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APPLE GROWING IN WESTERN NEW YORK
By Willis T. Mann.

APPLE growing is one of the most important agricultural interests of Western New York. Within the limits of the territory thus, somewhat vaguely, described, there are about eight million bearing trees with a productive capacity of approximately ten million barrels. This amount is exceeded only by two states besides New York,—Ohio and Pennsylvania, and it also approximates one-fifth the usual commercial crop of the United States. It has reached its greatest development in four counties bordering Lake Ontario,—Niagara, Wayne, Monroe and Orleans. These four counties contain more than three million bearing trees and have a productive capacity of nearly four million barrels, an amount that is equaled by only twelve states, and if we take commercial availability into account, by considerably less than that number.

The acreage of apple orchards included in this territory is about two hundred thousand. We have no data by which it is possible to estimate with any degree of accuracy the value of these orchards. Some of the better commercial orchards have given incomes for a series of years that would justify a valuation of one thousand dollars or more per acre. If we should estimate the average orchard at two hundred dollars per acre, which would seem to be very conservative, it would indicate a valuation of forty million dollars. However, it is certain that in the counties of commercial importance, apple orchards give tone to farm values, and the price of farms is largely based upon the amount and character of the orchards upon them.

Favorable climatic conditions and soils of great variety make it possible to raise a great number of varieties in a high degree of perfection. The earlier plantings, which were for family use and not for commercial purposes, were largely of varieties of interest and value to the amateur but not now valued by the commercial grower, owing to special liability to attacks of insects or diseases, or to some other unfavorable characteristics of tree or fruit. Some of these old orchards still stand as reminders of simpler days, when the apple had no commercial value, and every fancy of eye or palate might be gratified. Many of these old varieties are of high quality or possess other features of special merit, and might now be raised successfully for a personal market. They are not, however, of that rugged nature that commends them to the general commercial grower, or to the "trade," and so they have had to give way to fruits of the modern commercial type, of which the Baldwin is the great leader in this section. The Rhode Island Greening, the Spy and the King, much better in quality, are important commercial varieties but do not equal the Baldwin in popular favor for commercial purposes. New varieties of the type of the Duchess of Oldenburg and the Wealthy are finding popular favor on account of great productiveness and early bearing.

The soil is not only in great variety, but it is of high potential quality. It was formerly thought to be impoverished or exhausted but more recent experience has shown that under proper treatment it not only contains all the elements needed for the health and vigor and productiveness of the tree but in some cases, at least, the addition of mineral fertilizers is of no apparent value. The growers are coming to understand that the mechanical condition of the soil, its supply of humus and of moisture are essential
factors of fertility and so the growth of hay and farm crops in orchards, has given way to tillage and cover crops. But with the increase of knowledge of scientific principles, and of experience it is recognized that it is a question of conditions rather than of methods, so there is great diversity of practice even among the most successful growers, though the tillage and cover crop system has been the most significant feature in soil management in those sections of greatest commercial importance.

Under the old conception of the fruit as a secondary product, and the farm crop as first in importance, the trees were trained high to facilitate working under the branches. The tillage idea still requires that the branches shall be sufficiently high to permit teams to pass under them, but the desirability of lower heads than formerly is generally recognized. In many of the older orchards in which the trees were planted too close and were permitted to remain, the lower branches have died from lack of air and sunshine and the trees have become very high and now afford but little profit owing to the difficulty of proper spraying and the great cost of harvesting the fruit. Many of our most far-sighted growers, however, recognizing the need of air and sunshine for health and vigor of tree and fruit, have trained their trees so that they have ample room, and the lower branches have remained in full vigor. Such trees have a great spread of branch and great productive capacity. The increasing need of thorough spraying and the difficulty of treating high trees, as well as the greatly increased cost of harvesting the fruit is impressing upon the growers the need of a minimum size and height of tree.

Without doubt the most characteristic feature of apple growing in Western New York at the present time is the general use of the spray pump. About fifteen years ago it was first used in a practical way by some of the most progressive growers. For several years its use was considered experimental and for only about ten years has it been generally acknowledged as a practical operation. Since that time its use has become general in all the apple growing sections, and today the spray “rig” with its high tower upon which the operator stands, and the long lines of hose and extension rods is one of the familiar sights of the fruit growing sections during the spring. The small hand pumps and barrels which were first used, even by the largest growers, have given place in many of the larger orchards to power machines operated by steam or gasoline. By this operation the trees and fruit are protected to a large extent, from parasitic insects and fungus diseases, thus improving the quality of the fruit and insuring a greater regularity of crop production.

Storage warehouses and evaporating establishments have greatly increased in number, thereby giving greater stability to the markets, and making it possible to utilize the inferior grades.

The harvesting of the crop requires not only all the available help of the country districts but many hundreds of men and women from the cities. The difficulty of securing an adequate supply of help to properly handle the crop within the limited time in which the season permits, constitutes a serious problem with growers and requires the utmost economy in methods of handling. The fruit as picked from the tree is usually placed upon a sorting table where it is rapidly sorted and the better grades put in barrels which are delivered to the storage house, the inferior grades are delivered to the evaporators.

There is perhaps, no branch of farming that illustrates better the remarkable improvement of the past twenty years, in agricultural conditions. The progress in apple growing in these years has not been so much in the increase of acreage as in the increase in the knowledge of scientific principles and their successful application to existing orchards. The value of scientific investigations and teach-
ing have been demonstrated and the natural conservatism of farmers to the application of scientific theories to practical agriculture has been overcome and the value of agricultural education is generally recognized. The ready acceptance, by the farmers, of these new ideals was no doubt made possible by the increasing difficulties of production and the depressed condition of general farming, during the years immediately preceding and following the beginning of the last decade. The great increase in insects and fungus parasites, and general neglect had resulted in repeated failures, until growers began to lose faith in the value of apple orchards, and in their ability to make them productive. It was thought by some that there might have been an unfavorable change in the climatic conditions, or that the soil had become exhausted of the elements of fertility.

The experience of the past ten or twelve years, however, have shown that we were, in reality, face to face with a new era in agriculture. One in which the farmer must become a student and mentally alert, as well as a man of physical activity. We have studied insect life in its many forms; we have learned about fungus diseases and their destructive powers; we have studied soils, and the conservation of moisture, and the use and effects of tillage, and of cover crops, and the relation of micro-organisms to soil fertility; we have learned that a farm crop or hay in an orchard is inconsistent with good horticultural practice. We are also learning the importance of sunshine and air, and of ample space if we want fruit instead of timber. We have introduced and developed the practice of spraying to protect our plants and fruits from insect and fungus parasites. We have learned something about these and many other things and our practice has reflected in some degree, our knowledge and as a result our orchards have again become productive and we have become optimistic in regard to our ability to solve new problems and to control adverse conditions. We realize that new problems are continually rising and that our present success is not a finality, and we are aware of the growing competition with other apple producing sections; but, we again believe that the soil and climate of Western New York are peculiarly adapted to the apple and that it only requires skill and intelligence to assure success in production; and, that the great productive capacity of our orchards as compared with many other sections; the quality of our fruit for commercial purposes; the multiplication of storage warehouses where it may be held many months, giving it the character almost of a staple; our location with reference to the great markets of our own and foreign lands; and our shipping facilities, are all favorable conditions that tend to our advantage.

The commercial side of agriculture has been neglected but the great productiveness of our orchards is compelling us to study all those questions that relate to the commercial value of our product. We are interested in the methods of handling in the orchards and storage; and in the kind of package and manner of packing; the proper grading and classification; facilities and methods of transportation; the output of competitive territory, and the probable consumptive demands; and even in those social and political conditions which may affect the financial condition of consumers and their ability to purchase our products.

The orchards of Western New York are not large individually. There are few, if any, great plantations, and these improvements have been a result of a popular movement which denotes a high average of intelligence. In each community there were individuals who first demonstrated the value of improved methods but these were quickly followed by others. Men of very moderate acreage often demonstrated most conclusively the value of intensive methods of culture and treatment.

But all have been ready to acknowledge the value of the scientific investigations of the specialists of the agricultural college and the experiment stations.
ONCE upon a time, about a quarter of a century ago, there was a man with one talent who planted a vineyard of one acre. Grapes were then worth about forty cents per basket, which gave him an income, that from his point of view and also that of his one talent neighbors, meant prosperity.

In due time he died and went to his fathers. The ownership of the one acre vineyard fell to his son, who happened to be a one talent man also. The prosperity of the sire was not for the son’s enjoyment for but a few years. A psychological disease swept through the country, known as “Grapephobia.”

Some people had more concern for the opportunity to plant grapes than for the salvation of their immortal souls. Many hundreds of acres of common side hill cow pasture became vineyards.

The price of the fruit fell from forty cents per basket to ten cents. The profit in a basket of grapes was so small that it could be determined only by a process of decimal fractions and that so small as to seem of no account when compared with ones needs. It was only when the baskets were aggregated in a carload that a vineyard seemed worth while. The production of grapes by the carload instead of by the basket was beyond the man with one talent and one acre. That was his capacity and he could not develop farther, any more than he could lift himself by his own bootstraps.

During the disease — grapephobia, spoken of, there drifted into the business a few men having ten talents. They had capital and executive ability and knew the value of technical farm knowledge. They were aware of the importance of doing the three rights in conjunction; viz, the right thing, the right time, and the right way.

Thus began a new era in the grape industry, that of estimating the unit of profit by the carload rather than by the single basket, and there followed a new classification of vintners—the basket vineyardists and the carload vineyardists. The basket men are slowly dropping out of the business. Not by selling their land and homes to the carload vineyardist and becoming his hired men as some self-styled economic writers would lead us to think, but rather by taking up some subsidiary crops, for the details of which the carload man has no time.

I am glad of the opportunity to give the above picture of a situation that ought to interest young men who are students of agriculture and who in the main will find occupation in teaching academic agriculture rather than demonstrating bread and butter agriculture. The latter is not an over-crowded profession for there is today more room at the top than there was twenty-five years ago. I have a friend who says I may be right, but the climb is harder, for the spare room is higher up.

The grape belt of Chautauqua means a valley lying along Lake Erie from three to five miles wide. It begins, say at Silver Creek and laps over in Pennsylvania to Harbor Creek.

Sometimes we say the area planted to grapes is 28,000 acres. When we feel boastful and wish to magnify ourselves, we call it 30,000 acres. The total yield last year was about 6,000 carloads. About 3,000 tons of this went into grape juice and something less than that into wine. The Italians are becoming largely interested in the production of the latter which is made to suit the taste of their countrymen.

Writers who have “read up” more than they have “worked up” on the subject of grape culture open a chapter with “always select a southern exposure.” Of the 6,000 carloads produced last year, not a carload grew on soil not having a northern exposure.
Ten years ago we spoke of the yield per acre as four tons, very much as we speak of three miles per hour as being a fair gait in walking. A vineyardist having a greater yield than that had the right to brag—less than that, he should apologize. Those were days when we put up 40 to 60 buds against spraying—the remedy for insect troubles. They may feel that ultimately it will have to come, but like going to the dentist with an aching tooth, they will jam some cotton and camphor into the cavity and let it go for the present.

I estimate the new acreage planted to the vine but we don’t do it now. At present 25 to 35 buds is a fair number. This decline is due to bugs, slack cultivation and impoverishment of soil.

Plenty of people will differ with me in placing insects as the chief factor in the decline. They have a prejudice last spring as about 2,000 acres. This should not be considered as an increase of acreage, but rather as making good the decline of the old. The popular view is that it is better to install a new vineyard than to pull an old one out of the grave and bring it back to life.

AUTUMN

Every season hath its pleasures;
Spring may boast her flowery prime,
Yet the vineyard’s ruby treasures
Brighten Autumn’s sob’rer time.

Moore.
THE practice of horticultural inspection is comparatively new. The knowledge that some ills are contagious and by the exercise of control preventable in their spread, is knowledge which led to the rules of restriction laid upon the ancient leper.

Owing to the increased light which science has shed in recent years upon the nature of contagious troubles, the benefits which properly adapted measures of control may give have become much more apparent, and men have been quick to fight when the nature of their enemies was disclosed.

Those who carry out campaigns of this order can find use for executive ability. It was a game of war which Col. Waring waged with success against yellow fever in Havana. He applied not so much the doctor's skill as business enterprise. He added the element of action to the knowledge which was common property of both Spanish and American physicians.

The efforts at organized control of plant pests and diseases, represent the efforts of practical men who realize that the spread of specific troubles can be retarded by means within the control of a body of citizens although beyond the control of any single individual. The strength of union is necessary to effectively use prevention as a cure, and the extent to which people will unite when called on, determines the limitations of such efforts. Some personal liberty must be curtailed for the public good, and just here, I believe, is the reason America is behind Germany and some other nations in the growth of organized measures of prevention. An American citizen probably more than any other holds his home as his castle, and his rights as an individual far higher in general than the rights of his neighbors. Yet when aroused by impending danger which he is convinced is real, no citizen probably goes to work with more zeal to use whatever measure of protection may seem efficient.

Were all individuals equally well posted, all might be ready to join in measures for common welfare just as they join in putting out a village fire, and laws would be unnecessary; but particularly with new plant pests, there are sure to be unconvinced parties who will want to experiment until perhaps the experimenter loses control and a whole community suffers.

It was noted how nurseries serve as centers for the distribution of new plant pests and it followed that care of these small centers would be a protection to a wide territory. While other troubles were specified in the law and the provision was so made that any dangerously injurious disease or pest would be covered, yet the immediate object was to retard the spread of the San José scale and to provide a system in readiness for another such emergency.

The scientists who have given their attention to this question believe that a sufficiently empowered business system could have eliminated the beginnings of the San José scale in the Eastern States, but they realized in 1808, when the first law for the inspection of nurseries went into effect, that it was no longer a question of extermination, but one of putting off as long as possible the day when, unless a natural enemy should arise, every fruit grower must fight the pest for himself.

I think the work of seven years has shown that those whose faith laid the foundations of inspection work did not reason in vain. Had nothing aside from nursery inspection been done the gain would be well worth the cost. Few realize how constant is the interchange of stock among nurserymen nor how nursery products are sent each season to every corner of the land. With such infested stock present as there was to begin with, I cannot see that more than seven years would
be required to infest almost every other nursery and at the same time leave no community uninfest.

In my own district the fifty-five nurseries inspected showed eleven cases of San Jose scale when first examined. In one case only did it appear that infested stock had been distributed, but the time was at hand for a general distribution to begin. Over nine thousand trees were destroyed that season in clearing those eleven cases while the succeeding season there were about two and one half per cent as many destroyed, part of which were from one small nursery not found before. In no year since has the number of nursery trees infested with scale run over three per cent of the number destroyed six years ago.

The inspection of the 460 nurseries in New York state takes place whether desired by the owners or not. In some states inspection on request of nurserymen has developed the fatal defect that those nurserymen most in need of inspection will seldom call for it. They are likely to be either not so well informed or engaged chiefly in supplying a demand for ornamental stock, a trade not too discriminating where plant diseases are concerned. They may be small growers who desire to escape the charges made in some states. In New York all expense is paid from public funds, and this is just, for the benefit is to the whole state.

A year of practice in a section where scale is present works a great improvement in the efficiency of a nursery inspector, for no matter how well schooled he may be, his eyes will be quickened and he will learn how best to divide his attention.

Where stock of value is destroyed samples for both parties concerned are preserved in case disputes arise. Mounts are made for verification in such cases as well as in cases where there may be too little material to afford a good opportunity for judging by external characteristics.

The construction of fumigators and the supervision of their use entails some work. Nurserymen using the process for the first time are always desirous of some instruction before handling the chemicals, which as they understand, may cause fatal results to a bungling operator. By law nurserymen are required to fumigate all susceptible stock within one half mile of an infestation of San Jose scale, and for two years after an infestation has been destroyed, if such infestation be of a year’s standing. The fumigation with hydrocyanic acid gas is the most perfect process known but is regarded as only the complement of inspection. The aim is to leave no stock with which a nursery can work damage in case a party without scruples omits to fumigate as required by law. Troubles not so readily discernible as is the San Jose scale may certainly be overlooked by the closest inspection methods, but is not apt to escape for more than a single season, for after a year’s spread, detection will be easy. With fumigation the factors which may render the process ineffectual are air leaks, impure chemicals, defective circulation, and muddled trees. The process was once regarded as more certain than was warrantable and was supposed to kill borers in stock with all other breathing insects. Tests have shown however that borers are too well protected to suffer even from prolonged exposure, and the amount of fumigation which the scale can withstand has been found to be higher than is used in some Southern states. The standard formula in New York is high and to test the matter of reported damages through fumigation, a careful series of tests was made using strengths far beyond any before published in experimental records. It was shown that increasing the standard strength to quadruple the normal strength worked no damage in the Spring and that no appreciable loss showed in stock fumigated at eight fold the normal formula though the growth was less on lots of peaches treated at five fold strength or more.
Shipment inspection is a branch of work which has been made doubly efficient since the amendment of the statute requiring transportation companies bringing in nursery stock from their states to give notice of all such shipments. Notices showing shipments coming from suspicious points or going to New York nurserymen for redistribution are very prompt. The telegraph and telephone are in constant use through the shipping period to direct the work of inspectors who are on the road by day as well as by night through this rush period. In some years over a hundred infested shipments have been found and condemned either wholly or in part for the San Jose scale, and many thousands of seedlings for crown gall. Shipments found infested may be returned to consignors if desired and this is often done because the purchaser will not accept the goods when the conditions are known. In less than one half of one per cent of the cases purchasers have themselves found the condition of goods to be wrong. Beside attending to the immediate shipment in hand, a notification is sent to the shipper and to the authorities of the state whence the shipment originates in order to prevent recurrence of the occasion for complaint. Similarly other state authorities give notifications when anything is found wrong with New York State nursery stock, but in the seven year's work less than a dozen of these complaints have been on account of these infestations.

Peach yellows is a disease controllable in no way yet known, other than by the destruction of the affected trees. Nursery inspection avails little in respect to this disease, but in Michigan there has been a splendid example of the gain possible with an adequate yearly orchard inspection which eliminates the yellow trees before much spread takes place. The same system has been under trial for three years in two large peach belts of New York, one in Niagara county and one in Orange. Each contains over one hundred thousand trees and an inspection has been made of each. Something over thirteen thousand trees were condemned the first season and since then the number has been greatly lessened. Particularly in the Niagara belt, near Olcott, have the results been encouraging.

The list of dangerous pests known to other lands but not yet introduced into this country includes several which may be expected at any time, and I believe that in cases which will undoubtedly arise in the future much may be gained by prompt measures. I believe also that orchard inspection work will grow in usefulness as orcharding becomes a business in itself rather than a side issue in farming.
AUTUMN COLORS
By R. W. Curtis, '05, M. S. A.

OCTOBER days are here! By the blue mist on the hills and the yellow Autumn light, the maples flaming in the swamp, the Woodbine and Sumacs all crimson and red and the Elm leaves showing golden here and there—by these signs we know that Fall is near. Soon the frost will be on the pumpkin and the woods ablaze with Autumn color.

Thoreau says: "When the leaves fall the whole earth is a cemetery pleasant to walk in." Surely now is the time of the woodland harvest. The countryside is hung with ripened leaves of every shade and hue. It is Nature's great Fair Day and there are entries of all kinds and descriptions. The whole vegetable kingdom is out for display and every plant has its color.

As early as the first week in September the show begins. The Woodbine or Virginia Creeper is one of the first to enter. Even before the crimson flush creeps over the leaves and while its berries are still green I have seen the branching stem of the fruit cluster turning a bright red. A month later this commonest of all vines is a feature in the Autumn landscape and drapes rocks, stumps, fences and whole housesides with its crimson mantle.

Now, too, we notice the Boston Ivy, its near relative, and the vine of vines for stone buildings. On September 4th, I have marked its leaves beginning to turn and by the first week in October the vine is a blaze of scarlet and red. Its colors are brighter than those of the Woodbine and more lively also because of the beautiful gloss on its leaves.

At the same time come the Sumacs. What would October be without the Sumacs! The coloring of these fiery ones is beyond description. The big, velvety Staghorn grows in colonies everywhere. They flash out from the hillsides and greet us warmly at every turn in the road. Their long leaves look like great feathers and their leaflets hang downward "as though dipped in blood." Even after their leaves fall the crimson heads of these sumacs stand out big and stiff against the sky.

Very different in stature is the little Aromatic Sumac. We come upon this trailing shrub growing in clumps along fences and in waste places. Its prostrate habit renders it an excellent plant for border masses in front of larger shrubs and in Autumn its hairy trifoliate leaves vie in gorgeous colors with any of its larger relatives.

And then there are the other Sumacs, the poisonous ones. Of these the tall Poison Sumac grows only in swamps or wet places and in the fall "blazes its sins as scarlet." The other poisonous Sumac and the worst poisonous plant in America the Poison Ivy, grows everywhere in some sections of the country, climbing over fences and around trees and also reveals its true character only by its stains in Autumn. The Autumn color of the Sumac group is red, that of the Woodbine is crimson. All these plants make strong exhibits in Nature's annual display.

Another prominent Autumn group is the Maples. The Red Maple easily stands first with the Sugar Maple second. The Red Maples are the first trees to change in the fall. Even before the Woodbine and the Sumacs and while all the other trees are still green some of these maples down in the swamps will blaze out in full color. But this early brilliancy is forgotten in the full splendor of the October show. At this time nothing can equal the Autumn colors of the Red Maples. I have seen a whole tree with leaves the clearest, purest yellow, while by its side stood another with leaves brilliant red, crimson and scarlet.

How well I remember one of these trees on the outskirts of our town. I was coming home at the close of an Autumn day. Turning down a side street I came full upon a Red Maple.
It was a young tree and was one mass of crimson color. Its beauty radiated to the small unpainted house at its side and lighted up the whole place. What a sight to welcome the master of the house when he came home at night! Such trees have their color value. There ought to be more of them around our homes and along our streets. It would pay to plant them.

And after the Red Maples come the Sugar Maples and with them the Elms for these two are the trees of the people. By the middle of October the Sugar Maples are all tinted with red and yellow. Some trees are solid yellow while others mingle both colors on the same leaves. And now also the streets are literally roofed and draped with the golden yellow of the Elms. The foliage of these trees hangs in billowy masses and their mellow ripeness seems almost to impart a fragrance to the air.

Along the streets also are the Soft or Silver Maples for, next to the Sugar Maple, this tree is the most commonly planted maple. There are cut leaved varieties of this maple but they all usually turn a clear yellow in Autumn. Very similar in color is the Norway Maple which is a cultivated tree of dense, symmetrical head pleasing at all times but particularly so now. The Ash Leaved Maple or Box Elder, whose leaves look like an ash but whose fruits show its maple relationship, is also yellow tinted but much lighter and not so rich.

And among other yellow ones there are the Willows and Poplars, and also the Basswoods with their big heart-shaped leaves lopsided at the base. And there are the Birches! The whole Birch family is yellow colored except the Blue Beach (the Ironwood with smooth bark that looks like muscles), and the Wild Hazel-nut, both of which are tinged with red and crimson. And of course we know the Horsechestnuts with their five or seven leaflets like the fingers of one's hand. These are yellow as is also the Hackberry and the Tulip or Whitewood. And the Hickories, they also go with the yellow ones unless we think there is too much brown in them. In this case, being on the verge, they will serve to suggest some of Nature's browner Autumn tints.

Of these the Beeches are the most beautiful. Their first orange tinge is soon replaced by the warm, glossy brown of the mature leaf. At this stage the Beech leaves take on a neatness and firmness that is a delight to the eye. Quite similar and a close second are the Chestnut leaves, long, taper pointed, beautifully scalloped and of a smooth brown color. The Sycamore or Buttonwood leaves are also a shining brown. Then there are the tender Sassafras leaves and the big, firmer ones of the Magnolia or Cucumber tree. All these are brown as is also the little Spice Bush.

These colors I have briefly cited are not all of Nature's Autumn tints by any means. The fields and woods are full of colors. They catch the eye at every turn and are as varied as the rainbow and as many as there are plants. I have spoken only of some of the larger woody plants. Many more might be mentioned. Not a word has been said about the Viburnums and yet how we admire the little maple left one and how delicate are its purple hues. And there also are the Huckleberries growing low and covering the rocky slopes with color, and the Bittersweets trailing everywhere. One, the little Nightshade, has purple leaves and red berries on steel blue pedicles and the other, the more hardy Climbing Bittersweet, has yellow leaves and orange berries red inside. And then the Dogwoods—how gorgeously they are attired! The Red Osier Dogwood has crimson leaves and red stems surpassed only by that brilliant one, the Flowering Dogwood, the most beautiful of them all. Who has not gathered Dogwood blossoms in Spring, but who knows this little tree in the Autumn. Long will the sight be remembered. It is worth a trip to the woods to bring back the memory of such a vision.

And surely we must not forget the purple brown Ashes and the Shad-
bushes, a modest red and the Low-Running Blackberries like blood stains on the hillside and the Tupeloes flaming on the edge of the woods. And there are the Oaks, and Oaks are strong at all seasons. If you have Chestnut Oaks watch them, especially the young vigorous suckers. You will be rewarded by such blending of colors as you never saw before. And if there are Scarlet Oaks, be patient for these crimson colors do not glow until November.

Some one has said, "Contentment and happiness are results of thinking and one thinks much when he sees much." There is as much beauty in the world as we are able to see. With his eyes open to Nature the naturalist finds in the out-of-doors the fountain of perpetual youth. Every new experience has an added charm and each recurring season its new delight. Life becomes what he makes it and it means more every year the better he knows the Autumn colors.

METHODOF MAKING PRIZE BUTTER

FOUR tubs of butter were sent to St. Louis as regular entries in four monthly contests conducted by the National Creamery Butter-makers’ Association assisted by the United States Department of Agriculture. Each tub was about fifteen days old when scored and the scores were as follows: June, 93; July, 94; September, 96; October, 93½. The average of these scores was among the very highest and Mr. A. C. Brown, Dairy '04, deserves much credit for his success, especially in view of the fact that his creamery is located so far from the place where the butter was judged. His method which was about the same for each entry is described as follows:

Scrupulous care was taken to clean and sterilize every vat, separator, pump, pipe or other utensil which would come in contact with the milk, cream, or starter. The butter was made from milk brought by numerous patrons and no milk was especially selected. Heavy cream testing 40 per cent. to 45 per cent. fat was run from the separators at 70 degrees F. The cream was promptly cooled to about 64 degrees F. at which temperature it was ripened, having been diluted with 5 per cent. of clean, good flavored morning’s milk, and 15 per cent. nice commercial starter. In about eight hours after separating, the cream showed 55 per cent. acidity and was cooled rapidly to 48 degrees F. by the use of ice water around the vat. The cream was ripened in the common open vat and it was frequently stirred while ripening. Early the following morning the cream showed about .6 per cent. acidity and was churned at a temperature of about 50 degrees F. The churn was stopped when the granules of butter were about as large as small wheat kernels. One wash water was used at the same temperature as the buttermilk. Butter was salted at the rate of 34 ounces to one pound. The period of working lasted from one to two hours, the butter being worked slightly and then allowed to stand for some time before being worked again by a few revolutions. The butter was packed in selected thirty-pound tubs that had been steamed and soaked in brine. It was then chilled for twenty-four hours, then packed in a sixty-pound tub and wrapped with several thicknesses of building paper and burlap and shipped by express to St. Louis.
New faces are appearing amongst us as well as those of old students. The Countryman extends to you all a hearty greeting, and solicits the earnest support of every one. As pointed out by Mr. W. H. Collingwood in his article, "The Agricultural Students' Obligation," which appeared in The Countryman for October, 1904, it is a privilege to go to an Agricultural College at the public expense. But this privilege carries with it the obligation to render to Alma Mater and the State services according as they have received. The editors earnestly hope that no member of the College of Agriculture will hesitate to come to us with contributions of articles, news items, or suggestions of any kind.

SINCE 1828, the United States has enjoyed special tariff concessions from Germany according to a treaty entered into by the Kingdom of Prussia. Under this arrangement, exports of Agricultural products from the United States to Germany have grown until today Germany is the best customer of the United States with the one exception of Great Britain. On the first day of March, 1906, this treaty ends and our merchants will then be forced to pay the autonomous tariff rates. Meanwhile, however, Germany, to relieve the strain at home, has entered into reciprocal tariff relations with Italy, Belgium, Roumania, Switzerland, Servia, Austria-Hungary and Russia, which grant to them a specially low rate.

The United States might compete with these countries if all were on the same footing, but to have the tariff raised to the United States and at the same time greatly lowered to these
seven European nations, practically shuts the door against American exports, the greater part of which consist of farm products. As an illustration of how this will work, we will quote the following figures from an editorial in the “Outlook” of May 27th: “The value of the American wheat that Germany imported last year was nearly $6,000,000. The duty paid on it (under the reciprocity concession) was 83 cents per 100 kilograms (220.4 pounds.) Next year, under the new tariff, the duty will be $1.78, but Russia and Austria-Hungary will pay only $1.30. The amount of our corn exports to Germany last year was more than $7,000,000. It paid a duty of 38 cents per 100 kilograms. Next year it will pay $1.19, while corn from the treaty countries will pay only 71 cents. We have been sending American apples to Germany in considerable quantities (this trade amounted to $888,000 last year). Heretofore this fruit has been admitted free, but under the new tariff a duty of $2.38 per 100 kilograms will be exacted while apples coming from Italy, Belgium, Servia, Roumania and Switzerland will pay half rates. In the case of dried fruits, of which we exported more than $2,000,000 worth to Germany last year, there is a still greater discrimination.”

In view of these facts the grain farmers and stockmen of the west have become alarmed and a movement which culminated in a convention held in Chicago on the 16th and 17th of August, presided over by Alvin H. Sanders, editor of the “Breeders’ Gazette,” and attended by 600 delegates representing 7 live stock associations, 21 agricultural associations, 7 delegates appointed by governors, 16 manufacturers’ associations, and 40 commercial organizations. It may be noted here that this list is conspicuous on account of the almost total absence of horticultural organizations, there being only two included. This convention was eminently successful and called loudly for “immediate reciprocal concessions by means of a dual or maximum and minimum tariff as the only practical method of relieving at this time, the strained situation with which we are confronted.” In view of this, Congress was urged to take action at the earliest time possible, and it was recommended that a committee be appointed to stir up and keep before the people the work for which the convention was called.

**A Winter Fair in New York State**

The New York State Breeders’ Association, which was incorporated February, 1904, is introducing a novel innovation this year in the form of a winter fair to be held at Syracuse, December 19, 20 and 21. At a recent meeting of the Board of Directors it was voted to accept the title in its widest meaning, that is, an Association of Breeders of both plants and animals.

While fat stock and dressed carcasses will be the most important features, special emphasis will be laid on the educational features, for at each session there will be lectures by men and women of national reputation. Demonstrations on the cooking of meats will be of especial interest to housekeepers. It is interesting to note that prizes are being offered for the best bred corn, beets, timothy, clover, etc., as well as on live stock. It is specified that competition for best lamb killed, dressed, and packed for New York market is limited to farm-
ers, farmers’ sons and students of Agricultural Colleges. Also competition for best pair of chickens, killed, dressed, and packed for New York market is limited to farmers, farmers’ wives, sons and daughters, and students of Agricultural colleges.

No person not a member of the association can enter exhibits, but anyone over 18 years of age may become a member by making application through the secretary to the Board of Directors, and paying a membership fee of $1.00.

GENERAL AGRICULTURAL NEWS

Mr. D. Everett Lyon has given in “Country Life in America” for September, a very interesting and instructive article on the new Caucasian bees. We glean from his account the following facts.

The United States Government, with its efficient organization has one department, the Apiary, of which little is known by most persons. Many experiments have been carried on at that place, and the one now in progress will without doubt revolutionize bee-keeping.

The German or common brown bee has existed in America for about 200 years and has, in this period attained a wide distribution. The usefulness of this species is handicapped in several ways. It lacks energy in honey gathering, is not very prolific as a breeder, and is a poor defender of its home. On the other hand, this species is very savage under manipulation. The Italian bees were imported in 1860, and have proven themselves superior to the German in every way. In 1880, the Cyprian bees were brought to America, and these have in their turn proven superior in honey gathering, their only fault being their extreme excitable nature.

In 1902, the Caucasian bees were imported for the first time into this country. Pure bred queens, after mating in their native land, have been used for this experiment. They are extremely prolific in breeding, and are remarkably energetic as honey gatherers. But the most promising characteristic is their practically non-stinging habit. They are not entirely stingless, but may be called so because they only sting when their hive is robbed by other bees, or upon a severe jar on a very cold morning. If this species can be largely introduced throughout the country, there will be more profit and less danger to their handlers and to the inquisitive bystanders and bee-keeping will become an unalloyed pleasure.

* * *

The new agricultural building of the North Carolina Agricultural and Mechanical College at Raleigh, was formally dedicated on Sept. 1st. This is one of the finest buildings in the South for instruction in agriculture. The appropriations for the construction of this building were secured only after a hard struggle with the Legislature, but the farmers of the state won just as they have done in New York and other states, and the dedication of this building marks an epoch in the advancement of agricultural education in the South.

In appropriating the money the legislature stipulated that it was to come only from the tax on fertilizers, thus forcing the farmers alone to pay for the building in which to educate their sons, while they had already paid their part for the erection of the mechanical buildings. We quote the following from The Progressive Farmer and Cotton Plant.

“The length of the new building is 200 feet; depth, 74 feet. It is three stories in height. The material used is gray pressed brick, with red tile roof. The first floor will be used entirely for animal husbandry work, 4,800 square feet being used for dairying, cheese making, milk testing, etc.,
and 4,800 square feet for live stock judging, butchering, and preparation of meat products. The second floor will contain the class rooms, offices of the department, farm machinery rooms and soil physics laboratory. In the top story will be taught veterinary science, and botany, zoology and bacteriology in their relation to agriculture. The building will be one of the largest and best adapted buildings devoted to agricultural education in the entire country.”

This building stands on the summit of a large hill just west of the main group of College buildings and facing the entrance to the State Fair Grounds. The farm of six hundred acres lies adjoining and is practically all in view from the upper windows, the site on the whole being as fine as could be desired.

**CORNELL NEWS**

**CAMPUS NOTES**

The Corner stone of the main building of the New York State College of Agriculture was laid on July 27th without formal ceremony. The builders have been instructed to advance the dairy wing as fast as possible. At the present time the walls of the main part of the dairy wing are all finished up to the basement floor. All the walls of the extension of the dairy building are finished up to the main floor. The extension is to be one story high and it is expected that this part will be under cover early in the fall. All the walls of the main central structure are up to the basement floor. Construction work is greatly delayed on account of the difficulty in obtaining laborers. There are 80 men now at work but only 14 of them are bricklayers, a class of artisans most needed.

* * *

The following bulletins have been issued from the Cornell Experiment Station during the summer:

No. 288, Potato Growing, by J. L. Stone;
No. 229, An Orchard Survey of Orleans County, by G. F. Warren under the direction of John Craig.
No. 230, Quality in Potatoes, by John W. Gilmore;
No. 231, The Forcing of Strawberries, Cucumbers, Tomatoes, and Melons, by C. E. Hunn and John Craig;
No. 232, Experiments on the Influence of Fertilizers upon the Yield of

Timothy Hay when Grown on Dunkirk Clay Loam in Tompkins County, New York, by J. W. Gilmore and Samuel Fraser.

* * *

During the past summer a co-operative experiment in bean growing has been carried on by the United States Department of Agriculture and the Horticultural Department of Cornell. This is the third and last year of an exhaustive variety test. The object is the standardization of American varieties as well as to determine their horticultural status and practical value. At the Cornell plantation 350 samples were raised which will show probably 150 good varieties. Minute botanical descriptions have been made together with detail photographs of the entire plant, the leaf, the pod, (both dorsal, side view, and cross section), and the dry seed. All the work connected with this test has been most conscientiously carried on by Mr. C. D. Jarvis. This experiment was carried on in duplicate at Washington, D. C. by Mr. W. W. Tracy, Jr., who has made two trips to Ithaca during the summer for the purpose of comparing results with Mr. Jarvis.

* * *

Professor Wing went to a Farmers’ picnic in Chenango County and while there met the following Winter Course Students: C. S. Cook, C. E. Green, F. R. Harrington, C. E. Purdy, A. C. Brown, R. S. Meeker, and F. S. Har-
rison. All of these men with the exception of Mr. Brown, who is a butte-
maker, are successful and thrifty farmers. Professor Wing says that
this picnic was rather unique in that many Cornell banners were displayed.

* * *

The Orchard Survey in several counties in Western New York, which
was so successfully carried on by Dr. George F. Warren, has been continued
by the graduate students of the Department of Horticulture. Two weeks
work of this kind is now a require-
ment of all graduate students in horti-
culture. The following have been en-
gaged in this work the past summer:
G. W. Hosford, C. S. Wilson, J. E.
Coit, C. D. Jarvis and J. E. Howitt.
These men report a fair crop of
peaches but a very light crop of apples.

* * *

Dr. S. W. Fletcher was married in
July to Miss Margaret Ralston of
Chattanooga, Tenn. Dr. Fletcher
leaves us this fall to accept the chair
of Horticulture at the Michigan Agri-
cultural College. The students one
and all, and especially the Winter
Course men exceedingly regret his de-
parture, yet they gladly extend to him
their best wishes for his future suc-
cess.

* * *

After the close of the Short Dairy
Course last spring, B. C. Murray an
English student sent a cheese made by
him to King Edward of England. His
gift was acknowledged through the
British ambassador at Washington,
who promised that the cheese would
be placed on the King's table.

* * *

There has been increasing demand
among many of the Winter Course
students for more specialized instruc-
tion in horticulture. This year the
College is prepared for the first time to
satisfy this need. Such instruction
will be given as will help those per-
sons who have had some experience
along this line, to better positions, at
the same time instructing the begin-
ner in the salient principles of such a
profession.

* * *

The Dairy Department has oper-
ated a creamery through the summer
for the purpose of developing a milk
supply for the winter dairy school, and
to give an opportunity for carrying on
experiment work.

* * *

Mr. C. A. Rogers, '04, is at present
engaged as superintendent of the
farms of the James Vick Seed Firm at
Despatch, N. Y. Mr. Rogers spent a
few days on the Campus during July
and says he is highly pleased with
his work.

* * *

Professor James Rice is now occu-
pying his new home on Waite Avenue,
Cornell Heights.

* * *

Professor C. V. Piper of the
Division of Agrostology, United
States Department of Agriculture,
visited and was much interested in
the Timothy breeding Experiment on
the University farm.

