Agricultural Colleges and the Farmer

Written for The Bee by W. M. Beardshear, President Iowa State College and President National Educational Association.

AMONG the marvels of progress at the opening of the new century is what the agricultural colleges are doing for the farmer and mechanic. In general scope agricultural education helps to make ten acres do what 100 acres used to do. It develops the possibilities of a better soil, a richer plant, a fuller harvest and a fatter pocketbook. It teaches the breeding of better animals and more profitable markets. It makes 20-cent butter out of the same materials as former 12-cent butter. It harmonizes the points of the plow and the pen. To be specific, in agricultural education the youth is taught to study the causes and remedies of animal diseases. Veterinary science does much to prevent the spread of contagious diseases. Many of the minor diseases that affect domestic animals are brought under reasonable control. In the dissecting room the anatomy of domestic animals is studied as carefully as that of the human subject in medical colleges. The youth is taught proper care, handling, breeding, rearing and marketing of these animals. The value and profit of domestic animals are promoted millions of dollars through veterinary science.

The agricultural college trains men for government services in meat inspection, inspection of vessels, cars and yards against infectious diseases and the rapidly widening work of the United States Bureau of Animal Husbandry.

Animal Husbandry.

The young farmer is taught the laws of heredity, selection and variation as fundamental to stock breeding and rearing. The college keeps on hand only pure-bred animals as object lessons of the several breeds, for the student of agriculture. The farmer is taught the comparative merits of the breeds. The new questions arising, like that of the bacon hog, mutton and wool sheep, the dairy cow and the best beef-producing animal are undertaken with the sole view of determining what is advisable and desirable for the farmer. The practical money sides of rearing these animals are followed with great painstaking and eminent results. Young animals of the leading breeds are estimated from the sire and the mother, in cost of food, worth of product and handling, all the way to the butcher's block and the cash returns. The relative merits of the dairy animals, with their cost per day, their reward of profit and permanent value to the owner are determined with remarkable skill and clearness. The losing money battle from a poor animal of any kind is portrayed. The relative merits of animals for specific purposes, like sheep for mutton or wool, swine for bacon or lard, cattle for market or beef and horses for drafting, roading or speed, are all scientifically determined and results tabluated for the coming farmer.

Entomology.

In the science of insects untold aid has been given to the farmer by agricultural education. The determining and prevention of any pest upon any farm product is often of the most far-reaching moment. The insect pest may be, in certain localities, destructive to some entire field product and materially affect the markets of the nation. The ravages of the chinchbug are well known. An insect like the potatobug may affect the entire raising and market. Fruits are especially subject to the prey of numerous insects. Animals are also depreciated by lice, ticks and pests of kindred nature. Through scientific research insecticides have been provided and the knowledge of their appliance put within the easy reach of the farmer. The insect world is carefully studied and classified to secure acquaintance with their types and habits. Their life history is studied in connection with the grass, trees and animals upon which they exist, so that, when any species become numerous and destructive the practical and economical questions bearing on their subjection and destruction can be determined readily for the farmer. The San Jose scale, which proved so destructive to fruits in certain localities, is a good illustration of how the agricultural college can study its nature and endurance in different latitudes, its liability to spread, its destructive characteristics and its preventives. By stringent laws of the various states under the direction of expert entomologists this scale has been kept from spreading. Recently report was sent in to the Iowa station that San Jose scale had occured on rose bushes at a prominent city in a certain state in which is located a large nursery. The proprietors of this nursery had thirty-five cars of stock prepared for the spring market in all parts of the union. This report threatened the entire output. Entomologists, by investigation, found that it was not San Jose scale at all and were able to give a certificate to the owners to that effect, thereby saving them many dollars. This is a sample of the many different methods of information and help to the farmers.

Horticulture.

Many varieties of fruits that would not acclimatize in certain latitudes have been tested and thrown aside. A number of varieties of apples, cherries and plums have been tested and introduced, proving of untold wealth and blessing to the farmers in the hybridization of fruits. New varieties have been produced that have materially promoted the welfare of the farmer. Shrubs and ornamental plants have been brought from afar and placed within easy reach of his family. Central bureaus of information, wide in scope, practical in application and most valuable in character have been established through agricultural colleges.

Botany.

