REPORT ON THE ORGANIZATION AND MANAGEMENT OF SEVEN AGRICULTURAL SCHOOLS IN GERMANY, BELGIUM, AND ENGLAND, MADE TO HON. GEORGE B. LORING, U. S. COMMISSIONER OF AGRICULTURE

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A. S. WELCH

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IN

GERMANY, BELGIUM, AND ENGLAND,

MADE TO

HON. GEORGE B. LORING,
U. S. COMMISSIONER OF AGRICULTURE,

BY

A. S. WELCH, LL. D.

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LETTER OF TRANSMITTAL.

To Hon. GEORGE B. LORING,
Commissioner of Agriculture:

SIR: The following report comprises the results of a personal inspection of foreign agricultural schools and stations, made, in compliance with your request, during my late visit to Europe. In fulfilling the commission with which I was intrusted I have sought to present an *inside* view of typical institutions in Germany, Belgium, and England, with a hope of furnishing valuable information to the friends and promoters of industrial education in America. For this purpose I have described, mainly as I witnessed them, the organization, officers, methods of instruction, the spirit, equipments, and the experimentation of seven different institutions in the countries I have mentioned.

I heartily acknowledge my indebtedness to my secretary, Charles A. Keffer, for very efficient help in preparing my report for the press.

Hoping that these sketches may serve, in some degree, to improve the *ideal* of industrial education in the United States, I am, dear sir, yours, very truly,

A. S. WELCH.

AMES, IOWA, *June* 16, 1884.

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ON

AGRICULTURAL SCHOOLS IN EUROPE.

THE ROYAL AGRICULTURAL ACADEMY AT POPPELSDORF, NEAR BONN, PRUSSIA.

The Royal Agricultural Academy established at Poppelsdorf, in connection with the Bonn University, belongs to the first class of agricultural schools in the Prussian system. Though nominally attached to the University, which is located in Bonn, a mile distant, it is entirely distinct from that institution in its organization, funds, management, and purpose.

The objects it seeks to accomplish are—

1. To give complete instruction to students in the sciences on which the various arts and handicrafts of agriculture are based.

2. To give to students such a knowledge of the facilities, processes, and products of agriculture as may be learned by observation of the best methods.

3. To carry on extensive experiments in every department of agriculture for the purpose of improving its processes and enhancing the value of its products.

4. To make original investigation in the sciences which underlie agriculture, especially in their relation to its processes.

For the first of these objects the Academy has a faculty of learned men whose lectures are comprehensive and minute; for the second, a well-managed farm, gardens, domestic animals, and collections for demonstration; for the third, extensive experimental grounds and stables; and for the fourth, the numerous laboratories under the direction of scientific experts.

THE FACULTY.

This body is composed of the director and eighteen professors, each of whom has charge of a single agricultural science or art on which he gives lectures, conducts experiments, makes examinations, &c. There are other officers, such as recorder and his clerk, and each professor has one or more assistants. The director and professors constitute a council

which has oversight of the general interests of the Academy and the harmonious arrangement of its various operations.

The director is the general executive officer and president of the faculty. He has control of all the funds appropriated by the Prussian Government for the support of the institution, reports annually to the minister of agriculture, and is held responsible for all matters not special to the departments.

THE STUDENTS.

In his published statement the director declares that two classes of students may avail themselves of the advantages offered by the Agricultural Academy:

1. Those who desire to qualify themselves for the duties of landlords or the management of large landed estates.

2. Those who, while pursuing a course of studies at the University, wish along with this to gain a scientific preparation for any of the professions connected with agriculture.

In practice, however, any young man of the middle or of the higher classes who has graduated from the Realschule (German high school) or passed the studies of the first two years of a German Gymnasium, is admitted to either of the two courses in the Agricultural Academy. It is required that the applicant should send in his papers, showing that he has passed the examinations alluded to in one of the above institutions before his name can be enrolled as a member of the Academy.

GOVERNMENT.

No personal control or influence is exercised over the student. His name is enrolled on presentation of the required papers by each professor to whom he applies as a member of the class, but no account is taken of his presence or absence thereafter, and if he leaves without ceremony no notice is taken of the fact. The only restriction of which I could learn is the regular term examinations and the impossibility of maintaining the rank in scholarship essential to a diploma without passing them. There are in attendance 85 students, 45 in agriculture proper and 40 in agricultural engineering.

THE TWO GENERAL COURSES OF INSTRUCTION.

The courses of instruction are divided into two general curricula, one of which comprises the various sciences and arts in agriculture proper, and the other the branches preparatory to agricultural engineering.