* * *

Mr. H. L. Ayres of Schoharie Coun-
ty, who took the Dairy Short Course
in '04, has been appointed Creamery-
man under Professor Pearson.

* * *

The first edition of Professor Hunt's
book, "The Cereals of America," is
exhausted, and a second edition is
about to be issued.

* * *

On August 31st, Dean Bailey re-
turned from his somewhat extended
trip to California. While there he de-
ivered a series of lectures at the sum-
mer school of the University of Cali-
ifornia. After seeing something of
the agriculture throughout the central
part of the state, Dean Bailey attended
as a delegate the Irrigation Congress
held at Portland, Ore.
Professor Wing, whose house was almost destroyed by fire last May, is now back in his home after having spent the summer in Cascadilla Building.

The Ithaca Weekly Journal of August 10th contains a very interesting column and a half article on the success of a number of men who took the short course in Dairying last winter and have had their salaries raised in consequence.

Mr. J. Eaton Howitt, '05, of Guelph College, Ont., took special work in Entomology in the University this summer. He is registered for a Masters' degree, his major in horticulture and his minor in Entomology.

Professor F. A. Waugh, '99 G., of the Massachusetts Agricultural College spent Sept. 9th, 10th and 11th in Ithaca visiting Professor Craig. Professor Waugh later went to Syracuse to judge the professional fruit exhibit at the State Fair.

Mr. L. C. Griffith, who graduated B. S. A. last spring, has been engaged during the summer at Chautauqua, N. Y., as Landscape Architect for the Chautauqua Assembly.

Professor Hunt spent his vacation camping with his family in the Adirondack Mountains.

Herbert A. Hopper, B. S. A. '04, assistant in Dairy Husbandry at University of Illinois, spent two weeks in town.

The Cornell Chapter of the Alpha Zeta Agricultural fraternity has moved into new and commodious quarters in the Peer house on Thurston Avenue, Cornell Heights.

Mr. W. C. Baker, '08, B. S. A., returned from France on Aug. 1st. Mr. Baker has been studying art during the past year in Paris, and will be employed on the illustrations of the Cyclopedia of American Agriculture.
FORMER STUDENTS

Ex-'81—Willis T. Mann came as a student to Cornell in 1878. At that time the College was small and its equipment meagre, but as results have shown there was true Cornell spirit even in those days. After two years Mr. Mann left College and returned to the farm. Ever since, he has been a leader in advancing the cause of agriculture in his county both in theory and practice. Mr. Mann became interested in orcharding and his thirty or more acres of apple orchards, and large peach and plum orchards bear ample testimony to the applicability of book farming. Mr. Mann does not farm on the side, but lives in a handsome dwelling in the midst of his orchards at Barker, N. Y., and devotes his entire time to the care of his trees. The home farm is called "Evergreen Farm," and very appropriately. One of its striking features is a magnificent windbreak of Norway Spruce bounding it and sheltering the orchard on the west side. Another feature of the farm is the lawn which is spacious and of almost park like dimensions. On this lawn, grouped with excellent taste are splendid specimens of leading conifers together with a large collection of the best deciduous shade trees and shrubs. Here the smooth glossy leaves of the Southern persimmon mingle with the feathery tufts of the Northern tamarack. The neighbors show their appreciation of this farm park by using it freely for Sunday School picnics and church socials.

The New York State Fruit Growers count Mr. Mann one of the most active workers in that organization of which he is statistician and a charter member. When the graduate students in horticulture were working on the orchard survey in Niagara County the past summer, they were most royally entertained at Mr. Mann's delightful home while working in that neighborhood.

'73, B. S. A.—C. Y. Lacy of Long Beach, Cal., sends to the Countryman his best wishes for a long life of successfulness.

'81, B. S. A.—Professor G. C. Watson, who occupies the chair of Agriculture at the Pennsylvania State College, was on the Campus for a few days visiting Professor Wing. Later, in company with Professor Wing, he took an automobile trip through Seneca and Wayne counties.

Ex-'81—Nye Hungerford is running a dairy farm, located about two miles east of Ithaca. The Cornell spirit has been well inherited by his two sons, Roy E. Hungerford, '99, W. and Jay C. Hungerford, '05, B. S. A.

Ex-'81—Charles E. Thomas is at present living in Waterloo, N. Y. Besides breeding fine Guernseys Mr. Thomas milks about 35 cows for the retail trade of Waterloo.

'88—'90.—Graduate in Chemistry, W. A. Withers, A. M., who was fellow in chemistry during the year of 1890, at present occupies the chair of Chemistry at the North Carolina College of Agriculture and Mechanic Arts. We regret to learn of the death of his wife on August 20th of this year.
'91, B. S. A.—Horace Atwood, Agriculturist at the West Virginia Experiment Station, visited the Campus this summer.

'92, B. S. A.—Mr. Furman Lloyd Mulford, who was recently married to Miss Edith Eyre of Yardly, Pa., is now Superintendent of Parks at Harrisburg, Pa.

'90, Special—Professor Burnette of Louisiana Agricultural College was in town a few days during the latter part of August. Professor Burnette has been spending part of the summer at Sodus Bay, N. Y.

'94, Special—Thomas R. Hopkins is now engaged in farming at Willow Creek, N. Y.

'98, Graduate—Mr. George Henry Deuell, a graduate student in 1898, was married last spring to Miss Agnes Goeke of Brooklyn, N. Y.

'98, Special—Mr. Warren Shinn, who has been living for several years at Woodstown, N. J., was married on the 9th of August to Miss Bertha Becker of the same place.

'99, B. S. A.—Since leaving the University, Daniel B. Clark has spent part of his time in the employ of the Genesee Pure Food Company of his home town, LeRoy, N. Y. In the spring of 1900, he occupied the position of chief clerk to the Superintendent of Agriculture, Live Stock and Dairy Products at the Pan American Exposition and remained for some time afterwards under Superintendent F. A. Converse, another Cornellian. He is now one of the rural free delivery carriers of his township in order to be near his father who is failing in health.

'99, B. S. A.—Heinrich H. Hasselbring has charge of the Plant House, under Professor Barnes in the Botanical Department of the University of Chicago.

'99, B. S. A.—Walter Mulford remained in college after graduation taking the Forestry Course from which he graduated in 1901. While here he was elected to the Sigma Xi. From that time until July, 1904, he was for-ester to the Connecticut Agricultural Experiment Station, besides being the State Forester. Since July, 1904, he has been Forest Agent of the United States Bureau of Forestry, engaged in a study of Southern hardwoods. Mr. Mulford has occupied important positions in several Forestry Associations. He has just accepted the appointment of Assistant Professor of Forestry in the Forestry School of the University of Michigan at Ann Arbor.

'99, B. S. A.—Edwin R. Sweetland, who was a Varsity man in both crew and football while in college, has made coaching in athletics his profession. For some time past he has been coach in rowing at Syracuse University and is now very successful as coach in several different lines at the Ohio State University.

'99, Special—George S. Clothier is now in the service of the United States Department of Agriculture. Although he was here only for a short time, he says he will never forget the good times at the Lazy Club, and regards his study under Professor Bailey as the most profitable time he has ever spent.

'99, Special—W. H. Hodges, after he left us, taught Botany in the Louisiana Industrial Institute. In 1901, he took a general course in Agriculture at the Louisiana State University and has since been engaged in cotton raising at Elm Grove, La.

'99, W., and '04, Dairy—W. S. Markham who took the short agricultural course and also the dairy course has found both of great value. He is now managing one of his father's farms at Kennedy, N. Y., and is teaching in the public schools during the fall and winter months.

'00, B. S. A.—Franklin Sherman, Jr., has resigned his position as State Entomologist at Raleigh, N. C., and has gone to accept the chair of Entomology and zoology in the Agricultural College at Guelph, Ont.

'00, B. S. A.—A. W. Stephens, who for several years past has been managing the Cornell Co-operative society
store, has gone to Urbana, Ill., to take charge of a similar enterprise at the State University.

'00, B. S. A., '01, A. M.—G. M. Bentley, who has been for some time past Assistant State Entomologist at Raleigh, N. C., has resigned to accept the position of Assistant State Entomologist at Knoxville, Tenn.

'00, D.—H. J. Cooper, who was at the George Junior Republic for a year and a half is now assistant farm superintendent at the Lyman School for Boys, Westboro, Mass.

'01, D.—Cecil Royce contributes his support to the Countryman from Berkshire N. Y.

'03, B. S. A.—E. J. Glasson, who for some years past has been in the winter tomato and truck business in Southern Florida, has accepted a position with the United States Department of Agriculture as expert with the Bureau of Plant industry. Mr. Glasson spent September 5th on the Campus with friends.

'02, D.—Manley Clark is running a creamery during the summer months at Ironville, Essex County, N. Y.

'04, A. B.—C. W. Howard has gone to take the position of Assistant Entomologist of the Transvaal. As an undergraduate, Mr. Howard specialized in Entomology and since graduation has been laboratory assistant. His work in this new field will be under another one of Professor Comstock's students, C. B. Simpson, '99, Entomologist of the Transvaal.

'04, B. S. A.—Albert R. Mann is at present at Ithaca, employed as secretary to Professor Bailey on the Cyclopedia of American Agriculture.

'04, Special—The wedding of Miss Helen Adelaide Ellsworth to Mr. M. C. VonLohen Sels, '04, B. S. A., occurred on Wednesday, May 31st, at Esperanzo Farm, New Hartford, Conn. They are now at home at Vordu Ranch, Sacramento River, Cal. For the past two years Mrs. VonLohen Sels has been a special student in Agriculture.

Ex.-'04—J. H. Bluford is now head of the Departments of Agriculture and Chemistry at the Colored A. and M. College at Greensboro, N. C. In 1903, he established a short agricultural course of five weeks and has also organized a conference of colored farmers which is held annually at the A. and M. College during January.

'04, Special—R. S. Cushman, who was with us for the early part of last year, is now in charge of an estate at Greenwood, Mass. Here, in January last, he was married to Miss Ethel O. Staples.

'04, W.—Charles Huff, of Moravia, is now on his home farm applying the principles that he learned here, especially as regards farm buildings.

'04, W.—John A. Pease is engaged in dairy and fruit farming at Owego, N. Y. He considers the winter spent here at Cornell as largely responsible for his success.

'05, B. S. A.—Lawrence G. Dodge is now traveling in the interest of the Office of Farm Management, Bureau of Plant Industry, United States Department of Agriculture. Mr. Dodge spent several days in Ithaca during August conferring with Professor Stone concerning farm management in Western New York.

'05, A. B.—Herbert A. Jackson, who was assistant in Botany at Cornell last year, goes to the Delaware Experiment Station at Newark to take the position of mycologist.

'05, M. S. A.—R. S. Woglum has left for Raleigh, N. C., where he is assistant state entomologist. Mr. Woglum has full charge of affairs, as the office of state entomologist lately held by Franklin Sherman, Jr., is now vacant.

'05, D.—M. Johnson is engaged at the Dannfield creamery near Deerfield, N. Y. We are sorry to hear that Mr. Johnson has been seriously injured in the knee by a kicking horse.

'05, D.—H. Seymour Merry is now his father's assistant at Merry's cheese factory at Verona, N. Y. They are having a promising season, 18,000 pounds of milk being received daily.
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WHAT A COLLEGE FARM IS FOR*

By L. H. Bailey

The material lay-out of a college of agriculture may be roughly classified into three categories: the farms; the buildings; the movable property or equipment. You, as farmers, are interested specially in the farms. You look at a farm from the point of view of practical farming; we look at it from the point of view of education and investigation. There is likely, therefore, to be some conflict of opinion as to just what a college or university farm should be used for. It will be well for us all to discuss the question with some care, for it is fundamental to a modern college of agriculture.

There has been some division of opinion as to whether an agricultural college needs a farm, but the consensus of opinion now is that a farm is essential to an institution that teaches agriculture. Practically all the institutions founded on the Land Grant Act have working farms used for instructional purposes. In California a grant has recently been made by the Legislature for the purchase of a farm. In several states the farms are operated primarily by the experiment stations.

College farms vary greatly in size, but the general tendency seems to be to increase the area. Our own farms now comprise about 240 acres. These farms are in four areas: the original home farm with a remainder, since deducting the athletic grounds, of about 40 acres; the Preswick farm containing about 55 acres; the Mitchell farm of 107 acres; the Behrend farm of 36 acres. We are also farming some land that we do not own. We need more land. These farms represent a great variety of conditions and are not ideal lands for agricultural purposes. The disposition of them is also inconvenient with reference to the location of our buildings. However, it is much better for our purposes to have such areas in immediate connection with the College than to have ideal farming land at some distance removed. In most cases, the farms of the agricultural colleges are now immediately connected with the instructional work. In thirty-nine out of forty-eight cases the farm and the agricultural department are closely associated with the college or university, being either adjacent to the college grounds or only one or two miles away. There is only one state or territory (Arizona) in which the college farm is distinctly disconnected from the college or university, the farm at Phoenix being maintained strictly for experimental purposes. In Minnesota, Nebraska, New Jersey and Tennessee the college farms are separated in a measure from other university work although still maintaining a very close connection with the institution, the farm in each case being in close proximity to the agricultural department.

We may now consider what a college farm is for. In making these statements it must be borne in mind that I am speaking from the point of view of the college or university, and not from the point of view of the secondary school or of general farming. In secondary school work the farm might be used in a very different way from that in which it is utilized with college and university students. I shall try to state some underlying principles and shall speak in general terms, not intending that my remarks apply only to New York as distinguished from other areas.
states. The uses for college farms will differ somewhat in different states, depending on local conditions.

The college or university farm developed with the Land Grant Act. In its history it has gone through several phases of development. It was first conceived of in some quarters largely as a model farm. Of course the model farms came to be the laughing stock of the farmers of the state. This will always be the result. If they are model farms in the ordinary acceptance of that term, they will likely have very little pedagogical value. A person who is a first-class teacher of farming may be a second-class farmer; or, to transpose the statement, a first-class farmer may be a very poor teacher. One farm cannot be a pattern for all the conditions in the state. There are thousands of model farms in every good agricultural state; for model farms are good farmers' farms. If our students want to see a model orchard, there are a thousand of them in New York State. I like to think of the farms of the state as a part of the working equipment of the agricultural college. The state cannot afford to go into a model farm enterprise in connection with university work.

In some instances, college farms were utilized as areas on which to employ students at farm labor in the hope that by this means the boys would keep in touch with farm work and remain in sympathy with it. Compulsory student labor paid for in money has now ceased to be a factor in agricultural education of college and university grade. This compulsory paid student labor from the nature of the case could not have very great pedagogical value; it was a forced enterprise; and it was found that the student could employ his abilities to better advantage in other directions when giving his time and paying his way in college. Every college farm will afford some labor for students who need to earn money; but this is a very different matter from requiring every student to work as a laborer. The college farm should supply to every student some educational labor and practice, just as the machine shops supply it to engineering students.

Again, college farms have been run with the idea of making a profit. But you can hardly expect to run a farm with profit by means of student labor. If the farm returns a profit it usually means that the teaching effort is reduced. It has been found in most cases to be impracticable to run a farm that shall be both a profitable commercial enterprise and an efficient teaching enterprise. Commercial farming is to be exemplified on farmers' farms. You are well aware that it is difficult enough to make a farm support one family, let alone supporting teachers and laboratories and developing the productive power of miscellaneous students, being subject, at the same time, to disabilities of teaching hours and study hours. A commercial farm ordinarily raises a special series of crops or develops in some particular direction, whereas a teaching farm demands a great variety of enterprises and much demonstrative material. If a state is primarily to make money from a farm, then the farm should not be used for college teaching purposes, but it is to be conceived of as an out and out business enterprise.

Again, farms came to be used merely to illustrate or display farm practices. In the old days we had museums in our colleges to which the students could go to examine the wonders of the creation. We still need museums, but we must also have collections with which to work. It is not enough that a student see a zoological museum: he must also have zoological specimens to handle and to use. It is not enough that students merely see crops growing or see different breeds of animals. They must come nearer than merely to look; they must use and handle.

Again, there has been an idea that a college farm ought to represent the commonwealth, that it should be typical of the state. Now it is usually a poor state that can be typified in any one farm. If the state wants a typical farm, it is questionable whether the
university or college should be burdened with it. It would be essentially an advertising organization. The pedagogical value of the so-called typical farm may be very slight. Anybody can farm typical land. Of course I should prefer to have a farm as typical of the state as possible, other things being equal; but if the choice must be made between a typical or representative farm and a pedagogical farm, I should be obliged to choose the area that would allow me to develop the most direct and concrete teaching enterprise.

There was a period of years when the college farm in many cases, was used very little for college purposes. Not knowing what to do with such areas, some of them have been allowed to drift. Then there came the passage of the Hatch Act in 1887 establishing the Experiment Stations and this afforded means of utilizing the college farms. A few of our institutions are now carrying their farms only as areas for experiment. Of course we must have land for research. There are two kinds of investigational work on farms: one kind is studies in farm practice; the other kind is research in the fundamental physical, chemical and biological problems, which must be conducted on some farm under direct control. Indoors, we have research laboratories and teaching laboratories; outdoors, there should be a similar separation.

It seems to me that we have now come to the final and proper stage or idea,—that the college or university farm must be a laboratory. The pattern farm, model farm, commercial farm and illustration farm are all incidental and secondary to this general purpose. A college farm is not primarily for the growing of profitable or model crops. I should rather have the opportunity to teach one student by means of a farm than merely to show one hundred persons a field of perfect corn or pumpkins. If we are to study principles of plowing in the class room, we must also study them in the field, even if we are obliged to destroy a crop. We must determine and test the relations of plowing to germination, aeration, microbial life, and other questions of vital importance. If both ends cannot be attained, it is more important that a man learn how and why to plow than it is for the college farm merely to grow a good crop of wheat. Even if I were obliged to tear up the drains on a farm in order to teach proper drainage of the land, I should want the privilege of doing so. The botanist pulls up the plant in order to study it. In learning how to grow potatoes we may need to pull them up to study the root system even though we destroy the potatoes in doing so. I do not see how an orchard can be a "model" if it is used as a means of teaching students how to graft and prune. The stock judging pavilion that is to be a part of our agricultural compound is to be so arranged that the stock can be led or driven into it, as is done in other agricultural colleges. The cow, the sheep, the pig will be used as laboratory material. The students will study real live cattle, not pictures and models. They will endeavor to find out why cows are good or bad for this purpose or that. They will examine for conformation. These cows are just as much laboratory material as the plants of the botanist or the chemicals of the chemist. Students will study cattle in the same spirit that students in geology study the stratification of rocks. Of course we shall need to keep stock for the purpose of securing milk to be used in the dairy laboratory. The milk then becomes laboratory material, and the cows which produce it may also still be used for instructional purposes. In other words, the value of a college or university farm from a teacher's point of view lies in its usefulness as a means of teaching. You may not think of such an area as a farm; if the terminology troubles you, then call it land or field laboratory.

Agricultural education now rests upon an enlarged and quickened idea of the laboratory, or actual touch with objects, phenomena and forces. We are introducing laboratory methods into all kinds of schools; the kin-
dergar'en, manual training, school-
garden, nature-study and science work,
all mean laboratory method. And now
we also introduce the affairs of every-
day life into the schools. All labora-
tories are pedagogically valuable in
proportion as they are in vital connec-
tion with theoretical instruction. No
school, whether in New York or else-
where, from the primary school to the
university, is a good school unless it
has laboratory work. The effort is
now being made to introduce into
every high school in New York a
year's work in biology for the first
year; and the recent syllabus allows
this to be followed, in the second year,
with work in agriculture.

It will never be possible to sys-
tematize and to schedule laboratory
work on a farm as explicitly as under
cover because of the uncertainties of
the weather and the distances in-
volved. Therefore, indoor laboratory
work will always be necessary in agri-
cultural teaching; but the indoor work
should be looked on as a supplement
to the outdoor work.

I do not pretend to say that we have
developed a perfect utilization of our
own farms as laboratories, but we are
working toward that end. The farms
need much improvement and equip-
ment. Parts of our farms are being
used for experimental or research pur-
poses. Incidentally these areas also
become of value to students, but pri-
marily they are investigational rather
than educational. I am speaking now
of farms that are to be utilized for
pedagogical work rather than for in-
vestigational work. As such, we want
land that we can use when we choose
and as the necessities of the case de-
mand. I am asked whether, then, col-
lege farms should not be used for the
growing of maximum crops. I reply
that a college farm is a means to
an end; the end is the teaching of
students: the growing of maximum
crops may or may not be the best way
of attaining this end. We hope to con-
duct our farms on the best business
principles and in conformity with the
very best farm practices; we expect to
make them interesting and attractive to
students and visitors; nevertheless, the
laboratory utilization of these areas is
to be our first consideration. If we
are not using farms as a means of
training men, then we are not using
them for pedagogical purposes, and
the future will not justify our posses-
sion of them. For myself, I would
rather have ten acres of land to use
when I want it and as I want it than
to have any number of acres to look
at and admire.

THE AYRSHIRE
By H. Hayward.

WITHIN the past decade or
decade and a half the merits
of the Jerseys, Guernseys, and
Holsteins as dairy cattle have been
put prominently before the dairy
world. Not only by breeders them-
selves who have spent vast sums of
money in advertising individual herds,
but also breeders' associations, by of-
official test and by duplicating prizes
won at prominent fairs, or by award-
ing silver plates to the most successful
exhibitors, have done their respective
breeds an invaluable service by in-
creasing the demand for the breeders'
surplus stock. The result of this is
most readily seen perhaps by the dif-
ference in the prices asked for indi-
viduals of the breeds which are backed
by powerful associations and those indi-
viduals where the association seems
indifferent to the progress of the breed.

Aside from those dairy breeds al-
ready mentioned there is still another
that, while it has never been adver-
tised or boomed in any way, and which
at the present time is suffering from
a difference of opinion among its
breeders, is nevertheless a strong rival
in profit, hardiness, and beauty.

The Ayrshire takes its name from
the county of Ayr in Scotland, where
it was first recognized about a century
ago. It is generally supposed that the
small native cattle of Ayr were improved by the introduction of cattle from Yorkshire, England. These may have been either Teeswater cattle or cattle carrying a strong infusion of Dutch blood; Holland cattle having been imported for crossing upon the native Durham stock. It is also believed that Channel Island cattle were used to a slight extent upon the unimproved Ayrshire.

Unlike in some of the other of our improved breeds of cattle, no one breeder stands out as a leader in the improvement of the Ayrshires. On the contrary it seems that the farmers altogether strange that there should have been a parting of the ways, as it were, in regard to the type in the two countries. The American dairyman found that men milkers have larger hands than dairy-maids, and as a consequence sought larger teats on their Ayrshires than those of the Scotch type. Again, in New England, which is the stronghold of the Ayrshire in the United States, breeders fancied a dark red color more than they did the white so prominent in the cattle of Scotland, and thus the American cattle became a cherry red flecked with white.

![AYRSHIRE COW OF THE SCOTCH TYPE](image)

and the dairymen of Ayr made a common purpose of producing a cow that could average 620 gallons of milk on rather poor pasture and without much of any dry grain in the winter. How well the Scotchmen succeeded the modern Ayrshire testifies in no uncertain manner.

The first importation of these Scotch dairy cattle into America was made by H. W. Hills of Connecticut in 1822. From this date down to about 1875 importations were more or less frequent, but from 1875 to 1895 they ceased almost entirely.

There has been little intercourse between the American and Scotch breeder for so long a time that it is not

Then, too, as the Ayrshire in America fell into the hands of dairymen whose living depended upon their cows, little attention was paid to strictly fancy points, as the straight top line, the square udder, and upstanding horns. On the other hand the utilitarian type was strongly emphasized both in the breeding herd and in the show ring. All of these differences tended to produce two distinct types of Ayrshire cattle, the Scotch and the American,—or more strictly speaking, the New England type.

At the Columbian exposition held in Chicago the two types met for the first time in the show ring. The American type was represented by cattle from
The best known herds of New England, and from a strictly dairy point of view they were a magnificent lot of cattle. The Canadian exhibitors put forward a lot of very showy herds, many members of which had been imported from the best herds in Scotland for the occasion. As the two distinct types competed for prizes at that time the novice would scarcely have recognized them as belonging to the same breed. The Scotch, or Canadian type, as it is now sometimes called, won the majority of the prizes, although there was some dissatisfaction that the awards were

placed by Canadian judges. At the St. Louis World's Fair, however, a New England judge placed most of the awards on cattle of the Scotch type.

The demand seems to be for the more showy and handsome cattle of the type now so common in Scotland and Canada and which is rapidly gaining ground with American breeders. If this pattern of cow can be bred with the teats and other good dairy qualities of the old New England type, the Ayrshires will attract the breeder who seeks a dairy cow that not only is an economical producer and heavy milker but that is as a thing of beauty unsurpassed by any other dairy breed.

The Ayrshire is what may be termed a big little cow. She will weigh about one thousand pounds and is perhaps less angular and rough than the cows of any other dairy breed. As a consequence when dry she fattens quickly and easily. Hers is the most perfect udder, being square with teats set wide apart. In point of milk production, in proportion to size of body, the Ayrshire leads all breeds. A number of cows have official records of over ten thousand pounds, or five thousand quarts of milk in a year. The

records have been made without undue forcing and represent the natural capacity of the individual. Large herds frequently average over seven thousand pounds of milk per pear. For family use no milk is superior to the Ayrshire's. It is well balanced in its proportion of butter fat and other solids, and as its fat globules are small though numerous, the milk is well adapted to infants and invalids. The fashion in color changes from time to time. Just at present white with a few red spots on neck and body being most in favor. In disposition the Ayrshire is alert, active and is
very hardy, being the cow par excellence for rough, hilly, and scanty pastures.

The Ayrshire cow is quite rapidly increasing in popularity; in this respect she is coming rightly into her own, for in point of large production on scanty pasture and economy during the long feeding period made necessary by the severe winters of New England and Canada she has but few equals and no superior.

THE IMPORTATION OF CATTLE TO THE UNITED STATES

By Wing R. Smith.

THE general laws regarding the importation of cattle, compel the importer to purchase animals that are registered or whose sires and dams are registered in some recognized Herd Book of the country from which they are taken, in order that free entry may be secured, a privilege which most importers avail themselves of. In the cases of some breeds notably the Holstein-Friesian, the American Association requires forms that are especially prepared and which can be obtained from the Secretary of the Association, and which the importer is obliged to have filled out and sworn to before the proper officials, which paper is taken as evidence of pure and correct breeding in admitting the animal to registration in the herd book of this country. A quarantine of ninety days is compelled by the U. S. Government, at stations they have established convenient to the different sea ports, except in the case of cattle from Canada, which under certain restrictions are permitted to entry without quarantine.

In importing either few or many animals it is always desirable to have your shipping arrangements all perfected before the stock is purchased, otherwise you may be delayed, or forced to pay exorbitant charges. Most Transportation Companies charge per capita, but in large shipments an entire vessel may be chartered at an agreed figure for the trip. The ship usually provides a specified amount of space for each animal according to size or age; water is usually furnished, but stalls, partitions, hay, grain, straw and care are generally furnished by the shipper at his own expense and risk.

The Transportation Company frequently insures the animals against total loss of the vessel at a low, prescribed rate but other insurance if placed at all has to be taken out with certain Marine Insurance Companies that do that class of work and the rate is governed by conditions and circumstances, it is fair to say, however, that few importers insure, as it is expensive and not altogether satisfactory. As to the selection of animals and the manner of doing it, each individual has his own peculiar notions as to the particular types to be selected. A wise importer places himself in correspondence with some reliable breeder who will assist in finding the animals of the breeding type desired, or a native that is versed in the ways of the country and its language, and who will act as an interpreter and guide. The best districts or localities in which to buy should be known to the importer in the beginning, in order to save valuable time and much unnecessary expense, for time is money and the expense account swells up very fast when traveling about in strange and foreign countries.

Having secured your interpreter a personal inspection of the several herds or establishments offering the animals for sale and a critical inspection of each animal is certainly desirable if not imperatively necessary. Then follows the bargaining, and here one needs all his powers, for the foreign seller, be he farmer or dealer, is sure to place a higher estimate on the value of his stock than he is willing to take but he hopes, like all foreigners, to make a good sale. At the same time he is willing to cut into his profits
rather than lose a customer. In other words the buying and selling world is about the same in whatever country you happen to find yourself, but in all parts of Europe especially, do they look to "scalp" the American. A bargain once made is invariably held to, in the cattle districts, but be sure your bargain is complete with all the conditions of delivery, inspection, registration, etc., understood and agreed to, otherwise your last days in that land may be filled with trouble and sorrow to say nothing of tribulation. In most places, especially outside of England, cash and cash alone counts, for checks and promises are not looked on with favor. It takes time and patience to get large sums of money in the cities of Europe from the banks, hence a prearrangement with the bank is necessary if you wish not to be disap-

pointed or annoyed at the date of delivery.

A few general rules are well to be observed, among them the following: do not appear to be anxious for a particular animal or strain of blood no matter how much you want them. Do not confide too much in your interpreter as to the maximum figure you might be led to pay, otherwise you may have to pay that price many times. Set a reasonable figure that you are willing to pay, and you had better leave some animals, especially at first and take them later, than pay what you know and feel is more than the animal should bring.

If these suggestions are of any help to a prospective importer I shall have accomplished all that I attempted to do in writing this article.

THE DAIRY BULL

By C. H. Royce.

The bull, the head of the dairy herd is a much abused animal.
The impudent dairymen starves his in an evil smelling, filthy, pen, cleaned spring and fall at seeding time. The well-to-do breeder over-feeds his in a luxurious box stall. Both invite impotence with their extremes in feeding and by failure to give systematic exercise. Remedy these two defects in the management of the bull, and you have made great advancement in breeding dairy cattle.

In districts remote from creameries, cheese factories and milk shipping stations where dairying is not so intensive, you will find that nearly all the bulls are one or two years of age. Those older than this are generally fattened running at pasture with the cows for a large part if not all of the grazing season. This method of using young bulls increases their efficiency as breeders.

In the care of animals certain things are right, not because they are natural but because they are rational and scientific. If the bull at pasture makes a better sire than the stall kept bull

then we have not brought pasture conditions to the stall.

At pasture the so-called balanced ration is at all times before the animal in more or less abundance. Pure air, pure water, and freedom to exercise at will, combine to make the environment of the grazing bull ideal. It is very rare, therefore, that a bull having an even start in the spring, does not come into the breeding season in the pink of condition.

That the same degree of sureness in breeding is not obtained where bulls are confined, is evidenced by the call that is constantly coming up, to "come over and help us."

As the young bull approaches the age of fourteen to sixteen months, his ration should be carefully looked after. Whether at pasture or in the stall it should be ample and of the right character to give him plenty of energy. If he doesn't overturn the wheelbarrow and lift a gate from its hinges, as opportunity offers, then you are radically at fault in feeding and had better inquire into the subject at once. Give him some ground oats, some oil
meal and a little ground corn. Give it in such proportions as you would to a milch cow, and about a half-pound to each hundred pounds live weight. If the bull is at pasture no other feed need be supplied. If he is kept in a stall then something in the way of succulent food is necessary. In the summer time some of the soiling crops, fed the cows, will suffice, but care must be taken as too much succulent food impairs the value of the animal as a breeder. A little good hay is at all times a judicious addition to the ration.

In the winter time roots and silage with the grain will keep the bull thrifty and in that proper condition so essential to the head of the herd.

Whatever the faults of feeding and management and however grave they may be, I regard exercise as the great panacea for them all. As the great panacea for them all. Devices without number have been suggested to give the bull exercise. These devices generally resolves themselves into the “paddock behind the stall” in which the bull takes his own exercise. That this of itself is in sufficient can be demonstrated by taking a bull that has had the paddock treatment for some time and giving him a half mile on the staff. Nine times out of ten he will come home winded.

Some say “put him on the tread power.” This is good in its way, but many bulls refuse to go on the tread power and the older ones are generally too long to accommodate themselves on it. There is also some risk to which the owner of a valuable animal hesitates to subject him.

There must be then, some other form of exercise that will be more satisfactory to all. To my mind nothing is better than leading by rope or staff or driving in a yoke. Most bulls are, and all should be, taught to lead while calves, so that when the time comes for systematic exercise they are ready to be taken in hand at once.

A good way to exercise yearlings is to put two on one rope, snapping the end of the rope in the off one’s ring, and taking a half-hitch through that of the near one. You then have them under control and where they can be taught any of the movements used in guiding oxen.

By a judicious use of the whip the young bull receives many lessons that later he would refuse to learn, and which when pounded in, as is frequently done, only too often results disastrously, if not fatally, for the teacher in charge.

After the animal is taught to lead, when so trained, it is then possible to tether him out in the summer time, in orchards or nearby meadows where he could not be turned loose. When tethered the bull will take abundant exercise, especially if other cattle are in sight. The rope or chain should have a swivel in it and should be attached to the horns and run down through the ring so that if he starts head on away from the stake or tethering pin, he is not brought up by the nose and the ring torn out. For a tethering pin a good sized crowbar is best, as it stands firmly in the ground and is easily withdrawn when you want to change it.

The best method of all for exercising the bull is to make him earn his own grub either working single in cart harness, or double with another bull or steer. In the latter way, which is the most economical of all, the time of both bull and driver is conserved and many odd jobs of light work done that otherwise would be left undone. Perhaps these particular methods of exercise may not commend themselves to breeders generally. They show, however, what are the possibilities along these lines and may lead to the adoption of some other method, which will secure the desired end, and add a little variety to the life of one of our domestic animals for which, in the past, we have had little consideration.
THE STUDENTS' COUNTY MOVEMENT

By Scott Perky.

At the time I am requested for the following information the status of the students' county work is one of plans and of good hopes for the enlargement and success of the endeavor. The work of last year was successful enough to promise things for the future, and the early beginning this year will be an additional reason for hopefulness.

To those who are unacquainted with the nature of this work it may be said that it has consisted of agricultural meetings held at school houses in the county by students in the College of Agriculture. The purpose was to get in touch with the farmers for mutual benefit. Ideals for the work have included several kinds of activity not yet realized.

This year three distinct features may be inaugurated. These should be of equal importance. Meetings, as last year, will be held, but it is planned to have them not only agricultural but generally cultural, by way of programs including students of other departments of the University. Geology, biology, literature, etc., will have places along with agricultural subjects.

The distribution of books among the farmers is another feature. State Librarian Melville Dewey has become interested in our work, and has expressed himself as willing to loan suitable books in considerable numbers for distribution. A system for distributing them to the best advantage is being worked out. Not only books of farm practice will be distributed, but books of general culture, novels of good sentiment, and books for children.

Reading clubs are the third feature, and are particularly an experiment. At the meetings and during the distribution of books the formation of reading clubs among the people will be encouraged. Students of different departments of the University are expected to undertake to conduct these courses. Here, again, not only agriculture will be considered, but such subjects as geology, literature, history, etc., according to the choice of the club and to whether an able student in the elected subject can be found who is willing to give the necessary time. The cultural value of these reading clubs should be great, and their socializing influence also great, while opportunity is offered capable students for practice and review.

The success of this undertaking will depend mostly on the interest and cooperation of a large proportion of the agricultural students and very much on the interest and aid of the College of Agriculture faculty. It is undoubtedly deserving of success; and it is probable that those who push themselves to make it so will become better fitted thereby for other efforts and problems. It would be no mean undertaking to attach the county as a laboratory to the building now under construction; and although we may fall far short of such attainment, it is possible to utilize it, laboratory like, in a way mutually desirable to student and farmer.

Although the work has been carried on outside the Agricultural Association, it is desirable that the larger work of the future should have the backing of this organization and the authority it can give it. Therefore, a transfer has been effected whereby the Association—and thereby is practically meant the student body—will shoulder the responsibility of the work and make it official.
MOSQUITOES
By Chester J. Hunn, ’08.

THE telegraphic briefs of our daily papers have for some time past been full of interesting data concerning the yellow fever epidemic in our Southern States. It is most forcibly brought to our notice that the agent directly responsible for the spread of this disease is a mosquito of the genus Stegomyia.

We do not have to go far from home, however, to find a serious menace to public health in the shape of a representative of the same family of insects; for it has again and again been proven that the mosquito is an active agent in transmitting malarial fevers.

In considering the kinds of mosquitoes, we will take up but two main types; the Anopheles, which carries malaria, and the Culex, which does not. Of these two the Culex is by far the most common and although it does not transmit disease, it is decidedly pestivorous on account of its painful bite, to say nothing of its musical attainments. Many persons are interested in being able to recognize these two types. In the adult stage the Anopheles has longer legs, a narrower and more linear appearance, wings which are spotted, and in both sexes a pair of palpi as long as the beak which lies between them. Culex on the other hand has gray wings, while the palpi of the female are rudimentary, being much shorter than the beak. When at rest, the abdomen of Anopheles forms an acute angle with the support, its head lies between the front legs, and its hind legs extend out from the body. Culex on the other hand is parallel to the support when at rest, the head projects forward, and its hind legs are curled over its back.

Mosquitoes breed only in water, although the idea is still prevalent among uninformed persons that they breed in grass and dense thickets. Such places, however, merely serve as shelter during the day. Some females hibernate in cellars, basements, old barns, etc., and with the return of warm weather deposit their eggs in the nearest quiet water either at night or in the early morning hours. These eggs hatching the following day or the day after produce the larvae popularly known as “wrigglers” or “wiggle-tails.” Mosquitoes have been known to live over winter in the larva stage, being frozen in the ice. In this second stage their respective attitudes are reversed and we find Anopheles resting parallel to the surface of the water while Culex hangs at an angle. The larvae feed upon micro-organisms in the water and periodically rise to the surface to breathe. According to the temperature, from eight days to two weeks are spent in this stage after which they assume the club-shaped or pupa stage which lasts from one to three days, then the adult mosquito emerges from the water.

It is believed that the males are exclusively vegetarian in their diet, obtaining much of their food by sipping liquids. The females, however, feed throughout the adult stage, their food consisting principally of vegetable juices, human blood being preferable whenever available. Contrary to a belief held by some, the female mosquito may bite more than once.

The female mosquito usually seeks to lay her eggs along the margin of a shallow stagnant pool, but if such an opportunity does not present itself, she eagerly takes advantage of the following places: shallow cisterns, rain barrels, old tin cans, old paint buckets, sewer basins, cess-pools, clogged eavestroughs, and even manure pits. We find mosquito larvae in either clean or foul water, the one requirement being that it be stagnant. In quite large bodies of stagnant water mosquitoes breed near the margins only, for the wrigglers would not be able to breathe on a wind ruffled surface.