In botany the farmer is greatly benefited by the investigation of diseases of cereals, trees and shrubs and horticulture and plant life. The rust and smut of corn, rust of oats, wheat and barley are investigated to the profit of the farmer. Diseases which prey upon grasses are studied and often corrected. Diseases of fruits, like the cherry, currant and others, are studied to the discovery of a successful mixture to prevent the increase of the disease. The fungus diseases of the sugar beet have been studied and information given for the prevention. The rot of the turnip and the rutabaga, which has proved destructive in some parts of the country are treated first in the college and suggestions made for correction. A disease affecting alfalfa has been a matter of research, and in regard to it valuable information is given to the public. The whole question of forage plants is greatly promoted by the botanical department. In the government at Washington an entire section is devoted to work of this kind. Bulletin No. 9 in agrostology, under the United States Department of Agriculture on grasses and foreign plants of Iowa, Nebraska and Colorado, was prepared by the botanical department of the Iowa State college.

WILLIAM MILLER BEARDSHEAR

A few years ago a so-called forage plant named sacaline was heralded over the country as a great discovery, a fresh boon to the farmer. Its fraudulency was determined by scientific investigations of the agricultural colleges. Corn, the great staple farm product of the corn belt, is investigated from the botanical standpoint as to the seed, its vitality, its resistance to drouth and its economic features. The subject of weeds received much advantageous attention, with a view not only of determining the various effects upon crops, but the more economical methods of prevention and destruction.

The Dairy Farmer.

In recent years the agricultural college has done remarkable things for the dairy farmer. It has helped him to see the vast difference between quality and quantity of milk. It shows him that in the skimmed milk of the farm that he daily throws away one-sixth to one-fourth of the butter fat in his milk and teaches him how to save the one-sixth and one-fourth. It teaches him the individuality of the dairy cow, how to determine the worth of that cow before he buys her or disposes of a worthless animal that eats off its head and shrinks his pocket. It is bringing him to realize the marked increase of profit in the careful sanitary and cleanly condition through which he takes his milk product to the creamery. It is leading him to discover new processes in the ripening of cream, in the securing of richer flavor for his butter, a larger and better product. It enables him to produce 18 and 25-cent butter, where before he had an article much of which brought 12 and 15 cents a pound. The college has brought the science of bacteriology to disclose its secrets for the enlightenment and enrichment of the entire dairy interests. More than this, it has sent out young men equipped to make butter and cheese in the creameries of the states that command the tops of the markets, not only at home, but in the markets of London, wherein the products of the whole world center. Of such value have these workmen proved that they have been awarded many of the first prizes and gold medals in competing with the workmen of the country.

Domestic Science.

In domestic science the college is doing much for a higher home life. The sanitary conditions of the full life in the home are promoted by teacher and pupil. Many have been made more intellectual and practical in home-making and home-keeping. Many students are taught in regard to location, construction, finishing, furnishing, lighting, heating and cleaning of the house, the buying and serving of the food, the selecting, designing, making and cleansing of the clothing, remembering that

We may live without books,
But civilized man cannot live without cooks.

In the report of the secretary of agriculture, our own Mr. Wilson and the nation's most efficient secretary of agriculture, there is a section devoted to the work of domestic science in agricultural colleges in which he says: "In the great work of helping the women of the land, nearly half of whom are toiling in the homes upon the farms, this department, it is believed, has a large duty to perform. For whatever will be effective in raising the grade of the home life on the farm, in securing the better nourishment of the farmer's family and in surrounding them with the refinement and attractions of a well-ordered home, will powerfully contribute alike to the material prosperity of the country and the general welfare of the farmers."

Mission of the Experiment Station.

The government at Washington has most extensive offices, departments and sections embracing as a whole the questions having to do with scientific agriculture in our country. Questions that are too costly for the individual states are first taken up by the national government. The crops and local needs of the respective states vary greatly. In the south cotton would be a prominent question, while in the north corn would hold chief place. It is the mission of the Iowa experiment station to be the distributing point to the farmers of Iowa of the most recent and valuable information along the various lines of scientific agriculture. More than this, the government expends $15,000 a year for the adoption of the most recent discoveries and problems to our Iowa soil and climate. We make original investigations of soils, crops, animals and diseases having specifically to do with the Iowa farm and farmer. These results are distributed free of cost to all who apply for them. To describe the benefits of the experiment station itself would require a volume.

I have not time to mention the other great departments in the state colleges of the land. We are equally as proud of mechanics, of engineering, of sciences and military tactics, and of the higher education of women. We are for the man with his coat off, with his head and hand skilled for more useful labor and the peer of the man trained in the professions. We are for the woman dispensing sweetness and light, with her head and hand skilled in her own defense. Congress designed by the land grant of 1862 to make agriculture and the mechanic arts the leading and chief types of the industrial classes and give the children of these masses an education that would be equal in degree to the training of the professions and would enable them to successfully compete and enjoy, in the struggle of life. W. M. BEARDSHEAR.

