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The Situation in Genetics II: Dunn's 1927 European Tour

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Introduction

In the February 2003 edition of *Mendel Newsletter* Joe Cain and Iona Layland reprinted a letter from Leslie Clarence Dunn recounting his tour of Russian experimental biology centers. This article follows on from that one, reprinting Dunn's account of the European genetic centers he visited in 1927.¹

The letter includes Dunn's evaluation of the following genetic centers:

In Great Britain:

Cambridge
Edinburgh
John Innes
Aberdeen
Rowett Institute
Oxford
Manchester
Leeds
Sheffield
Dublin
Belfast

In Denmark:

Royal Veterinary College
Carlsberg Laboratory
A number of breeding centers

In Norway:

University of Oslo

In Germany:

KWI für Biologie
Institut für Vererbungs-forschung of the Landwirtschaftliche
Halle

More details about specific locations can be gained from the letters Dunn wrote throughout 1927 to his colleague at Storrs Agricultural Experimental College, Walter Landauer.²

Dunn's letter is addressed to the International Education Board's Director of Agricultural Education, C.B. Hutchison. The Board used travelling scholars to inform them of the current state of science at different centers. The information such scholars provided was very valuable to the Board because they had a policy of funding the best scientific centers. Dunn, himself, was an American geneticist who worked mainly with poultry while at Storrs Agricultural Experimental College (1920-1928). The combination of the International Education Board's interest in university science and Dunn's particular interest in poultry genetics appears to have affected Dunn's choice of centers to visit. In Britain, for example, Dunn did not visit a number of important plant breeding centers where genetics research was undertaken, such as the Welsh Plant Breeding Station, the Scottish Plant Breeding Station and the South East Agricultural College at Wye.³

Dunn's letter

Storrs, Connecticut / Jan 26, 1928

Dr. C. B. Hutchison, / International Education Board / 20, Rue de la Baume / Paris, France.

Dear Dr. Hutchison:

Here follows the second part of the report of my visit to centers of genetic research in Europe. The report on the Russian part of my trip already has been submitted.

In Great Britain I visited the Universities of Edinburgh, Aberdeen including the Rowett Institute, Manchester, Cambridge, Oxford, Dublin, Belfast, Sheffield and Leeds, the Harper Adams Agricultural College, the John Innes Horticultural Institution at Merton, and the Rothamsted Experimental Station. If one considers genetics very broadly and includes, as is the rule in Europe, experimental embryology, physiology of reproduction and similar related subjects, then the most important center of genetic research would seem to me to be Cambridge, with Edinburgh and the John Innes Institution following. Except for some work at London and Newcastle (which I was unable to see), little work in genetics is under way at institutions other than those named. In England, however, amateurs, or men of independent means who hold no university appointment always have figured in research, and in genetics Hurst and Salamon are representatives of this type and are accomplishing a great deal.

I think the situation and the work in progress at Edinburgh needs little additional comment [to Dunn's letter to Hutchison of April 6, 1927⁴]. The work of the Animal Breeding Department has been chiefly in the physiology of sex, but this is changing, and actual breeding experiments were begun during the past year. The present experiments are chiefly with rabbits (hereditary and nutritional factors affecting wool characters in Angora rabbits), inheritance of several traits in mice, and most recently, genetic experiments with *Drosophila*. Several people are studying interaction of endocrine and sex glands in fowls. Some good observational and experimental work with sheep is made possible by the cooperation of agricultural colleges and farmers.

There are several promising young men at Eding[b]⁵urgh. The work of Greenwood on sexual and endocrine interaction in fowls and of Roberts on inheritance in sheep seemed to me the best. As I wrote previously, the scientific growth of the men in Crew's department is hindered by lack of contact with other scientific departments.

This together with inadequate library and facilities for either breeding or laboratory experiments at present are the chief disadvantages for students going to Edinburgh for genetics.