Continued on Page 46
A New State Agricultural Organization

The Lieutenant Governor recently emphasized the importance of the agriculture of New York State. Mr. Bruce journeyed to the Pacific coast last summer, and while he is not a farmer, he has that large grasp of affairs which enabled him to see that the agriculture of New York State compared favorably with that of other states, and to understand the necessity of promoting the agriculture of the Empire State in a befitting manner. It is, perhaps, not without significance that almost immediately following these declarations of Lieutenant-Governor Bruce, there should have met at Cornell University for the first time the representatives of the allied agricultural organizations of New York State for the purpose of inspecting the work of the College of Agriculture, and that while here they should have formed a permanent organization under the title of "The New York State Society for the Promotion of Agricultural Education and Research." Mr. Milo H. Olin, representing the New York State Breeders' Association was elected President; T. B. Wilson, representing the State Fruit Growers' Association, Secretary, and John Hall, representing the Western New York Horticultural Society, Treasurer. An executive committee was named, composed of President Olin, E. P. Powell, of the Central New York Farmers' Club, W. F. Marks, of the New York State Beekeepers' Association, Gilbert M. Tucker, of the State Agricultural Society, and a member to be named from the State Grange.

When the proposition was before the State Legislature to appropriate two hundred and fifty thousand dollars to Cornell University to build a home for the College of Agriculture, it was these allied societies, under the splendid leadership of Mr. Herbert Cook, Denmark, N. Y., that did such effective work in presenting the agricultural sentiment to the members of the legislature. After the establishment of the New York State College of Agriculture, the Board of Trustees of Cornell University invited each of these societies to send a representative annually to Cornell to inspect the work of the College of Agriculture, and advise the Trustees concerning the management and development of that College. They have accepted the responsibility placed upon them and appear determined to foster agricultural education and research as a means of promoting the agriculture of the Empire State.

It is an old saying that figures do not lie, and all friends of the Agricultural College here at Cornell should be especially glad of this at the present time. For is it not the registration in the agricultural courses the prime indicator of the growth of the College? As yet, statistics are hard to secure, as there are several stragglers still to report, but up
to the time of writing, the total registration has reached 217. This is an increase of nearly 17 per cent. over the total registration at the end of last year. It is especially gratifying to note the number of Short Course students who have returned this year to take full-year courses. Every year sees more of these students returning to get more and fuller instruction in the subjects of which they have had so beneficial a sample, they have had.

We may ask ourselves the reason of this great growth, and the answer is not long in forthcoming. Primarily it is caused by the great agricultural awakening which is taking place all over the world. Farmers everywhere are being aroused to the fact that education is the backbone of modern agriculture. This is being done in a large measure by the Grange and other agricultural clubs and associations, to whom the College owes much in the way of co-operation and support. Another reason for this growth, which is perhaps as important as the other, is found in our College itself. The Agricultural College is becoming more and more noted for its professors, its students, and its curriculum. Thus, as it sends out each year, an ever increasing body of men whose chief aim is “Better crops and more of them,” its sphere of influence is steadily broadening. As the Orientals say, “May her shadow never grow less.”

**GENERAL AGRICULTURAL**

**GENERAL NEWS**

According to *Milchwirtschaft*, a dairy paper published in St. Petersburg, there have been formed through the agency of the Riga Agricultural Society, four control societies. Each one of these consists of 13 farms with 160 to 200 cows per farm. These societies secured after the Danish pattern, the services of control assistants—graduates of an agricultural school and qualified to give advice to the members of the societies regarding feeding and milking. These assistants also provide demonstrations in milking, feeding and food determination. The Riga Society helps the movement by paying the assistants 250 rubels per annum ($125.00) and by the furnishing of apparatus and account books. Each member of the control societies has to pay one rubel (50 cts.) per year per cow.

It is announced in *Chemist and Druggist*, that among other prizes Dr. Henri de Rothschild has recently offered one of $600 for the best study on the supply of milk to a large city (hygiene, technology, transport, legislation, sale, etc.). This prize may be divided should the jury of award consider it advisable. The competition is open to foreigners, and papers should be sent in before June 1st, 1906, to the Secretary, M. C. Nourry, 49 rue des Saints-Peres, Paris.

“According to a report of the Austro-Hungarian consul at Madrid, a royal decree provides for the establishment of a testing-station for agricultural machinery at the Instituto Agricola de Alfonso XII.” at Madrid. The aim is to make practical tests of agricultural machinery and apparatus as regards material, mode of operation, work, accomplishment, cost, etc. Spanish and foreign inventors, constructors, and agriculturists are invited to submit machinery for this purpose. The Station will be provided with the necessary space, power, and attendants. In this way, foreign manufacturers in particular, will be enabled to introduce their goods into Spain. The results of each test will be embodied in an official certificate.”—Mark Lane Express.
RESOLUTIONS

The Faculty of the College of Agriculture in meeting assembled on Saturday, Oct. 14th, passed the following resolutions:

WHEREAS, The death on Oct. 10th, 1905, of the Hon. Samuel Frederick Nixon, Speaker of the Assembly, has removed a wise and powerful public servant who was deeply interested in the agricultural welfare of the State; therefore be it

RESOLVED, That the Faculty of the College of Agriculture of Cornell University hereby expresses its appreciation of Mr. Nixon’s efforts in the aid of agriculture, and its high estimation of his services in support of education for country life; and it also declares its deep feeling of sorrow and loss.
SPEAKER NIXON

The death of S. Fred Nixon, Speaker of the Assembly, removes one of the most conspicuous figures in the public affairs of New York State. He had gained a position of unusual influence, and used it to the honor and welfare of the Commonwealth. His loss will be mourned by all the people, for he was in every sense a wise and faithful public servant. The farming interests will keenly feel his loss, for he was deeply interested in all movements that looked to the betterment of agriculture. He was himself a farmer and grape-grower, as well as a business man in the little town of Westfield in Chautauqua County, and he therefore had first-hand knowledge of agricultural problems.

Mr. Nixon was a born leader of men. For fifteen terms he had served his constituency in the State Legislature, and during the last seven terms he had been speaker of the Assembly, thus exceeding all precedents in the speakership in this state; yet he was only forty-five years of age at the time of his death. This power he used with consideration and sympathy, thereby winning the personal friendship of political opponents as well as political colleagues. Yet he was positive and original in his convictions and methods. This is attested in part by the pieces of legislation with which his name is prominently associated. These laws deal mostly with public education and agriculture. One of the laws by which he is best known is that giving pupils in rural towns that have no high school the advantage of high school training in another town by calling on the State to pay the tuition. His influence was powerful in providing a liberal increase in the free school fund; in the enactment of the law allowing any district to provide free text-books; in providing increase of funds for library purposes in the districts; in means for the apportionment for teachers in thinly settled districts; in securing the appropriation of $250,000 for the rebuilding of the normal school at Fredonia. These statements show how deep was Mr. Nixon’s interest in popular education, and how much he tried to help the disadvantaged classes.

In purely agricultural legislation his work is marked by his efforts to put money in the hands of those whom he believed would make wise use of it for the public good. He did not try to force his own ideas, but gave in order that others might work out the problems as they thought best. In this regard he has set a most striking example. He stood for appropriations to the State Department of Agriculture, for the fairs, for the State Experiment Station, for extension work to be prosecuted by the College of Agriculture at Cornell University, and for the appropriation of $250,000 for buildings in which to house the work of the College. The Extension work in agriculture was all developed within Mr. Nixon’s service in the Assembly and was made possible by him. Through his efforts the first appropriations were made; and to the end he maintained the keenest personal interest in the work, frequently suggesting, always ready to counsel, never dictating. He was the father of the act creating the work, a law that has been commonly known as the “Nixon Bill.” His unwavering support and clear, cool judgment have been a constant incentive to those who have tried to do the educational work of which he was so fond. Those of us who knew him in this work are overcome with the sense of personal sorrow and loss; but the memory of the things that he desired to have done will remain as a quickened inspiration.

We regret that Mr. Nixon could not have seen the completion of the great buildings for the College of Agriculture, in which he was so much interested. He believed that the relief of the agricultural status is to come through education. He intended to reach the common people in a way that
appealed to their every-day lives. We shall do our best to carry out these hopes. He gave his powerful support at a time when help was much needed; and he did not confine his support to one institution or to a single line of effort. The farmers of the state will remember him with increasing gratitude as a great and sympathetic friend. L. H. Bailey.

CORNELL NEWS

CAMPUS NOTES

As the new Agricultural buildings are of such interest to all our readers, the "Countryman" will publish each month, a short account of the progress of their construction.

One story of the manufacturing part of the Dairy Building is now nearly finished as far as the masonry is concerned, and carpenters are expected to begin on the roof in a few days. The masonry of the higher part is now finished up to the first floor. All foundation walls of the main and Agronomy Buildings are finished and work has begun on the superstructure of the main part.

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Mr. W. H. Harper, '01, B. S. A. Ohio State University, and '02, M. S. Illinois, has now taken up his duties as assistant in the Animal Husbandry department. Mr. Harper comes to us from the Missouri Agricultural College, where he was detailed by the United States government in connection with cattle-feeding experiments.

One of the pleasing results of last year's winter course is the continued organization of the Fletcher Club. The offices have become permanent and meetings are to be held semi-annually, one at the State Fair, and the other at Ithaca during the Experimenters' League meeting in the winter. The first meeting was held at the State Grange Headquarters at the State Fair Grounds on Sept. 6th. Thirty-five members were present and reported an interesting meeting, which adjourned to the Hotel Warner for a banquet.

Dean Bailey, in his correspondence, has received many inquiries from farm managers for various estates and country places. The positions carry many inducements. In many cases a married man is preferred. Anyone contemplating this line of work is requested to confer with Professor Bailey, in order to be put in touch with such positions.

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We have with us this year, six men from India. One of these,—Prabhaker Sadashiva Shilotri,—is here on his own responsibility and is an undergraduate in the University. J. B. De is here as a representative of an Industrial Society of India and is registered in the Graduate department, as he is a graduate of Calcutta University. The other four men are from Bengal, and are sent here by the government of that province. They are: Hira Lal Dut, Surendra Nath Sil, Apurta Chandra Ghose, and Jatindra Nath Chakravarti. All four are graduates of Calcutta University and have also attended the Agricultural Department of the Engineering College of Sibpur. They are especially interested in agronomy, plant-breeding and economic entomology.

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Mr. John W. Gilmore attended the meeting of the National Association of Agricultural Implement and Vehicle Manufacturers, which was held at Niagara Falls, Sept. 27, 28 and 29. He presented a paper on the "teaching of farm machinery in agricultural colleges." This paper was received with a great deal of interest, and the following resolution was adopted by the As
sociation: "Resolved, That we endorse and commend the teaching of farm mechanics and agricultural engineering in the various agricultural and other colleges, and that we pledge to all of this work our hearty co-operation and support."

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Howard Sharp, '05 Dairy Course, is now assisting Mr. Ayres in the Dairy Building.

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Professor Bailey has arranged to have a few lectures given here on "Agricultural Journalism." These lectures will cover methods of writing for the press, the wants of the press and the needs and demands of the people. They will probably occur during the Short Winter Course, so that all agricultural students will be able to attend. So far, Mr. H. W. Collingwood, editor of the "Rural New Yorker," and Mr. G. M. Tucker, editor of the "Country Gentleman," have signified their willingness to deliver lectures in this series.

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Dr. G. F. White of the Veterinary College is giving the course in Dairy Bacteriology this fall. As the laboratory facilities are limited the class is rather small. An ample laboratory is provided for all in the plan of the new Dairy Building.

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H. S. Merry, G. C. Manrow, and L. D. Neish, all '05 Dairy Course men, are back at the University taking long courses. Several of the Winter Agricultural Course boys are back, too. There is an increasing tendency among the Short Course students to come back for a longer course of the agricultural training which they have learned to appreciate during their short course.

* * *

R. C. Lawry has been appointed an assistant in Poultry Husbandry. Mr. Lawry is the first man to hold such a position in the College.

The Animal Husbandry department has bought ten new sheep this month—five Cheviots and five Shropshires. These are the only ones of their kinds now on the University farms.

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The Poultry Department has been working during the past summer on two problems which will interest all poultrymen. They are the value of alfalfa as a pasture crop for laying hens, and the comparative value of a wet and dry mash feeds.

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Dr. A. C. True, the Director of the Office of Experiment Stations at Washington visited the College of Agriculture lately. On Oct. 11th he spoke to the Agronomy Seminary on "Agricultural Education," outlining his ideal system for agricultural colleges.

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Professor Rice is writing a series of twenty articles on poultry for the Junior Naturalist Monthly. These articles are written on the nature study basis.

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The first meeting of the Agricultural Assembly for this year was held in Barnes Hall on the evening of October 5th. Professor Bailey spoke to an audience which almost filled the big dome. When the meeting adjourned to the social gathering downstairs, the large reading room was crowded to overflowing. Refreshments were served by Mrs. L. H. Bailey.

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On the 1st of October, the Dairy Department leased the Sage creamery, which is situated about six miles north of Ithaca. This was done to secure a continuous supply of milk for instruction and experimental work in the winter. In the summer the place will be run as a skimming station.
FORERUNNERS

'91, B.S.A.; '92 M.S.A.—Mr. C. H. Royce spent his boyhood days on a farm in Sullivan county, N. Y., where his father and grandfather had been farmers before him. In 1887 he entered Cornell taking purely agricultural subjects and was graduated in 1891. During the fall of that year he returned to the University for graduate work and was allowed by the faculty to spend the winter term at the

Wisconsin Agricultural College, because of better facilities to study the losses of fat in the manufacture of cheese.

After receiving his Master's Degree he became a farm superintendent and since then has had charge of such places as "Fox Meadow," the country place of the late Charles Butler in Westchester County; "Ellerslie," Hon. Levi P. Morton's famous farm at Rhinecliff, N. Y., and "Castle Grove," owned by the late John R. Bennett at Dansville, Pa. Each change has been one step higher on the ladder of success. Each succeeding position brought greater responsibilities and larger reward. This is eloquent testimony to the practical value of Cornell training. It is also circumstantial evidence of the highest character to the ability and push of the one who puts that training into practice.

Mr. Royce naturally takes an active interest in the various agricultural organizations in the state. He is a member of the "Grange," the "Fruit Growers Association," the "Breeders Association," the "Dairymens Association" and "Experimenters' League." While secretary of the Eastern New York Horticultural Society he had charge of the annual fruit exhibit at the State Fair. The things in which he is the most enthusiastically interested are the breeding of good Guernsey cattle and the tilling of the soil a little better than most of his neighbors, in both of which efforts he has been remarkably successful.

To put it briefly, Friend Royce is one of a large and growing class of young Cornell graduate farmers who, by their good farming and good citizenship are doing much for the neighborhoods in which they live and are doing most effective service by their good example in breaking down the arguments and prejudices against the value of an agricultural college education.

A personal sketch of any really successful Cornell Agricultural College student would be incomplete without reference to the wife and children. This would be particularly true of "Charlie" Royce, whose good wife and four bright children give you a cordial Cornell welcome at their door.

* * *

A few weeks ago while in conversation with a member of the Countryman staff, one of the new students incidentally made mention of three former agricultural students whom he knew. One of these men The Countryman had tried to reach by letter two or three times during the last year, but had failed. Notes on all three are published in the Former Student
columns of this issue. This is one way in which The Countryman gets news for the Former Student columns. There are, no doubt, others here who have knowledge of men who have left Cornell. Any person who can furnish such information will materially help The Countryman by giving a note of it, either verbally or by mail, to some member of The Countryman board.

* * *

'84, B. S. A.—A recent number of the Utica Saturday Globe, contained an article and picture of Charles Fred Boshart of Lowville, N. Y., the Republican nominee for assemblyman from that district. Since leaving college he has been with his father on the old homestead. For a number of years they have been considered to have one of the largest hop-farms in the state. Boshart has kept up an interesting study of natural science, having made very large collections of birds, insects, and plants.

'87, A. B.—Frederick V. Coville is at present U. S. Botanist at Washington. While here he became a member of Phi Beta Kappa and Sigma Xi. He is continuing his good work in his new position by bringing to the notice of the government several noteworthy facts.

'05, W.—Robert McAdam is at present occupying the position of Dairy Inspector for the U. S. Dept. of Agriculture, paying special attention to renovated butter factories and markets. Mr. McAdam is secretary of the New York State Dairymen's Association.

'06, W.—Grove Bradley Smith of Memphis, N. Y., is a successful general farmer. He says that the time spent here has proven a good investment.

'93, Special—Charles A. Lueder, more familiarly known as "Pop" Lueder, who graduated from the Veterinary college in '02, has established a large practice in Herkimer, N. Y. He is back at Ithaca during the football season as assistant to Coach Warner, and has charge of the freshman football squad. A. J. Burley, D. V. M., '05, is taking care of his practice in the meantime.

'03, Special—Simon Simpkins, who came to Cornell as a special student from the Hebrew agricultural colony, at Vineland, N. J., has just rented, in company with a friend, a 3-acre fruit farm in the heart of the town of Boulder, Colo. They are going on the place with the intention of making money to pay their expenses while attending the University of Colorado, which is situated in Boulder.

'04, Graduate.—Louis Hart Weld is at present teaching Biology at Evanston Preparatory School, Evanston, Ill., which is one of the largest preparatory schools to Chicago University. He spent the last summer at his home at Medina, N. Y.

'05, Special—Maxwell Corotis and B. Stockler have both entered the regular agricultural course in the Ohio State University, at Columbus, Ohio.

'05, B. S. A.—Miss Emma M. Soch stopped a few days at Ithaca while on her way to Hampton Institute, Va., where she has a position as teacher of physics, physiology and elementary agriculture.

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BOOK REVIEW


The gospel of the return of men to nature has been preached for centuries. Nature and the commonplace have been brought into art in all its manifestations, into philosophy, into science, but never before has their meaning been better explained in their connection with every day life than in this book. Rousseau spoke of the return to nature as a means of saving the world from the calamities of civilization. Walt Whitman idealizes the commonplace but with him it is only a philosophy, a point of view. Professor Bailey brings us nearer to nature as a way of living, as a means of securing our material and intellect-
ual necessities. Instead of a return to
nature, as has been heretofore preach-
ed, Professor Bailey preaches the
movement, the progress towards na-
ture. The natural life that nature of-
ers is not sufficient compensation for
the developed minds of the present
day; we need rather a better under-
standing of nature, a nature in which
besides the esthetic and physical ad-
vantages, we can find also the intel-
lectual pleasures that the modern pro-
gressive mind needs.

The Outlook to Nature is divided
into four parts: The realm of the Com-
monplace, Country and City, The
School of the Future, and the Quest
of Truth. As the titles indicate, the
book deals with the commonplace as
understood by the man who comes in
touch with the real things, the things
that touch us most closely. "No man,"
he says, "is efficient who is at cross-
purposes with the main current of his
life; no man is content and happy who
is out of sympathy with the environ-
ment in which he is born to live." This
is the philosophy which that
author proposes, the absolute harmony
between ourselves and the world about
us.

Centuries of isolation caused by un-
surpassable distances, inadequate
means of transporting ideas without
great delay, the difficulties which the
spreading of new ideas presented to
the great minds of the passed ages,
made the city the center of civilization,
the great sea of knowledge into which
all great minds, all new ideas had to
flow. Times have changed and in the
woods man can get as much of the
flow of thought that irrigates the world
as the man who lives in the great cen-
ters. The Outlook to Nature gives us
the true possibilities of country life,
physical and intellectual, and the ideas
of the writer in regard to museums
and large educational institutions, are
borne out by the many secluded, iso-
lated small town Universities that
make the fame of the German scholar-
ship.

The third chapter is a discussion of
the School of the Future and here as
in the preceding parts the study of the
real things, the love for the things ex-
isting, touching us, affecting us, or as
the writer expresses it:

As the race in its progress,
So the child in its nurture
And the flight of the poet
Come up out of labor.

Constructive, creative,
Will the method of nature
Of life and its contents
Make the School of the Future.

The last chapter is the true expres-
sion of the naturalists faith. It is,
so to speak, a spiritual materialism, the
creation of a faith most free of dogma,
most faithful to truth, most full of a
cheerful resignation before the great
revelations of nature and a free-and
simple faith in the goodness and god-
liness of truth.

The way in which the book is writ-
ten is as restful, as free, as open
hearted, and as simple as nature, so
wisely admired, and so well loved by
the poet writer. And if there is any-
thing to be objected to in this book it
is its shortness, or the outline manner
in which it is written. Perhaps other
books will come from Professor
Bailey's hand that will complete and
expand his nature philosophy.

Chas. Ar.

Soil Physics Laboratory Guide,
by W. H. Stevenson and J. O.
Schaub. The Orange JuDD Co.,
New York. 43 4 x 7 ¼ in. 80 pages.
50 cents.

A neat little handbook, being de-
dsigned to give instructors and students
a series of forty experiments in soil
physics with directions and explana-
tions. Each experiment is followed by
questions for the enforcement of its
practical application. A striking fea-
ture is the original series of illustra-
tions which show the principal appar-
atus used in the laboratory with de-
tailed explanations of each. The ap-
pendix contains directions for the keep-
ing of laboratory notebooks, a table
of weights and measures, and a series
of useful formulae. The experiments
themselves are only in part original,
but all are concise, practical and sim-
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Malaria is caused by an extremely small animal parasite, a protozoan, living in the red corpuscles of the human blood. When fully grown, the cell walls of this organism rupture, setting free a large number of spores into the blood. At the time of this rupture occur the chills or spasms so commonly experienced by malarial patients. This is the critical moment of the disease, and the opportune time for administering quinine. If this precaution is not taken, each of these spores, after being distributed by the blood serum, will attach itself to another red corpuscle, thus spreading the infection. Meanwhile certain individuals die in the blood. We have just considered the asexual method of development, and will now take up the sexual method. Certain individuals grow larger forming females, while others develop flagella becoming males. After conjugation further development can only take place in the alimentary canal of Anopheles. After some of this infested blood is transferred by actual biting to the stomach of Anopheles, these fertilized individuals penetrate the walls of the canal, and here, after a growth of about five diameters, break up into a large number of blasts or spores. The blasts pass into the body cavity, and push forward into the salivary glands, remaining here until Anopheles bites a person thereby causing a new inoculation.

Mosquitoes have a large number of natural enemies. In the larvae stage they are preyed upon by fish. Special emphasis should be laid upon sun-fish and top-minnows, for these are...
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among the most active in this respect. The dragon-fly larvae, the water-tigers, and other predaceous water insects are also large controlling factors. Perhaps the most prominent agents of repression are the parasitic diseases to which the larvae are subject. The adults are caught by birds, especially the swallow, night-hawk, and purple martin, and by dragon-flies, frogs, toads, lizards and kindred creatures.

Man employs many artificial means for controlling this pest. They may be destroyed while hibernating in houses by a thorough fumigation with hydrocyanic acid gas, or by formaldehyde or even insect powders. However, insect powder only disables the females for a time, so they should consequently be quickly swept up and burned. All breeding places about the premises should be done away with. Piles of tin cans, basins, bottles and other articles capable of holding water should be buried. The weeds which afford resting places during the day, should be cut down. All little pools, such as form in ditches, post-holes, cow-tracks and other excavations, should be filled. If it is necessary to have an exposed cistern, water barrel, or tank, it should be protected by a wire-screen cover, or cheese-cloth, or mosquito-netting of double thickness. Tubs, vases, and drinking receptacles for animals should be emptied at least once a week. Examination of the eave troughs, and water-pipes, will often disclose clogging or leakage. Inspect the cesspools and provide tight covers for them. Much swampy territory can be drained, or if impossible the water can be drawn into one large pool where the introduction of fish may rid them of the larvae, especially if aquatic plants are growing therein.

The last remedy is that of “oiling.” It is necessary for the mosquito larvae and pupae to come to the surface of

[Continued on page 52]
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Comparative test of steamed bone meal and raw rock phosphate, alone and with clover turned under. Pot 102 has clover turned under without phosphorus, and pots 101 and 125 are check pots without soil treatment.
MAINTAINING SOIL FERTILITY

By Cyril G. Hopkins.

ONE of the problems which probably is, and which surely ought to be, uppermost in our minds is how to restore the fertility of our poorer soils and how to profitably and permanently maintain all our lands in a state of high productive capacity.

It should be the aim of the practical scientific farmer to help to bring about a system of agriculture which shall at least permanently maintain the high crop yields of our best soils and which shall increase the fertility of our poorer soils to their maximum profitable productive capacity.

But to grow large crops requires large quantities of valuable elements of plant food, and this brings us to the subject of “Circulation of Plant Food.” This is the most important process connected with any possible system of permanent agriculture. The farmer of greatest temporary success is as a rule the farmer who takes the largest amounts of plant food from the soil; but the system of farming of greatest permanent success must be a system which will not only take large amounts of plant food from the soil, but which brings about such a circulation of plant food that so far as necessary equivalent amounts are returned, again to be used by growing crops, and again to be returned.

HISTORIC SYSTEMS OF LAND RUIN.

The almost universal practice of the civilized world up to date has been to ruin land and then cry, “Westward Ho!” and he who undertakes to say that the rich soils of the great central states can never be reduced in fertility knows not whereof he speaks.

What has been the system? And what is the common practice today? First, beginning with virgin soils, we crop continuously with corn and small grains till the practice becomes unprofitable. Second, when these crop yields become much reduced, we introduce clover into the rotation and thus maintain, to some extent at least, the nitrogen. But the fixation of nitrogen is not the only function of clover, nor indeed its most effective function on many soils. Clover is a gross feeder on phosphorus. Considerable quantities of the elements taken from the soil and subsoil by the deep rooted biennial clover plant remain in the roots and stubble and, as these residues decompose, the products of fermentation and decay liberate still other quantities of phosphorus from the soil itself, thus furnishing a good supply of available phosphorus to succeeding crops of corn or other grain. (Potassium may be effected in a similar way). On soils where this is the principal effect of growing clover in rotation, applications of phosphorus produced about the same increase in crop yields as are produced by the use of clover; whereas, applications of nitrogen itself, even in the best forms, produce little or no increase in the crop. Furthermore, on such soils, about the same effects are produced by the use of non-leguminous green manures, such as rye, buckwheat, or rape, as are produced by clover or applications of phosphorus.

Usually this process continues until the clover system fails, until the clover crop is unable to obtain sufficient phosphorus for its own growth.

Landplaster and caustic lime are next brought into use to force the soil to give up plant food which could not otherwise be obtained by crops. This system is effective but short-lived, for after a score of years the soil commonly refuses to yield up the required
quantities of its remaining stock of fertility even under the destructive action of these powerful stimulants. It is this use of lime that is referred to by the well known German proverb which says: "Lime may make the fathers rich, but it makes the children poor."

Then comes the common commercial fertilizer system, in which we apply to the soil not sufficient plant food to grow good crops and maintain the productive capacity of the soil, but only enough to supplement that which can still be forced from the land. The most common application is 200 pounds per acre of so-called 2-8-2 goods applied once or twice in a four-year or five-year rotation. This means 2 per cent. of ammonia, 8 per cent. of so-called phosphoric acid, and 2 per cent. of potash. A 200-pound application of such a "complete" commercial fertilizer would supply four pounds of ammonia, 16 pounds of so-called phosphoric acid, and four pounds of potash; or, in the language of Illinois, about 3½ pounds of actual nitrogen, 7 pounds of actual phosphorus, and 3½ pounds of actual potassium, whereas a 100-bushel crop of corn would remove from the soil in one season about 148 pounds of nitrogen, 23 pounds of phosphorus, and 71 pounds of potassium; or 40 times as much nitrogen, 3 times as much phosphorus and 20 times as much potassium as is commonly applied for two or three years' crops. Sometimes acid phosphate alone is used and this is certainly less absurd than to continue to buy potassium when it is not needed, and to pay 15 cents a pound for nitrogen when it can be obtained from the air at a cost not to exceed one cent a pound, or at no cost whatever if the legume crops and catch crops are properly fed and pastured.

But even where acid phosphate alone is used the applications are usually too small to supply the needs of maximum crops and maintain the supply of phosphorus in the soil. The common practice is to remove all that can be extracted from the soil even by the aid of the 60 per cent. of manufactured landspaster, contained in the acid phosphate, and then depend upon the added phosphorus to make up the balance required by the crop. Even in the rotation experiments at the Ohio Station, where a system better than commonly followed has been practiced, the total phosphorus applied in acid phosphate during a five-year rotation is less than is contained in a single 100-bushel crop of corn.

Most farmers use more or less farm manure, and this is well, for it helps to maintain the supply of nitrogen and potassium even though it does not return much phosphorus to the land. It should be remembered that about three-fourths of the potassium in a crop of corn, wheat, or oats is contained in the stalks or straw, while only one-fourth is contained in the grain; also that when the crop is fed to animals, practically all of the potassium is returned in the solid and liquid manure; whereas about three-fourths of the phosphorus in the crop is contained in the grain, and even if the grain is all fed, a considerable part of the phosphorus remains in the bones of the animals and is thus sold from the farm.

**FORMS OF PHOSPHORUS.**

I firmly believe that the supply of phosphorus in the soil can be profitably maintained by the use of sufficiently large quantities of acid phosphate; and if the continued use of acid phosphate finally produces such acid conditions in the soil as to prevent the growth of clover as appears to have been a common occurrence where it has long been used, then the acidity can be corrected from time to time by applications of some form of lime.

At present prices we can profitably substitute for acid phosphate steamed bone meal, which is known to be a satisfactory form of phosphorus, and thus avoid the possible injurious effect of acid phosphate, but this suggestion could not be adopted by any large proportion of the farmers of the country because of the limited supply of bone meal.
Comparative Effect of Steamed Bone Meal and Raw Rock Phosphate, in Connection with Clover and Manure.

<table>
<thead>
<tr>
<th>SOIL POT No.</th>
<th>TREATMENT APPLIED</th>
<th>WHEAT YIELDS</th>
<th>INCREASE Bu. per Acre</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>GRAMS Per Pot</td>
<td>BUSHELS* Per Acre</td>
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<tr>
<td>101</td>
<td>None</td>
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<tr>
<td>102</td>
<td>Clover</td>
<td>16.3</td>
<td>43</td>
</tr>
<tr>
<td>103</td>
<td>Bone meal</td>
<td>14.7</td>
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<tr>
<td>104</td>
<td>Rock phosphate</td>
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<tr>
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</tr>
<tr>
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<tr>
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<tr>
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</table>

The table shows the soil treatment, the actual yields of wheat in grams per pot, the rate of yield in bushels per acre, and the gains from the treatment.

The only very extensive supply of phosphorus is the natural rock phosphate, from which acid phosphate is made by mixing a ton of rock phosphate, with about a ton of sulfuric acid, the resulting acid phosphate being sold for about $15 a ton, or $30 for the two tons of material which contain no more phosphorus than the original one ton of raw rock phosphate, which we get for about $8 delivered in Illinois.

As to the value of non-acidulated finely ground natural rock phosphate, I consider this as a material which gives great promise of extensive use in the economic and profitable improvement of poor soils and in the maintenance of large crop yields on good soils. It should be distinctly understood, however, that repeated experiments have shown that small applications of this material give practically no immediate returns if used in the absence of decaying organic matter. On the other hand, when used in intimate connection with liberal amounts of farm manure or green manure or both, we have conclusive evidence that it is one of the most economic and profitable forms of phosphorus, especially where

*The pots used in these investigations are 10½ inches in diameter, consequently 1 gram per pot corresponds to 1 pound per square rod or to 160 pounds per acre. The actual yields in grams per pot are given but the results are also computed to bushels per acre.
the crop returns for a series of years are to be taken into account.

The fact that steamed bone meal costs $25 to $30 a ton, while raw rock phosphate, equally rich in phosphorus, can be bought for one-third as much, has led several experiment stations to investigate the practicability of using raw rock phosphate. Some good results have been obtained by the experiment stations of Ohio, Maryland, and Illinois.

**POT CULTURE EXPERIMENTS.**

A series of pot culture experiments recently harvested at the Illinois Station furnishes some additional data on the relative values of steamed bone meal and raw rock phosphate. The soil used was the gray silt loam of the Lower Illinois Glaciation, and wheat was the crop grown in the pots. The phosphate used is known as the "blue rock phosphate," which is thought to be somewhat more readily available than the "brown rock phosphate." In certain pots the phosphorus was turned under with a good growth of clover; in other pots with farm manure, and in others with both clover and manure. In all cases equal money values of bone meal and rock phosphate were applied, that is, the quantity of rock phosphate applied was three times the application of bone meal.

It will be seen that the untreated soil (pot 101) yielded at the rate of 27 bushels of wheat per acre (28 bushels on the duplicate pot No. 125). Where clover was turned under (102) the yield was increased by 16 bushels; that is, from 27 to 43; and where bone meal was turned under with clover (105) the rate of yield was 59 bushels per acre, the increase of 32 bushels being just double that produced by clover without bone meal.

Where raw rock phosphate was turned under with clover (106) the wheat yielded at the rate of 62 bushels per acre, making a total increase of 35 bushels over the yield of the untreated soil. Of this 35-bushel increase, 16 bushels should be credited to the clover and 19 bushels to the rock phosphate.

It will be observed that rock phosphate used alone produced an increase of only 11 bushels, which added to the increase of 16 bushels due to clover alone makes only 27 bushels. In other words the sum of the gains which they make when used separately was 8 bushels less than the increase produced when the rock phosphate and clover were turned under together. Some what similar results are produced with clover and bone meal when used separately and together; also with bone meal and potassium, and with rock phosphate and potassium, one of the chief functions of the potassium apparently being to increase the availability of the phosphorus in the bone meal and in the rock phosphate. Such extraordinary combined action does not appear, however, from other combinations.

As a general average the rock phosphate has made slightly better gains than the steamed bone meal.

**VALUE OF POT CULTURES.**

It is appropriate to emphasize the fact that those who study very thoroughly carefully conducted pot culture experiments are those who have the most respect for the results which pot cultures furnish. The information obtained in pot culture work is usually reliable and correct, although two or three years' field experiments are commonly required before the pot culture results are fully confirmed, largely due to the fact that field plots are rarely if ever exactly uniform and comparable, and to the fact that unfavorable weather conditions, uncontrolled by human agency, often modify the field results.
R ECOGNIZING that the food value of potatoes is almost entirely dependent upon their starch content, extensive analyses have been made to determine the amount of starch in the potato and its proportion to other substances and water. The starch, protein and fat content, and the presence of other substances which influence flavor and color have been considered the factors upon which quality is usually based. The standard of chemical composition is fairly adequate when only the utility of potatoes for the manufacture of starch is considered, and perhaps also when potatoes are used only for stock food, but the amount of potatoes used for these purposes in this country is small. In France and some other parts of Europe potatoes are grown directly for starch manufacture and for stock feeding purposes as well as for table consumption.

It is true, however, that the starch content must be considered in any estimate of the quality of potatoes; for, when this is deficient or falls below a certain standard (about 17 per cent.) the indications are that the tubers have not developed properly, have not ripened, or they have grown under adverse climatic or soil conditions; and such potatoes prepared for food will not meet the standard set for table potatoes in this country. The culinary value of potatoes varies with the tastes and estimation of different peoples. In the United States a tuber of a starchy flavor, white or floury in color and mealy when cooked, is considered of better quality than one which is strong, colored or soggy after boiling; this mealy condition is usually found in potatoes with a starch content ranging from 17 to 20 per cent. though such conditions may not depend directly upon starch content. In France, on the other hand, potatoes which retain their form, are yellowish in color, and are soggy after boiling are most desired for culinary purposes. This condition is usually found in potatoes low in starch content and high in protein. Condon and Bussard, two French investigators, conclude from their extensive studies upon this subject that the culinary value of the potato is directly proportional to its total nitrogen content, and inversely proportional to its richness in starch. 

There are trade estimates of quality in potatoes which have no direct relation to the culinary or structural considerations. These may be classed as size, surface aspects, shapeliness, and variety considerations. Usually the trade does not call for potatoes of excessive size. Those ranging from two to three inches in length weighing from 5 to 10 ounces are most acceptable. If larger or smaller than this, for whole or baked potatoes, they are non-uniform in baking qualities and do not look well when put upon the table. Then, too, in preparation for cooking, the large tubers have to be cut in order that they may be uniformly cooked before the small ones are over done. There is slightly more waste also in paring. The surface aspects and general shapeliness of the tubers are perhaps the greatest considerations of the discriminating consumers. So far as we are able to determine, the pink-skinned varieties are in general quite as good in quality from a culinary point of view as those of light or yellowish color. The blue and dark tubers are not desirable for table use except for salads and garnishings. Excepting the potatoes put on the market as earlies, those having a more or less netted skin, or those whose skin has a corky appearance or touch, are usually preferred to the smooth and clear-skinned tubers. This appearance or touch, is, in some instances, a variety characteristic, but in general it indicates a

degree of maturity or development which promises good cooking quality. On the other hand, the potatoes of smooth and clear skins are oftentimes excessively watery or immature. Potatoes with numerous and deep eyes are also objectionable because they may carry much dirt, and the labor, time and waste in preparing them for cook-

ing are much greater than is the case with potatoes of even surface. Tubers having deep notches and quick curves in their surfaces are also usually avoided, while those of oval, flat-round and elongated-oval shape are most desirable.

Quality in potatoes, from both the culinary and trade points of view, varies to a limited extent in different varieties; but as a general rule, a knowledge of variety characteristics is possessed only by those who have given the question some study. However, it is a matter of common observation that some varieties resist rot in storage better than others and some deteriorate in cooking quality after going into storage. Undesirable flavors or colors are developed and sometimes the tendency to break down into a mealy condition upon boiling diminishes.

If “the proof of the pudding is in the eating” then it is desirable to find out if possible what characteristics a potato possesses which render it acceptable upon the table. From studies and investigations extending over two years, it seems that the culinary and dietetic quality of potatoes is not dependent upon chemical composition so much as it is upon the anatomical (and perhaps physiological) characteristics of the tuber, and the arrangement and distribution of starch and water areas in its substance, and also that the structural characteristic of the tubers is influenced by the conditions of the soil, and of the soil and atmospheric climate in which the potatoes grow.

In order to arrive at some basis for estimating the quality of potatoes from studying its structure and to train the judgment it will be necessary to study the parts of a potato. If a cross section of a tuber is made and a slice about 2 mm. in thickness from this section is held up to the light, or even carefully examined by reflected light, four zones or areas will be recognized. Using the nomenclature followed by Coudon and Bussard, these are:

1. The Envelope or Skin comprising the corky covering of the tuber.

2. The Cortical Layer which is just within the envelope and varies from one-eighth to one-half inch in thickness. This part is generally more dense than any other and is separated from the interior by a well marked ring containing fibro-vascular bundles.