How the Yankees Built a Bridge in Burmah

A STEAMSHIP recently arrived at New York with a little group of men browned to a copper color by exposure to the tropical sun. As they reached the dock a number of people waiting to meet them gave each a hearty handshake and extended congratulations. In the engineering world this group will be long remembered as the men who put up the greatest railroad bridge in the world in a country none of them had ever seen, amid trials and troubles which might be expected to discourage anyone but a Yankee engineer.

Two or three years ago the surveyors of a railroad line in Burmah came to a hole in the ground which was so deep that it seemed as if a balloon would be the only way to cross it. This was the Gokteik Gorge. To go around it would require twenty or thirty miles more of track, and the question arose whether it could be spanned by a bridge. The general officials of the company thought it could if the right men could be found to undertake the work. Several American firms were invited to put in bids and one of them, the Pennsylvania Steel company, secured the job. It was a case of hurry from start to finish for the work must be done within a year from the time the contract was let. The steel for the towers, girders and other work had to be turned out at the works, shipped to New York, loaded on board vessels, carried to Rangoon, loaded on cars and then transported 450 miles to this hole in the ground. Special machinery had to be built to put the bridge together and to raise the different pieces and hold them in position. In all about 5,000 tons of metal alone were required for the work, the bridge itself taking 4,852 tons.

Long and High.

From one side of the valley to the other was nearly half a mile. For two-thirds of this distance the railroad track had to be laid at heights ranging from 100 to 250 feet above the ground. Then came a drop of 320 feet to the top of a bridge nature had thrown across one of the mountain rivers of southern Asia. Upon this natural bridge, just wide enough to form a safe support, heavy steel towers were riveted together to such a height that the men working upon them at the top looked like insects to the observer from below.

As soon as the cablegram came from the Burmah Railway company accepting the American bid, a special force of workmen was selected to turn out the material as rapidly as possible and the bridge department worked day and night. As fast as the columns and girders came from the shops they were piled in the railroad yards and painted to prevent rusting. Ordinarily when a bridge is transported in sections each part is lettered and numbered to indicate its parts and position in the structure. But it was borne in upon the company that it would have to depend for its labor upon the East Indian coolies, who knew nothing of American letters and numbers nor, probably, of any other kind. But even a coolie can tell colors, so the trusses, girders and columns were painted in one color and the pieces used to join them were striped, while the metal work for the bridge construction machinery was painted dead black. Subsequently some trouble developed because two of the native firemen were color-blind, but in general the scheme worked well. To move the mass of machinery required three different steamships.

Delights of the Climate.

When the construction gang reached the spot the first thing they had to encounter was the rainy season. The locality is in the mountains 4,000 feet above sea level, where it is so cold at night that a man shivers under heavy blankets and so hot at mid-day that no man with a white skin can live in the sun glare. During the rainy season the clouds seem to literally open in this part of the country and the water comes down in torrents from sunrise until afternoon, drenching and soaking everything, so that it is impossible to do anything but remain indoors and wait until the rain stops.

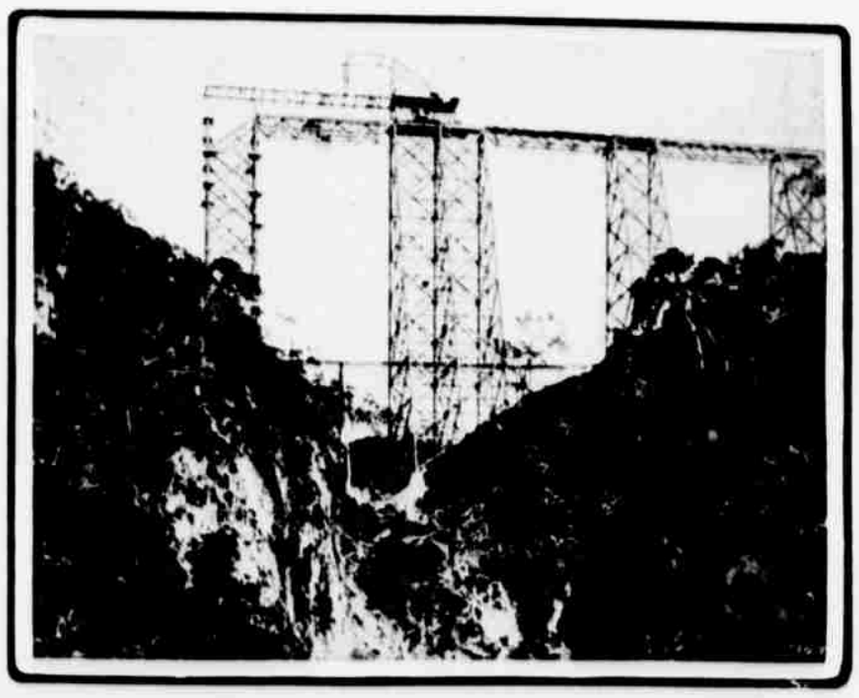
The work, particularly in its initial stages, was performed amidst various perils. In the depths of the gorge, matted with underbrush and scattered with huge rocks, lurked the deadly snakes of India. Some of the coolies were bitten and died. Poisonous vegetation also affected the men and vapors arising from the depths of the ravine bred low fever in American bones. There were beasts of prey, too, but, although they were seen and heard prowling about the camp at night, the bridge builders suffered nothing from their depredations except the loss of some live stock. The incessant rains turned the ground into liquid mud and the masons laying the stone foundations for the towers were held back ten weeks. At last these were completed and then the "traveler" was put in position.