At the other Scottish Universities there apparently is little activity in subjects related to genetics. At Aberdeen there is an excellent medical school and a good department of Natural History on the old model presided over by Professor J. Arthur Thomson. I [1/2] talked at some length with Professor Thomson, and found him a most interesting man and interested in all phases of biology. The newer tendencies in experimental biology, however, have not as yet found entrance or encouragement at Aberdeen. One very promising new development is the Rowett Institute near Aberdeen, where I spent an afternoon. This is a modern nutrition institute, very reminiscent of an American experiment station in organization and aims. It is studying problems in the chemistry of the nutrition of farm animals -- especially swine, sheep, cattle, and fowls -- and is excellently equipped with a quite complete library and a new field plant in which the conclusions from laboratory studies are tested under practical conditions. I found it much the most energetic and progressive of any research institution I visited, and one from which I judge much work of practical importance will come and in fact already has come. I could not avoid the impression, however, that its efficiency and organization are maintained at the cost of some sacrifice of individual freedom and originality on the part of the investigators. It will, I think, develop rather as a "testing" institute than as a "discovery" institute, although this is not to belittle its valuable contribution to the nutrition of poultry and swine. I make these comments because it already has become a center of a good type of agricultural research for Great Britain and for the Empire, because it eventually will become a part of Aberdeen University, and because its activities show at present a tendency to expand into other phases of agricultural research which may embrace some phases of animal breeding. It already is attracting many colonial and some foreign students, and should provide an excellent training ground for nutrition chemists who will work in laboratories of the same type.

I visited also some of the farms in Aberdeenshire which have for long specialized in the breeding of Shorthorn and Angus cattle and Clydesdale horses. I had an excellent impression of the intelligence and knowledge of the breeders, and felt that with their support Scotland should offer special advantages for animal breeding research as it has for the development of practical breeding methods.

I also had an opportunity to meet poultrymen, to visit one large poultry farm and several smaller ones. The large farm was one of the best managed and most successful poultry farms I have yet seen. A most commendable feature was the presence of a number of student apprentices who after completion of a short course at a Poultry Institute connected with one of the Colleges of Agriculture, are assigned to approved farms to complete their training. Certain farms thus become adjuncts of the agricultural colleges, and mutual advantages accrue, not the least of which is the continued supply of well-trained young people for work either on the farms or in the schools.

Animal breeding in Scotland (as is true also of other branches of Scottish agriculture) is conducted on a relatively small, intensive scale, which depends rather on the quality and value of the individual unit than on mass production. It is carried on with great care, honesty, and intelligence, and it seemed to me should in the future supply scientifically trained animal breeders as it has in the past supplied superior breeding stock -- and in this the farms will play a part not inferior to that of the universities -- although a [2/3] coordinating agency is greatly to be desired. Americans, especially those from the Northeastern [sic] states where conditions are very similar to those in Scotland, may well be recommended to visit the Scottish animal breeding centers.

In England the most important center for genetics or animal breeding undoubtedly is Cambridge. I was impressed here more than anywhere else by the close and almost ideal relationship between university research and practical agriculture. Various persons and departments in Cambridge have been selected by the government and by agricultural associations as recipients of aid for research. Research is conducted as pure rather than applied science, but frequently employs agricultural animals and plants and considers actual agricultural problems, although these do not dictate the research methods or direction.

The most interesting work in animal breeding at Cambridge seems to me to center in the laboratory of physiology of the School of Agriculture under the direction of Professor F.H.A. Marshall, although the activating figure is Mr. John Hammond. Although most of the work is on the physiology of reproduction in animals, the present tendency of the work of this laboratory is to study in addition the problems of growth, fertility, and fecundity which have not yet yielded to ordinary genetic methods, and which seem to me to constitute at present the most important group of problems in animal breeding. There is at present in the School of Agriculture an excellent combination of men and environment for the study of such problems. The necessary departments of chemistry and physiology are well developed and coordinated; ample statistical resources under Professor Yule are at hand; the field and laboratory facilities for small animals, while not adequate, apparently are favorable and improving, and a large pathology and veterinary department under Professor Buxton is connected with the field laboratory. I was greatly interested in the fundamental techniques for dealing with breeding problems developed by Marshall, Hammond and their associates. Using the rabbit as material, the details of ovulation, fertilization, lactation, and fetal growth have been worked out; a considerable measure of control over some phases of reproduction has been obtained as a result of this knowledge, and by means of methods for obtaining and storing sperm, artificial insemination [sic], etc., [sic] it is now possible to fix within limits such variables as number and size of young per litter. Similar techniques have also been applied to similar problems in the larger animals, especially in cattle, and work of considerable interest is now going forward with sheep and horses. The next step after obtaining some information and control over normal processes, is to study the genetic variables involved in fecundity, fertility, and growth, and these problems now are occupying more and more of the attention of [sic] this department.