3. Within the cortical layer is the External Medullary area which comprises the main starchy part of the tuber. This part varies considerably in uniformity. If it is non-uniform to a marked degree the tuber is likely to be of poor quality.

4. The Internal Medullary area occupies the central part of the tuber and
often having branches permeating the external medullary area. **This area is usually more or less translucent, inasmuch as it contains much water and but little starch.** When this area is large and branching the tuber is likely to remain soggy when boiled or it will have resistant lumps which will not mash readily.

In cooking, mealiness is the most important consideration in estimating quality. In general this character follows upon the presence of sufficient starch in the cell to rupture its walls when cooked. The grains of potato starch expand and coalesce when boiled in water, and if the cells are sufficiently full of these bodies this expansion will cause the cellular structure to be broken down and a degree of mealiness is the result. When the requisite amount of starch is not present in the cells, its walls are not broken down in cooking, hence the tuber retains its form, or is soggy. When the internal medullary area is large and branching (in the variety Doe's Pride) the external medullary area is **not** uniform, and when the tuber is boiled in water it is hard and soggy or it contains portions which will not mash uniformly and readily. Both by analysis and microscopical examination the internal medullary area is observed to have less starch by as much as five or six percent than the external medullary area.

If, as stated, the starch grains expand when boiled in water, it would seem that a cooked tuber ought to be greater in volume than a raw one, but this is not the case to any marked extent. The boiled tuber contains about the same percentage of water as the raw one. Three trials out of four showed a loss in weight by boiling of from three to ten grams, while one trial showed a gain of a little over three grams.

These observations seem to point to the conclusion that although the starch grains expand greatly on boiling; yet the volume of potato substance is not materially increased because in expanding, the starch grains incorporate the water which was originally in the tuber in a free state. In other words, the mass acts somewhat as a sponge. If the cortical layer is thin, the skin netted, and the external medullary area uniform, the texture crisp and the internal medullary area small, the tuber generally becomes mealy when boiled.

It is pertinent to mention here the practical bearing of these studies of quality upon the production of potatoes. Results of the investigations indicate that while the largest numbers of tubers are produced in the upper two inches of the soil, yet the greatest weight of tubers and tubers of best quality are produced under from three to five inches of soil. We believe that...
the superior yield and quality of potatoes growing from two to five inches in depth is due to the prevalence of more uniform temperature conditions during each twenty-four hour cycle, and also to the constancy of the moisture in this depth of soil. Throughout the growing season the temperature in the soil varied only about three-tenths of one degree between the two, four and six inch depths, while the temperature at two inches dipped two degrees lower and rose two and one-half degrees higher than the temperature at four and six inches in depth during the twenty-four hours. The temperature at four and six inches depth was more nearly constant. The average moisture content during the growing season in the upper two inches of soil was 13.26 per cent, varying from 8.75 per cent. to 16.98 per cent. while that at four and six inches was 15.12 per cent. and 15.91 per cent. respectively with narrower variations.

Another factor in the growth and development of potatoes which influences quality is the degree of maturity. A distinction, however, must be made between those potatoes taken from green plants in the midst of their vegetative growth and those taken from plants which have died because of the close of the season. Though immature, the former are esteemed of good quality, while the latter are of uniformly poor quality. We believe that the cessation or retarding of growth of the tubers, as the plant dies slowly, causes abnormal development in both composition and cellular structure, while tubers taken from the growing plants are suddenly interrupted in the midst of normal growth and development. Immature potatoes are relatively richer in protein and poorer in starch than normally developed and ripened tubers, and they are also more watery.

Fortunately the factors which seem to influence quality in potatoes are within control of the thoughtful potato grower. Given a good variety and a good potato soil it is believed that good quality is developed under a uniform soil temperature of 65 to 75 degrees; and that great fluctuation in soil temperature is detrimental to the best development of potatoes. These facts bear directly upon the depth at which potatoes should be planted, best results being obtained when planted at a depth of from four to six inches. The consideration of quality in potatoes has a close relation to the problems of improvement and breeding, and it is to be hoped that in future work along this line quality may be considered as important a factor as yield.

THE FARMER’S STORE

Heap high the farmer’s wintry hoard!
Heap high the golden Corn!
No richer gift has Autumn poured
From out her lavish horn!

Whittier.
INDIVIDUALITY OF THE WHEAT KERNEL

By Harry Snyder.

Wheat kernels show a greater individuality in chemical composition and physiological properties than is generally conceded. In nearly every sample two distinct types of kernels are present, even in wheats that have descended from a single kernel or mother plant. In the study of individual wheat kernels at the Minnesota Experiment Station, reported in Bulletins Nos. 85 and 90, it was found that from the same sample of wheat starchy and glutinous kernels with as much as 5 per cent. difference in protein content occur, while kernels grown from a uniform lot of seed showed a range in protein content of from 13.81 to 17.51 per cent. Even individual seeds from the same head showed a difference of 1.62 per cent. This suggests that in all varieties of wheat there are two types, glutinous and starchy. In some cases these differences are so slight as to scarcely affect the physical properties or the general appearance of the grain, while in others they are so pronounced that the two types of kernels can readily be distinguished even by the untrained eye.

Why there should be so large a difference as 4 per cent. or more in the protein content of wheat grown from an apparently uniform lot of seed is not difficult to understand when it is remembered that wheat is self-fertilizing, and whatever starchy or glutinous tendencies an individual kernel may possess makes itself manifest upon reproduction. That the tendency to reproduce either starchy or glutinous kernels exerts itself is shown in the analyses of a large number of samples of both commercial and pedigreed wheats.

The glutinous wheat kernels are characterized by a darker amber color and by a harder and more flinty texture than the starchy kernels. When the two types of kernels are cut through horizontally, the dark color and the hard and horny character of the glutinous wheats and the lighter color and more floury nature of the softer starchy wheats are readily observed. Occasionally a kernel of wheat is found, one-half of which is starchy and one-half glutinous.

In the analyses of separate wheat heads, slight differences in the nitrogen content of individual kernels have also been observed, and in many cases it was possible to distinguish starchy and glutinous seeds on the same wheat head. When grown from the same glutinous seed individual kernels varying in degree of gluten are produced. In the case of four samples of wheat grown from a uniform lot of seed containing 14.57 per cent. of protein, a range in protein content of from 13.81 to 18.45 was secured. In the case of individual kernels produced upon the same wheat head, the difference in protein content was small, but still there was an appreciable difference, showing that each head and each kernel, as far as chemical composition is concerned, has an individuality.

Some misconception seems to exist as to the relative importance of protein or gluten in assigning a value to wheat. It is generally held that the larger the amount of gluten, the more valuable the wheat for flour and bread-making purposes. This is true for wheats with protein content of less than 15 per cent. but an excess of gluten over 15 per cent. does not add to the bread-making qualities of the flour. Experiments made at the Minnesota Experiment Station show that the breads produced from wheats of high protein content are not of better quality than those of average protein content and that whenever additional gluten, even to the extent of 15 to 20 per cent., was added to the bread, the size and physical qualities of the loaf were not improved. In regard to the nutritive value, a high protein content is desirable, provided it is associated with other characteristics, such as improved bread-making value. However,
in the case of wheats containing 15 per cent. of protein, the ratio of proteins to carbohydrates is about 1 to 5, and any increase in the amount of protein would unnecessarily increase the amount of nitrogenous matter in a mixed ration. Hence it is that it is not necessary to aim to develop wheats of abnormally high gluten content. To do this, it would undoubtedly be necessary to sacrifice yield, as abnormally high nitrogen content and large yield are antagonistic characteristics. The high yielding, medium gluten content wheats are undoubtedly the ones that will prove the most valuable to the farmer, the miller and the consumer. It is certainly a safe type of wheat to adopt as a standard, rather than one having either an abnormally high or low protein content.

A great many of our wheats contain too small an amount of gluten, and in the selection of seed due regard must be given to maintaining its glutinous character. But this should be combined with other desirable characteristics, as a high yield per acre and a high flour yield from the grain. An even gluten content is important in the selection of seed wheat. It is not possible to compare samples of wheat grown in different localities and under different conditions and assign a relative gluten value on the physical appearance of the wheat alone, as a less amber and horny kerney of one sample may contain more gluten than a darker colored and more corneous kernel of another sample. It is only when the starchy and glutinous types are selected from the same sample that these comparisons will be found to hold true. Nature herself has carried on this process of selection and has produced seeds of both high and low protein content, which can be readily picked out from physical appearance alone.

A study of individual kernels has also shown that the highest nitrogen content is present at earlier stages of growth, rather than at the time of maturity. Thus it is that if the selection of seed were made on the basis of nitrogen alone, immature and light weight seeds would be selected as the ones containing the maximum amount of gluten. The study of heavy and light weight grains showed that, while there is a larger percentage of nitrogen, phosphoric acid and potash in light weight seeds than in mature, well developed, heavy weight seeds, 100 heavy weight kernels will contain from two to four times as much nitrogen, phosphoric acid and potash because of their greater weight than the same number of light weight seeds. Thus, while the light weight, immature seeds have somewhat the advantage in percentage composition, the heavy weight matured seeds have decidedly the advantage because of their greater weight and larger content of the most valuable plant food nutrients. When the heavy weight seeds are selected for seed purposes, the additional reserve plant food at the disposal of the growing crop is often sufficient to materially affect the vigor of growth and the yield of grain.

Seed selection and the breeding of high grade grains alone will not solve the problem of better grain production, unless due consideration be given to the cultivation of the soil and the conservation of its fertility. Seed and soil stand in the same relationship in crop production as breeding and feeding in live stock production. Neither can produce the best results alone.

Wheat raising during the past third of a century has been confined largely to the new lands in the western states, but with no large areas of new lands to be brought under cultivation and a reduction in the yields per acre on old lands due to excessive and exclusive wheat production, more wheat will undoubtedly be produced on eastern farms. This will require more systematic farming than has been practiced heretofore, and more attention must be given to seed and soil. By careful selection of the seed, a better quality of grain can be secured, and by proper treatment of the soil, particularly in the way of increasing its fertility, the glutinous character of the wheat can be largely maintained.
THE hop crop is more fluctuating in selling value than almost any other, ranging in extreme market conditions from one cent to one dollar per pound. The latter price and even $1.25 was reached in 1882.

To the grower, there is a large element of uncertainty from early spring till the crop is harvested, sold and the proceeds deposited in the bank. A speculative condition prevails from beginning to end, so that the grower, if he is a careful, cautious, conservative man, may well hesitate about becoming almost a gambler.

In consumption it has practically but one use—in yeast for brewers, distillers and bakers. Unlike many other products it does not find any material increase of consumption when crops are large and prices low. Its use is limited.

While its cultivation is confined to limited localities, it is still grown in several countries. In the United States it is mainly on the Pacific Coast and New York state, and sections of Wisconsin and Maine. Outside of this, it is an important crop in England in parts of Europe, with a few in distant Tasmania. The more important localities are the Pacific Coast and Europe, New York state and England having less acreage than formerly. England has now less than two-thirds the acreage of 20 years ago.

New varieties may be formed by hybridizing and selections from seedlings, but so far as I know, this has not been systematically attempted, and new kinds have been found by accident. There is opportunity for some one, with Luther Burbank’s skill, to take hold, for new varieties are needed and this field promises as splendid results as have been realized with new kinds of potatoes.

At one time the writer had 500 or 600 seedlings but none of them promised anything better than those now cultivated. The skill and experience of a trained experiment station worker is needed to develop new varieties,
We feel grateful to Director Bailey for the worthy manner in which he upheld the dignity of the Agricultural College. In answer to the questions asked him by the editor of the Era he says that, if in any way the students in Agriculture have been disregarded by the other University students, it is not in the least annoying to him nor has it embarrassed the College of Agriculture.

We grant that such prejudice may have existed in the past but that it exists now is very doubtful. Last year the College of Agriculture was recognized by the student body as the most united college in the University and one of high social standing. Students at large admired this spirit and often remarked that the students in Agriculture enjoyed more good social times than those of any other college.

Several instances occurred last year where sons of parents, wealthy and of high social standing, asked before entering the Agricultural College if it would in any way lower that social standing. The answer in every case was "No" with the explanatory clause that the social standing of the students in Agriculture was equal to that of the students in any other college. Prejudice which may have existed has to all appearances now passed away and the very fact that the question is being discussed is evidence that its existence is doubted.

It is true that the great majority of the students in the College of Agriculture expect to enter some line of agricultural work. Many of us will return to the farm; many will go out as teachers; some will devote our lives to investigation. Although our paths will, of necessity, be separate, our purpose will be the same—the elevation of the farmer. As teachers, investigators, farmers, this problem confronts us: How shall we keep closely in touch with each other, where shall we meet as brother meets brother, by what co-operation shall we become most efficient, through what organization can we accomplish the most towards realizing our ideal? There is but one answer—the Grange.

The Grange is an organization of the farmer, by the farmer, and for the farmer. It was founded by farmers; none but farmers, or those interested in agriculture, are members, (and among its constituency are to be found the most prominent agricultural leaders in the country); its sole purpose is to enrich and elevate the life of the farmer. The Grange combines, to a high degree of perfection, the moral and intellectual, as well as the social and fraternal aspects of farm life. Again, it is free from the objections common to many secret societies. Indeed, the only reason for its existence as a secret organization is that "everybodys' business is nobody's business," and the Grange is, above all things, a place where purposes are accomplished, where things are done.
But for the Grange, the Rural Free Delivery, with its multitudinous benefits, would still be in the future. Pure food laws find support in its meetings, as does much other wise and beneficial legislation. It is the farmer’s “open court,” where he may speak, discuss, or be entertained, as he sees fit. In a word, the Grange is a concrete embodiment of the idea of the elevation of the farmer, not through some extraneous agent, but by the free working of his own mind.

For these reasons, weighty and of real significance, every student in the College of Agriculture should be, outwardly as well as inwardly, a true Patron of Husbandry.

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**A Winter Course for Farm Women**

The College of Agriculture at Cornell University is adding one more facility for the benefit of farm women by offering for the coming session a winter course of eleven weeks in Home Economics for the benefit of farmers’ wives and daughters. This is in addition to the new short course in horticulture offered for the first time this year. The course opens January 2nd and closes March 20th. It is free of tuition to all residents of the state. The only expenses are the personal outlays for living and traveling. For the present winter this course is to comprise a series of lectures by the leading women in the field of householding, domestic science, and economics as applied to the home. About twenty women have been engaged to give these lectures and demonstrations. Among those who will take part are the following: Mrs. Ellen H. Richards, Institute of Technology, Boston; Dean Marion Talbot of the University of Chicago; Miss Isabel Bevier of the University of Illinois; Miss Abby L. Marlatt of Providence, R. I.; Miss Alice P. Norton of the University of Chicago; Mrs. James Hughes of Toronto, Canada; Miss S. Maria Elliott, Simmons College; Miss Anna Barrows, Boston; Miss Helen Kinne, Teachers’ College, New York, and others of national reputation.

As will be seen, this is to be the most distinguished gathering of its kind ever held in this country and it presents to every farmer’s wife and daughter an opportunity which they will do well to embrace. If you wish further information, it will be gladly given by Miss Martha Van Rensselaer, Morrill Hall, Ithaca, N. Y.

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**GENERAL AGRICULTURAL NEWS**

The Farmer and Breeder recently gave an account of a goat dairy located at Colorado City. It is owned and operated by Messrs. F. A. Stephens and B. H. Stahman and has proved a financial success.

The operation of milking is a unique one. Instead of sitting down to milk, the operator drives the goat through a passage-way which leads up to an inclined platform on a level with the milker, who stands up and extracts the milk. The total daily output of this dairy is 50 gallons of milk, each goat averaging about one-half gallon.

* * *

The American Pomological Society recently held a meeting in Kansas City. At this meeting Professor John Craig was elected secretary of the organization.

* * *

Mr. Henry Ford a native of Michigan has recently invented a farm automobile. The inventor claims his machine will cost only $400 and that it
will do the work of four horses. It can also be transformed into a stationary engine for running machinery.

Mr. Ford is a practical farmer which gives us reason to believe that his new invention may prove useful and practical.

* * *

The government of Victoria has recently given a new endowment to the University of Melbourne. This endowment was given with the understanding that the University would use it to establish a course in Agriculture leading to a degree.

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The following article taken from the Breeders' Gazette throws a good light upon the rapid advancement of agricultural colleges. It also shows in what high esteem the agriculture college is held at the present time:

"Practically without exception American agricultural colleges recently opened their fall terms with increased attendance. In some instances the enrollment has been almost doubled. Altogether the increase has been marked, indicating wonderful growth and distribution of interest in agricultural education. It is a good token. Nothing is more significant as showing the trend of the times. It requires but ordinary mental penetration to see the day when the largest success in agriculture as a business will depend upon technical training and commercial sagacity. The colleges ought to be overflowing; every one of them. Their mission is to shape the destiny of agriculture and hence of the nation through their students. Their responsibility is tremendous but they are equal to it. What they have accomplished within a few years in the face of a disappearing prejudice is a trustworthy earnest of a great service in future."

* * *

The Norton County High school of Norton, Kansas, has recently established a four-year course in agriculture. The new department already has an enrollment of nine boys out of 70.

Mr. A. F. Turner, a graduate of the Kansas Agricultural College is in charge of the course.

* * *

The Experiment Station Record for October, 1905, gives the following excellent description of the new College of Agriculture at Manitoba:

"Buildings are being erected for a new college of agriculture for Manitoba, established by a recent session of the provincial legislature which appropriated $200,000 for the purpose. The college is located at Winnipeg and its principal is W. J. Black, a graduate of the Ontario Agricultural College, who will have charge of the work in animal husbandry. The principal buildings consist of a main building 131 feet long by 67 feet wide and three stories high above a high basement.

The main building is of stone and white brick and the science and dairy building of brick with a stone foundation. The main building in addition to providing laboratories, class rooms, a library, and an auditorium with a seating capacity of upward of 500 will afford temporary accommodations for about 60 students, the intention being to erect a dormitory building when the increase in attendance warrants. The basement and first floor of the dairy and science building will be used for butter and cheese making, milk testing, home dairying, etc., and the upper floor for laboratory and class room purposes.

In addition to these two buildings a power house, principals' residence, live stock auditorium, and horse and cattle barns are being provided.

The horse and cattle barns are of modern design, and the live-stock auditorium, which connects them will afford seating capacity for about 300. The college farm consists of about 117 acres and is immediately outside the city limits of Winnipeg on the Assiniboine River. The college buildings are located on the banks of the stream, about four miles from the center of the city.

The regular college course will ex-
tend over two years, and will open immediately after the fall work on Manitoba farms has been completed and close in time to allow students to reach home before the spring work begins. There will be no rigid entrance examinations, the main requirement being a sufficient knowledge of the English language to benefit by the lectures and practical experience on a farm covering at least two summers. A tuition fee of $10.00 per annum will be charged, and board will be furnished at actual cost. There will be a special dairy course in butter and cheese making to cover from 10 to 14 weeks. 'The college in its teaching will be practical in the highest possible degree. It will train practical farmers, not educate them along lines calculated to lead young men away from the farm.'

It was expected to open the college to regular students in January, but owing to the delay in building, this has been abandoned. It is planned, however, to carry on the dairy school and to offer short courses in animal husbandry and agronomy. W. J. Carson has been elected professor of dairying.'

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**CORNELL NEWS**

**CAMPUS NOTES**

In accordance with the promise made last month to our readers we will furnish the following report of the progress on the new Agricultural buildings: The masonry contract for the whole group of buildings has been sublet to Mr. Dempsey, who has charge of the Masonry work on Goldwin Smith Hall, and it is expected that he will push the work as fast as possible. He reports satisfactory progress so far. The contractor proposes to have as much grading as possible done before freezing weather begins. Already considerable progress has been made along this line, especially around the Agronomy Building. The walls of the Agronomy Building are finished up to the water table, which is to be a course of Indiana limestone. These walls are to be covered with tar paper and plank, and left as they are until spring. The workmen are now laying the plates on the extension of the Dairy Building preparatory to roofing. Most of the brick-layers are working on the main part of the Dairy Building and the walls are now a few feet above the first floor level. It is the intention of the contractor to have the Dairy Building enclosed before winter sets in, so that some inside work can be done. Quite a little progress has also been made on the interior basement walls of the Main Building.

* * *

A very enjoyable Agricultural Assembly was held on the evening of November 2 in Barnes Hall. After Professor Bailey's address the Assembly was entertained by Mesdames Hunt, Gilmore, Troy and Hunn in a way that left nothing to be desired. Fruit punch and fancy cakes were served and everyone enjoyed the evening thoroughly.

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Messrs. Hogenson and Brown of the United States Bureau of Soils have been assigned to study some of the problems in soil management in cooperation with the Cornell Experiment Station. Mr. Braziele will also conduct studies of fertility of soils with particular reference to soil solutions. These problems will probably be carried on for several months. Students may confer with any of these men on problems connected with Soils work.

* * *

Mr. W. G. Johnson, editor of the American Agriculturist, and Mr. C. M. Shultz of the Associated Farm Press have accepted invitations to give lectures in the course on Agricultural Journalism which is to be given this winter.
The total registration in the College of Agriculture is now 219, made up of the following groups:

New regular students - - 55
Old regular students - - 67
New special students - - 59
Old special students - - 38
Total - - - - - - 219

There are 122 regulars and 97 special students, which is a decrease in the proportion of the latter.

* * *

Since Dr. Fletcher left us, Mr. G. W. Hosford has had charge of the Reading Course. Dr. Fletcher’s work has been divided and Mr. G. D. Brill, who took his B. S. A. degree here in 1888, has been secured to take the work of the Winter Course in Agriculture. Mr. Brill has had charge of the grounds of the Lake Placid club in the Adirondacks, and has secured a leave of absence in order to take up the winter work here. He has had a long practical experience in farm management and will be a valuable addition to the staff here.

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Mr. J. S. Cates, a graduate student in agriculture, has received an appointment to the Bureau of Plant Industry at Washington. He is to develop methods of weed eradication.

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G. Harold Powell, Pomologist in charge of Fruit Transportation and Storage, U. S. Department of Agriculture, is investigating the relation of commercial methods of handling perishable fruit to their shipping quality and to their keeping in cold storage. The investigations have been conducted since 1901 in various parts of the country with special reference to cold storage. During the past year or two they have been extended to transportation problems. Mr. Powell is now investigating the losses that occur in shipping oranges and lemons from California. The industry there amounts to 30,000 carloads of fruit and the annual losses from decay in transit are about one-half million dollars. As a result of the experiments of the last year, which included the shipment of $30,000 worth of fruit, the fact has been established that a large proportion of the losses are the direct result of the rough handling of the fruit in the groves and packing houses, making it susceptible to decay. During the coming year not less than $75,000 to $100,000 worth of fruit will be shipped from California under different conditions in the groves, packing houses and in transit to determine the most practical methods of overcoming these losses.

Mr. Powell recently visited Cornell for a few days, and during his stay he delivered an extremely practical and interesting lecture before the class in Systematic Pomology on “The Growing, Handling and Marketing of Citrus Fruits.”

* * *

The Horticultural Department has received a very important consignment of peonies from Europe. Goos and Kooneman of Germany sent 200 varieties, which arrived in excellent condition, in spite of the fact that the roots were six weeks in transit. Many of the rarer kinds were included in this lot. Four other consignments were received, making an addition of 400 varieties to the 1,600 varieties which were planted last spring. These flowers are to be used in the study of synonyms.

* * *

At a meeting of the Poultry Association on November 9th the following Board of Directors was elected for the ensuing year: Prince, Gable, Thayer, Jackson, Moody, Martin, Miss Jenkins.

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Messrs. Orr and McGrew have been engaged for lectures this year. Mr. Orr will speak here January 24, 25 and 26, while Mr. McGrew will speak on February 8, 9 and 10. Poultry students are extremely fortunate in having the chance to hear these experts.

* * *

The Annual Meeting and Winter Fair of the New York State Breeders’ Association will be held at Syracuse,
December 19 to 21, under the auspices of the 41st Separate Military Company. The Fair should be of especial interest to all Cornellians on account of the part which the College of Agriculture is to take. The following addresses will be given by Cornell professors:

"Experiments on the Utilization of Skim Milk for Feeding Swine," Professor H. H. Wing.


Lieut.-Governor M. Linn Bruce and Asst. Sec. of Agriculture W. M. Havs will also speak.

The Agricultural College proposes to make an extensive exhibit of roots, dressed poultry, fat lambs, and steers (Galloways, Shorthorns and Herefords.)

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The College will exhibit several pigs at the International Live Stock Exposition which is to be held at Chicago, December 16 to 23.

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The present registration of twenty students in the two-years' course in Nature Study shows a decided advance over the eight last year. This is an evidence of the increase of interest in this line of work. The Nature Study work includes many of the natural sciences and the method of presenting them in the school room. For laboratory practice, the students do actual teaching in the Ithaca schools, one or two rooms being assigned to each person for his special problem. The aim of the course is to bring the student into closer contact with nature on the one hand and with children on the other, and to see, to understand, and to appreciate what is going on in the outdoor world.

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Prof. J. E. Rice spoke at the Farmers' Institute at Farmington, N. H., on November 9th.

FORMER STUDENTS

'98, Ph. D.—Cyril G. Hopkins was born of English-Canadian parentage on a farm near Chatfield, Minn., July 22, 1866. When he was fourteen years old his parents moved to a farm near Estelline, South Dakota. His early education was received in the country schools of Minnesota, and the village schools of Estelline. He entered the South Dakota Agricultural College as a preparatory student in 1885, and was graduated with the degree of Bachelor of Science from the agricultural course in 1890. Dur-
during the winter vacations, and received the degree of M. S. in 1894. In 1897, he returned for a year's study, receiving his doctor's degree in 1898.

In 1894 he was elected chief chemist of the University of Illinois Agricultural Experiment Station, which position he still occupies. In 1900 he was made chief in agronomy in the experiment station and professor of agronomy in the agricultural college; in 1903 he was elected vice-director of the Illinois Experiment Station.

Professor Hopkins is the author or joint-author of a large number of papers, circulars, and bulletins on chemical and agricultural subjects, among which are: "Chemistry of the Corn Kernel," (thesis for Ph. D.); "Methods of Corn Breeding;" "Nitrogen Bacteria and Legumes;" "Laboratory Manual for Instruction in Soil Fertility," and numerous others.

Although Professor Hopkins is one of the most eminent agricultural chemists in the United States today, he is probably more widely known as an agronomist. He made his earlier chemical studies the basis for his later work in the improvement of corn. He is the originator of the system of corn breeding which is now being practiced on a commercial scale by seed-corn growers throughout the leading corn-producing states. The results attained by these seed-corn breeders has become one of the most potent factors in stimulating the deep and general interest that is now taken in the improvement of plants. The recognized practical and scientific value of Professor Hopkins' system has made him one of the leaders in that new and most fascinating science—plant breeding.

'88, B. S. A.—Leonard Pearson, D. V. M. (University of Pennsylvania) 1891, was a student in the Royal Veterinary Academy and in the University of Berlin in 1891-92. Since that time he has been continuously connected with the Veterinary Department of the University of Pennsylvania, now being Dean of that department. He is also state veterinarian, secretary of the live stock sanitary board, and president of the State Guernsey Breeders' Association, is a member of the Phipps Institute for the study, treatment and prevention of tuberculosis, and is a member of several other city, state and national organizations. Dr. Pearson is the author of various papers on topics pertaining to veterinary medicine and animal husbandry. He was recently in Europe, where he attended and also contributed to the work of the International Tuberculosis Congress in Paris.

'92, Graduate—Irwin D. Aldrich, a former president of the Agricultural Association, writes from Big Stone, So. Dakota. At present he is publishing a weekly newspaper and holding the positions of president of a canning company, and secretary of the State Board of Regents of Education. He is, moreover, keeping up his interest in Agriculture by looking after a five hundred and sixty acre farm. After his graduate work here, Mr. Aldrich went to South Dakota where he has remained, being at first assistant secretary of the state senate for a session, and later County Superintendent of Schools of Grant County for four years. He is married, and now has three children.

'01, M. S. A.—M. F. Miller, B. S. A., Ohio State Univ. '00, after receiving his degree spent nine months in the Bureau of Soils of the U. S. Department of Agriculture. In 1902 he was appointed instructor, and later became assistant professor of agronomy at the Ohio State University. During this time he was also connected with the agricultural extension work, and for two years was editor of The Agricultural Student.

In 1904 Mr. Miller was elected professor of agronomy at the University of Missouri; he also has charge of soils and farm crops in investigations at the experiment station. He is conducting special investigations in the breeding of cereals, mainly of corn and wheat. A state soil survey is being inaugurated, the department of agronomy having charge of the investigations regarding the fertility of the various soil types.
Co-operative experiments, farmers’ institutes, “corn specials” and corn shows are other features of the activities of the department. Prof. Miller writes: “Missouri farmers have been noted for their conservatism, but the manner in which they are falling in with the ideas of improved agriculture assures a wonderful agricultural development of the state.” The last legislature was very liberal in its appropriations, and the prospects for effective work are very promising.

'01, Special—A. LaVerne Roe who was until a short time ago at the Walker Gordon Farms at Plainsboro, N. J., is now with the Bryn Clovis Dairy Company of Malvern, Pa., and is an interested subscriber to The Countryman.

'02, B. S. A.; '05, M. S. A.—George Wheeler Hosford has come back to Cornell as a member of the faculty. Mr. Hosford is supervisor of the Farmers’ Reading Courses. Until this spring he was at Hampton, Va., as an assistant in the Agricultural Department of Hampton Institute. During the summer he was with the Orchard Survey of Niagara county and later with Mr. J. H. Hale in his large peach orchards at South Glastonbury, Conn.

'05, B. S. A.—H. R. Cox spent a few days during the early part of November at the University. During the past summer he has been traveling for the James Vick’s Sons’ Co. of Rochester. After Christmas he will visit the South for the purpose of studying agricultural and horticultural methods.

'05, B. S. A.—W. R. Dunlop became much interested in Guernsey cattle while at college and has carried his interest home with him. He is now building up a Guernsey herd on the home place.

'05, M. S. A.—Arthur Withers Gilbert, B. S., (Mass. Agr. College) '04, is now assistant in the department of agronomy, and is also teaching farm mechanics at the University of Maine. His duties in the future, however, will be chiefly in connection with the Extension work, which he is now developing. As a part of this work, he intends to organize farmers’ reading courses and boys’ clubs throughout the state.

'05, B. S. A.—Mr. Howard Loop has charge of a small force of men who are sent out by the Pennsylvania State Department of Agriculture, for the purpose of demonstrating methods of destroying San Jose scale by means of spraying. It is not the object of the department to check the scale directly through this work. The work of the party is educational in nature. They will visit the infected areas in different parts of the state, where a demonstration will have been arranged for at some orchard and the meeting thoroughly advertised in order that the farmers of that locality may come to watch the experiment. After applying various mixtures known to be useful in destroying the scale, Mr. Loop will give a short talk on insect pests and the method of combating them. It is hoped that with this instruction farmers will be able to keep the scale in check on their farms.

'05, B. S. A.—Ray C. Simpson is about to start South where he will engage in raising pecans on a large scale. He will conduct the pecan industry as a branch of his father’s business, which is at Vincennes, Ind.

'05, B. S. A.—Hayes C. Taylor is back at the homestead near Leonard, Chester, County, Pa. College has not spoiled Taylor for the old farm; he rather likes it all the better after being away for four years. He has entered into local affairs with the zest which characterizes the man with the right college spirit. Between times Taylor gets away from the farm long enough to help in politics as a member of the reform party in Chester county.

'05, Ph. D.—G. F. Warren, the first editor of The Countryman, sends his best wishes for the future success of the paper. He is now horticulturist at the New Jersey Experiment Station, New Brunswick, N. J.
BOOK REVIEW


This is practically a second edition of the work published under the title of "The Chemistry of Soils and Fertilizers" in 1899. The subject matter has now been rewritten, new material added, and laboratory practice made a more prominent feature. The book is largely elementary in nature as it is intended as a text-book for use in agricultural colleges. Of the chapters dealing directly with the soil, that on the chemical composition of soils is especially strong. Perhaps the most valuable of the chapters on fertilizers are those on farm manures and the general use of commercial fertilizers in which the subject is treated in a clear, practical way. Although a large part of the material used in these chapters is by no means new it is presented so as to be readily available for reference or study. There is added a series of thirty illustrated experiments and a list of almost a hundred collateral references. The author, Harry Snyder, (B. S., Cornell '89) was instructor in Agricultural Chemistry at Cornell for several years. He is now Professor of Agricultural Chemistry at the University of Minnesota and Chemist of the Minnesota Experiment Station.


This little book is a very complete and comprehensive work on the Chrysanthemum. Its scope and character may be gleaned from the list of contents, which comprises chapters on culture for exhibition; composts; planting; benches, boxes or pots; general cultural details; crown and terminal buds; feeding. its object and application; care of the buds; exhibition and judging; specimen plants, chrysanthemum plants in six-inch pots; commercial culture; raising from seed and hybridizing; sports, hardy chrysanthemums; chrysanthemums for south and west; chrysanthemums in Australia; insect pests and diseases; classification and selection of varieties for special purposes; and history of the chrysanthemum. The book will be welcomed both by professional and amateur growers of chrysanthemums, for the lucid, comprehensive as well as the practical character of its contents, which, if strictly followed cannot fail to bring about the desired results, namely, the obtaining of large chrysanthemum flowers in the greenhouse, and a profusion of bloom in the garden.


This book grows out of an attempt on the part of the author to present the fundamental principles of agriculture in the order of their importance to farmers, students and teachers. He considers the principles to be those which state the conditions necessary to the growth and development of plant roots and states them as follows:

The roots of farm plants need for their best development, a firm mellow soil, a moist soil, a ventilated soil, a warm soil, a soil well supplied with plant food.

The book is divided into two parts. The first, composing about two-thirds of the volume deals with the general principles underlying plant culture. Under this heading the author discusses roots and their places in the economy of the plant; soils and their relation to plants. The relation of water to soil forms the basis of three interesting and instructive chapters. He concludes the part upon soils with a chapter each upon soil temperature and plant food in the soil.

The nature of seeds and the operations designed for preparing the soil for the reception of seeds are presented.

[Concluded on page 80]
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learn how to control pests, how best to fertilize, and study the needs and problems of the crop. This has not been done in this country but has in England (and Germany, I think), by the Southeastern Agricultural College at Wye and reported annually.

It is an expensive crop to the farmer. If poles are used for supporting the vines, 750 hills per acre, 2 per hill, costing ten to twelve cents each, makes a large outlay. If one pole per hill is used the cost is still large, and strings must be put up in place of the pole saved, to give needed light and exposure for the vines. In either case the decay and wear is large. The summer labor for cultivation is another expense, but the cost of the harvest is the most important item of all—about two-thirds of the whole when ready for market, the remaining third to be divided between annual labor, expense, and use of land, interest on poles, kiln, etc.

As with most agricultural products, there are pests and enemies. First, because earliest, is the hop grub constituted with a special liking for the young vines. The first eggs are deposited in the head of the young vine, thence they drop to the ground and feed on the vines just below the surface. The grub is similar to the common brown corn grub, but more active and has a row of brown spots along the back. Sometimes 10 to 20 may be found in a single hill. When about half-grown the skunk seems to consider them a delicious morsel and digs them out carefully and industriously. No other way has been found except to go from hill to hill and where the vine is wilted or yellow, look for the worm and kill him. Next there is sometimes an attack of a small green fly, which saps the vitality of the plant, which loses its grip on the poles and slides down, like a lazy man not willing to do anything.

[Continued from page 65]

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There is a curled leaf blight, caused most likely by some unknown insect. Next is the red rust blight, which is worst on the cluster hops—the Red vine and Humphreys being hardier and much less liable. This is a fungus disease, similar to the fungus blight on potatoes. It is first found on the leaves and then eats away the hop itself. Lastly, and perhaps the worst of all is the hop aphid or house. These increase very fast in hot humid weather and then if the weather changes, may all disappear in a short time. If they come early the crop may be ruined, as in 1886. Usually they come later and cause the hops to be mouldy and decay. The leaves and even the ground becomes blackened with honey dew. The remedy is to spray with a solution of quassia chips and whale oil soap, but it is disagreeable work and expensive. In England and Oregon growers expect to spray every year, but little has been done in this state.

The conditions of louse thrift are quite narrow. On the one hand, they increase fast, or on the other soon disappear, depending on the weather and who knows what that may be next week. On the whole there seems no crop with as many elements of uncertainty as this. It is a speculative crop, for after all the contingencies of growth and harvest the market may prove unfavorable and the profits or losses may be large.

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in a simple way. The first part of the book closes with a discussion of the other parts of the plant, namely, leaves, stems and flowers in the order of their importance to the farmer. Recognizing that the conditions necessary for root growth are the important factors in soil fertility, the author devotes the second part of the book to a discussion of certain farm operations and practices and their effect upon soil fertility.

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Utica, N.Y.

GENTLEMEN:—In answer to your communication of recent date as to my experience in spraying for the purpose of destroying wild mustard, I take pleasure in giving you the benefit of my experience.

I purchased one of the Standard Sprayers last spring through M. A. Richards of Warsaw. My farm is situated at Gainesville, in this County, and for many years has been covered with wild mustard, which showed itself in great profusion in every spring crop, retarding the growth of the grain and sapping the soil to such an extent that I was unable to secure more than half a crop. I learned through the report of the State Experiment Stations that wild mustard could be killed by spraying. I had not much faith in the remedy, but concluded it was worth the experiment. I had eight acres of barley which was sown rather late, and as I was late in giving my order for the Sprayer, when it came the grain was about six to eight inches high and the mustard was in blossom.

I concluded to try the experiment on one acre and watch the result. I mixed one barrel of the solution composed of eight pounds of blue vitrol to forty gallons of water and applied it. When mixed ready for use the solution made forty-five gallons. The second day after the spraying the mustard was practically all withered and dead, but the leaves of the grain turned red and resembled a field of grain that was badly rusted. Nearly everyone who saw it said: "You have killed the mustard, but you have killed the grain as well," and I thought so myself. Within two weeks the grain that had been sprayed improved so that it was the most thrifty portion of the field, and the improvement was plainly discernible up to the time of harvest, when we found that in that portion of the field no mustard had gone to seed, and the grain was easily 50 per cent. better than on the balance of the field. I have no hesitation in saying that this treatment will eradicate wild mustard from the land without material injury to the grain crop, but I believe that better results can be obtained by earlier application and reducing the strength of the solution to about six pounds of vitrol to forty gallons of water. This is the formula I will use next season, and I shall use it upon every acre of grain I sow.

