inadequately washed, for cups and saucers. Narrower departmental talk took the place of stationwide exchanges. It was at a Rothamsted tea that the intriguing question was asked, I believe by Bristol-Roach, whether it was better to add the milk to the cup before the tea or afterwards. This was resolved by proper experimental design and statistical test, and leading to biochemical speculation on the nature of the differences between tea prepared in these different ways. This had nothing to do with Student's 't test'.

Both before and during the war Rothamsted was a sanctuary for refugees from the Nazis other than those mentioned, as well as scientists such as Fred and Nina Kleczkowski who came to England to work and were stranded at the outbreak of war. Many never returned to their own countries. They made many valuable contributions to Rothamsted and some of these still remain to be put on record. Because this account is of personal reminiscences it

leaves aside the many aspects of Rothamsted's work of crucial value in war time such as its programme to maximise food production by matching fertiliser use to need country-wide, almost on a field-to-field basis, or the statistics department's involvement in Royal Air Force tactics. Someone must have interesting things to say about the Army's sojourn at Rothamsted Manor and the part played by certain members of staff in code-breaking at Bletchley Park. The wraps of secrecy have recently been taken from the latter, somewhat reluctantly, and a book published of personal memories compiled by Alan Stripp and Sir Harry Hinsley.

Conclusion

I hope these notes will evoke other readers' recollections. Should they do so I am confident that they will reinforce my experience of Rothamsted's golden years and underline our understanding well expressed by Medawar in *The Limits of Science*, that scientific discovery is not a premeditative activity but springs from all sorts of personnel and idiosyncratic interactions and imponderables - such as the social event of simply drinking tea.

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