In addition to this group, Cambridge also is the oldest center of strictly genetic work in the narrower sense. Professor Punnett continues his genetic analysis of fowls, rabbits, and sweet peas while his assistant, Mr. Pease, is actively at work upon similar problems in rabbits, fowls, and the cabbage plant. Punnett himself confines his work rather narrowly to Mendelian analysis, and in this I include his study of linkage groups in the sweetpea and his present study of the linkage between fecundity and color genes in the fowl. Pease, on the other hand, shows a greater tendency to extend his work into the physiological field, and has the active cooperation of workers in [3/4] physiology and biochemistry.

One of the most promising developments at Cambridge, and one which bids fair to benefit the whole university community, is the splendid school of biochemistry, built up under Sir Gowland Hopkins. This now is housed in a fine new building, with ample facilities for work in biochemistry and physiology. The work which interested me most in this school is that of Dr. Joseph Needham and his wife, who are making very thorough and fundamental studies of the chemistry of development in the chick embryo. Needham is developing the new subject of chemical embryology, and has results which will be of great significance in interpreting the facts of growth and differentiation, and already has a bearing on the genetics of embryonic growth and mortality. At this institute also is J.B.S. Haldane, a chemist by training, but a geneticist in his interests. He is working on the chemistry of some mammalian colour patterns, and spends about half of his time at the John Innes institution, where he acts as consultant in genetics in succession to Bateson.

Other work going on at Cambridge of particular interest to geneticists is of course that of Biffen in plant breeding experiments, which I was unable to see in detail, of Herrst in genetical and cytological studies in the genus *Rosa*, and of Gray's laboratory on growth and development in fish. The general impression of Cambridge was one of great and stimulating scientific activity, especially in the phases of biology fundamental to genetics. With its combination of strong scientific departments unified by the University, an active research atmosphere, excellent library facilities, and nearness to London, Cambridge seems to me the best place for students in most biological subjects. It does lack adequate accommodations [sic] for breeding experiments with animals, although this is less serious than the absence of active encouragement of graduate study in genetics. I suspect Punnett is responsible for this, although I believe that if some facilities were provided, Punnett would welcome workers to Cambridge provided he did not feel himself responsible for them. He is essentially a lone worker, although a most cordial and genial man, and I judge a good teacher. It seemed to me time and again that a great deal of good could be done by the introduction of a geneticist of the newer type as a link between Punnett's department on the one hand and Marshall's and Biffen's on the other, with sufficient facilities and energy to start a graduate group in pure genetics. This would take advantage of an almost ideal background, and provide a cog in British genetics of which one feels the lack at present.

Oxford seemed to offer little of interest in genetics. I was unable to find there Professor J.A. Scott Watson, who apparently is interested in but not actively engaged in genetic research.

I spent one afternoon with Haldane and Miss Pellew, at the John Innes Horticultural Institution at Merton, on the outskirts of Metropolitan London. Although ostensible for horticultural research, the most active work is in pure genetics, with special emphasis on the cytology of plant hybrids. Here is gathered an excellent group of trained cytologists, headed by Newton, and including Huskins, Darlington, and several others. Genetic analysis is chiefly in the hands of [4/5] Miss Pellew and Miss De Winton, and has centered, because of the influence of Bateson, on problems of segregation, bud mutation, etc. I had the impression that the cytological studies had got ahead of the genetic ones, and that the Institute was much better for plant cytology (offering certainly the best opportunities in Britain in this subject) than for genetics. The Director, Sir Daniel Hall, who succeeded Bateson, is interested but not particularly trained or informed in the specialties under investigation, and it is to fill this lack that Haldane has been appointed to act as adviser, critic, and virtual director in the genetic phases. Under this arrangement the Institute should be an excellent place for advanced research, particularly since there now is an arrangement with the University of London whereby students may do research at Merton.

In the west of England I paid two calls especially in the interest of research in poultry breeding. The professor of zoology at Manchester, Professor Dunkerly, is much interested in poultry breeding, as chairman of a committee administering the Cheshire Poultry Station. Some work on inbreeding in fowls has been begun, not yet in a very serious way. The station is isolated, small, and has no resident scientific direction. I visited also the Harper Adams Agricultural College, near Newport, Shropshire, [in]⁶ which is located the National Poultry Institute and the oldest egg-laying contest in Britain. Due to some misunderstanding, none of the persons connected with this work were at the College when I called, so my impressions had to be gained from personal inspection and from helpers. The Institute has an excellent investigational plant for poultry, built and organized by Professor Thompson while on leave from the New Jersey Experiment Station, but there seems to be as yet no definite program of research. Students get practice in practical husbandry, but there is as yet no opportunity for advanced research. It is probable that this Institute will develop in its present direction, since the college is small, predominantly agricultural, and isolated. A new director now has been appointed -- Professor R.J. Parkhurst, of Idaho -- and it remains to be seen whether or not he will create at Newport the center for poultry breeding research for which the physical plant is ready.