Very truly yours,
FRANK W. BROWN.

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The Cornell Countryman, Ithaca, N. Y.
PODGEROSA SPRAYED THROUGHOUT THE SEASON, WITH GREEN FOLIAGE ENTIRELY TO THE GROUND
Nearly every season tomatoes suffer more or less from attacks of certain fungus diseases upon the foliage. Several species of fungi are known to cause such injury. Some are, however, more disastrous in their effects than others. A very common one on the tomatoes in this state is a "leaf spot" fungus known botanically as *Septoria lycopersici* Speg. The writer has observed this disease for several seasons in the gardens about Ithaca. It appeared on his own tomatoes in the summer of 1904. Although the season was quite well advanced the loss was considerable. The plants had been set late and little fruit ripened before the middle of August. The blight spread rapidly and many of the vines were stripped of their foliage. The following season it was decided to test the value of Bordeaux Mixture in controlling the disease. Some studies of the fungus were also planned. Only a brief sketch of the summer's work is here presented. A bulletin on the subject will soon be issued from the Cornell Experiment Station giving a more detailed statement of the work.

This disease, like the tomato itself, undoubtedly came first from South America. It was there that the fungus was first observed and described by Spegazzini. It was not observed in this country until about 1894. In that year Dr. B. D. Halstead of the New Jersey Experiment Station first reported it as doing serious injury to tomatoes. It appeared suddenly and with considerable virulence about the same time in different truck growing sections of the East. Since then it has been frequently reported as serious in various states and even in certain countries of the Old World, especially Australia. At the New Jersey, Ohio and Delaware Stations quite a bit of work has been done in spraying for this disease, but not with uniformly favorable results.

The fungus appears first on the tip leaflets of the lower leaves, soon, however, infesting the entire leaf, causing it to die and dry up on the vine. (Fig. 1.) In the meantime the leaves above have become infected and unless immediate measures are taken for checking the progress of the fungus, the entire plant will be defoliated, and killed. This spread of the disease from below upwards is very characteristic. The parasite causes distinct spots in the leaf tissue (Fig. 2) which lose the green color and dry down leaving small gray papery areas of various sizes and shapes. Where the attack is severe these spots become confluent, often involving the entire leaf. These areas differ from other leaf spots of the tomato by the appearance on the lower surface of numerous little black pimples or pustules (Fig. 2) the fruit bodies of the fungus. These fruit bodies, known as *pycnidia*, are filled with spores, slender hyaline thread-like bodies with several cross walls. When mature they ooze from an opening in the tip of the pycnidium and are blown by the wind to the healthy leaves above and to other plants nearby. Here they germinate sending out a little thread, the mycelium, that enters the leaf. This quickly branches in all directions, killing the leaf cells and causing the characteristic spots. Each spot results from the growth of a single spore. Fruit bodies soon appear filled with spores and these are now disseminated to healthy leaves. The en-
tire cycle from spore to spore is completed in a very short time so that the devastation wrought by the parasite, is under favorable conditions, very rapid. The fruit bodies are frequently arranged in concentric circles owing to the radical growth of the mycelium from the point of infection.

The fungus often attacks the stem as well as the leaves, giving them a mottled appearance especially on the upper surface where the falling spores readily find lodgment. The fruit has never been observed to have been attacked. The explanation of this is not easy.

The first effect of the disease is to cause a more or less complete destruction of the foliage. Since the leaves are the active work-shops of the plant, manufacturing the food upon which the growth of all the parts depend, their entire loss means the death of the plant. If the attack comes early in the season, the fruit that has set fails to mature, and the entire plant soon succumbs. Late attacks destroy the leaves and expose the green fruits to the sun. Deprived of their normal food supply, they cease to grow and ripen prematurely. Such fruit is of small size and poor quality, lacking the rich flavor and firmness of fruits which ripen normally. A light attack resulting only in the death of a few lower leaves, may not seriously affect the crop. Such attacks, however are extremely dangerous as they quickly become destructive upon the appearance of favorable weather.

In the case of many parasitic fungi it has been observed, that certain varieties of the host plant are more susceptible to the disease than others. Although no special effort was made to test this in the case of the Septoria disease, some indications of a tendency along this line were observed. In the writer's garden this past season were five varieties of tomatoes: two varieties, names unknown, Stone, Ponderosa and the little yellow plum tomato used for preserving. One of the unknown varieties, the Ponderosa, and the yellow plum tomatoes were especially susceptible to the fungus. The other varieties were quite resistant. It was also noticed that the varieties most affected were apparently those with the least foliage, i.e., in which the leaflets were narrow and far apart on the leaf axis. Those with broad leaflets forming a dense growth of foliage seemed to be much more resistant.

In many cases the disease originates in the seed beds, the lower leaves of the young plants often showing the
disease when transplanted in the field. Frequently, too, plants become infected after they are set out. This is likely to be the case when the tomatoes are set in the same garden year after year. The old diseased tops left on the ground from the past season’s crop, serve as a source of infection, the following year. Dr. Halstead has clearly demonstrated, that planting tomatoes on the same soil year after year results in the increase of the fungus on each succeeding crop.

The season of 1905 seems to have been a very favorable one in this section for the development of the leaf spot fungus. Few gardens about Ithaca escaped its ravages. The writer began spraying his plants about a month after they were set and continued throughout the season. Notwithstanding this, however, the disease appeared to a considerable extent on the lower leaves of nearly all the plants. Only on the more susceptible varieties, however, were the lower leaves entirely killed. The disease had appeared sometime before spraying was begun. In fact, some of the plants were diseased when transplanted. During the earlier part of the season all diseased leaves were removed and destroyed about twice a week. This alone did much to reduce the abundance of the disease. The plants were THOROUGHLY sprayed with Normal Bordeaux Mixture to which an excess of lime was added. This extra lime caused the mixture to stick better. The application was made about once every ten days or two weeks depending largely upon the weather. The leaves were covered on both sides, and stems and fruits were also coated. (Fig. 3.) Thoroughness is the key to success in spraying for this as well as any other fungus disease. The spraying of the fruit with Bordeaux is undesirable where tomatoes are grown for commercial purposes but for home use this is of little consequence as it is quite easily rubbed off. The application of Ammoniacal Copper Carbonate might be substituted for the Bordeaux when the fruit approaches maturity.

The results of this treatment were most satisfactory. The plants were staked so that thorough work could be done. While the tomatoes in adjoining gardens died early from attacks of this blight and ripened little fruit, the writer’s crop was heavy and of the finest quality, the foliage remaining green and healthy until frost came. (Frontispiece.) The apparatus used in spraying consisted of two wooden candy pails and a good foot pump with a short hose and a nozzle giving a fine spray. The work was done evenings, after the regular work of the day. The time and labor required to entirely control this trouble in the home garden is very small and will be well repaid by the yield of large and fine flavored fruits. To be thoroughly successful, spraying should be begun in the seed beds, and continued throughout the season. Much may be done to hold the disease in check by removing diseased leaves as soon as they appear.
THE MANUFACTURE OF CONDENSED MILK
By O. F. Hunziker.

HISTORICAL SKETCH

WHILE the recognition of the value of milk as a food and the knowledge of the principles of the manufacture of butter and cheese date back to the mystic ages, condensed milk is the child of the industrial evolutions of the nineteenth century. The first condensed milk was manufactured in this country by Gale Borden in 1856. In Europe George H. Page, an American, was the pioneer in the condensed milk business, erecting a factory in Switzerland in 1867. The early factories were equipped with very primitive machinery, the methods used were little more than an experiment, and the output was very small. The start was naturally slow, and in this country the first factory was not a success. Gradually, however, with the improvement of the machinery and a better understanding of the principles involved in the process of its manufacture, the quality of the finished product was perfected and found favor on the market. The industry progressed and developed into a business of tremendous dimensions. Today, the milk from not less than half a million cows is manufactured into condensed milk.

In the early days of the industry, sweetened condensed milk was the only form made. Later other forms were added, which reached the market under the names of "Unsweetened Condensed Milk," also called "Plain Bulk Milk," "Evaporated Cream" and "Milk Powder."

Sweetened Condensed Milk is milk from which a portion of the water has been evaporated, and to which enough granulated cane sugar has been added to preserve it. It is put on the market in tin cans holding from 8 oz. to 20 oz., 16-ounce cans being the most common size used. In barrels, it is sold in bulk to candy or caramel manufacturers. Sweetened condensed milk, if manufactured and packed properly, will keep for years, though it is best when fresh.

Unsweetened Condensed Milk generally called "Plain Bulk Milk," is milk from which a portion of the water has been evaporated and which has subsequently been swelled by the introduction of free steam. This milk is sold in ordinary milk or cream bottles, or milk cans. It is not sterile and containing no sugar to preserve it, will keep only from 8 to 10 days.

Evaporated Cream is an unsweetened condensed milk. It has all the outward characteristics of cream, resembling the latter in odor, consistency and richness of taste. It is made by evaporating a small portion of the water of the crude milk, and putting the partly condensed article into tin cans varying in size from 8 ounces to one gallon. The filled cans are hermetically sealed, then sterilized at a temperature that will destroy all germ life, including spores of the most resistant types. The degree of the temperature and the duration of the exposure of the cans to it are so regulated as to not only destroy all germ life, but also to give the contents of the cans a creamy color and consistency. Evaporated Cream will keep indefinitely.

Milk Powders.

In the manufacture of Milk Powders the milk is evaporated to dryness in vacuo or the solids are separated from the water by a centrifugal process. Generally, cane sugar is added and either whole milk or skim milk is used. The processes employed in the manufacture of milk powders today do not, as yet, yield an entirely satisfactory product.

The output of sweetened condensed milk exceeds in quantity that of all the other forms of condensed milk combined. This fact, together with the limited space assigned to this subject in a paper serving the many important and diversified interests of rural science, as does The Cornell Countryman, compels the writer to restrict his dis-
cussion alone to the subject of sweetened condensed milk.

I. Essential factors to be considered when choosing a site for a Condensory.

When choosing a site for a Milk Condensory there are certain elements, factors and fundamental conditions which must be considered. Their presence or absence will largely determine the desirability of any given locality, while the ignorance of these factors will tend to curtail the success of the factory and may ultimately result in a total failure. The most important of these conditions are:

A. The supply of crude milk.
B. The supply and quality of water.
C. The facilities for transportation.
D. The topography of the territory in question.
E. The altitude.

A. THE SUPPLY OF CRUDE MILK.

The first consideration, when selecting a site for a Condensory, is the milk supply. The territory in question must be adapted for the production of milk; it must be a Dairy Country. The factory should be erected in a locality which will, within a radius of not more than 10 miles, yield a sufficient supply of milk to run the factory at full capacity. It must be remembered that the cost of the equipment of a factory with a capacity of less than 25,000 lbs. of milk daily, is usually out of proportion to the gross returns of the business.

In connection with a survey of the milk supply in any given locality the demand for crude milk for other purposes must not be ignored. The presence of creameries and cheese factories need not be considered very seriously in the light of competition. The condensory is generally in a position to pay higher prices for milk. They also announce their prices from six to twelve months in advance so that their patrons know just what to expect. Again, the condensories pay their patrons oftener (monthly or bi-monthly) and with more regularity. The creameries and the cheese factories pay their patrons according to the quotations of the market of their respective products, the returns depending also on the skill of the operator in turning out a high quality of goods. Besides their pay days are irregular and usually far apart. The presence of creameries or cheese factories is rather a point in favor of a condensory site, indicating a large supply of available milk.

A different problem arises where the territory in question is in close proximity to a large industrial center, or where the transportation facilities to a city are very favorable. Where this is the case the continuous and great demand of crude milk for the city may result in sharp competition, limiting the supply of milk available for the condensory and raising the price of the same to abnormal proportions.

B. THE WATER SUPPLY.

Next in importance stands the water supply. The value of a generous supply of clean and cool water cannot be overestimated in connection with the manufacture of condensed milk. Besides the water used in the boiler for washing purposes, large amounts of water are necessary for condensing and cooling the milk.

Owing to the need of a large water supply, condensed milk factories are usually erected along creeks or rivers, from which they may pump the necessary water and which will also take care of their refuse. Other localities are fortunate enough to be supplied with water from springs and artesian wells, while in still others it is necessary to drill wells, shallow or deep from which the necessary water supply can be secured.

The creek or river water may be cool and fairly clean and may, therefore, serve the purpose very well. Condensories whose sole source of water is a stream, are known to have manufactured first class condensed milk for years.

On the other hand, the creek, river or stream may follow through one or more villages or towns above the con-
densory, and its shores may be bordered by other factories; when it reaches the condensory the water may be so polluted that it would be entirely unfit for use. In spite of all precautions the water used in the condensory is bound to come in contact with the milk directly or indirectly. Even where all the utensils and apparatus, after being washed, are conscientiously steamed, and while no harm need be feared from that source, there are still many channels through which the milk may become contaminated with the polluted water. It sometimes happens that during the process of condensing, the vacuum pump accidentally stops. If the manager does not notice this at once and if he fails to immediately close the valve of the water pipe leading to the condenser, varying amounts of water will run from the condenser into the milk in the vacuum pan. Where this water is filthy, it means the loss of an entire batch (say 15,000 lbs. of milk besides 2,400 lbs. of sugar.) Again, the pan may be rinsed between batches and the polluted water used will pollute the water of the succeeding batch. Or, when the cooling cans filled with condensed milk are set into the cooling tanks, frequently water splashes from the tank into the cans. So here again there is great danger of contamination. Finally, all the pipes conveying the milk from the receiving room to the vat-room, from there to the well-room and from the well-room into the pan, are repeatedly flushed with water.

The following observations made by the writer may serve to illustrate to what extent creek water may be polluted: A few years ago one of the milk condensories in this state made defective condensed milk, which was returned from the market in large quantities, causing great loss. An investigation of the source of water used in the factory revealed the following facts:

The factory obtained all its water from a creek which it bordered. Not more than 50 rods above the factory stood a slaughter house right on the edge of the water. The shore was literally strewn with hogs' and calves' heads, and in the creek rose a pile, about eight feet high, of slaughterhouse refuse, which was in an advanced state of decomposition, polluting the water of the creek and the surrounding atmosphere to an extent that kept occasional visitors at a safe distance. From there down the stream, the water, charged with rotten organic matter, had covered the bottom of the creek with a brownish-red, slimy, malodorous deposit. This water was used in the condensory for cleaning purposes; with this water the cooling cans were rinsed and used again without steaming; this water poured forth from the spray pipe of the condensor, a few feet from where the milk was being cooked in vacuo; this water, together with the milk that was carelessly sucked over into the condensor formed a thick spongy coating on the inside of the walls of the condensor; this same water so infected this spongy crust with Bacillus flourescens liquefacieus, that the odor inside of the condensor, from the activity of the above and other putrefactive organisms, the usual inhabitants of polluted water, forbade men with the most robust constitutions to stay in the condensor for more than an instant.

Is it to be wondered that some of the condensed milk from that factory was not relished by the consumer and that carloads of the same were rejected and returned to the manufacturer. The astonishing part of it all was not that some of the milk turned bad, but that any of it remained good.

Where it is necessary to drill wells, the territory should be carefully surveyed by an expert, in order to determine the formation of the strata, care being taken that in the place finally selected, the well won't serve as a cesspool for the surface water, nor for the drainage from manure-piles, refuse, and slaughter houses, and cemeteries. Generally speaking the deeper the well the less the danger from pollution, the purer the water, and the more constant its supply.

(To be continued.)
SOME RELATIONS OF CHEMISTRY TO AGRICULTURE

By George W. Cavanaugh,
Professor of Chemistry in its Relation to Agriculture at Cornell University

The popular conception of the relation of chemistry to agriculture is much the same as that of medicine to the health of man. The physician diagnoses the disease and prescribes the remedy and treatment. The chemist can analyze the soil; but here the analogy ceases, he cannot not from the data derived from the analysis, prescribe the fertilizer nor make recommendations in soil management. There are too many other factors entering the problem of soils, which are equally important with the soil’s composition to make it possible to correctly prescribe from analytical data alone.

That the opposite of the above should be the generally accepted idea is not strange. Many of the early investigators and writers devoted much time in trying to bring this problem down to a working basis, and their efforts are often given largely to descriptions of methods of analyzing soils. Then, too, it was the goal most sought for. If the question of a soil’s fertility could be decided once for all by an expert it would relieve the owner of much worry and trouble.

This idea is, however, already beginning to change. Not so many men actually engaged in agriculture are now asking to have soils analyzed. It is significant, however, that many requests still come from people who are settling on farms for the first time after a life spent in the city.

The American farmer is fast reaching the state where he no longer asks to have the fertilizers prescribed for him but only that the chemist guarantees the quality of those of his own choosing.

Analysis of soils constitutes but a minor part of the work of an agricultural chemist, perhaps in general the least part. The examination of materials to be used in agriculture and of agricultural products probably constitute his principal work.

Here are two distinct lines of endeavor. On the one hand is the control of the quality of products offered on the market. This field is productive of results that have immediate value. On the other hand is the whole range of plant breeding by chemical selection. The work in this line has only begun, but the results so far obtained indicate that, in time, they will be far reaching. The effective control of the market for many agricultural products depends on the ability of the chemist to detect adulterations and substitutes. The manufacturer of oleomargarine can so skillfully blend colors, flavors and imitate the texture of genuine butter that the ordinary consumers can be easily deceived. There are, however, differences not apparent to the eye by which the chemist can readily detect the one from the other. For a time the so-called “process butter” threatened to invade the market of genuine butter. The similarity between them is greater and in consequence it is harder to detect. Recent investigations by the agricultural chemists have now made it possible to readily discover the adulteration. If these distinctions could not be easily made, the manufacturer would soon have the butter maker at his mercy.

Many of our Eastern dairymen must buy grain and concentrated feeds to supplement the feed grown on the farm. The Western miller has large quantities of by-products, of which the most notorious are corn cobs, oat hulls and corn bran. These are all low in nitrogen and consequently in protein content. The laws of most States have the sale of feeds under control. A chemist named Kjeldahl devised a means of determining the nitrogen content of an organic substance in a few hours. It had previously been a long and difficult process. His method is now used daily in the analyses of hundreds of feeds. It
is, however, in the field of plant breeding by chemical selection that one finds evidences of some of the most striking relations of chemistry to agriculture. This line of activity is of comparatively recent date notwithstanding the marked success of an earlier effort. We have for some time recognized the rise and development of the sugar beet from the ordinary garden beet. The increase in sugar content was possible because it was found that the beet root would still produce seeds after a portion of the root was removed. The portion removed was used to make an analysis for the sugar content. It was therefore easy to perpetuate only those with a higher sugar content. This process is still continued each year, in order to maintain the standard high. More recently successful efforts have been made in other lines. Whenever individuals of a crop vary in some easily distinguishable character, differences in future crops are possible. When the differences are of such a character that chemical analysis is required in the selection the chemist finds a fruitful field of work. Already one company, that grows seed corn, is maintaining a fully equipped chemical laboratory. It has been found practical to select corn that it may have a higher protein content for the cattle feeder, or a higher starch content for the starch maker. The desirable cooking qualities of the potato are being studied in their relation to the composition, and a beginning has been made in raising the sugar content of sweet corn.

While little effort is now being made to examine soils and to prescribe treatment for them, it must not be supposed that the chemistry of soils is being neglected. There is probably no other line of investigation that is receiving more attention. The old type of soil examination, where the gross amounts of plant food constituents were determined, is being succeeded by more rational methods. Now the soil is examined for its degree of acidity or alkalinity, the character of its humus, and even the nature and strength of its soil solution. Instead of trying to find the amount of potash the soil contains, more attention is given to the conditions which influence the bacterial life of the soil, especially the nitrifying bacteria. This is more in accord with rational management. When the work now under way shall have progressed farther, we may confidently expect a more intimate and practical relation between the chemistry of the soil and its management.

POTATO GROWING

By F. A. Salisbury.

Potato growing is entitled to a great deal of attention in this state, as New York leads all the other states in the production of tubers. The industry has undergone a great many changes in recent years and still offers a large field for development. When we think that the average yield in this state is less than ninety bushels per acre and that three hundred or more bushels can be grown, we begin to realize that there is still opportunity for development in the industry.

While potatoes are grown on a great variety of soils, loose friable soils are best suited to the crop and of these a strong sandy loam is preferable. Many make a mistake by trying to grow a crop on a soil that is not congenial to it, but by proper handling many soils that are not termed potato soils can be made to produce profitable crops. The best results can be expected from a crop on sandy loam following a clover sod. Potatoes are very prompt to respond to manures and chemical fertilizers, but in some cases due to peculiar soil conditions, not much satisfaction is received by using chemicals. It is often best to apply the manure to a preceding crop, as corn, and then follow with potatoes.

The ground should be well plowed
and fitted before the seed is planted as it then can be much more economically worked.

The introduction of modern potato machinery, partly due to the scarcity of farm laborers, has made it possible for the farmer to grow a large acreage of potatoes with a small amount of hand labor; and yet, those who grow but a small acreage, who for this reason can not take advantage of the machinery, need not feel handicapped, as the expense of growing the crop is not always materially reduced by the use of machinery.

The selection of seed is one of the most important points. No matter what the subsequent care may be, if good seed is not planted, the best results can not be expected. Be sure to use seed from good vigorous stock, from fields that showed excellent vigor and vitality. If the crop is grown for market, select a variety that is productive and of good quality; if for seed, varieties that your trade demands.

While it is usually best to plant good sized potatoes, small ones can often be used without detriment to the crop. Small sized potatoes from vigorous stock are preferable to large ones from stock that is weak.

If the seed is infested with scab or the soil on which it is to be planted is likely to produce scabby potatoes, the seed should be treated for scab.

It has not been long since the seed was nearly all planted by hand, but now the modern planter, which furrows, drops, and covers the seed at one operation enters largely into the planting of the crop. If the planter is used, be sure that it does accurate work. The loss of a few plants on an acre might more than pay the difference between a good and a poor machine.

Some people object to using a planter since in that case they cannot cultivate the crop crosswise; but with the use of a harrow or weeder at the proper time the weeds can usually be kept in check. If a weeder, spike tooth or slant tooth harrow, is run over the field several times before the young plants appear, the young weeds can be destroyed, and but little trouble later is likely to be experienced with weeds. If there is grass in the field which the weeder or harrow will not destroy, the grass can be checked by covering the rows and young potato plants just as they break through the ground with an inch or two of dirt, with but little, if any, detriment to the potatoes.

Cultivation should begin as soon as the rows can be followed. Let the soil be worked to a depth of at least four inches at first and shallower later. Keep the soil well stirred, as it helps to make plant food available and conserves the moisture. If many acres of potatoes are grown the two horse riding cultivator is an economical tool to own, since more and better work can be done with it than with the one horse walking cultivator.

The writer recalls with how much care potatoes were "hilled" and "laid by" a few years ago. Today it is accepted that level or nearly level culture and a moist soil mulch give the potato the best chance to develop.

The depredations of "bugs" and blight on potatoes are a boon for those who take advantage of the means for preventing them, which the science of agriculture has placed at hand.

If one were told that seven hundred per cent. had been realized on a legitimate investment the statement would be questioned, but that has been the average per cent. of profit realized by using Bordeaux on potatoes during the last three years, which the following figures show:

<table>
<thead>
<tr>
<th>Year</th>
<th>per acre</th>
<th>Price</th>
<th>Value</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1903</td>
<td>62 bu.</td>
<td>40c</td>
<td>$24.80</td>
<td>$20.80</td>
</tr>
<tr>
<td>1904</td>
<td>66 bu.</td>
<td>40c</td>
<td>26.40</td>
<td>22.40</td>
</tr>
<tr>
<td>1905</td>
<td>80 bu.</td>
<td>60c</td>
<td>48.00</td>
<td>44.00</td>
</tr>
</tbody>
</table>

Average profit for three years $28.73 or over 700 per cent. on an investment of $4.00. While as good results cannot be expected every season, experiments have shown that even in years when blight is not very prevalent, the benefit from the use of Bordeaux will be sufficient to pay the expense. There are cases where the profits have been greater than cited above.

(Concluded on page 104)
of his community. In order to fit one's self for these duties, merely to go to the regular class lectures and recitations while here is not enough. Join your class organization, and take part in its activities whenever and in whatever way you can. Come to the general agricultural meetings, and become acquainted with the professors and with the other students. One of the things you will prize most after you leave the University will be the friendship of your teachers and of your fellow-students from all parts of the state and country. Make it an object to put aside your books and give up all work one or two evenings a week, and go to some lecture, musical entertainment, or social gathering, where you can get broader ideas and higher ideals than would come to you if you merely followed a regular routine. If you become a little homesick or discouraged with your work, be all the more anxious to leave your books for a time to get out and shake hands with others who perhaps have felt more or less the same way. You will go back to your work with an interest and enthusiasm that will make it seem much easier and pleasanter. Whenever you are in any difficulty over your work, or anything else, do not hesitate to talk with your professor about it. The students and faculty of the Agricultural College have come to have a great deal of respect and regard for the winter-course men, and are anxious to help you to get the best results from your short stay among us.

The Report of the Secretary of Agriculture for the year 1905 should be encouraging to the American farmer, and should stimu-
late him to greater effort in Agricultural production. The general farm production for 1905 has exceeded that of any previous year, notwithstanding the partial failure of two or three second class crops; and this unprecedented production has increased the value of farm lands far above that of any previous year.

In importance of farm crops corn heads the list with a production of 2,708,000,000 bushels and worth $1,216,000,000. This is a gain in production of 42,000,000 bushels over the next lower year, and a gain in value of $128,000,000.

Hay is second in value. Although the production was not as large as in some previous years, the high price has given it a value of $605,000,000. This is $34,000,000 higher than the next lower year, that of 1903.

Next comes cotton. All of the data for this crop has not yet been received, but the value of the crop is somewhere near $75,000,000.

The wheat crop, which stands fourth, is second in size to that ever produced in this country. The yield was 684,000,000 bushels valued at $525,000,000, which is $11,000,000 over the big yield of 1891.

Oats are fifth in order of value with a yield of 939,000,000 bushels, value $282,000,000. This is 50,000,000 bushels and $22,000,000 under the crop of 1902.

The potato crop was in part a failure. Its value is $138,000,000, which is only $13,000,000 behind the crop of 1903.

Barley increased somewhat in production on account of the high price during the past few years. It yielded 133,000,000 bushels, valued at $58,000,000. This is 7,000,000 bushels and $4,000,000 under the highest crop produced heretofore.

Tobacco, like potatoes, is also a partial failure, yet because of the high price, it nearly exceeds in value the crop of 1899. All returns have not been received but $52,000,000 is thought to be a low estimate.

Sugar cane and sugar beets are classed together and are valued at $50,000,000.

The rice crop yielded 637,000,000 pounds. This crop is second in size ever produced in the United States.

Summing up the production and value of the different crops, only corn reached its highest production this year. But corn, hay, wheat and rice, reached this year their highest market value.

The total production of the cereals, including rice is 4,521,000,000 bushels, with a farm value of $2,123,000,000 or $145,000,000 over last year.

Live stock products have increased in both production and value. Dairy products are valued at $665,000,000, which is $54,000,000 above 1904. Poultry and poultry products have also made a large increase.

The report for live stock is favorable in the extreme. Despite the competition of bicycles, automobiles and trolley cars, the horse continues to increase, now numbering on farms 17,570,000, and valued at $1,200,000,000. Mules are worth $252,000,000.

Milch cows continue to increase, numbering 17,570,000, with a value of $482,000,000. Other cattle have decreased as have also sheep and swine.

A review of farm products show the value of things produced on farms to be $6,415,000,000. Animals have increased in value since 1900 $2,490,000,000.
The Department of Agriculture has and is doing everything in its power to aid the farmer. Plant and animal diseases have been investigated and in a majority of cases a remedy for them has been found. The different kinds of soil have been tested and their crop adaptability proven. In short every branch of agriculture has been given its share of time and attention, and the results of this good work is seen in the enormous increase of farm values and farm products.

In short every branch of agriculture has been given its share of time and attention, and the results of this good work is seen in the enormous increase of farm values and farm products.

How the Department regards the work already done and that to be accomplished is well shown in the following quotation from the Report:

“Great as has been the work undertaken and accomplished, gratifying as have been the results as shown by the Report, be it remembered that we are still at the threshold of agricultural development, and that the educational work, which has led to such grand results, has only been extended as yet to a portion of our population. There is not an intelligent, patriotic citizen in the United States, who will not say, ‘Let the good work go on.’”

**GENERAL AGRICULTURAL NEWS**

Mr. Henry Wade who is secretary of the Canadian Horse Breeder’s Association, is about to start a register for Thoroughbred Trotting and Pacing Horses.

Mr. Wade is starting this book at the earnest solicitation of the Canadian Live Stock Commissioner. This book is intended for a register only and not a stud book.

* * *

“Some of the animals of the Branch Experimental Farm herd at Napan, N. S., are afflicted with tuberculosis. Instead of slaughtering the diseased animals, Dr. Rutherford, Dominion Veterinarian, has decided to segregate the herd under conditions such as favor the eradication of tuberculosis from the human system. The effects of the proximity of the diseased stock to sound animals will be tested from time to time, as well as the gradual improvement in the former which is expected to result from being stalled in quarters fitted up on the most improved hygienic principles. The interesting part of the experiment will be the application of the cold air treatment to consumptive cattle. It has been tried on the human system with considerable success: its effect on lower animals will be watched with interest.”—Farming World.

* * *

“The big farm barn at the Massachusetts Agricultural College burned to the ground on the morning of Nov. 17, the fire being seen first about midnight. The building was well gone before the fire was discovered, so that there was no chance to save it. About 60 milch cows were saved with the sheep. About 60 hogs were burned together with 38 bulls and young stock. The machinery and 225 tons of hay were a total loss. Incendiaryism is suspected, there having been other dairy barns burned in this town in the same week. There was some insurance but not much, it not being the policy of the state to insure public buildings.”—The Country Gentleman.

* * *

At the meeting of the American Association of Farmers Institutes recently held in Washington, Mr. G. C. Creelman, President of the Ontario Agricultural College, was elected president. Mr. Creelman has been secretary of this association for a number of years.
The Irish Homestead gives an account of an interesting experiment carried on at the Hohenheim Agricultural Experiment Station by Herr Gusten Fingerling, to test the effects of condiments upon dairy animals. The experiment was divided into two parts, (1) To test influences on amount of food consumption, milk secretion, and digestibility; and (2) The food value of condiments when combined with other foods.

The results were that where poor food was used condiments were a benefit, more food being consumed and better results being obtained. In cases where a perfect nutritive ratio was fed, condiments did not increase the amount eaten or increase its digestibility.

* * *

The variety of wheat known as Macaroni Spring wheat has shown itself so well adapted to the soil and climate of Kansas, that the Kansas State Agricultural College is endeavoring to change it to a winter variety. Great success has thus far attended the efforts of the College, the sowing of last year producing 42½ bushels per acre. This year’s sowing will complete the third trial, and it is hoped will be a big step toward the end in view.

* * *

The U. S. Department of Agriculture is working in co-operation with the Colorado Agricultural Experiment Station in breeding a pure breed of American Horses. The type it is expected will be as distinct as any which we have at the present time. For the basis of this experiment the American trotting horse has been taken, and it is hoped to get a good roadster and general purpose horse. It is expected that the work will take at least 15 years. Prof. W. L. Carlyle, who was formerly of the Wisconsin Experiment Station, is in charge of the experiment.

* * *

During the past year the corn root worm has wrought great havoc in Nebraska, whole crops in many cases being destroyed by this pest. Authorities say that the only way to destroy this pest is by a series of crop rotations.

* * *

"Japan promises to be a good customer for the horses of the United States. Several shipments of horses have already been taken to that country and the prospects for a greater trade in this branch of the breeding industry between the two countries are so bright that even the daily press is beginning to take notice of them. The Boston Globe recently referred to the prospective demand for American horses on the part of Japan as follows: "The Consular-reports of the department of Commerce and Labor are furnishing valuable information concerning American opportunities for trade in other countries. They are pointing out that Japan in peace is a fruitful field for American enterprise. Not only may American machinery find there a good market, but American breeders of horses have an opportunity to do a profitable business in Japan.

The Japanese horse is an undersized animal weighing not over 900 or 1,000 pounds, and standing under 14 hands high. He is entirely inadequate to the demands made upon him. During the war all serviceable horses were commandeered by the authorities and today there is a widespread demand all over Japan for good horses.

The Japanese government is anxious to get a good supply of horses and many of the best horses purchased for the army have been distributed by the government for stud purposes. It will be a long time, however, before the demand is even temporarily filled in Japan for horses as good as those which America can supply.

In getting a foundation for horse breeding, Japan shows the same disposition to begin with the best that can be obtained, that has characterized her efforts in other directions. Representatives have been sent to the different countries to see for themselves the horses raised in each, and it is a distinct compliment to the breeders of the
United States that this country was the one selected to draw on for foundation stock. It may be noted too, that the greater part of the horses purchased in this country by the Japanese have been trotting horses. They have bought some thoroughbreds to use in the building up of cavalry horses, but as the general purpose horse, it seems evident that the trotting-bred horse will take the same prominence in Japan that it has in this country."

—Horse World.

** **

In *Gardenflora* of September 1st, 1905, there was an article by Dr. L. Wittmark, which describes a new kind of edible wild potato, found in South America. Professor Fleckel has grown them in his garden at Mar- seille since 1896, and the improve-

ment in both flavor and size has been very marked. Originally the taste of this potato was very bitter but since it has been cultivated nearly all of the bitter flavor has disappeared and there has been a large increase in starch content. In five years time the weight has increased from 29 grams to 100 grams and some have even reached 400 grams in weight. The flesh is a yellowish white, purple or greenish white. When seen growing in the field this new potato would be taken for our ordinary potato. If after harvesting the crop the runners are planted, a potato resembling our early potato results. This new variety will probably not take the place of our ordinary potato, but since it likes wet soil, it may cross well with our potato where it is necessary to plant on damp ground.

** **

CORNELL NEWS

**CAMPUS NOTES**

The department of Animal Husbandry has bought two cows and one heifer from J. K. Innes of Randall Centre, Pa. These animals are of the dairy type of Shorthorn. There are only a few large herds of the dairy Shorthorn in this country, the beef type predominating.

** **

Several of the students in the College have been agitating the question of a "Traveling Summer School of Agriculture," to be carried on during the summer of 1906. The object of the school is to give such students as may care to join it, an opportunity to travel over the more important agricultural centres of this country and to make a study of field and orchard crops, animal husbandry, and the manufacture and utilization of plant and animal products. The course is intended to cover not less than six weeks, and if established, will be carried on under the direction of an instructor appointed by the College. The total expense is estimated at $300 to $400 per man.

This plan was presented to the faculty by the students interested, and has been referred to a committee for investigation.

** **

During the coming winter, there will be a number of interesting lectures given. Among those who have promised to speak to the students of the College, are the following: President Gunnison, of St. Lawrence University; Director F. E. Dawley, of the State Farmers' Institutes; H. E. Cook; Mr. Fred Shepard, lecturer of the State Grange.

** **

Nature Study work in the public schools is progressing finely along the line of school gardens. Frank Cornell has given a lot on Cayuga street for this purpose, and Supt. Boynton has given permission for the use of school grounds wherever possible. The class in Outdoor Art is to lay out these gardens, and the school children are to do the actual planting and care for the gardens. Part of the plan is to have the children display and sell the products of their own gardens.
One hundred and eight students are registered in Soils 1, an increase of 10 over last year. The laboratory is equipped in a much better way this year. There are 150 samples of soil from all parts of the United States mounted in cases. The mechanical analysis centrifuge is in operation. Special studies are being carried on concerning the temperature, moisture, etc., of soils. Manurial requirements of all soils are also being studied by the new basket method.

* * *

Most of the professors are very busy now with Institute work. They hope to finish this work up before January so that they can devote all their spare time to the Short Course students.

At a recent meeting of the Poultry Association, the following officers were elected for the ensuing year: President, H. F. Prince; vice-president, F. G. Thayer; secretary-treasurer, C. E. Martin; supt. of show, L. B. Gable.

* * *

Several business men and a few ladies have registered for the winter course in Horticulture which is to be given this year. They expect to get some information which will be of practical value to them when they go back.

* * *

At the meeting of the Agronomy and Soils Seminary on Dec. 6th, Mr. Brown of the U. S. Bureau of Soils explained the wire-basket method of soil study and gave a brief account of the experiments being carried on here.

* * *

The 20th annual convention of the New York State Dairymen's Association was held in Binghamton on Dec. 12, 13, 14 and 15. Director Bailey spoke on "The Current Ideas of Education for Country Life." Prof. Pearson also spoke, his subject being "Sanitary Milk for Butter and Cheese."

This year the Winter Courses have branched out in a new direction. A course for women, in Home Economics, has been started and will run the same length of time as the other short courses. Housekeeping, domestic science and economy are to be covered in lectures and demonstrations. Following is a list of the women who will aid in instruction: Mrs. Ellen H. Richards, Boston Institute of Technology; Dean Marion Talbott, of Chicago University; Mrs. Alice P. Norton, of the University of Chicago; Mrs. James Hughes, Toronto, Can.; Miss Isabel Bevier, University of Illinois; Miss Abby L. Marllatt, Providence, R. I.; Miss S. M. Elliott, Simmons College; Miss Anna Barrows, Boston; Miss Helen Kinne, N. Y.; and a number of others.

* * *

The Lazy Club is in a flourishing condition this year. The first meeting was held on Sept. 25, with a discussion of "The Fruit and Vegetable Exhibit at the New York State Fair," by Mr. C. S. Wilson. Mr. Novik spoke on "Chicago Parks," and Mr. Hosford described Hale's Connecticut peach farm.

Nov. 6 was "Chrysanthemum night," and Mr. Hunn was in charge. Mr. Bayer and Mr. Wilcox spoke on different phases of the subject. There was a fine display of 'mums at the club room, furnished by Mr. Bayer of Toledo, and by several Buffalo florists. Mr. John Rudy of Elmira sent several large blossoms, one of which was 12 inches in diameter.

On Nov. 13, Mr. Warren H. Manning, a Boston landscape architect, spoke on the "Jamestown Exhibition." Mr. De and Mr. Ghose told about "Fruit and agricultural products of Bengal, India, on Nov. 27.