This was a mechanical giant, the largest by far ever used in bridge construction. It lifted and lowered the tons of steel and held them in its grip while the men fastened them into place. Although in the photographs of the work the traveler looks to be only twenty or thirty feet in length and to weigh perhaps four or five tons, it extended from its support on the end of the railroad track a distance of 165 feet over the gorge and contained ninety tons of metal alone. The beams or trusses which formed its lower portion were 219 feet in length and from its top to the railroad track was forty feet. To keep this immense weight from toppling over a counter-weight of seventy-five tons was loaded upon the rear portion, which was mounted on wheeled trucks, so that it could be rolled along as the bridge was erected.

The little band of thirty-five Americans put the mammoth bridge together from side to side of the gorge in a little over eight months after the work was commenced. The bridge is so strongly built that it will support a train of loaded freight cars reaching its entire length, in addition to four locomotives weighing fifty-four tons each. Owing to its great height it must be strongly braced to withstand the force of the gales which sweep down the valley at a velocity of sixty or seventy miles an hour. The engineers had to calculate upon these and other delicate points, but tests made after completion show that they calculated to a nicety. It was expected in building the bridge to have the aid of compressed air in boring holes through the steel and fastening the rivets, but when the 500 natives who were employed as laborers heard the hissing and noted the effect of the unseen force they believed it to be something supernatural and not one of them could be induced to touch the compressed air tools. As a result all of the bolts and rivets, nearly 200,000, were fastened in the old-fashioned way by hand hammers. This delayed the work about one month.

The Gokteik Viaduct, as it is known in Asia, is located upon the principal railway between Rangoon and the Chinese frontier. It is the highest bridge in the world with two exceptions—the Pecos viaduct in Texas and the Loa bridge in South America. It is 100 feet longer than any other railroad bridge in the world and contains 1,500 tons of metal more than any other, the next largest being the new bridge across the Kinzua valley in Pennsylvania. The Kinzua is but 2,053 feet in length and is nineteen feet lower than the Gokteik. The natural bridge upon which the Gokteik structure rests is one of the wonders of Asia, being an arch 200 feet in thickness and about 500 feet long. Ages ago the river which flows beneath worked its way through the barrier. Photographs taken from the bed of the stream when the traveler was completing the last towers showed the columns and girders in the bridge structure like delicate lace work, so small did they appear, while the top portion of the traveler was actually invisible.

The work was done under the supervision of J. C. Turk of New York, as engineer for the Pennsylvania Steel company, under the general direction of Mr. J. V. W. Reynders, general superintendent of the bridge department, who prepared the drawings for the structure. The bridge cost $750,000, or $310 a foot. Of the little band of Americans who went half way around the world to do this work, every man came back alive and hearty, but with the memory of one of the most trying tasks ever completed by Yankee pluck and ingenuity.



HIGHEST PART OF THE BURMAH BRIDGE

The New Reporter Again

Baltimore American: "That's a very poor story—very poor, indeed," growled the city editor to the new reporter, who had just turned in his account of the fire.

"What's the matter with it?" asked the n. r., who was an inquisitive youth.

"Matter? Why, man, at no point in the narrative do you refer to the brave fire ladies."

The new reporter returned to his desk in sadness, feeling that the intricacies of journalism were many indeed.