At the few provincial universities which I visited (Leeds, Sheffield, Dublin, and Belfast), there is little active work in genetics. Dry at Leeds is doing some interesting morphological work on hair characters in mammals, and Cannon at Sheffield apparently is an excellent teacher and has a group of students interested in genetics without opportunities for research. At belfast [sic], Professor J.A. Scott Robertson is doing some good work on nutritional problems in poultry, and now is establishing an experimental plant for poultry research. In general, however, it probably is true to say that animal breeding research is confined to Cambridge and Edinburgh.

I was unable to see very much of the experimental work at Rothamsted, but I did gain an excellent impression of the work of Professor R.A. Fisher's department in biometry. Fisher seems to me the outstanding English worker in biometry as it relates to genetics, and is himself studying some purely genetic problems in mice. He is able to take an occasional student, and this would seem to me to be an excellent place for a graduate student interested in biometry.

I realize that this is a very incomplete picture of the situation [5/6] in Britain with respect to animal genetics. Although the centers of genetic research appear from this report to be limited in number, one should not overlook the fact that there is a very generally distributed interest in the subject, as evidenced by the large membership of the Genetical Society, and the large number of biologists who are actually involved in work bearing indirectly on genetics. This indirect interest has, I believe, a greater influence on the science than in America, for in Britain one notes fewer specialists and possibly a wider diffusion of knowledge and interest in genetics among men who remain biologists rather than genetists [sic]. I still feel that foreigners interested in genetics may very profitably spend long periods in Britain, and that those with almost any kind of special interest can be accommodated somewhere.

From England I went via France to Denmark, where my time was divided between Winge's laboratories and fields at the Royal Veterinary College, and a cursory inspection of poultry farms and breeding centers. At Copenhagen Winge and Clausen (now on leave in U.S.A.) have been very active in a wide variety of genetic and cytological work both on plant and animal material. I was interested chiefly in Winge's work on inheritance in the fish *Lebistes*, in which the peculiar type of X-chromosome inheritance is found, and in Clausen's excellent study of chromosome irregularities in *viola* species and hybrids. Winge now is beginning some very extensive breeding work with the inheritance of flower color in *verbena*, in addition to continuing his work on *Melandrium*, in which the x-y type of sex chromosome behaviour has been identified, as well as a character inherited through the Y-chromosome. His interests, however, are extremely diverse, including inheritance studies with many plants, as well as cytological studies of mouse tumors. He seems to have excellent facilities for work both with plants and with animals, and confines his attention to pure genetics, having little or no contact with problems of animal or plant breeding as such. Since Johannsen's death, Winge apparently is the chief geneticist in Denmark. Facilities are available for a few students, although I had the impression that Winge is not particularly eager to have them. I judge that Winge has a great ability in discovering problems of all kinds, and that his interests are extensive rather than intensive; and could utilize to good advantage students who would study intensively some of the many problems with which he is working. Copenhagen should be an excellent center for genetics, although on account of the natural limitations of a small country and a small university, it cannot be expected to compete in amount of work with larger centers. In Copenhagen also is the Carlsberg Laboratory, where Professor Johannes Schmidt has worked for many years on problems in physiology and general biology, including genetics. It appears to be a completely equipped biological institute, liberally supported by the socialized Carlsberg Brewery, but in the absence of Professor Schmidt, I could not get detailed impressions of it.

Thanks to Mr. Hans Folden, a leading poultry breeder and editor, I had an opportunity to visit a number of poultry farms and breeding centers. I found poultry-keeping very widely distributed and highly developed -- usually in small, carefully managed units. The breeding centers maintained by the cooperative societies are [6/7] used as centers for the distribution of pedigreed stock, as well as for demonstration. Two research stations have been established with the cooperation of the government. These were concerned chiefly with testing methods of feeding and management, and include as yet little serious research work.