Oct. 23 and Nov. 6 were nights of banner attendance, having 54 and 49 respectively.

All are welcome to these meetings which are held at 7:30 every Monday night at the Forcing Houses.
The above cut represents the new buildings of the College of Agriculture as they will look when completed. The agricultural buildings are situated at the extreme north-east part of the Campus. They occupy a site which is higher than any other part of the University grounds, and will command a view of the country around in all directions.

On the left of the picture is the Hall of Agronomy, 51 feet front by 109 feet deep. In the center is the main building, which will contain lecture rooms, laboratories, and offices; it has a front of 145 feet and a depth of 100 feet. To the right is the dairy building, which, including the extension for cheese and butter laboratories, has a front of 163 feet, and a depth in the main part of 60 feet. The group is connected by arcades.

Work on the buildings is still in progress. The walls of the main part of the dairy building are now completed up to the second floor, and the extension is roofed over. Little progress has been made upon the other buildings since last report, because of the effort which was unsuccessful, to complete the dairy building in time for the winter course students.
FORMER STUDENTS

'88, B. S. A.—After graduating from the College of Agriculture at Cornell University, Mr. G. D. Brill, upon the advice of Professor Roberts, returned to his home at Poughquag, N. Y., to test on the farm what he had learned in the school.

After several years farming he returned to Cornell in 1897 to take some advanced work in horticulture. While he was at the university, President Schurman received a letter from China asking that a man be recommended to introduce American machinery and methods of agriculture there. Mr. Brill was recommended for the position by Professor Roberts and after some correspondence, and on condition that he might have an American assistant of his own selection, he went to Wuchang to begin work under Chang Chi Tung, Viceroy of the Central China provinces. The next year he was joined by Mr. J. W. Gilmore with tools, plants and seeds. Together they established the first agricultural school in China with sixty students.

After the Empress Dowager de- throned the Emperor and seized the reins of government, a reaction against reforms set in and both resigned; Mr. Gilmore to return to America, and Mr. Brill to collect plants and seeds for the United States Department of Agriculture. While in the Philippines he made some reports to Dr. F. W. Atkinson on the agricultural conditions there and was tendered a position by him to establish an agricultural college in the Islands. Mr. Brill first returned to the United States and was married to Miss Mary Williams, who had been a Special student in Agriculture at Cornell, then returned to the Philippines for a year, but resigned and left at the time Dr. Atkinson did. After spending some time in China, Palestine and Europe, he returned to farming at his old home.

Last spring he sold out to his brother and went to the Adirondacks to take charge of several thousand acres of land for the Lake Placid Club. He has recently come to Cornell to assist in the Winter-Course in General Agriculture.

Mr. Brill’s office in the College of Agriculture is largely as administrator and also counselor of the men who take the Winter-Course in General Agriculture. He will attend to the correspondence and registration, will have in charge the co-ordination of schedules, and will advise the students in regard to any matters on which they need help; he will aid them in their organizations, and, in general, be an adviser and guide. There is need of co-ordinating the social and other activities of all the Winter-Course students in all the courses. He will also give instruction.

* * *

'05, W.—E. E. Barnum of Albion, N. Y., has returned to Cornell to take the four-year course.

'05, W.—R. J. Brooks is on the home farm at Cortland, N. Y., putting into practice some of the ideas he learned here at Cornell. He says that the course was many times worth the effort, besides the many acquaintances made here.
'05, W.—E. L. Chapman writes us that he is on his father's fruit and grain farm at Albion, N. Y. The course here is making his work much more interesting.

'05, W.—A. L. Cook feels well repaid for the time spent here last winter. His advice is that every young man with an inclination towards agriculture should, at least, take a short-course at Cornell. At present he is on the Riverlawn Farm, Cincinnati, N. Y.

'05, W.—James B. Covill of Victor, N. Y., is going to return to us this winter to take up more advanced work.

'05 W.—De Witt G. Crowell is a member of the firm of Crowell Bros. They are running a large farm at Wallkill, N. Y. Their specialty is fruit and potatoes, and also have a herd of thoroughbred Holstein cows. They find that scientific agriculture is profitable.

'05, W.—C. D. Davis spent a short time at the Winter's Farm, Smithboro, N. Y., after which he returned to his father's farm at New Berlin, N. Y.

'05, W.—H. A. Dean is at present working for his father at Ithaca, N. Y.

'05, W.—Clarence H. Diggs is growing potatoes on the home farm at Elba, N. Y. He says that no money value can be placed on the knowledge and friendships gained here last winter.

'05, W.—William J. Faulkner of Hornellsville, N. Y., writes that spraying is financially a success. He has also gained an interest in improving the strain of Holstein cattle in his district.

'05, W.—G. G. Grannis contributes his support to The Countryman from Clinton, N. Y., where he is employed in a grocery and drug store.

'05, W.—Clifford E. Greene is on the home farm at McDonough, N. Y. They have 125 acres in all. The stock consists of registered Guernseys, high-grade Jersey cattle, and O. I. C. swine.

'05, W.—F. Helfer, of Naples, N. Y. says that it pays to spray especially with grapes. Owing to this advantage from his course here he wishes to return and pursue further work.

'05, W.—H. H. Herriman, of Syracuse, N. Y., has written us that he is coming back this winter to take the Poultry Course. Already he has gained a financial benefit from his last course by the increased value by drainage of 22 acres of swale land. His acquaintances made here are extremely valuable to him and he himself wishes that every city man, who contemplates taking up any branch of agricultural work, should take at least a short course at Cornell.

'05, W.—Jesse C. Irwin is superintendent of the farm belonging to the Crowell Bros., at Wallkill, N. Y. The success on this farm that has come from the use of scientific methods has had its effect on the community. Mr. Irwin and Mr. Crowell have persuaded several other young men of their neighborhood to take the Winter-course this year. Mr. Irwin expects to return for more work himself in the near future.

'05, W.—Stephen L. Merritt is at present practicing mixed farming at Akron, N. Y.

'05, W.—W. H. Miller, of Newark, N. Y., is now registered in the two-year special course.

'05, W.—Howard A. Olin has changed his address to Perry, N. Y., where he will run a large farm in cooperation with his father.

'05, W.—H. B. Patten has settled down to till a 150-acre farm at Albany, N. Y. He certainly is following the teachings of Cornell, for he is at present repairing his farm buildings.

'05, W.—Walter G. Phillips is making use of the knowledge acquired here, at East Bloomfield, N. Y. He is carrying on general farming on a 240-acre farm and in the midst of his successes, he says that he will never forget the many pleasant memories of Cornell.

'05, W.—Claude E. Purdy is on the Tarbell Farms at Smithville, N. Y.
This farm is the property of Mr. Gage E. Tarbell of the Equitable Life Insurance Co. We consider Mr. Purdy very fortunate in his position as assistant herdsman. He says that this is partially due to his short stay here.

'05, W.—E. N. Reed, of Cortland, N. Y., tells us that his prospects in the farming line are very bright. His neighbors are impatiently waiting to see the outcome of the practicing of the ideas gained at Cornell.

'05, W.—F. A. Salisbury is carrying out some of the ideas of practical agriculture, on a fruit and vegetable farm at Phelps, N. Y. He is taking an active interest in the Grange of his section, holding several important offices.

'05, W.—Milo J. Shaw has found spraying very beneficial on his father's farm. The short Winter Course has helped him to realize the beauty and the value of country life to such an extent that he "wished a little Moore (Miss Mable Avis M.), and employed a preacher on the 6th of December last." Mr. and Mrs. Shaw will be at home, Kendall, N. Y., after New Year's to all their friends.

'05, W.—Milton B. Sisson is on the home farm at Almond, N. Y. He is especially interested in the breeding of Guernsey cattle and fancy poultry.

'05, W.—Raymond Watson is on a general agricultural farm at Lockport, N. Y. He is especially interested in dairying and poultry, although fruit and vegetable growing occupy some of his time.

'05, W.—R. D. Woolsey, the president of the Fletcher club, '05, is at present, dairy superintendent at the Tully farms, Syracuse, N. Y. Their plant is adapted to accommodate about 500 cows, but at present the dairy consists of only about 200 cows. They are shipping certified milk of a high grade. They have a number of the 1905 short course students in their employment. These are Harry Walker, dairy course; Elmer Phillips, poultry course; and John Ford and C. W. Thompson of the general agricultural course.

'84, B. S. A.—The November issue of The Countryman contained a notice of the nomination of Charles Fred Boshart, of Lowville, N. Y., for assemblyman from that district. By a recent number of the Lowville Journal and Republican, we learn that he was elected to the office by a majority of 1,197; without solicitation he carried his own town by a far larger majority than any other candidate for the same office had ever received.

Mr. Boshart was born Sept. 17, 1860, on the farm where his grandfather had settled over a century ago. With the exception of four years at Cornell, during which time he was a pupil of Prof. T. P. Roberts, Mr. Boshart has been connected with his father in farming in one of the richest dairy districts of the state. He is going to Albany to represent the people of his district, regardless of political considerations, and in the interest of wise and wholesome legislation. His work in the legislature will be chiefly in the interest of the dairy farmer, the breeder, and the agriculturist, for which work his past life and experience has well fitted him.
Some of the short course boys of last winter are inclined toward a political life. Gerry H. Wilcox of Villenova, N. Y., after much urging, accepted the nomination for Justice of the Peace, and was elected by a splendid majority over several candidates of greater age than himself. In spite of this condition of affairs, his ambition is to some day plant a strictly up-to-date farm on modern scientific lines.

BOOK REVIEW


This book was primarily prepared to meet the needs of the teacher of agriculture in the schools, but is equally valuable for anyone who desires to obtain a general knowledge of elementary agriculture. The style is easy and pleasing, the type is large and clear, the paper is good and it is, moreover, profusely illustrated with half-tones and wood cuts which not only supplement and enforce the text but render the book very attractive.

The authors begin with the nature and formation of soils, discussing very fully the factors of soil formation. From this they very logically pass to the different kinds of soils and their physical properties, to soil moisture, and the relation of soil moisture to plant life. The preparation of the soil for plants leads up to a discussion of the soil as related to plant life, in which the uses of the soil to plants, the constituents of plants, and the fertility of the soil are clearly and concisely discussed.

Under leguminous plants, is included the action of these plants as nitrogen gatherers and soil renovators, and their value as food. From this follows the principles of feeding, under which the different kinds of food are taken up; a comparison of nitrogenous and carbonaceous foods; the analysis of feeding stuffs; balanced rations and the rotation of crops.

In the chapter upon milk, special attention is given to the care of milk, simple explanations being given of the causes of bad milk, and directions by which bacteria and abnormal odors can be kept out of the milk.

Methods of separating and ripening cream, of testing, of churning and carving for the butter, are taken up briefly but clearly, each process being carefully illustrated and explained.

From the consideration of the dairy the authors turn again to plants, and take up the question of propagation by means of seeds, and buds. Cuttings, budding, grafting, and layering are each explained and the method illustrated by figures. From the propagation of plants they pass to the closely related topic of improvement of plants, first the improvement of existing types and secondly the securing of new varieties.

The last chapter is devoted to the ornamentation of the home and school grounds. The treatment of landscape gardening contains an exposition of the formal and the natural style with a marked preference for the natural style.

The subject matter in the book has been compiled from the leading authorities and at the end of every topic is a reference list of the latest and best works upon that subject.
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There are a large number of spray machines and spray pumps on the market and many of them give good satisfaction. An expensive machine is not required to apply Bordeaux. Good results have been obtained by using home-made devices, the hand pump and piping only being purchased; and yet, where a large area is grown the spray machine worked from the wheels or by an engine is, without doubt, a profitable investment. The results obtained from spraying depend on the thoroughness of the work and too much attention cannot be given to it. Spraying is a prevention, not a cure, and the difference of profit or loss in growing the crop may hinge on spraying.

The harvesting of the crop often presents quite a problem. It has not been many years since the “Armstrong digger” (a fork in the hands of a man) was the most useful tool to separate the tubers from the soil. Today there are many styles of diggers from which the grower can select one suitable to his soil. The machine has removed a large amount of labor in harvesting the crop and, at this time on most potato farms the digger is used, the potatoes are picked into crates, drawn to the root cellar and emptied into bins from which they can be marketed at the convenience of the grower.

The sorter, or rather the grader, also facilitates handling, as the tubers can be shoveled onto this machine, which removes the small ones and at the same time gives the operator an opportunity to pick out rough or decayed potatoes. By sacking the potatoes in the cellar, and many dealers prefer to handle them this way rather than in bulk, some time is gained in handling them at the shipping point.

Marketing the crop gives the farmer an opportunity to exercise his judgment. The crop can often be held for a rise in value with profit, but not always.

On the whole, potato growing offers a good field for investment and the outlook for the future of the industry is bright.

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<table>
<thead>
<tr>
<th>Hours run</th>
<th>1,200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds separated</td>
<td>1,080,000</td>
</tr>
<tr>
<td>Turns of crank</td>
<td>8,152,760</td>
</tr>
<tr>
<td>Turns of bowl</td>
<td>1,152,000,000</td>
</tr>
<tr>
<td>Oil used</td>
<td>8 quarts</td>
</tr>
<tr>
<td>Time oilling</td>
<td>About 5 min.</td>
</tr>
<tr>
<td>Time adjusting</td>
<td>None</td>
</tr>
<tr>
<td>Repairs</td>
<td>None</td>
</tr>
</tbody>
</table>

43 Years' Work—75c Repairs

<table>
<thead>
<tr>
<th>Hours run</th>
<th>2,150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds separated</td>
<td>1,985,000</td>
</tr>
<tr>
<td>Turns of crank</td>
<td>5,652,070</td>
</tr>
<tr>
<td>Turns of bowl</td>
<td>1,864,000,000</td>
</tr>
<tr>
<td>Oil used</td>
<td>5% quarts</td>
</tr>
<tr>
<td>Time oilling</td>
<td>About 7 min.</td>
</tr>
<tr>
<td>Time adjusting</td>
<td>10 min.</td>
</tr>
<tr>
<td>Repairs</td>
<td>75 cents</td>
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</tbody>
</table>

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I concluded to try the experiment on one acre and watch the result. I mixed one barrel of the solution composed of eight pounds of blue vitrol to forty gallons of water and applied it. When mixed ready for use the solution made forty-five gallons. The second day after the spraying the mustard was practically all withered and dead, but the leaves of the grain turned red and resembled a field of grain that was badly rusted. Nearly everyone who saw it said: "You have killed the mustard, but you have killed the grain as well," and I thought so myself. Within two weeks the grain that had been sprayed improved so that it was the most thrifty portion of the field, and the improvement was plainly discernible up to the time of harvest, when we found that in that portion of the field no mustard had gone to seed, and the grain was easily 35 per cent. better than on the balance of the field. I have no hesitation in saying that this treatment will eradicate wild mustard from the land without material injury to the grain crop, but I believe that better results can be obtained by earlier application and reducing the strength of the solution to about six pounds of vitrol to forty gallons of water. This is the formula I will use next season, and I shall use it upon every acre of grain I sow.

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THE CORNELL COUNTRYMAN is an Illustrated Monthly Magazine, published by students and graduates of the Cornell University College of Agriculture.

MANUSCRIPT for publication should be received by the 10th of the month preceding that in which it is to be published.

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THE PRODUCTION OF CERTIFIED MILK
By H. A. Jeffers,
Manager of the Walker-Gordon Laboratory Farm, Plainsboro, N. J.

NO article of food is receiving more world-wide attention by physicians and scientists than milk. The physician who deals with the contagious diseases and who is familiar with the unhealthy condition of our cities, fully realizes the important part milk plays in the general health and welfare of the people. Not until within the last few years has a general movement for a better and safer milk supply been inaugurated. Previous to this period no particular interest had been manifested for a cleaner milk and the only improvement established was against adulteration by water or skimming. Boards of Health required through laws that milk should contain not less than a certain minimum percentage of fats and total solids. But that it was one of the best mediums for growing and disseminating bacteria was not appreciated. The requirements were that it should be sweet to taste and yellow in appearance. It too frequently contained that cow flavor which is a component part of unclean milk and which is yet believed to be the natural flavor by the majority of consumers.

We have not yet passed many milestones along the road to perfection when we consider that the bulk of our milk is produced by men who care nothing for sanitation or cleanliness in their dairies and not a bottle or utensil is sterilized in its daily routine, therefore, let us briefly review the conditions at the farms where it is largely produced and handled.

At the farm where nature lavishly bestows her gifts of pure air, sunlight, nature's own disinfectants, we too often find the most filthy conditions maintained by man. Manure is in evidence on all sides, the exercising yard being small and foul, the stables usually low and dark, containing overhead storage, wooden floors, neither scrubbed nor seldom swept, the ceiling festooned with dust-laden cobwebs and never whitewashed. Every niche and corner bears evidence of neglect. The cows are fastened in rigid stalks, their flanks, udders and tails covered with manure—grooming not being practiced in their care. The milkers without changing clothes or washing hands proceed to milk with no preparation. The warm milk is put directly into cans and without cooling is often drawn in the hot sun to the shipping station where it is bottled into unsterilized jars. The milk is collected from hundreds of farms and distributed to thousands of families, there may be disease at the farm or in the family where it is consumed, yet the jars and cans go their daily round without sterilizing. This milk fairly teeming with bacteria, is produced by any method and handled in any way to cheapen production.

The improvement is not taking place as rapidly as could be desired, but every state has a department of Dairy instruction in connection with their Agricultural College where young men from the farms are taught how to produce and handle dairy products. These same young men are returning to the farms, shipping stations and distributing depots where they are exerting an influence for better sanitation and cleaner methods.

The highest standard of production is being carried on by a comparative few, and probably not more than 3,000 quarts of certified milk are delivered in Philadelphia daily. The production of this special milk requires the broadest
yet the most specialized work the agriculturist is called upon to do. He must bring into constant use the practical deductions of the chemist, veterinarian, physician and bacteriologist. He must be familiar with soils, production of crops, selection, breeding, feeding and care of cows and above all the most sanitary method of drawing milk from the udder and sealing to avoid contamination.

The following are essential features to be carried out in the production of certified milk. The details each producer works out for himself depending upon his conditions and environment. The first essential is the location of a farm naturally well drained with a pure, never-failing water supply remote from sluggish streams or swamps. The second is properly constructed buildings—barns for the cows and house for handling milk. The former should be isolated and used solely for cows. The construction may be simple, but abundance of sunlight, plenty of air space, approved ventilation, cement floors, without mangers, and a smooth tight ceiling are necessities. Cow fastenings should be plain, light, and durable, allowing the animal freedom and comfort. Watering devices for them, wash basins for the milkers and a small room in close proximity for storage of tools, etc., completes the barn equipment.

The dairy building should be removed as far away from the barns as convenient and constructed in three parts separate and distinct from each other, the first containing steam boiler, engine, laundry and lavatories; the second containing rooms for receiving, washing and shipping of jars and ice storage. The third consists of refrigeration, milk receiving and bottling rooms, the latter so constructed that only the bottlers have access. The apparatus consisting of vats, cooler, filler, separator and a pressure sterilizer with doors at each end connecting the washing and bottling rooms. The dominant idea in construction of all buildings and apparatus is that every nook and corner can be easily washed and sterilized.

The plant is now ready for the cows, which should be selected with extreme care and taken to the Quarantine Barn where they are subjected to the tuberculin test and rigidly ex-
examined for physical defects by the veterinarian. Cows passing the test and examination should be kept in quarantine at least one week and fitted for admittance to the regular herd by clipping the tails, udders and abdomens, grooming and washing with disinfectants daily. When in proper condition they are admitted to the herd where the endless daily routine of grooming, cleaning, clipping, scrubbing, washing and milking begins. The manure should be removed at least twice daily to a distance; preferably spread on the fields. Shavings are considered the cleanest bedding and land plaster the best absorbent and deodorizer. The cows, stables and surroundings should be so neat and clean that any lady would find pleasure and delight in visiting them at any time.

Feeding of the cows is an important factor of the business which is usually done at the finish of milking to avoid bad flavors, and prevent contamination of the milk. Foods should be selected free from obnoxious weeds, moulds, and other ferments.

At milking time the cows should be groomed and their tails, udders and abdomens washed with clean water and wiped, leaving the parts damp. A little chain is put under their necks to prevent them from lying down until after milking.

The milkers now prepare for the most important step in the daily routine by discarding their working clothes, thoroughly washing and cleaning hands, manicuring finger nails, and dressing in freshly laundered suits and caps, preferably white. When starting to milk the first few streams of fore milk, which is rich in bacteria and poor in fat should be drawn into a separate receptacle. The milk should then be removed with a firm, quiet, steady movement of the hand, into a sterile pail. This pail should have as small an exposed area as possible. It has been found practical to use a pail with top partially hooded leaving a comparatively small opening exposed to the dropping of dust or hair from the animal. Milking with dry hands, washing at intervals when soiled, is imperative.

After the milk is drawn it should be immediately taken to the milk house either bottled in sterile jars, immersed in ice water and cooled down to 40°F., or, which is the more common practice, run over a cooler and bottled at a temperature of 40°F., iced in shipping cases and kept at this low temperature until delivered to the customer.

There are two principal differences between certified and market milk,—quality and price. Certified milk is of definite composition, limited in bacterial content, while market milk, coming from so many sources, varies widely in composition containing vast numbers of bacteria, some of which may, as too often has been proved, convey the germs of our most dreaded diseases.

The Question,—which kind of milk shall we use,—resolves itself into a practical business proposition. The consumer will ask himself which milk is the more economical, the ordinary at the popular price with its attending risks and uncleanliness, or Certified milk at an advance of a few cents which has been produced under most careful sanitary methods, supervised by a corps of earnest professional men who surround the plant with such strong safeguards that disease contamination is practically eliminated and a pure milk assured.

At the advanced price the producer gets only fair interest on the investment. The consumer gets full value received. Clean milk is not a fad. The demand is increasing as consumers become educated. The limit of uniformly low bacterial content is far from being reached. It is not too much to predict that the time is not far distant when the price of milk will be governed by its bacterial and fat content and the customer can buy any grade of milk he wishes from the poorest to a milk that is practically sterile.
THE IDENTIFICATION OF COWS

By Archibald R. Ward, B.S.A., D.V.M.
University of California

Some work with the tuberculin test on cows, in which I have recently been engaged, has necessitated devising a method for absolutely identifying individual cows. The town of Palo Alto, California, requires, as one of the conditions to be satisfied before milk vendor’s license is issued, that the cows in the dairy shall have successfully passed the tuberculin test. The ordinance further provides that no milk from a diseased cow shall be sold. The enforcement of the features of the ordinance concerning tuberculosis simply consists in testing dairies and watching to see that no diseased animals are retained.

Ear tags bearing the legend “Palo Alto Board of Health” together with a serial number, are placed in the left ear of approved animals. The distinctive legend, placed on at the factory, is a fair protection against ear tags being affixed by unauthorized persons. There is no assurance, however, that an owner may not take an ear tag from a dead cow and place it on some other cow. In case of accidental loss of an ear tag, much confusion could arise, if there were no other means of identifying the animals.

A solution of the difficulty was suggested by the method, for the identification of registered stock, employed by some cattle breeders’ associations. For instance, when a Holstein-Friesian breeder applies for the registration of an animal he submits a sketch of its markings on a printed outline. To meet the requirements of my work a new sketch was prepared.

The proportions of the outlines prepared are adapted to a three by five inch catalog card, as shown by figure 1. With the aid of the outline it is a simple matter to record the distinguishing characteristics of an animal. It is not at all necessary to attempt an elaborate sketch. The location of the chief markings may be indicated more rapidly and accurately than could be described in words. Brands, scars, mutilations of the ear, etc., may be recorded with facility and practical accuracy. No very exact system of designating colors is necessary. The terms current among dairymen are used, such as brindle, roan, “blue,” red and fawn, when recorded with color boundaries, etc., are quite sufficient. Jerseys sometimes require considerable care on account of the gradual transition from one color to another. Where several cows in a dairy have one unmixed color, in addition to scars, etc., the horns offer desirable characters for identification. A horn shell may be off, or there may be a peculiarity in the direction of growth. Difficulties would arise in using this method in a pure bred Short Horn herd.

After a test, a sketch of the head of each cow is made, and the incomplete record is placed on the stanchion over the head of the cow. Later the cards are taken in turn and the side and rear views are recorded, but the card is returned temporarily to the stanchion in each case. Ear tags are affixed in the left ear of approved animals and at the same time the serial number of the same is recorded on the card. Condemned animals are punched in the right ear. The temporary test number (21, Fig. 2) painted upon the animal is recorded in the sketch.
Cards are filed away in a standard catalog case along with the temperature records. In the case of single cows or small dairies these are made on a three by five inch card, or in larger dairies are on a sheet five inches broad, which may readily be folded and filed with the identification cards.

The sketches and other precautions make it impossible for questions to arise concerning the status of a cow. When inspecting a dairy after the test, the number of the ear tag is ascertained and the card compared with the cow. If an unauthorized change of ear tag has been made, detection is sure. If no ear tag is found there will be a punch hole in the left ear, or at least a scar. Likewise an animal previously condemned would show a mark in the right ear. In either case, reference to the cards would result in further identifying the animal. I have about five hundred cards filed away alphabetically under the names of the proprietors of the dairies. The cards have been in use six months and seem to meet the requirements for which they were designed.

TO THE WINTER-COURSE STUDENT

By L. H. Bailey.

COMING to college means more than merely to acquire technical knowledge, even for the winter-course student. He will soon find himself taking a new attitude toward many important questions with which he may have been familiar all his life. He will begin to see that there are many ways of looking at a question; and before his eleven weeks are passed he may begin to feel that it is quite as important to develop a new way of looking at a problem as to acquire new facts concerning it. If the student was reared on a farm, he has been more or less isolated, at least when at work. Therefore, he is very likely to have acquired only one point of view on any subject and to hold it tenaciously. Education consists largely in broadening one's sympathies and giving him new means of attacking any problem. This power comes through knowledge and discussion. The student will soon find that the class-room is a place for discussion; and he will naturally want to carry this discussion beyond the class-room into the meetings with his fellows. So it comes that the student organizations become the natural proving ground of the class-rooms. Many a subject set a-going in the class-room will be threshed out when a knot of students forms at the table or of an evening.

The winter-course student should consider himself or herself a part of the agricultural student body. He will meet a cordial welcome from the students and the faculty. He is bound, on his part, to contribute something to the welfare and good fellowship of the College of Agriculture. He should, first of all, in this semi-official capacity, join the Agricultural Association. This is said to be the oldest student organization at Cornell University. It is always alive, having fresh and useful questions to discuss. Next, the winter-course student should identify himself with at least one organization that represents the winter-course work. He will never again have the opportunity of close association with so many congenial spirits; it would be a pity to lose the opportunity. No doubt there will be as many clubs as there are separate courses,—the general winter-course club, the dairy, poultry, horticulture and home economics clubs, but there should also be some arrangement whereby all the winter-course students can meet together. Perhaps there can be a federation of the clubs for a few general meetings.

Aside from all this, the winter-course men and women should find themselves at home in the Assembly, that meets on the first Thursday evening of each month,—three meetings at
which they may come in touch with the whole agricultural student body and the faculty. The Assembly is essentially a College function or enterprise, and should be planned for by every student in the College. This meeting tends to unify and solidify the diverse interests of the College of Agriculture.

Of course these various activities take one's time, but they are worth it. If one engages in them, it means that he systematizes and economizes his time, and this of itself is a gain well worth the while. The really busy and effective persons are the ones that organize their time and utilize it all, either in definite study or in systematic and useful outside activities. The student coming direct from the farm, where time is not likely to be carefully economized, may think himself confused and lost in the seeming rush of university life, but, if he analyzes the situation, he will find that the seeming haste is only the methodical and expeditious working out of a well-considered daily plan. Probably most persons can accomplish at least twice as much in the world as they think they can accomplish, if they only plan their work well and aim to fill all the hours. There is really no place in the world for mere idleness. This well regulated day means also good habits, good health and good spirits. It means steady, continuous effort without unnecessary fatigue. So I do not look on these extraneous activities either as a waste of time or as necessarily adding heavy burdens.

The winter-course student also becomes a part of the general student body of Cornell University. It is a most significant development of public sentiment and of response to the needs of the community that opens the University freely to young men and women who feel that they can come but for a short period and without the usual formalities required of students. Here are laboratories and lecture halls and libraries, outside the College of Agriculture, placed at the service of the farm youth of the state. The least that this youth can do is to try to form some intelligent conception of what these things are for and what they mean to the progress of the world. It is possible in three months to catch the spirit of a University.

No student in the University has so much done for him in the space of three months as the winter-course student has. The schedules are so arranged that the work is condensed and is put in the best possible form for quick assimilation. Of course the winter-course student loses something by this very condensation,—he loses the value of the time element in education, the process of gradual assimilation and reflection by means of which the University work becomes a very part of a man, developing relationships and perspective; but, after all, the winter-course student, while he is here, is a privileged man, and he ought to feel that it is his part to make the most of every opportunity.

In order to get the most from the opportunities that are here, the student must feel free to call on some one for advice. The person to call on is the one nearest his work, that is, on the officer who has charge of the particular course that he is taking. The student will find that useful and honest questions are considered with painstaking good will.

The student will receive much help and good cheer by putting himself in touch with the Christian Association in Barnes Hall. This organization stands for helpfulness in all phases of student life. The pastors of the various churches in Ithaca extend a hearty welcome to the winter-course and other students.

The general object of the student's coming is that he may prepare himself to handle his own problem to better advantage, for every person has a problem if he has any work to do in the world. With most winter-course men this problem is the farm. He should have this farm in mind all during his three months' course,—questioning how he may improve it, how he may apply the knowledge he receives. Perhaps he can discuss the farm with his
teachers. When he returns to the farm, he will be a marked man in the community. The greater the opportunities a young person has the more is expected of him, and rightly so. The winter's work should put more ambition and enthusiasm into the man. He should see life in a larger way, for the school, church, good roads, clean public service, and all the ideals of citizenship should have risen in his mind. The State provides these winter-courses: the State should receive the benefit.

THE MANUFACTURE OF CONDENSED MILK

By O. F. Hunziker.

III

TRANSPORTATION FACILITIES.

Another important factor to be considered in choosing a factory site is the transportation facilities. It is essential that the condensory have access to one or, if possible, to more than one railroad, otherwise the shipping facilities are greatly reduced and the expense of freight and cartage increased.

While, for reasons previously discussed, it is not advantageous to erect a factory in close proximity to a large railroad center, it is equally undesirable to choose a condensory site where the transportation facilities are poor. Where access to one road only can be had the freight rates are generally high and the accommodations poor. Monopoly in any business, railroads not excepted, tends to reduce the efficiency of the service and to raise the price of the goods. Competition calls for greater attention to efficiency and induces competitors to lower the prices of their goods. It ever means a struggle for the survival of the fittest and it offers the public all the inducements that ingenuity, enterprise and business ability can produce. The same holds true in the case of railroad companies. Where two or more companies want the business of one manufacturing concern they will leave nothing undone that will show off their service, their accommodations and their rates to better advantage to the manufacturer whose good-will and patronage they are seeking. The result is that the transportation service becomes more efficient, the accommodations are better and the freight rates are lower.

This is highly important for the manufacturer of condensed milk, as the freight item is a very conspicuous item in the expense account of the condensed milk business, and, as prompt shipments may prevent, in many cases the cancelling of orders which might have been rendered void by delay.

Low freight rates and efficiency in the transportation service may determine the success of the business. Part of the crude milk may have to be shipped to the factory by rail and, besides the shipping out by rail of all the finished condensed milk, the necessary raw materials, such as coal, sugar, tin-plate, solder, labels, box-shooks, rosin, gasoline, etc., must be hauled to the condensory by rail continuously.

IV. THE ALTITUDE.

The altitude of the Condensory site should not be lost sight of. The higher the elevation of the territory in question, the lower is the atmospheric pressure. At the sea level the atmospheric pressure is the greatest. It is a well understood physical law that the boiling point of water at the sea level is at 212°F. The greater the elevation, the lower the temperature at which water boils. We know that on high mountains water boils before it reaches a temperature high enough to cook potatoes or to obtain hard boiled eggs. This factor is of the greatest importance in the manufacture of condensed milk. Condensed milk is heated in an open kettle to from 180° to 200°F. If heated to much lower temperatures it tends, with age, to undergo digestive fermentations which render it unfit for consumption. If, then, the condensory is erected on an elevation at which the...
milk boils before it reaches the desired temperature, the quality of the condensed milk is inferior, its keeping quality is impaired, indeed, its decomposition may be so rapid and so active that it becomes unsalable before it reaches the market, in which case it may result in a total loss to the manufacturer. The writer knows of one factory in Switzerland which, for the above reason, had to be abandoned completely, after having manufactured thousands of pounds of condensed milk which were unfit for use.

V. THE TOPOGRAPHY.

Though of less immediate importance than the foregoing factors, the general lay-out of the land should receive some attention. Where it is possible the factory should be erected on a hillside. The receiving platform being built on the side of the hill, the factory may be run on the gravity plan. Where this is possible the milk received at the factory will enter the different processing rooms by force of gravity. This will avoid the necessity of the use of milk pumps and will economize labor. It will also do away with many feet of milk pipes and elbows, which otherwise would be necessary. The presence of milk pumps, numerous elbows, valves and excessive feet of milk pipes is always undesirable in a condensory. The initial expense of the factory is augmented, there are more leaks where milk is lost. The cleaning involves much extra labor, and as milk pumps, elbows, valves and milk pipes are difficult to properly clean there is always great danger of their retaining remnants of milk, which are prone to undergo decomposition, pollute the milk and injure the quality of the condensed milk.

Where this natural elevation does not exist and the land is level, the gravity plan of the factory can be established by artificial grading of the land, which, however, involves some extra expense.

VI. FACTORS GOVERNING THE QUALITY OF SWEETENED CONDENSED MILK IN THE CONDENSORY.

The Quality of the Fresh Milk.

If an inferior quality of milk cannot be manufactured into a high grade butter or cheese, good milk is absolutely essential for the production of a superior quality of condensed milk. Poor cloth will never make a good suit, no matter who is the tailor; inferior milk cannot produce good condensed milk, no matter who is the processor.

Good, wholesome feed, healthy animals not too far advanced in the period of lactation, low temperature and the absence of dirt, are the essentials in the production of good milk. The distribution among the patrons of copies of, and holding them to, the following regulations will generally bring about the desired results:

Keep obnoxious weeds out of the pastures and do not feed onions, garlic, turnips, cabbage and wet distillery slops. Ensilage and roots may be fed without injuring the milk if fed immediately after milking, in which case the peculiar and undesirable odors can pass through and out of the animal body before the next milking. Do not feed sour or musty ensilage. Reject all the milk from cows less than 60 days before and the first 14 milkings after calving. White-wash the stables at least twice a year. Remove the manure from the barn daily. Ventilate the stable and sprinkle the floor with water to lay the dust before milking. Wipe off the cow's flanks, udder, and teats before milking with a clean damp cloth, and milk with clean dry hands into a clean sterile pail. Strain, aerate and cool the milk to 60° F. or below immediately after it is drawn and keep it at that temperature until it reaches the factory. Do not use a cheese cloth for straining as it is seldom, if ever, free from remnants of milk; but use an eighty to one hundred mesh wire strainer.

Rinse all the utensils, such as pails, strainers, coolers, dippers and cans immediately after using with cold or lukewarm water, wash them thoroughly with a brush and hot water to which some soap, soap powder or sal-soda has been added. Rinse and scald them
with boiling hot water, and invert them over a steam jet for a few moments. Do not wipe them with a dirty dish cloth, but stand them on a table, rack or shelf in an inclined position to which dirt and dust have no access and where they can drain off.

At the Condensory the milk should be received by a man who is an expert on milk. He should examine every can, and where there is room for doubt in his mind he should test the milk in question for acid with Farringon’s or Mann’s alkaline solution. Milk containing more than .2% acid should not be allowed to pass. Milk with a temperature above 65° F. should be returned also.

While the above rules and regulations may impress the reader as being arbitrary and strict in the extreme, he should remember that the losses involved where a poor quality of milk is accepted may be of such dimensions as to result in the ruin of the business. The Condensory usually pays prices high enough to more than make up for the extra care the patron is asked to take with his milk. Moreover, there is nothing in the above commandments which an up-to-date, self-respecting dairyman should not carry out on his own accord as a duty to himself and to his fellowmen.

Cleanliness in the Factory.

Practice what you preach! The lack of due attention to cleanliness in the factory has two powerful drawbacks.

It is inconsistent with the instruction the manufacturer gives to the patrons of his factory, and it is in itself conducive to the production of condensed milk of an inferior quality.

It does not take the watchful eye of the intelligent patron, who comes to the factory daily, very long to learn whether the manufacturer gives his milk as good care when it reaches the factory as it had on the farm. Shiftlessness in the factory will of necessity weaken the farmer’s ambition to bring his milk to the Condensory in the best of condition, and it will discourage him to take the pains with it which he would if the factory-man set him a good example in this respect.

The effect of carelessness in the factory may not be serious for some length of time, especially where the factory is new, but it is sure to bear fruit sooner or later and when the results begin to tell, the manufacturer is generally utterly unable to cope with the troubles. Bad milk is returned to the factory and he cannot imagine what causes his milk to go wrong. He is incapable of locating his troubles by systematically eliminating all the possible avenues through which his milk may become defective, because he lacks the knowledge, the training, and that patient perseverance which alone can solve the riddle which racks his brain until, bald-headed, lean, and with the eye of a dying cod-fish, he admits that he is beaten and is willing to make room for a better man.

Cleanliness in the factory is absolutely essential. The milk vats should be rinsed and steamed out as soon as possible after use. The milk pipes should be scoured by running steel-flue brushes through them, flushing them out with clean, cold water and steaming them till they are scalding hot. The copper kettles and vacuum pans should be rinsed and scoured with sand-paper or emery cloth, then rinsed and steamed thoroughly. All the vats, kettles and milk conveyors should be flushed and steamed again in the morning before the condensing commences. The sugar shoot should be kept scrupulously clean, care being taken that no damp or wet sugar remains in it, as it is liable to ferment and when the fermenting sugar reaches the milk it will surely cause trouble in the finished condensed milk.

The special stress laid in this article on the factor of cleanliness in all the operations in and out of the Condensory is the result of many costly and valuable lessons learned by practical experience in the manufacture of sweetened condensed milk.

Article No. VII. of this series will contain a detailed account of the process employed in the manufacture of sweetened condensed milk.