At the opening of the next academic year a separate course in land surveying, constituting one year's study only, will be added to the course in agricultural engineering, which thus augmented still requires an attendance of two years for the final examinations and diploma. The engineers will hereafter be required to have passed all but the highest class of a German Gymnasium.

NEW COURSE IN FARM ENGINEERING.

The modified course in agricultural engineering will embrace—

First year. A course in surveying and natural sciences.

Second year. Hydraulics, mechanics, engineering, drainage, improvement and cultivation of moors, regulation of rivers, road building, &c.

The two curricula already noted include the following sciences and practical arts, which are invariably taught by lectures:

I.—*Introduction to agricultural studies:*
- (1.) Encyclopedia of Agriculture.
- (2.) Agricultural methods.
- (3.) History and literature of agriculture.

II.—*Natural sciences:*
- (1.) Mineralogy and geology, with practice in the minerals.
- (2.) Economic botany and plant diseases.
- (3.) Zoology, with anatomy of the domestic animals.
- (4.) Physics, with experimental practice.
- (5.) Chemical manipulation.
- (6.) Physiology, with practice on plants and animals.
- (7.) Agricultural chemistry; analysis of plants and manures; analysis of fodder and fodder mixtures.

III.—*Geodesy:*
- (1.) Pure mathematics, analytical geometry, and higher analysis.
- (2.) Field measurement and leveling, with practice in the use of instruments.
- (3.) Practice in adjusting and measurement with instruments.
- (4.) Land measurement.
- (5.) Topographical exercises in land triangulation.
- (6.) Practice with the aneroyd and tachymeter.
- (7.) Geometrical and topographical drawing.

IV.—*Technology:*
- (1.) Encyclopedia of Technology.
- (2.) Meadow making, drainage, drain irrigation.
- (3.) The study of ground for highways and water-flows; management of running water.
- (5.) Mechanics, specially of agricultural implements.
- (6.) Geometry as applied to field measurement.
- (7.) Descriptive geometry.
- (8.) Highways, water management, and street making.
- (9.) Practice in constructive drawing.
- (10.) Agricultural economy, technology.

V.—*Sciences of public economy and law:*
- (1.) National economy.
- (2.) Political economy.
- (3.) Laws relating to land.

VI.—*Agricultural arts under the different departments:*
- (1.) Field and plant culture.
  - *a.* Climate and soil, manuring, soil preparation, agricultural implements and machines.
  - *b.* Special plant culture.
  - *c.* Forage plant culture.
- (2.) Horticulture.
  - *a.* Wine culture.
  - *b.* Fruit culture.
  - *c.* Raising of vegetables.
  - *d.* Beautifying the land.

VI.—*Agricultural arts under the different departments*—Continued.

(3.) Forestry.
  a. Tree culture and forest protection.
  b. Profit of forestry, forest management.
(4.) Art of breeding.
  a. General principles of breeding.
  b. Special breeding, breeding of the horse, breeding for beef and milk, sheep breeding, breeding of small animals, bee breeding.
  c. Health of house animals.
  d. Shoeing and animal obstetrics; diseases of the house animals (acute and chronic).
(5.) Laws of business.
  a. System of accounts and balancing.
  b. Farm accounts.
  c. Records of property.
(6.) The relation of the industrial sciences to agriculture.

The extensive facilities for illustration are embraced in the following list:

1. The experimental ground.
2. The economic botanical garden.
3. The garden for illustration of fruit and vegetable culture.
4. The chemical experimental station.
5. The physical and chemical analytical laboratories.
6. Laboratory of plant physiology.
7. Laboratory of animal physiology.
8. Laboratory of field experimentation.
9. Hall of machines for trial. Implements and machines, with steam engines.
10. Mineralogical, botanical, and zoological collections belonging to the Royal University.
11. Forest collection, wood specimens.
12. Models for instruction in architecture.
13. Collections for instruction in anatomy.
14. Agricultural collections.
15. Technological collections.
16. Models of agricultural tools and machines.
17. A special library of the industrial sciences and arts, 6,000 volumes.
18. Technical libraries belonging to each department.

I shall give detailed accounts of many of the above collections in subsequent pages under "Methods and Facilities for Instruction."

COLLECTIONS.

The scientific collections belonging to the general equipment of the Bonn Agricultural Academy and kept in the different laboratories far surpass in extent and completeness those which are found at kindred institutions in the United States.

In the first place, the vast museums of Bonn University are all open to the students of agriculture at the Academy. Each of these contains, often in a separate building, collections made in a single department of natural history, which in many cases comprise all the known varieties yet discovered. The museums of zoology, ornithology, entymology, paleontology, anthropology, &c., are extensive and full, and some of the