In Norway I visited Professor Otto Mohr, of the University of Oslo, and Dr. Christian Wriedt, who then was government consultant in animal breeding, but now has gone to Stockholm to establish a research station in animal breeding for a private foundation. There is no provision for genetics as such in Norway. Dr. Mohr is professor of anatomy in the University, but devotes most of his time to research on *Drosophila*. He has cooperated also with Wriedt in genetic studies on dogs, sheep, and cattle, which have been made possible by the help of farmers and breeders. It is too bad that Mohr is unable to take students in genetics, for he is an outstanding investigator, and the first and chief *Drosophila* worker in Eastern Europe. Wriedt is a man of tremendous energy, and has been able to carry out important work with pigeons and farm animals only because he has been able to secure the cooperation of farmers and breeders all over Norway. He left Norway because the government itself would make no provision for work in animal breeding or genetics. In his new station near Stockholm he is to be associated with Dr. Gert Bonnier, who will work chiefly with fowls, while Dr. Wriedt will work with the larger animals. This promises to be a new center of animal breeding research. As yet I believe the new station has no university affiliation.

Finally I spent three months in Berlin-Dahlem, at the Kaiser Wilhelm Institut für Biologie. The work of this institute and of the Institut für Vererbungsforschung of the Landwirtschaftliche, also at Berlin-Dahlem, is so well-known as to require little further description. I found conditions for work in genetics at the Kaiser Wilhelm Institut almost ideal, the best I believe of any institute that I visited. Berlin and Dahlem represent the greatest concentration in men and facilities for work in genetics of any place in Europe. ◆ Cow[TT]²ens, Goldschmidt, Bann[ur]⁸, Nachtsheim, Hertwig, Schiemann, Brieger, Stern, Belar all are very active in a variety of genetic problems, and facilities both as to laboratories, animal and plant breeding space, libraries, etc., are excellent. I found the workers at both institutes most hospitable and agreeable, and appreciated especially the nearness of specialists in all fields of botany, zoology, and other sciences.

One disadvantage at Dahlem is the absence of a really complete library for genetics at either of the research institutes. The library at the Kaiser Wilhelm Institut is much the better of the two, but the files of foreign journals for genetics are incomplete, and there are practically no books on the subject at all. This is more of

an inconvenience than a real handicap, because in one of the other of the great libraries in Berlin one is able to find nearly everything necessary.

I was unable to visit other centers in Germany, except Halle, and here the work in animal breeding is of an old-fashioned almost pre-Darwinian sort, concerned chiefly with the phylogeny of domesticated mammals. There is, however, a fine collection of skeletal [7/8] material of domestic animals, and a small "Haustiergarten" where various pure races and hybrids of domestic animals are maintained. There is little actual experimental work at this institute, and I don't think that it will contribute much to genetics.

The two other places I had hoped to visit were Hannover (Dr. Krons[a] ⁹cher) and Hohenheim (Dr. Walther), where there seems to be considerable activity in animal breeding research, chiefly with farm animals.

As a summary, then, research in animal genetics is growing rather rapidly in Europe, although in numbers of persons engaged and in facilities it undoubtedly is still behind the United States. The chief centers seem to me to be Cambridge, Edinburgh, Berlin, and Moscow. It is difficult to rank these centers, but all things considered, Berlin seems at present the most important, with Moscow close behind.

If I were to choose again a place for graduate study in genetics, I think I should settle on Berlin, with Cambridge as second choice. The great advantage of Berlin, especially for an American, lies in the balanced biological group, in the somewhat different and broader conception of genetics that obtains there, and especially in the presence of such men as Correns and Baur.

This has been a long time in preparation, and I'm afraid I have lost sight of some of the chief facts which should have been included. If there are details which should be filled in, I hope you will let me know.

With best regards, / Sincerely yours, / L. C. Dunn / LCD:MWS

Endnotes

1. Dunn to Hutchison, January 26, 1928, folder: "Hutchison, CB [white folder]," Dunn papers, APS Library.
2. See the Landauer, Walter 1927 folders, Dunn papers, APS Library.
3. A survey of British sites for genetics research, 1900-1940 is given in Marie, Jennifer. 2004. *The Importance of Place: A History of Genetics in 1930s Britain*. PhD thesis. University College London.
5. Dunn to Hutchison, April 6, 1927, folder: "Hutchison, CB [manila folder]," Dunn papers, APS Library.
5. Added by Dunn.
6. Added by Dunn.
7. Added by Dunn.
9. Added by Dunn.