(To be Continued)
March 11, 1906

The Countryman

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February, 1906

With this number of The Countryman we present to our readers a line of articles, the main issue of which is dairying. Inasmuch as these articles were written by men widely separated who, while in the dairy business have passed through experiences most diverse, it is quite remarkable how they all converge into one thesis, how they all unite their energies in driving home to the thinking farmer the fact that the one thing of the highest importance in any and all dairy lines is Cleanliness! Ah, how our colleges and experiment stations have battled with the demon Filth. How they have preached the gospel of cleanliness in season and out of season until we begin to see the light breaking (in streaks) and the dawning of a better day for the Patrons of the Cow.

The Farmers Meeting: A Problem

The intellectual life of the farmer is constantly broadening. His interests become continually more numerous and more complex. As a part of this self-development, and to facilitate this self-education, he has called meetings, held conventions, established societies and associations, and founded national organizations of the highest character. The problem is not why these meetings exist, but why the young people of the farm are, generally speaking, so little interested in them.

The usual farmer's meeting is largely composed of two classes—the children, up to 13 or 14 years old, brought by their parents; and the middle aged or white haired men and women. Between these two classes is a great gap. significant, and suggestive of many problems.

Of course, in far too many cases the young people leave the farm at their earliest opportunity. For this there are many reasons, (see agricultural literature for the last decade), chief among which is the nature of country education. The farmers' children are taught everything—but the farm. "That which is first worth knowing, is that which is nearest at hand"—this will be the keynote of the New Education.

Although it is true that a large number of our young people do leave the farm, still it is reasonable to suppose that those who remain on the farm by the very fact of their remaining, should be interested in these various meetings. However, this does not seem to be the case; and for this there are several good reasons. First: very often the subjects discussed at such meetings are not made interesting to the young people. They desire something beyond the dollars-and-cents aspect, the purely utilitarian view, of the farm. Of what interest to the average young man or woman on the farm would be the discussion of such a topic as this: "What is the relative importance of the Oyster-shell bark louse and the San Jose scale?" proposed at the 51st annual meeting of the West-
ern New York Horticultural Society? But tell them the fascinating life-histories of these two insects, explain their wonderful transformations, their feeding habits, their domestic relations; in a word, reveal to the young people the wonderful in their commonplace environment, and they will attend these meetings with eager ears. They will go back to their daily work, to the green fields and orchards of their home, with opened eyes, with a new point of view, and with a fresh inspiration. It is this same factor, the knowledge of the near at hand, the discovery of

"Tongues in trees, books in the running brooks,
Sermons in stones, and good in everything,"
that will transform the farm, and put new life and value into the farmers' meetings.

Secondly: The young people are not given sufficient encouragement or opportunity to take part in the programs at these meetings. There is a tendency upon the part of the older persons to discourage, as presumptuous, any efforts of the young people in this direction, and to consider their endeavors as unworthy of any serious thought. It should be remembered that excellence is obtained only through effort, and that what at first is merely unwilling toleration of this effort, may easily glide into genuine admiration for the resultant excellence. It may be stated as almost axiomatic that the best farmers' meeting is that which is made up of proper proportions of the experience of the old, and the inspiration and enthusiasm of the young.

*Vaughan McCaughey.*

The College of Agriculture at Cornell has attracted a more and more diversified class of students, especially as far as geographical representation is concerned.

After the completion of their theoretical studies, or at the end of the Senior year, many of the men wish to travel in the United States to study the management of special farm industries and of large farm enterprises. This is rather unsatisfactory if done alone. Therefore, at the instance of a petition signed by seventeen students the following plan was discussed in the faculty and decided upon for the coming summer.

The party of students is to travel with a professor in charge following a carefully selected route, making appointments with experts in various lines for meetings as the party progresses on the trip. This plan has now been duly ratified by the Board of Trustees.

Certain academic requirements are made obligatory, as well as the consent of the faculty concerning each individual participant. The trip will last at least six weeks, and a deposit of $400.00 must be placed with the University treasurer, unexpended monies to be returned. Six hours of University credit are given. It is hoped that Prof. Thomas F. Hunt will take charge of the first trip,—summer of 1906.

Proposed stopping places are: U. S. Dept. of Agriculture, Washington, D. C., where Secretary Wilson will kindly put the experts of the Department at the disposal of the party; a study of the Cotton industry with its by-products; a survey of tobacco culture; the fertilizer beds of Carolina; Georgia fruit and truck interests; the

**The Travelling Summer School of Agriculture**
sugar and rice industries of Louisiana; the cattle ranches of Texas, and feeding for market; irrigation methods in the far West, etc., etc.

If possible the party will have its own cars, a living car and a dining car. Cities will be avoided as a rule and the cars will be sidetracked wherever convenient for the purpose of investigation.

Such a trip should be of incalculable value to the favored ones who are financially able to take it. It should not be imagined that this is to be a pleasant summer outing merely, as explanations and lectures will be given by the professor and full reports and accurate notes on all phases of the subjects studied will be required before University credit is given. The dining car being well equipped with books and writing materials will be turned into a study room after dinner in the evenings. Needless to say the number of students will be limited. The promulgation of this idea has called forth enthusiastic support by the students and also many persons prominent in the field of agricultural achievements.

This is a new departure in Agricultural Education and one which should prove valuable. As there is no precedent by which to go, the financial as well as the other features have been roughly estimated, but when the professor in charge has been appointed (Feb. 15th) we shall probably have more definite news.

GENERAL AGRICULTURAL NEWS

Among other things at the National Dairy Show, to be held in Chicago February 15-24, will be an exhibit of milk and cream under the direction of the Dairy Division of the U. S. Department of Agriculture. For a number of years the National Creamery Buttermakers' Association, as well as State dairy associations, have called for exhibits of butter and cheese at their annual meetings, and offered medals, diplomas, etc., for those products receiving highest scores. This kind of work is all good and should be encouraged.

The producer of market milk should have a similar opportunity to display his product, particularly when it is recalled that the number of such producers exceeds the number of butter and cheese makers.

In order to get this idea in motion, the Dairy Division has secured space at the National Dairy Show and proposes to call for exhibits of unpasteurized milk and cream, free from preservatives. The milk exhibits will be divided into two classes—Class I for certified milk and Class II for market milk or milk produced by those who do not make any claim to produce a certified product. There will be one class for fresh cream (Class III) unpasteurized and free from preservatives.

While this exhibit will be under the direction of the Department of Agriculture, the officials of the National Dairy Show will offer gold and silver medals for the first and second prizes in each class, and diplomas to all who have a score of 95 or above in Class I (certified milk) and of 90 or above in both Class II (market milk) and Class III (cream).

It is proposed to have the milk and cream scored on a basis similar to that used for butter and cheese. The score cards and conditions for entry will be forwarded to those desiring to enter this test. Applications should be made to Chief of Dairy Division, U. S. Department of Agriculture, Washington, D. C., not later than February 1, 1906.

Considerable interest is being displayed on the part of market-milk producers in a number of States, and it is expected that this exhibit will prove an attractive feature of the National Dairy Show.
The Cyclopedia of American Agriculture, of which Prof. Bailey is editor, is now well under way. The work, published as a companion to the Cyclopedia of American Horticulture, will be handsomely bound and illustrated. It is to contain signed articles by the leading experts in North America, among both investigators and practical farmers.

The Cyclopedia is to be published in four volumes, each of which will be complete in itself, and may be purchased separately. Each volume will have twenty-five full page half-tone inserts of typical farm scenes in various sections of the country, and in addition will contain at least one illustration on each double page. The progress of the work to date is as follows:

Vol. I—Farms, Climate, and Soil. All manuscript for this volume is now in the office. It will be sent to the printer not later than Feb. 1st, and should be on sale next June.

Vol. II—Crops. All the articles for this volume have been assigned and part of the manuscript received.

Vol. III—Animals. This volume has been organized but not assigned.

Vol. IV—The Farm and the Community. (Economics, Statistics, Social questions, Organizations, History, Literature, etc.) No work has as yet been done on this volume.

The Cyclopedia was begun in June 1905 and it is expected will be finished June 1907. It is predicted that it will be far in advance of any work of the kind published. Mr. A. R. Mann (Cornell B. S. A., '04) is the secretary in charge of the Cyclopedia office. Mr. W. C. Baker (Cornell '97) has charge of the illustrations, to which he is devoting his entire time.

* * *

The Michigan Experiment Station has made an interesting report upon its investigations in regard to the influence of inoculated nodules upon the composition of the crop. It was found that in two crops of soy beans growing side by side, one of which had nodules and the other without them, there was no noticeable difference as to the height, color, rapidity of growth, or weight of hay per unit of area. Upon chemical examination, however, it was found that hay made from plants bearing nodules contained 18.52 per cent. protein, while hay from non-inoculated plants had only 0.56 per cent. protein. This result, showing almost twice the amount of protein in hay from inoculated plants, was substantiated by similar results with cow-peas. Inoculation would seem by these results to affect the chemical composition of leguminous hay and not its bulk.

* * *

The following Poultry Institutes have been arranged:

Yorktown, Feb. 6th.
Ballston Springs, Feb. 7-8.
Penn Yan, Feb. 9-10.

* * *

Cornell was well represented at the annual meeting of New York State Dairymen's Association, held in Binghamton, December 12-14. Below are the names of about fifty former students, members of the faculty and University trustees who took supper together the second day of the meeting:

L. H. Bailey, Director
R. A. Pearson, Professor
W. W. Hall, Instructor
George A. Smith, Lecturer
H. E. Cook, Lecturer
H. A. Harding, Lecturer
E. J. Preston, '75
W. H. Jodran, G., '78
G. D. Brill, '88
E. A. Gillette, S. C., '95
W. E. Scarrett, S. C., '95
C. H. Stewart, S. C., '95
J. H. Bevier, S. C., '97
J. M. Belknap, S. C., '98
A. C. Brown, S. C., '98
D. P. Maynard, S. C., '98
F. D. Silvernail, S. C., '98
F. H. Stewart, S. C., '98
W. F. Burlingame, S. C., '00
E. D. Gillette, S. C., '00
J. W. Harter, S. C., '01
H. B. Winters, S. C., '01
A. G. Lauder, '02
F. Bradt, S. C., '02
G. Harter, S. C., '02
I. Harter, S. C., '02
E. S. Haver, S. C, '02
J. W. Illston, Sp., '03
F. W. Bodertha, S. C, '03
W. G. Harkness, S. C, '03
G. Stewart, S. C, '03
A. N. Ticknor, S. C, '03
W. E. Ayres, S. C, '04
D. H. Cole, S. C, '04
W. L. Markham, S. C, '04
L. A. Perce, S. C, '04
H. H. Shaler, S. C, '04
H. E. Austin, S. C, '05
Orra Barrows, S. C, '05
C. Beardslee, S. C, '05
L. Conrad, S. C, '05
J. R. Cunningham, S. C, '05
E. F. Fortin, S. C, '05
Ralph Fowler, S. C, '05
F. E. Hamilton, S. C, '05
A. S. Mihalko, S. C, '05
Floyd Peabody, S. C, '05
L. W. Russell, S. C, '05
M. G. Webster, S. C, '05
R. D. Woolsey, S. C, '05

There were four guests at the supper including Mr. F. G. Urner, editor of the New York Produce Review and American Creamery, and three young men who expect to take the Short Dairy Course this winter.

In addition to those above named some Cornell men were at the Convention but on account of committee meetings or otherwise could not attend the supper. Among them were H. C. Troy and W. E. Griffith, instructors, Mr. Gilbert Tucker, trustee and F. E. Dawley, ex-trustee.

* * *

The New York State Breeders' Association held its first annual Winter fair Dec. 19-21, at Syracuse. As was expected the number of exhibitors was small but of a class indicative of the was also an exhibit of the varieties of timothy. The dressed poultry exhibit under the direction of Prof. J. E. Rice presented the contrasting types of several of the leading varieties. Glista Alpha of the Cornell herd won third place in the butter test for aged cattle. Among the lecturers were Lieutenant-Governor Bruce, Prof. Willet M. Hays, Assistant Secretary of Agriculture, Prof. Holden of Iowa State Col.

CORNELL NEWS

CAMPUS NOTES

The College of Agriculture has a greater enrollment than ever before. There are 237 students in the Winter-course, 223 regulars and specials and thirty graduate students in Agriculture, a total of 490.

* * *


The Winter-Course students in Poultry Husbandry have elected H. W. Freeman of Middleport, N. Y., and A. E. Boicourt of Westfield, N. Y., as directors of the Poultry Association, the former also being second vice-president.

* * *

Prof. Fippin speaks Mar. 23 before the Columbia County Grange on "Soils." * * *

Prof. and Mrs. James E. Rice were blessed by a baby boy, born Jan. 5. He has been named James E., Jr.
The registration in the winter course in poultry increased from seventeen of the previous year to thirty-five, an increase of 105%.

* * *

The work of the students in the Short Dairy Course is very widely scattered, work being taken in the Dairy Building, old dairy building, Judging Pavilion, Sibley Dome and Library lecture room.

* * *

Mr. B. E. Brown, Bureau of Soils at Washington, the scientist in charge of the paraffine wire basket experiments being conducted here for the past three months, leaves for Missouri to take up similar work. Mr. F. R. Ried of Washington will take his place.

* * *

Prof. Cavanaugh delivered a lecture at Arcade, N. Y., Jan. 25, on "The Science of Feeding Animals."

* * *

The Poultry Department has been visited during the past month by Dr. E. M. Santee of Cortland, N. Y.; A. F. Hunter, Syracuse, N. Y., associate editor of the American Poultry Advocate; Miller Purvis, Peotone, Ill.; editor of Poultry, and J. H. Stonebum, Waterville, N. Y., editor of the new paper, Poultry Husbandry.

* * *

The faculty of the College of Agriculture have taken up a new line of work. Mr. E. C. Curtis of Cayuta, N. Y., recently purchased an abandoned farm in the town of Newfield, Tompkins County. It is 1,800 feet above sea level, or 1,000 feet higher than the campus. The soil belongs to the Volusia silt loam type, is thin soil and hard pan. The part the faculty plays is to advise the owner what kind of a crop should be planted and what treatment should be given the soil, in other words, how to rehabilitate the farm and to make it profitable. Samples of some of the soil have been taken and various crops are being grown in them during the winter, to determine what will do best. The owner is more than willing to follow any advice given.

* * *

Prof. T. F. Hunt returned Jan. 12, after three weeks spent in an extended tour through Nebraska, taken in connection with the "Seed Corn Special Train." The party covered all parts of the state and spoke to several audiences at nearly every point. Prof. Hunt made thirty addresses during the trip, and states that the people in general seem to appreciate the object of these excursions.

* * *

C. F. Shaw, '06, goes to Washington Feb. 1, having been appointed scientific assistant in the Soils Bureau, division of Field Survey, under Prof. Bonsteel.

* * *

Six pigs bred and raised by the College of Agriculture were exhibited at the International Stock Show at Chicago in the College Class. They took no prizes here. Three were slaughtered and entered in the "slaughter class." One took first prize in its class, and sweepstakes over all breeds.

* * *

Prof. Pearson gave a lecture Jan. 24, at Arcade, N. Y., on "Production of Clean Milk."

* * *

This year there has been published a novelty in the form of a hand-book of information and advice for Short-Course students. The booklet of twenty pages was published by a committee from the Agricultural Association in conjunction with the University Christian Association. It contains a 1500-word article by Director Bailey; a list of student organizations in the College of Agriculture; information concerning the University Christian Association; information about Ithaca including a church directory and directions for obtaining rooms; a number of the familiar yells and songs; and as new features in a booklet of this kind "The Old Farm at Cornell," and "The Big Red Team." The hand book closes with a list of one hundred rooming and boarding houses.
The third annual show of the Cornell University Poultry Association will be held the 14-15-16th of this month in the Judging Pavilion and Poultry Building. The success of the show last year foreshadows a more successful one this year. Previous to it, lectures will be given by Prof. W. R. Graham of the Ontario Agricultural College, at Guelph, Canada, and by T. E. Orr, secretary of the American Poultry Association, on scoring fowls and giving practical exhibitions of the same. The show will be judged by T. F. McGrew of New York City.

With the increased facilities for taking care of the show, it is hoped to have on exhibition five hundred fowls of eighty varieties, including Games, Bantams, Ducks and Pigeons.

In the basement of the Poultry Building will be a display of incubators, fifteen brands being represented. These will be running at the time and some of them will have chicks hatching. This will be a valuable opportunity to judge of the advantages and disadvantages of the different types, as they will be working by side. Catalogs and other literature will be on hand for free distribution.

In another part of the basement will be a complete exhibit of poultry dressed after the various methods used today. Statistics will be given to show the percentage lost in dressing and drawing fowls of the different breeds. Next to these will be varied types of bone cutters used by poultrymen.

The first floor will have the pigeon and bantam display. Some very high class birds were on exhibition last year which will be again shown this year.

The best drawings of poultry houses and trap nests, submitted by the class in poultry of the preceding term, will be given a prominent place. On this floor will be a representative exhibit of the various poultry and grit foods. Also such articles as leg bands, trap nests as well as poultry remedies.

All the larger fowls will be housed in the judging pavilion. Some of the prize-winning birds from Madison Square will be found here. A number of prominent breeders have indicated their desire to exhibit and a contest for the best prize ribbon is assured.

Three days before the show, the students in Poultry Husbandry will each draw a slip, telling them to go to a certain pen and pick out the best fowl there. The students then wash the fowls and prepare them after the manner of exhibition birds. They are then entered in the show. The student also scores all fowls entered from the Poultry Department and judges them by comparison. The person making the best score will be awarded a prize of five dollars and those passing more than ninety per cent, will be given a certificate of honorable mention. All this instruction and practice gives the student such work as is seldom found in a poultry course.

In one corner of the Judging Pavilion will be a booth having all the poultry papers and books for sale. A small commission from subscriptions and sales is received by the association and by this method the association pays its expenses. All wishing to purchase literature are urged to get it of the Poultry Association.

Thursday afternoon from 2 to 4:30 will be Faculty Day. All members of the University Faculty and their families are cordially invited to attend. There is no admission fee.

Every student in Poultry Husbandry is earnestly requested to cooperate and help make this show better than the preceding one, and every student of Cornell and especially of the College of Agriculture is cordially invited to attend.

* * *

A beautifully decorated silk banner has been received by the Cornell College of Agriculture for display and safe-keeping. It is the first prize banner awarded by the National Creamery Buttermaker’s Association in 1904 to the creamery buttermakers of New York State because the average of the scores of their exhibits at the St. Louis Exposition was higher than the average of any other state.

This banner was exhibited on the speaker’s platform at the recent State
Dairymen's Association meeting in Binghamton. Only a remarkable series of circumstances is responsible for its coming to light. Secretary Sudendorf of the National Association who attended the State meeting, was as much surprised as anyone to see it. It is explained that after the St. Louis Exposition the banner was carefully packed and sent by express to its makers in Newark, New Jersey, to have the words "won by New York" placed upon it. For some reason the package never arrived at its destination but, strange to say, it went to Binghamton and a few weeks ago the Express Company there sold it at auction with numerous other unclaimed packages, for transportation charges. A Binghamton woman bought it for $5.00. Although the banner is said to have cost originally $125.00, she was disappointed when the box was opened and it is fortunate that she did not cut it up for crazy quilt pieces. The Secretary of the Binghamton Chamber of Commerce was asked if he knew of some person who might want the article for its auction price. The woman was referred to Mr. W. W. Hall who is active in the Dairymen's Association affairs and he promptly took the banner off her hands, paying $5.00, which he had just received from another party for a life membership in the Association. Thus the banner became the property of the Dairymen's Association and was displayed and created much interest at the convention. Before adjournment a resolution was unanimously passed ordering that it be sent to the Cornell College of Agriculture. This action was appropriate, as Cornell is the one institution in the State conducting regular courses of instruction in butter making. Furthermore, the majority of New York exhibitors at the St. Louis Exposition, whose well-made butter won the banner, were former Short Dairy Course students at Cornell University.

FORMER STUDENTS

'00, B. S. A.; '01, M. S. A.—Otto F. Hunziker was born and brought up in Switzerland. After graduating from an agricultural college in that country in 1892, he emigrated to this country, and later entered the Bryant and Stratton Business College, at Providence, R. I., from which he was graduated in 1896. In 1900, he received his B. S. A. degree at Cornell, and a year later his M. S. A., specializing in dairying and in dairy bacteriology. The following year he was appointed assistant in bacteriology to Dr. V. A. Moore, and also had charge of the laboratory work in dairy bacteriology. During the years '03, '04 and '05 he was connected with the Scranton Condensed Milk Co., at Ellicottville, N. Y., where he acted successively as milk inspector, factory inspector, foreman of the various departments, superintendent and finally as bacteriologist and chemist. At the beginning of the present year he was appointed head of the dairy department of Purdue University, at Lafayette, Ind., where he says "they keep plenty of sand to prevent a man from becoming rusty."

While at Cornell Professor Hunziker published bulletin 197, on the germicidal action in cows' milk, and
bulletin 203, on the care and handling of cows' milk. He is a member of the honorary scientific society, Sigma Xi, and also of the graduate scientific fraternity, Gamma Alpha. His thorough scientific knowledge, combined with his broad and varied practical experience in the manufacturing of condensed milk, has made him one of the best authorities on that subject. Up to the present time the public has known but little about the making of condensed milk; the series of articles by Professor Hunziker, which are now being published in this paper, is almost the first literature on that branch of dairy industry.

Professor Hunziker was married April 10, '05, to Miss Florence Belle Burns, of Portville, N. Y.

Ex.-'8o—J. T. Caine, Jr., is the registrar of the Utah Agricultural College at Logan, Utah. He also has a fine herd of dairy cows on his farm near the college.

'93, W.—William Devendorf, who was a member of the first Winter Course at Cornell, is now on a farm of one hundred and twenty-five acres at Hastings Center, Oswego Co. Oswego County annually produces a large crop of strawberries, which are chiefly shipped to New York City. The berries from this section are much sought for by dealers, on account of the good keeping quality of the fruit.

'01, Special—G. W. Keeler of Louisville, Ky., is another man who has "made good" in the Department of Agriculture. Mr. Keeler has been made one of the Tobacco Experts of the Department. He soon leaves for Ireland, where he is to continue the same work.

'01, B. S. A.—Adams Phillips, who spent two years as professor at Washington College at Limestone, Tenn., later returned to the Fredonia Normal School, of which he is an alumnus, to teach biology. Mr. Phillips spent a few days at Cornell during the early part of December.

'01, Special—George M. Taylor has made the most of his opportunities and his Cornell learning, and is now a flourishing farmer near Louisville, Ky.

'04, B. S. A.—G. A. Bell is now connected with the Department of Agriculture as Assistant in the Bureau of Animal Industry. Last fall he conducted special poultry investigations the results of which are now published as "Hints to Poultry Raisers," Circular 82 of the Bureau of Animal Industry.

'04, Special—Dwight E. Carley has been on his father's farm of five hundred acres at Lisle, Broome County, N. Y., most of the time since leaving Cornell. This winter he has been testing milk for several breeders of Holstein cattle about the state.

'04, B. S. A.—Fred L. Crowe, who came here from Truro, Nova Scotia, has been with the Red Cross Company at Boston for the past year. He is contemplating engaging in farming in the near future.

'04, B. S. A.—W. F. Fletcher is associated with Mr. H. R. Gould, in the division of pomology of the Bureau of Plant Industry, at Washington, D. C.

'04, D.—After taking the Winter Course here at Cornell, Henry K. Jarvis moved westward and is now located in Champaign, Ill., where he is filling the office of herdsman at the University of Illinois.

'04, B. S. A.—Archie Stone is doing practical work as superintendent of the Lakeside Stock Farm of Syracuse, N. Y.

The Ithaca Weekly Journal of Aug. 10th, 105, gives us the following clue to the whereabouts and success of a number of '05 Winter Dairy Course men:

'05, Dairy—Leon H. Allen, of Varysburg, is now employed in East Homer, N. Y., in the cheese making business. He writes: "My position this year is much better than last year's and the responsibility is a great deal heavier. My salary is $13 more per month than it was last year."

'05, Dairy—Wellner E. Allen, of Almond, N. Y., is now head cheese maker in the Almond Creamery with
about the same responsibility but with a one-third increase in salary.

'05, Dairy—Herman E. Austin, of Whiteville, reports that his salary is the same as last year but that he has now been made a partner in the business of the Austin and Company’s Creamery, and that he now has entire charge of the cheese making.

'05, Dairy—Otis Blish, of Grafton, N. Y., is now head man at the Halcott Centre Creamery and receives $20 more per month.

'05, Dairy—Ashton D. Cowles, who is now manager of the Adirondack Creamery, says that now his salary is $50 per month and board, while last year he was making but $35 per month.

'05, Dairy—Jay R. Cunningham of Sherburne, N. Y., is now running a creamery of his own in Sangerfield, N. Y., and says that he has all the responsibility of the concern and is making double the money he made last year.

'05, B. S. A.—Laurence G. Dodge is in the Department of Plant Industry of the U. S. Dept. of Agriculture, working under Mr. Spillman, who is the agronomist of the Bureau. Mr. Dodge is at present traveling through New York and the New England States, studying the problem of farm management. We hear that he is getting on very well in his line of work.

'05 Dairy—Ephraim F. Fortin, of Bainbridge, N. Y., is now head butter maker with the Bainbridge Creamery. He says: “My responsibility is heavier than last year and I have had an increase of 25 per cent. in salary.”

'05, Dairy—Robert W. Haines, of Addison, N. Y., who is now connected with the Addison Milk Condensing Company, reports that his salary has been doubled since last summer.

'05, Dairy—Frank S. Hartwell, of Saugerties, N. Y., who is employed in the Saugerties-Elgin Creamery says: “Last season I was assistant butter-maker and cheese weights and had no regular responsibility. This season I am butter maker and have all the responsibility in the creamery. My salary is about three times greater this season than last.”

'05, W.—Floyd Howard, of Morrisville, N. Y., was married on New Year’s day to Miss Flossie Hall of the same place. They will go on a farm of about one hundred acres, at Morrisville, in the spring.

'05, Dairy—William C. Meracle, of Rome, Pa., who is now a cheese maker, says he has a much better position than last year and one-third increase in salary.

'05, Graduate—Eugene Merritt ('03, A. B.) was recently appointed to a position in the Bureau of Statistics of the U. S. Dept. of Agriculture. The crop reports are now made and issued under the direction of a committee, of which Willet M. Hays, Assistant Secretary of Agriculture, is the chairman.

'05, Dairy—Stiles Miller, of Sussex, N. J., is now with the Sheffield Farms-Siawson-Decker Milk Company of West End, N. J., as foreman of the milk bottling plant. He says: “My responsibility is much greater than last year and my salary has been increased from $40 per month to $70 per month this year.”

'05, Dairy—Howard J. Northrup, of Huntersland, Schoharie County, N. Y., who is now first man in the Huntersland Co-Operative Creamery in Maine, Broome County, N. Y., writes: “My responsibility is greater and my salary is increased $15 per month.”

'05, Dairy—Judson J. Northrup, of Libson, N. Y., is now assistant foreman in the Middletown creamery, of Middletown, Delaware County, N. Y. He says: “I have more responsibility than last year for now I do all the churning, ripening and a good deal of the testing of both milk and cream and get a one-third increase in salary.”

'05, Dairy—Floyd H. Peabody, of Union, N. Y., is now a butter maker with the Ulster Creamery of Ulster, Pa. He says: “One year ago I was working on a farm for $20 a month, and at present I am getting $32 per month and board.”

'05, B. S. A.—R. C. Simpson writes from Monticello, Fla., that the pecan business is the “real thing” as a money
maker. He is delighted with the South
and most especially with pecans.

'05, Dairy—John Allen Smith, of
Oak Hill, Greene County, N. Y., is
now first man in the Locust Grove
Creamery of that place. He writes:
"Last year I was manager of the skim-
ming station at $50 per month. This
year I am first man in the creamery
at $55 per month the year round
and have a helper furnished me. I received
16,500 lb. of milk yesterday and made
989 lb. of butter. I am having good
success while I am moving up."

'05, W.—Arthur T. Snow is now
assistant superintendent and instruc-
tor in manual training and gardening
at Chappaqua, Mt. Inst., a boarding
school under the direction of the Soci-
ety of Friends at Chappaqua, N. Y.
He is using this as a stepping stone to
a higher position, where he can better
apply the knowledge received at Cor-
nell. 

'05, Dairy—James Adam Thomson,
of Bovina Center, Delaware County,
N. Y., is now manager of the Bovina
Creamery. He says his responsibility
is the same but that he has had an in-
crease of $60 more per year in his
salary.

'05, Dairy—Martin V. Wade, of
Chenango Forks, is now in the Meri-
dale Creamery Company, Meridale,
N. Y. He has charge of receiving all
the milk and cream and testing the
same. In his letter he says: "Last
season I worked as a helper in the
milk shipping department with the or-
dinary responsibility of a helper with
a salary of $37 per month. This sea-
son I am responsible for all the milk
and cream taken into the creamery
with a salary of $50 per month. At
present about 19,000 pounds of milk
and 7,000 pounds of cream pass under
my inspection daily."

'05, Dairy—Leslie R. Wells, of
Rensselaer Falls, is now at Wolcott, in
the cheese making business. He says:
"I have a great deal more responsi-
bility this year and my salary has been
increased one-half. I am very much
pleased with my present position. Last
year I was a helper in the creamery."

'05, W.—Frederick R. Wheeler, 567
Locust St., Lockport, N. Y., is raising
fruit on a large scale. He is another
of last winter's short course class who
has been married within the past year.

'05, W.—Mr. Whetzel recently
received a letter from Mr. Gilbert A.
Prole of Batavia, N. Y. He writes
the following in regard to his potato
crop:

"You know I wrote you about pota-
toes and sent you some leaves that I
thought were blighted, as our potatoes
were dying off some, and I thought
the spraying had done no good. Soon
after this there began to be a differ-
ence between the sprayed and unspray-
ed rows. The sprayed ones stayed par-
tially green two or three weeks after
the unsprayed. When I weighed them
there was a difference of 64 bushels
per acre for spraying,—the sprayed
183 bushels per acre, the unsprayed
119 bushels per acre. The spraying
material for the 10 acres cost me
$17.20. I sold one carload in the fall
for 60 cents per bushel and have sold
another for 75 cents per bushel. The
first carload I had for spraying."

Mr. Prole has been instrumental in
organizing four farmers' reading clubs
in his county, having a membership of
about 25 each; other reading clubs
will be formed. These clubs will meet
together about once a month through-
out the winter for discussion of the
subjects studied, and arrangements
will be made to have, if possible, some
member of the faculty of the agricul-
tural college present to address the
meeting. Interest is added to the
meetings by having music and recita-
tions. The following subjects will be
studied this winter: "The Soil"; "The
Fertility of the Land"; "Farming with
Green Manure"; "Physics of Agricul-
ture"; and "Liming of Soils."

Ex.-'06—S. R. Clark is now on the
home farm at Onondaga Valley, just
outside the city of Syracuse. He is
interested in breeding Holstein cattle.
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DOES PURE BRED POULTRY PAY?

By T. F. McGrew

In grandfather’s time if the hens produced twenty-five or thirty eggs during the year, and the greater portion of these in the spring-time, it was all that was expected from them. These were known as the dung-hill or barnyard fowls. About 1867 the era of progress of poultry husbandry in this country commenced. If our information is correct, the Census of 1870 gave an average of about 30 eggs per hen per year from the limited information gathered. Thirty years later the Census Report credits about 70 eggs per hen as the average product of the United States. All of this increase has come from the one source of better poultry created under the influence of the fancier, who pays special attention to what should be known as “Standard Bred Poultry.”

In the egg-laying contest, conducted under either private, State or National control in this country, Australia or England, there has never been recorded to our certain knowledge an instance where mongrel or cross-bred fowls won the laurels or came anywhere near doing so. The best market poultry, the most successful poultry plants, the most successful egg-producing hens, the best turkeys and water fowls of all kinds are those bred direct from some one of the many standard bred varieties.

If there is anyone who can gainsay these statements and prove us in error, let them do so, but so long as there can be no contradiction to these facts, why should any one in the wide, wide world continue to harbor cross-bred mongrel stock in hopes of making a profit therefrom, when the evidences are so overwhelming that only those who keep properly selected stock for the purposes intended, make money from the growing of poultry.

The best egg-producing hens, the best meat-producing hens, the finest of market turkeys, ducks and geese come into our markets only through the existence of the Standard bred poultry. We have not in all our experience known of a single instance where “even value received in the keeping of poultry came from the possession of the common barnyard stock,” and in every instance of profit and success the groundwork or foundation of same is from some one or more of the standard bred varieties. The expense of possessing good stock of this kind is so slight as to prevent no one from having the same. Gradually from any farm every single head of the old-time, ante-dated, invaluable stock can be sold, and the money received for same expended for some of the better kinds that any one can hope to succeed with. These are facts that cannot be gainsayed or disputed. Every one familiar with the growing of poultry fully realizes this to be the condition. With this overwhelming proof all in one direction, how it can be possible for the agricultural interest of the country to cling to a single old-fashioned hen in hopes of gaining something from her, is more than any of us, who are familiar with the situation that governs conditions which have increased the poultry products of this country from a mere pittance to over $500,000,000 per year can understand.
FIG 1.—Barred Plymouth Rock and White Leghorn Males, alive, dressed, and dissected. Observe variation in type and comparative size of parts.

COMPARATIVE ANATOMY OF THE BARRED PLYMOUTH ROCK AND THE WHITE LEGHORN TO SHOW TYPE DIFFERENCES

By C. A. Rogers, ’05.

The accompanying photographs (Fig. 1) serve to illustrate the strong contrast between the large, compact, meaty Barred Plymouth Rock and the small, sprightly, light-weight White Leghorn. The broad high back and the deep chest and rear of the Rock furnish a very striking contrast to the long slender narrow back, and narrow chest of the Leghorn.

Perhaps the most pronounced contrast is apparent when these fowls are dressed and exhibited side by side. At first glance we see the Rock stands out with a deep short body and long extremities and the White Leghorn with a long thin body. Attention is drawn, however to the quite prominent breast muscle of the Leghorn which is exceptionally large and perhaps this accounts in large measure for the popularity of the White Leghorn as a broiler.

After studying several individuals of each breed the following average measurements were reached. The intestines of the Rock measure 70.5 inches, while that of the Leghorn was only 55.9 inches. The caeca in the Rock measured 7.2 inches and in the Leghorn 6.6 inches. The percentage of the dressed fowl to the live weight in the case of the Rock was 90.50 per cent, while that of the Leghorn is 86.80 per cent. In like manner the percentage of the edible parts of the Rock is 75.49 per cent, and that of the Leghorn 66.55 per cent. Again the percentage of the waste parts of the Rock is only 13.42 per cent in contrast to 16.45 in the Leghorn. Further comparisons are as follows:

<table>
<thead>
<tr>
<th></th>
<th>B. P. R.</th>
<th>W. Leg.</th>
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<tbody>
<tr>
<td>Live Fowl</td>
<td>100.</td>
<td>100.</td>
</tr>
<tr>
<td>Feathers</td>
<td>5.16</td>
<td>8.15</td>
</tr>
<tr>
<td>Blood</td>
<td>3.84</td>
<td>3.34</td>
</tr>
<tr>
<td>Dressed fowl</td>
<td>90.50</td>
<td>86.80</td>
</tr>
<tr>
<td>Edible parts</td>
<td>75.49</td>
<td>66.55</td>
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<td>R. Arm 1st joint</td>
<td>1.63</td>
<td>1.46</td>
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<td>R. Arm 2nd joint</td>
<td>1.88</td>
<td>1.84</td>
</tr>
<tr>
<td>L. Arm 1st joint</td>
<td>1.68</td>
<td>1.38</td>
</tr>
<tr>
<td>L. Arm 2nd joint</td>
<td>1.92</td>
<td>1.84</td>
</tr>
<tr>
<td>R. Leg 1st joint</td>
<td>7.66</td>
<td>6.26</td>
</tr>
<tr>
<td>R. Leg 2nd joint</td>
<td>6.52</td>
<td>5.07</td>
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<tr>
<td>L. Leg 1st joint</td>
<td>7.92</td>
<td>6.20</td>
</tr>
<tr>
<td>L. Leg 2nd joint</td>
<td>6.39</td>
<td>5.15</td>
</tr>
<tr>
<td>Entire breast</td>
<td>16.50</td>
<td>15.96</td>
</tr>
<tr>
<td>Left pectoralis</td>
<td>7.53</td>
<td>6.80</td>
</tr>
</tbody>
</table>
Back, rump and neck .......... 19.80 17.25
Heart .......... 1.58 .54
Liver .......... 1.54 1.50
Gizzard .......... 1.42 2.00
Total waste parts 13.42 16.45
Lungs .......... 2.45 5.23
Kidneys .......... 1.54 1.65
Head .......... 5.66 5.43
Shanks and toes .......... 1.42 .73 .30
Testicles .......... 1.66 5.89
Loss weight .......... 1.77 5.46

These tabulations seem to give a decided advantage as an economical meat fowl to the Barred Plymouth Rock.

Referring to the illustrations of muscle texture (Fig. 2) the network of lighter color represents the perimysium or connective tissue. Within this perimysium are seen the nerve bundles, arteries, and blood vessels which supply and care for the cells in the fibers of the muscles. Any part of the muscle enclosed by this perimysium is known as a fascicle. The fascicles contain the individual fibers between which there is a connective tissue called endomysium.

The perimysium and endomysium compose the objectionable part of the meat, the tough part. When the muscle is only partly cooked, the perimysium and endomysium are especially tough, but when properly cooked they become like gelatin. In either case there is much less nourishment in these connective tissues than in the fascicles, consequently the greater the proportion of perimysium and endomysium to the fascicle, the tougher and coarser will be the meat and the less nourishing.

A careful comparison of sections of the muscles points out clearly that the meat of the Rock contains a larger amount of fascicle or solid meat fiber in proportion to the amount of perimysium and endomysium than does the meat of the White Leghorn. Consequently we may infer that the meat of the Rock is tenderer and more easily prepared for eating than the meat of the Leghorn, provided of course that the conditions of fatness, health, etc., are equal.

[The above article is a brief statement from a thesis prepared by the author for a Masters' degree in Agriculture, in the preparation of which 27 individuals representing 6 varieties of poultry were dissected and studied. Ed.]
SOME OF THE WHYS OF THE FRESH AIR POUlTRY HOUSE
By Ellis M. Santee.

