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Hellriegel's work at Bernburg

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Today's Institute of Cereal Research at Bernburg-Hadmersleben has developed as a successor to the Herzoglich Anhaltische Landesversuchsstation Bernburg, whose first director was Professor Dr Hermann Hellriegel. The latter's great achievements have placed us all under a particular obligation.

On 20 September 1886, Hellriegel published his new findings on the nitrogen nutrition of legumes. He scientifically explained and substantiated the faculty of legumes for collecting nitrogen, which so far had only been used empirically, and thus opened the way for an agronomy promoting soil fertility.

This great scientific feat did not fall into Hellriegel's lap by chance. As with almost all scientific progress, success was preceded by intensive and laborious preparatory work. A close study of Hellriegel's work reveals his efforts for exact work in every aspect. His method and style of work were not only exemplary for his time, but set a luminous example even for today's generation.

Hellriegel came to Bernburg in 1873, after an invitation by the Duchy of Anhalt to act as an adviser to the Government and to agricultural practice, in a capacity which was then called a 'migrant teacher'. This was a regular position which entitled him to a pension and offered him social security. In his previous activity from 1856 to 1873 as head of the agricultural experimental station at Dahme-Niederlausitz, Hellriegel had already acquired a good scientific reputation. He conducted large-scale manuring trials, and developed sand culture with exactly dosed fertilizer dressings; later, this was recognized worldwide as a standard scientific procedure. His nomination as a Prussian professor in 1869 confirmed his scientific reputation.

The years 1873–1881, when Hellriegel worked as a migrant teacher and had his residence at Bernburg, were not lost for him as a scientist. He acted in many ways in numerous agricultural associations, and thus gained good insight into the problems of practical agriculture. An essential feature of his work was that he always had a critical look at the arguments from a practical viewpoint. He therefore never remained one-sided and always paid attention to practical applications when he had to draw scientific conclusions from his trials, from literature or from consultations.

Hellriegel's successful activity at Dahme might be called an apprenticeship; in 1882 he began his master's years at Bernburg. It was mainly owing to his initiative that the Government of Anhalt established the Bernburg experimental station. The Association of the beet sugar industry took over an essential part of the cost on a contractual basis. As head of the experimental station, Hellriegel's main task was to study the nutritional and cropping conditions of sugar-beet. It was hoped that adequate fertilization would help to check beet weariness, at that time a very widespread disease in Halle-Bernburg region, caused by cyst nematodes. Because the growing of sugar-beet in sand culture was very difficult, Hellriegel and his assistant

Hermann Wilfarth conducted the experiments on other crops, such as oats, barley, lupins and peas. The objective was to develop new and better cropping methods for sugar-beet. The new experimental station was perfectly adapted to this purpose (glasshouse, pot-filling station, shadehouse, laboratory). From the results of the trials made at Dahme, it could be proved beyond any doubt that yields in cereals rose in proportion to nitrogen applications. Although some peas grown in sand culture without nitrogen dressings became completely normal plants, others were beyond help and 'died of hunger'. At first, large methodological studies and manifold fertilization trials led nowhere. Only after Hellriegel and his collaborators learnt from a publication of the Austrian scientist Schindler about a possible influence on nitrogen assimilation by the root nodules of legumes did they develop new methodological bases for further experiments. These trials were aptly planned and exactly conducted. They served to clarify the relation between the microorganisms of these nodules and the extraordinary growth behaviour of peas. In spring 1886 Hellriegel added a watery soil extract, containing microorganisms, to clean sand cultures. The results were obvious: with addition of the watery soil extract the peas in pots without nitrogen fertilization grew into luxuriant plants and formed numerous nodules at their roots, whereas without addition of the watery soil extract the plants held under the same conditions developed very poorly and did not form any nodules. Other legumes behaved similarly.

As mentioned earlier, on 20 September 1886 Hellriegel reported before the 59th assembly of the German natural scientists and physicians in Berlin about his results, which contemporaries called epoch-making. The new findings were in fact far-reaching. The detection of plant-specific forms of *Radicalicola* (species of rhizobia), and their faculty for inoculation, were the basis for the production and application of rhizobia preparations. The effects of green manuring became explicable, and the successes achieved by Schultz-Lupitz when growing legumes on light soils were given a clear scientific explanation.

By his discovery Hellriegel had become a research worker of international renown. The experimental station of Bernburg became the centre of attraction for many interested visitors from home and abroad. Hellriegel received many awards, including honorary membership of the Royal Agricultural Society of England.

In 1897, friends and patrons of the town of Bernburg erected a monument in Hellriegel's honour. On the occasion of a symposium held in his honour in 1964, the bust was transferred to the park of the Institute of Cereal Research. We commemorate Hellriegel as the founder of agricultural research at Bernburg. Tribute to his achievements was paid by a festive meeting and scientific conference of our Institute on the occasion of the centenary of agricultural research at Bernburg in June 1980 (the Inaugural Charter of the Anhaltische Versuchsstation was signed in 1880; the experimental station was opened in 1882). Thanks to the generous promotion of science by the G.D.R. Government, the successor to the 'Anhaltische Versuchsstation', the Institute of Cereal Research, Bernburg-Hadmersleben, is today a large, modern and active place of research. Because the former experimental station was located in the very centre of the town without any room for extension, it was transferred to the suburb of Bernburg-Strenzfeld.

The Institute of Cereal Research is engaged in basic research related to the breeding and yield formation of cereals, including aspects of fertilization, to the breeding of new varieties of winter wheat (including hybrids), winter and spring barley and maize, and to the further perfection of cereal and legume cropping methods. Hadmersleben is that part of the Institute

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where the well-known winter wheat variety 'Heine' has been bred. From 50 to 80% of all high-yielding cereal varieties (except winter rye) and 100% of the maize varieties grown in the G.D.R. were developed by that Institute. The spring barley variety 'Triumpf', widely grown in England, was also bred by our Institute. In the G.D.R., Hellriegel's work is not forgotten, but is continued by the Research Centre of Soil Fertility, Müncheberg, which is successfully researching into intensified utilization of the biological nitrogen fixation of the atmosphere.