So much nonsense has been said and written (and I have done some of it), upon the subject of having the conditions in our poultry houses more nearly approach those of our own houses, and poultrymen have so thoroughly learned the bitter lesson that too much warmth is bad; and there is now danger of the pendulum swinging too far the other way, thus losing the greater part of the good accomplished by the agitation that it may not be unprofitable nor out of place to briefly consider why we cannot profitably adopt our own surroundings to the needs of our fowls.

The need of a plentiful supply of oxygen is common to us both, but in the hen in a much more exaggerated amount, for the reason that the hotter the fire, the more oxygen is consumed and the little hen must consume enough fuel, combined with the oxygen of the air she breathes, to keep the normal temperature of her body up to about 106° Fahrenheit, while we get along very comfortably upon 98.6.

Nature gave her an overcoat of feathers that makes it possible to retain the heat for the greatest length of time when once she has generated it, thus making it possible for her to depend almost entirely upon the heat from within.

It is not because of the cold, but in spite of it, that the cold poultry house has and is proving more profitable. It is due to the fact that cold air contains less moisture and more oxygen.

The danger from the cold house is two-fold; first from the manner of its construction, and second, from the manner of its use.

We are too apt to think that a crack more or less in our houses will do no harm so long as we want plenty of fresh air anyway, and thus we get the profit consuming, death dealing draught. Strange as it may seem, the house that is supplied with plenty of pure air through a muslin curtain, requires to be more nearly air tight in every other respect than any other kind of a house.

In the use of this house, everything must be done to stimulate activity; the deep litter, the small grains, plenty of sunlight in every part, and the fresh pure water constantly before them.

Then there is the moisture problem that we can almost eliminate from consideration in building our dwelling-houses, but which must receive almost first consideration in building our poultry houses. We pen our fowls in October and keep them there until March, each day carrying in large quantities of moisture in the water, the food and the air, never taking any out, except the small amount contained in the egg and the droppings, which are too often left until the moisture is nearly all dried out.

After six years’ use of the muslin curtain, I am well convinced that it, more nearly than any other one thing, solves our most perplexing building problems; but it must be used in an otherwise tight, low house with some glass for best results.
MARKET PRICE OF EGGS
By Henry Jennings, Sp.

In the study of the market price of eggs from 1860 to 1904, the highest weekly quotations of the New York Market, as given in the The Country Gentleman, were taken as furnishing the most reliable data available.

From the data collected, tables were prepared showing monthly averages. From these tables it is seen that with few exceptions May is the month of the lowest average prices, and December the month of the highest, though the highest quotations may occur in November, December, January and in some cases February. The time of the highest prices seems more variable as to date. From these monthly lists yearly averages were obtained and are shown by the chart and accompanying figures. There has been considerable variation, although the fluctuations have been more gradual than is generally thought to be the case.

Although in some cases the variation in value may seem to be quite marked it is not so great but that it can be partially explained by a short period of scarcity and resulting high prices. However, I have no direct proof that this has actually occurred. The time of the highest yearly average was directly following the Civil war, when the prices reached the remarkable value of 35.42 cents per dozen. Of late years the highest average was in 1904 when the prices went to 28.45 cents per dozen.

Taking a general summary it seems that the fluctuations in the average value of eggs is not as wide as is ordinarily thought. The causes for these fluctuations in weekly, monthly, or even yearly values is probably entirely influenced by such things as temperature and general weather conditions, or the variation in the value of the chief grains used for egg conditions. By a careful study of these causes it might be possible to determine which one of the three was responsible for the fluctuations.

MARKET PRICE OF EGGS.
Yearly Average.

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<td>1876</td>
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The average struck from these yearly averages shows the price for the entire series of years to be 23.05 cents per dozen.

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### A Down East Duck Ranch

*By F. G. Thayer, Sp.*

To the observer the sight of thousands of White Pekin ducks is a sight not to be forgotten. At the same time there is no branch of poultry keeping where visitors are less desired than on a large duck ranch. The Pekin duck is probably the most timid of all the domesticated ducks and strangers as a rule are prohibited from visiting on this account; as all stampeding, scaring or otherwise disturbing the duck causes loss in flesh, vitality and profit.

The duck business of today is probably one of the most firmly established profit paying branches of poultry husbandry. But there is no branch of poultry farming where failure is so certain when proper methods are not followed. It requires a large outlay of money and a large and varied husbandry experience. It takes time to develop a market and know when and where to ship your duck to an advantage.

The substance of this article is based on practical experience on Weber Bros.' Duck Ranch of Wrentham, Mass. They are located 23 miles southeast of Boston, Massachusetts, on good state roads running between Providence and Boston within easy access of the depot. The ranch is situated in a valley where it is extremely cold in the winter and very warm in the summer. The land is hilly. Very few mechanical devices are used for saving time and money except that the water that is used on the place is pumped by means of a gasoline engine and a windmill through pipes to various houses and yards. The ducks have
water for drinking only, being reared without any water for swimming. They are watered in large troughs for the large ducks and in small fountains for the young ducklings. The water must be changed occasionally for ducks will not drink luke-warm water. The two feed houses are centrally located thus economizing in labor to a large extent.

The management makes it a practice to carry 400 head of breeding stock throughout the season. When selecting breeders only well matured, sound, vigorous stock is desired. They must be broad backed, good lunged, strong in their feet, not too fat, and without lopped wings. These breeders are given a green run in a large orchard where they receive the best of care and are not forced in any way. They are selected occasionally and poor ones put into the fattening pens to get ready for the market. The breeding house is divided up into pens with 20 ducks and 5 drakes to a pen. Each pen having a sloping run connected with it.

During the cold winter months the house is heated so as to take off the chill and keep the ducks comfortable and the eggs from freezing. It has been found in practice, that fat ducks lay less eggs and less fertile ones and those which do hatch are low in vitality.

Incubators are used exclusively for hatching. Both hot water and hot air machines are used. The average hatched of fertile eggs ran very high and of very good vitality. The mortality was very small. The eggs are turned twice daily. The incubators are ventilated whenever needed from sides and top and never from top and bottom at the same time because it cools off the eggs, dries them up, and causes a draft. More ventilation is given on the eleventh day.

The hot-water machines are run at 102° F. throughout the hatch with the thermometer on the eggs and the hot air machines at 102° F. above the eggs. Moisture was applied to the hot water machines but none to the hot air ones. It is a good practice to keep the cement floor wet down constantly as it keeps the air moist and does away with some adding of moisture to the machines. The incubator house was built underground with overhead ventilation and end ventilation by means of a muslin curtain. All windows were whitewashed so as to shut out all possible sunlight and to keep the air within at as even a temperature as possible. To further help this along and afford a good ventilation shutters are used on the windows.

Hatching is generally commenced along in January and February and lasts until the latter part of July when the fertility runs low.

From the incubator house the ducklings are removed to the nursery, which is heated by hot water and is 273 feet long and 12 feet wide. It is divided into 73 pens. There is a narrow walk next to the hover, which makes work more convenient. The pens have new sawdust daily. The young ducklings are kept near the hover at first and then they are gradually allowed a run as far as the house permits. During the first week they are not allowed out doors at all. They are kept in the nursery until they are two weeks old when they are removed to the large brooder houses where they are given more room, but still in hot water heated houses. They are kept here until five weeks old when they are removed to the cool brooder houses where they receive no heat at all. In the yards are shelters where the ducks may keep cool during the daytime when houses are too warm. They are kept here until they are eight weeks old when they are moved into the fattening sheds. These fattening sheds are composed of V-shaped buildings, with sides open and yards on both sides. They are fattened here and then driven to the slaughtering pen from whence they are killed for market. They are from 10-14 weeks old when killed.

The breeding ducks are fed a mash morning and night with a little whole corn at noon. The mash consists of cornmeal, bran, flour, meat scraps with
some oyster shell and grit mixed in. Plenty of finely cut green material is also used. Carrots and cut alfalfa is used in the winter and is found satisfactory.

Newly hatched ducks are fed crackers, eggs, rolled oats and grit for 5 times or one day. They are then changed to a feed of rolled oats, scalded corn meal, bread crumbs. This is fed for 3 days when the rolled oats is gradually increased and this fed for ten days. They are fed five times daily and always watered before feeding to avoid choking of the ducklings. After this they are fed corn meal, 150 lbs.; bran, 3 bu.; flour, 95 lbs., and meat scraps 33 lbs., with occasionally linseed oil meal, pinhead oat meal and screenings from breakfast foods. To all of this is added finely cut green food. The green food is practically all raised on the farm. This includes red clover, rye, rape and corn. This was all ground by a hand ensilage cutter. The ducks were fed sparingly morning and noon and at night they were given as much as they would eat and a little was left on the feeding boards. The feeding hours were 6—9—11—1—5 when using five feeds a day, which diminished to three feeds per day after five or six weeks old. The ducks were fed especially for fattening from one to two weeks before killing. At night they were fed on a “fatter’s food” consisting of 100 lbs. corn meal, 66 lbs. flour and 60 lbs. meat scraps with plenty of green food mixed in.

The ducks or ducklings are all dry picked. They are first stunned with a stick on the head and then stuck in the throat through the mouth which severes the large blood vessels. From there to the picking place the operator pulls out the tail feathers and throws them on the floor. He then places the head of the duck between his leg and picking box and commences to pick the feathers from breast first and then from back. He separates all the feathers into their relative classes. He picks to the first joint on the wing. When the feathers are all off the ducks they are shaved with a sharp concave knife to remove all pin feathers that could not be removed otherwise. The carcass is then cooled in ice water to remove all body heat. They are shipped in early part of season to the New York markets and later to the Boston market. They are packed in barrels for New York and in boxes for Boston.

The pickers will average 50 ducks per day and some of the pickers have picked as high as 78 in one day of 10 hours. They receive 7 cents per duck for picking. The feathers are saved and shipped to various cities. They were bringing 48 cents per pound in 1905.

Lanterns are hung in all the houses and yards so the ducks will not stampede or be afraid during the night. All the yards are plowed up each fall and sown to rye.
Of the many employments open to women, few offer the freedom, health and profit that poultry keeping does. But even greater than these considerations has been the pleasure of the work to me. While poultry keeping is a business made up of many details, yet it can be managed so one can spend many hours away and everything go on well. One is not tied to an office desk, so many hours; nor shut up in a factory under a "boss;" nor confined by the drudgery of house work from dawn till dark. The work can be done in the cool, morning hours, then during the heat of the summer days, and the long afternoons, one can read or sew, or go to the club, while the evenings are always free.

The work does not, like office work or some occupations call for any expensive wardrobe for it is rough and dusty work. Poultry work is not, as Samantha Allen said about matrimony, "all sitting on a rainbow and eating honey."

Sometime ago I received a letter from a teacher, who wished to come and learn by actual work with the fowls, what I could teach her about poultry. This young woman said she would need to be paid for her services, as she supported herself and mother. I couldn't be bothered.

She really wished to learn the business for the income it would bring her. I advised her to give up the city school where she found the work too hard, take a village school where the work would be easier and a place to establish a small number of fowls might be easily found, thus learning the new business before giving up the old. In her case the mother could help her look after the chicks.

As one grows into the knowledge of the chosen breed (for one breed is enough even for a woman) the birds can be advertised and exhibited at some local shows and this will bring acquaintances among other poultry keepers among whom one will make life long friends.

The greatest profit comes in knowing how to feed what is at hand in combination with what is lacking, which must be purchased and in put-
ting the finished product upon the market at the time it brings the best prices. Whether it be eggs and meat for market or eggs for hatching and birds for exhibition.

For the woman who cannot give enough time to the poultry business to manage a plant for market eggs and fowls, there are many side issues, one of the most profitable being the raising of fall chickens. These can be hatched at home, or purchased by the hundred at almost any town fair in the country. These chickens can be bought in the fall for what one would pay for the eggs in the regular hatching season. At this season the weather is pleasant for the worker, and for the checks there is plenty of grass, bugs are plentiful and the ground covered with grain and weed seeds.

The pullets hatched in September would lay in March and the young males either caponized or sold for soft roasters, if they had not been disposed of earlier as broilers.

Volumes might be written about what a woman could do with poultry, but first she must learn the business, either by slow experience or at a school where Poultry Husbandry is taught in all its many branches.

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*Egg broken
How frequently does the setting hen turn her eggs?

By H. F. Prince, ’07.

Much has been written about the turning of eggs during the period of incubation. Opinions differ widely. The preceding figures describe an effort to find out how frequently eggs are turned by the natural method. The old hen seems to be a pretty reliable authority, and the attempt was made to let her answer the question herself.

Most of us have noticed a setting hen just before she settles down on the nest. She will thrust her head under her body, rustle the eggs around, straighten up and finally settle back with an air of contentment and a willingness to rest for another twenty-four hours.

Four hens; two Rhode Island Reds, one Plymouth Rock, and one Buff Cochin, were placed on fifteen eggs each. Each set of eggs was marked with numbers from one to fifteen. If an egg was broken a star was placed by the number and dropped from the succeeding records. The hens were taken off each evening with the exception of the first, between five and six o’clock and fed. While the hens were eating, the position of each egg in the nests was noted. The results were surprising. In every instance it appeared that each egg had been moved during the preceding interval. Moreover the eggs did not remain in the same part of the nest for more than three days. The only times I observed the hens changing the position of the eggs was in the evening after they had returned to the nests. The thorough manner in which the hen turns the eggs may well furnish us a clue to the most natural and proper treatment of the eggs when under the artificial conditions of the incubator.

The Colony brooder houses have many advantages over outdoor brooders. This one at Cornell University provides both a glass and a cloth window.
THE POULTRY INDUSTRY IN THE EMPIRE STATE
By Lewis J. Elwood, Sp.

The object of this article is to show the relative importance of the poultry product as compared with the other leading agricultural products and to show the parts of New York State in which most poultry is kept.

In making the comparison it must be remembered that New York State does not lead in poultry products, while it does in some others. It ranks first in dairy products and potatoes, second in orchard products, sixth in oats, which is our leading cereal crop, and only seventh in poultry products.

The rank of the first seven states in value of poultry products is as follows: Illinois, $20,250,000; Iowa, $19,508,526; Ohio, $19,127,778; Missouri, $17,840,625; Pennsylvania, $16,231,968; Indiana, $15,614,937; New York, $14,791,491.

The length of the lines in the cut is in proportion to the value of the products. It will be noticed that with the exception of the dairy industry which includes butter, cheese, milk and skim milk, the poultry product compares fa-
vorably with others. The values of the principal products in this state for the
year 1899 are:

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<th>Product</th>
<th>Value</th>
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<tr>
<td>Total dairy products</td>
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<tr>
<td>Potatoes</td>
<td>15,019.135</td>
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<tr>
<td>Poultry</td>
<td>14,791.491</td>
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<tr>
<td>Oats</td>
<td>12,929.092</td>
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<tr>
<td>Orchard products</td>
<td>10,542.272</td>
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From the map one will observe that there is more poultry kept in the western
part of the state than in the eastern and more along the lines of railroads. The figures were taken from
the census report of 1900 and this does not consider poultry which is kept
within village limits nor the poultry under three months old. If the total
number was to be estimated the cen-
sus figures would have to be increased
by at least 40 per cent.

**A SETTIN’ HEN**

When a hen is bound to set,
Seems to me taint etiket,
Dousing her in water till
She’s connected with a chill.

Seems to me ’twas scursly right,
Giving her a dreadful fright;
Tying rags around her tail,
Pounding on an old tin pail.

Chasing her around the yard
Seems as if ’twas kind of hard;
Bein’ kicked and slammed and shooed,
Cause she wants to raise a brood.

I should think ’twas getting gay
Jes’ cause Natur wants her way.

*Anon.*

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**THE STATUS OF POULTRY HUSBANDRY IN AMERICA**

*By J. Demary, Sp.*

POULTRY Husbandry as a dis-
tinct branch of agriculture is a
feature of modern times. The
keeping of fowls has been one of the
farm industries for centuries, but its
importance has not been realized until
recently. Artificial incubation was
known and practiced by the Egyptians
and Chinese thousands of years ago,
but not until the modern incubator
reached a high state of development
was there any definite attempt to study
the common breeds of fowls and by
systematic breeding render them of
more use to mankind.

Since the use of incubators placed
the rearing of fowls more directly
under the owner’s care and atten-
tion, it followed that better knowl-
edge of the industry would be
obtained than under the easy going
methods of the past. The present
great and increasing interest that
is being taken in Poultry, is largely
due to the diffusion of this knowledge
through the various books, bulletins
and articles that are written upon this
subject.

As the “rules of the game” became
more definitely understood, the occupa-
tion assumed more dignity and at

present it ranks equally with the other
branches of Agriculture.

The teaching of Poultry Husbandry
has also assumed great importance and
it seems to open a profitable field of
work to those who will make a careful
study of the industry in both its theo-
retical and practical phases. Too much
stress cannot be laid on the latter
point, for in the keeping of poultry,
the “personal equation” is of the
greatest importance.

Considering the growing import-
ance of the industry the fact that the
Experiment Stations have given so lit-
tle attention to the matter is hard to
understand. Statistics show that some
of the Western States have a very high
rank in the value of their poultry
products, but so far very little work
has been done along this line by their
Stations. A careful study of the re-
plies to a circular sent out by the Cor-
nell Department of Poultry Husband-
ry, shows that of the 45 stations re-
turning answers, only 12 were giving
some form of instruction, ranging
from a few lectures, to an eleven
weeks Short Course, besides issuing
bulletins on the subject.

Three stations issued only bulletins
and of the remaining 30, none of them had considered the industry of sufficient importance to justify investigation. In a few cases while nothing was being done at present, a hope was expressed that funds might be available in the future, for such work.

The Colleges that give instruction in Poultry Husbandry are widely separated although most of them are in the North Atlantic States. They are Maine, New Hampshire, Massachusetts, Rhode Island, New York, Connecticut, Delaware, Minnesota, Missouri, Kansas, Oklahoma, Arkansas and California. The nature of the instruction, aside from the special Short Courses, consists for the most part of lectures given in connection with the general Agricultural Course, a special feature not being made of it. The Short Courses, some of which are being given this season for the first time, are from two to eleven weeks duration, the shortest periods consisting of lectures by some well known poultrymen, and the longer being filled with an additional amount of practical work with fowls and incubators.

The capital invested by the various Colleges ranges from $100 up to $8,000. New York State has the largest amount invested in poultry instruction and investigation, there being a large Poultry Department at Cornell University devoted largely to instruction, and a large poultry plant at the Geneva Experiment Station which is devoted entirely to investigation. Considering the investment, Rhode Island comes second to New York with Connecticut a close third. Maine has about $2,000 invested, and most of the other Colleges have a few hundred dollars in houses and fowls. The Ontario Agricultural College leads either Cornell or Geneva if considered separately, but not if taken together.

The number of students receiving instruction is hard to estimate since the lectures are given in a general way. Short Courses in Poultry are given by New York, Rhode Island, Connecticut, Maine, Delaware, Indiana, Pennsylvania, Missouri, and California; with the most complete equipment at the first four. Maine and Connecticut offer a six weeks course, and Rhode Island and New York an eleven weeks course for 1906.

The attendance at the Short Course at Cornell this year is thirty-five, at Rhode Island twenty-five students, Connecticut twenty and Guelp, Canada, twenty-three.

Love your hens and your hens will love you. Even Leghorns will be friendly.
The influence which the American Poultry Association has exerted for the systematic classification and breeding of pure bred poultry is beyond calculation. It has accomplished a large and important work in the publication of the American Standard of Perfection. But it has not done its whole duty. Two important fields of usefulness remain undeveloped and unattempted. First is the field of influence for the promotion of education and experimentation in Poultry Husbandry. The time is opportune for the Association to act. It should undertake immediately the Herculean, but not impossible task, of convincing the agricultural colleges and experiment stations that they have not been giving but should now give, just recognition to the interests of poultrymen. It is in the best position of any organization to do this. It is a National Association and is the largest body of organized poultrymen in America. Will it improve the opportunity?

The battle should be fought in the open. The ammunition should be the plain facts which show the value of poultry products in comparison with those of other branches of farming.

Alongside of this should be shown by comparison the actual amount of money which the agricultural colleges and experiment stations are annually expending for Poultry and for the various other agricultural industries. With this should be shown the relative number of persons who are in some way engaged in Poultry Husbandry compared with those occupied in various other agricultural occupations. However, the most important claim which poultrymen have for a just share of assistance from those whose business it is to solve the problems of profitable poultry production is the great desire and need for definite reliable information, which only scientific investigation can supply.

The second opportunity for the A. P. A. is of no less importance. The work of the Association while good, has been one-sided. It has devoted practically its whole attention to encouraging the development of pure bred poultry. The time has come when it should broaden its field of usefulness. It should offer effective assistance as an educator in matters which have to do with the actual care and handling of poultry.

To this end, an educational program should be prepared for each annual meeting of the Association and possibly for additional meetings, where the subjects of building poultry houses, feeding, breeding, scoring, judging and rearing poultry should be ably presented and thoroughly discussed by the best authorities. This policy is similar to that adopted by practically all other organizations. Such a program would increase the attendance upon the meetings, widen the sphere of usefulness, attract to its membership a great body of poultrymen who
otherwise would not be drawn to the Association. Very few members of the A. P. A. feel that they can travel long distances at large expenditure of time and money to attend the annual meeting. This is proven by the small attendance. The treasury is in a healthy condition which would warrant the expenditure of some money for the purpose stated. It is probable that the colleges and experiment stations, the directors of farmers' institutes and others who are interested in the agricultural uplift in the various states, would heartily co-operate with the American Poultry Association in providing speakers. In line with the above policy, the Association should prepare and have incorporated in the American Standard of Perfection a set of rules for exhibiting, judging, and scoring live poultry for utility, dressed market poultry and market eggs. Such an innovation would be an epoch making policy in the history of the American Poultry Association.

It is the hope of the Cornell Countryman that all who are interested in the welfare of the American Poultry Association will use their best efforts to widen its influence so that it shall appeal to all classes of poultrymen everywhere.

The long list of poultry papers mentioned elsewhere in this issue, is worthy of careful consideration. It may be taken to illustrate a healthy condition in Poultry Husbandry. It shows that poultrymen are good readers. It indicates also that poultrymen are prospering; otherwise so many specialty publications would not receive profitable support.

The past four years has seen marked improvement in the quality of poultry publications. We now have several really high-class poultry journals. This improvement is partly due to the readers. They, as well as the editors, make a poultry paper. They do this in a direct visible way by their subscriptions and their advertising, but back of it all is the demand of intelligent readers for readable, reliable, useful information. Poultrymen are thinking. They appreciate good poultry literature. The poultry paper of the future that wins out must recognize this fact. With this recognition will come a realization that the average reader is a good deal more concerned about the questions, how to build poultry houses, how to feed and breed poultry, than he is in what one editor "thinks" of another. In other words, what is now wanted is instructive not destructive journalism.

The prospect is bright for the poultry editor who realizes the real need of poultrymen. Poultry Husbandry is on the ebb tide of prosperity. The ebb tide is a long way off. The fact that there never was a time when poultrymen could make more money in the various branches of Poultry Husbandry than now is the reason why the poultry editors should rejoice. The prosperous poultryman advertises and subscribes freely and pays the bill promptly.

All success to the up to date poultry papers. May their circulation and their influence for good increase and may all who keep poultry realize that money spent for several good poultry papers or agricultural papers with live poultry departments, will be their best paying investment.
REGISTRATION IN POULTRY HUSBANDRY IN CORNELL UNIVERSITY

<table>
<thead>
<tr>
<th></th>
<th>1st yr. 1903-04</th>
<th>2nd yr. 1904-05</th>
<th>% Inc.</th>
<th>3rd yr. 1905-06</th>
<th>% Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. students registered one year</td>
<td>27</td>
<td>60</td>
<td>122+</td>
<td>229</td>
<td>32+</td>
</tr>
<tr>
<td>Total No. hours University credit.</td>
<td>79</td>
<td>173</td>
<td>119+</td>
<td>229</td>
<td>32+</td>
</tr>
<tr>
<td>Total No. students registered, Course</td>
<td>37</td>
<td>53</td>
<td>96+</td>
<td>55</td>
<td>3</td>
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<tr>
<td>Afternoon Practice 38 A.</td>
<td>22</td>
<td>31</td>
<td>49+</td>
<td>42</td>
<td>35+</td>
</tr>
<tr>
<td>Morning, Noon and Night 38 B.</td>
<td>3</td>
<td>16</td>
<td>500</td>
<td>29</td>
<td>81+</td>
</tr>
<tr>
<td>Seminary (Advanced Course) 39.</td>
<td>0</td>
<td>7</td>
<td></td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>Post Graduates for M. S. Degree Minor</td>
<td>0</td>
<td>0</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Subject</td>
<td>0</td>
<td>0</td>
<td></td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Seniors—Thesis</td>
<td>0</td>
<td>0</td>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>One Year Specials in Poultry Husbandry</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>35</td>
<td>105</td>
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<tr>
<td>Winter Course</td>
<td>0</td>
<td>17</td>
<td></td>
<td>35</td>
<td>105</td>
</tr>
<tr>
<td>Elocating Poultry from the other Winter Courses</td>
<td>30</td>
<td>30</td>
<td>0</td>
<td>41</td>
<td>36+</td>
</tr>
<tr>
<td>Total No. of Students taking some form of Poultry Instruction at one time.</td>
<td>57</td>
<td>107</td>
<td>46+</td>
<td>147</td>
<td>37+</td>
</tr>
</tbody>
</table>

The Editors' Table

The Editors of the Countryman have taken especial pains to make this, the annual poultry issue, especially interesting to all poultry raisers. We take pleasure in presenting to our readers a line of articles, most of which represent the original investigations of students in the Cornell Department of Poultry Husbandry.

We shall be pleased if other publications will do us the honor to clip freely from our columns provided of course that proper credit is given to the authors and to the Cornell Countryman. To some this request may seem unnecessary and presumptive, but in view of the fact that a contemporary publication has recently copied two leading articles from this paper withholding all credit and leaving the reader to infer that the articles were original with them, we deem it excusable to call attention to our copyright.

The Poultryman's Problem

It is to the shame and discredit of Agricultural Colleges and Experiment Stations that the poultrymen have been left to work out their own salvation. Practically every modern improvement in method and practice in Poultry Husbandry has been suggested and developed by individual poultrymen through the expensive school of experience. A new era is dawning for Poultry Husbandry. The Agricultural Colleges and Experiment Stations, long dead to the interests of poultrymen are at last awakening. Some of them have opened their eyes, rolled over and gone to sleep again. Some are shutting first one eye and then the other, trying to make themselves think that they are awake when in reality they are only dreaming, and most of their dreams are of large dairies, orchards, and fields of waving grain. The great majority, however, are sleeping serenely, wholly oblivious to the crying needs and just demands of the great poultry interests, aggregating $500,000,000 worth of poultry products in the U. S. It may be said to the credit of three or four states that they are now apparently making an honest effort in a small way to give to the poultry interests what has always belonged to them, a fair share of attention from
trained educators and investigators. The future will justify the prediction that money thus expended is well invested. Let the good work go on. The work remains for poultrymen and poultry organizations everywhere to see to it that state and national funds for educational and investigational purposes be equitably proportioned to the various Agricultural interests. When that time comes, every Agricultural College and Experiment Station will have a well equipped, up to date poultry plant and some of these will rival the dairy and horticultural departments. The last census shows that in several states the value of the poultry products are greater than either the dairy or the horticultural products.

_Both editors and readers are fortunate in the fact that success with poultry is becoming more and more of a certainty and less of a gamble than formerly. Successful poultrymen, the Poultry Press, the Colleges and Experiment Stations, all are contributing to the systematizing of knowledge relating to poultry. All these forces are working toward the same end, that of eliminating the element of chance. Therefore the poultrymen and the editor alike have the advantage over those who have gone before them who were obliged to blaze the way._

This condition of prosperity and progress is due to many contributary causes. The poultry interests are sharing in the general condition of prosperity affecting most things agricultural. Better knowledge as well as higher prices is responsible for prosperity. By improved methods we have increased quality and decreased the cost of producing poultry products, thereby increasing the demand.

However, the real basis for the large permanent demand for poultry products is the fact that they possess intrinsic merit of high eating qualities. The popular food product must both please the palate and satisfy the stomach without emptying the pocketbook. Poultry products for the most part satisfy these requirements. They are staples of life.

It is good business judgment to engage in the production of what the people want and cannot do without. The margin of profit for the food consumed and the labor required in the production of poultry and eggs, recommend it as a good safe business investment,—provided always that the one who manages the business knows how to handle it.

**GENERAL AGRICULTURAL NEWS**

Prof. Thos. F. Hunt has been appointed to take personal charge of the Traveling Summer School of Agriculture for the summer of 1906.

**NEW YORK STATE GRANGE**

_Enthusiastic Meeting Held at Geneva, New York, February 6th-9th._

Nearly sixty of the students and members of the faculty of the Cornell Agricultural College, including Pres. Schurman, Dean Bailey, Prof. Pearson and Messrs. Hosford, Parker, and Brill attended the 33rd session of the New York State Grange held at Geneva, February 6-9, 1906.

A feature of the program on Tuesday evening was an address by Pres. Schurman on “Public Opinion and Public Policies.” Pres. Schurman addressed the members of the Grange not so much as farmers as citizens mak-
ing the point, that as the farmers comprise a large part of the voting interests of the country they should be especially interested in questions which relate to the welfare of the country as a whole.

Both the Railroad Rebate Bill, and the Mortgage Tax Bill were discussed at some length by President Schurman who contented himself with laying both sides of the question before the audience rather than drawing conclusions in favor of or against either measure.

The question of illiteracy of some of the farming population is a subject of especial interest to the Grange and was touched upon in his address.

The annual election of officers took place on Wednesday when G. A. Fuller was elected Master. Wednesday evening the proceedings were again of general interest and ex-Congressman Schurbert addressed the meeting on the Railroad Rate Legislation, a subject just now near and dear to the farmers' heart. Mrs. Parsons also gave an interesting talk on the School Gardens of New York. Mrs. Parsons will be remembered by many of the Countryman readers from last year when she took an active interest in the School gardens of Ithaca.

The principal address of Thursday was that of A. S. Draper, Supt. of Public Instruction who gave an interesting talk upon Education in General. During the day the sixth degree was conferred upon 624 candidates, being the largest number yet given at any meeting. In the evening the annual banquet was held in the coliseum and a royal good time was reported by the guests. Friday's session was given over to business.

The most important matter which came before the Grange for consideration was the subject of introducing agricultural education into the secondary schools. A resolution was passed in favor of making the teaching of agriculture compulsory in the High Schools of the State.

The resolution was left in the hands of Charles Downing, who will take measures for the carrying out of the resolution.

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Students Studying Poultry Feeds.
CORNELL NEWS

Officers of the Cornell Poultry Association.
Freeman Boycourt
Thayer Gable
Martin Moody
Miss Jenkins Jackson
Prince

THE 1906 POULTRY SHOW

Reported by H. F. Prince, '07.

The third annual show of the Cornell University Poultry Association, held Feb. 14, 15 and 16, was the most successful since the existence of the Association.

The increase in registered attendance shows the need of some such show in Ithaca. The first year the attendance was 424, second year 509, and this year 631. This does not show the complete attendance as many failed to register.

By starting early, the sales of books and subscriptions to magazines, all former records were broken, the total amount being $302.40. This has been in charge of Mr. Martin, the secretary of the Association, who has been very faithful. Fifty magazines and as many agricultural and poultry books gave the visitors a good variety to choose from.

The list of entries from outside of the University exhibitors was greatly increased. Among them were, O. L. Krum, Ithaca; Dr. Gallagher, Slaterville Springs; A. L. Jenks, Ithaca; E. G. Wyckoff, proprietor of Valley View Poultry Farm, Ithaca; R. D. Button, Canastota; W. R. Curtis & Co., Ran-sonville; A. G. Sincebaugh, Ithaca; C. H. Yaple, Richford; Truman Teeter, Etna; L. R. Hodges, Ithaca; G. L. Ferris, Atwater; E. S. Yauger, Ithaca; Brookside Poultry Yards, Slaterville Springs; Jas. Dwyer, H. F. Prince, C. L. Opperman, George Wescott of Ithaca; Edith A. Wertz, Forest Home.

The scoring of the show was done by T. F. McGrew of New York City. In connection with the Poultry Show, Mr. McGrew gave a number of lectures on showing birds and an illustrated lecture Friday evening on "The History of the Breeds."

Added interest in the show was taken by the students, because of the "James G. Halpin prize of five dollars for the best student scoring." Mr. Halpin was president of the Association last year and is now instructor in poultry at Rhode Island Agricultural College. Ten varieties of birds were assigned to each student entering the competition. The score of Mr. McGrew, the judge, and those of the students were compared, both in regard to the total number of cuts, and as to where the cuts were given. We believe this to be the first prize given for student scoring of poultry.
A new departure was taken by the Association in admitting pet cats to the show. This was under the active supervision of Miss Vera French of Buffalo. Miss French was assisted in judging by Mrs. Geo. Gould of Ithaca. Miss French was assisted in judging by Mrs. Geo. Gould of Ithaca. Miss French was assisted in judging by Mrs. Geo. Gould of Ithaca. Miss French was assisted in judging by Mrs. Geo. Gould of Ithaca.

Much praise is due Miss French for the admirable way in which she handled the cat exhibit, and the decided success of this new departure makes it probable that this feature will be emphasized next year.

Among the exhibitors were Mrs. Geo. H. Gould, 331 N. Geneva; Mrs. Geo. Baker, 310 N. Tioga; Dr. A. L. Andrews, 112 Sears St.; Mrs. Rhodes, 123 Park Place; Mrs. Owen, 205 Lake St.; Dr. Brown, W. Seneca St.; Miss Bessie Eberhart, 110 Reservoir Ave.; Mrs. Bennett, 1 Grove Place; Mrs. F. W. Rites, University Ave.; Mrs. Hitchcock, 211 Eddy St.; Miss V. R. French, Buffalo, N. Y.; Dr. B. G. Wilder, Cascadilla Place; Mr. C. L. Oppenman, Poultry Buldg.; Miss Bergen, Eddy St.; Mrs. Fay Allen, N. Geneva St.; Mrs. Brown, 133 Hazen St.; Miss Edna Vose, 705 E. Seneca St.; B. G. Fulkerson, N. Plain St.

The large number of varieties shown made it of great educational value. Among the varieties were Barred, White, Partridge and Buff Plymouth Rocks; White, Silver Pencilled, Silver Laced, Gold Laced Partridge Wyandottes; Rhode Island Reds; Buckeyes; Light Brahmas; Buff, White and Partridge Cochins; White Langshans; S. C. White, R. C. White, S. C. Brown, S. C. Buff, S. C. Black Leghorns; R. C. White Minorca; Blue Andalusian; Colored Dorking; Red Cap; S. C. Buff Orphington; Black, G. P. and S. P. Hamburgs; Black-Breasted Red, Birchen, Red Pyle, Brown Red, Malay, Cornish Indian, Sumatras, Black Games; Black-Breasted Red, Red Pyle, Buff Cochin, White Cochin; Frizzles, Black Japanese Bantams; Pekin, Aylesbury, Rouen, Gray and White Calls, White Crests, Black and White Muscovy; Indian Runner Ducks and twenty varieties of Pigeons. The entries were in charge of L. B. Gable.

The directors in charge of the show were H. F. Prince, F. G. Thayer, L. B. Gable, C. E. Martin, Miss M. Jenkins, G. H. Moody, S. B. Jaskson, A. E. Boicourt, H. F. Freeman.

Without the aid and help of the Winter Course Students in Poultry, it would have been impossible to make it so great a success.
PRIZE WINNERS AT THE 1906 POULTRY SHOW

Judge T. F. McGrew of New York city did the scoring. The poultry exhibited by students from the Cornell Poultry Dept. did not compete with those from outside.


Prizes won by other than student exhibitors were as follows:


Capons, Pekin ducks, two firsts; white-crest pair, first; black muscovy pair, first; mallard duck, first; mallard drake, white muscovy, pair, first; black Cayuga, pair, first; white call, second; gray call duck, second; all owned by R. F. Button.

Buff Cochin bantam, hen, first; cock, second; hen, second, O. L. Krum. Rouen duck, first; Rouen drake, first, R. D. Button. Spangled game bantam, cock, first; black fluff, hen, first; white Javanese bantam, hen, first; cuckoo creeper hen, first, Brookside Poultry yards.

White Cachin bantam, hen, third, E. S. Yawger. Mr. Sincebaugh won a number of firsts, seconds and thirds on his exhibit of pigeons.

Black-breasted red game, cock, first; golden penciled Hamburg pullets, two seconds, C. H. Yapel, Gold Wyandotte, cock, first, Brookside yards.


Single-comb Brown Leghorn, pen, J. Dwyer, first; pair, Thomas Campbell, first; hen, J. Dwyer and E. S. Yawger, thirds; pullet, J. Dwyer, second. Single-comb White Leghorn, pair, E. G. Wyckoff, first; G. L. Ferris, second. Rose-
* * *

The students in the Winter Poultry Course have formed a permanent organization with Mrs. Edith Wertz as corresponding secretary.

* * *

Mr Bolye of Utah, '06, W. P. C., was awarded the James G. Halpin Prize for the year.

**FORMER STUDENTS**

'00, B. S. A.—James E. Rice entered Cornell University as a special student in Agriculture in the fall of 1886. He afterwards changed to regular, and graduated with the class of 1890. During his College course, he was entirely self supporting and managed one of the largest and most popular student boarding clubs of the time. Beside this work, he found considerable time to work upon the farm and in various other ways.

Throughout his College course he was very much interested in the cadet corp and drilled during the whole time. The last year he was the highest officer in the cadet corp. Notwithstanding all of these outside activities, his College work was done so well that he was elected to Sigma Xi.

His graduating thesis was on "The Effect of Foods on the Flesh of Fowls," and was so well done and complete that it was afterwards published as a part of one of the bulletins of the Agricultural Experiment Station.

From 1890 to 1893 Mr. Rice was a graduate student and assistant to the Professor of Agriculture, and during this time he gave a course of lectures to a volunteer class of students, this being, so far as is known, the first organized instruction in Poultry Husbandry ever given in an American Agricultural College.

In the spring of 1893 Mr. Rice formed a partnership with F. L. Mulford, a fellow student and graduate, and they engaged in farming on a fertile farm in Bucks County, Pennsylvania, near the city of Trenton. This venture, however, did not prove entirely successful, and in the following spring Mr. Rice moved to Yorktown, New York, and entered into partnership with his brother-in-law, Mr. Floyd Q White, under the firm name of White & Rice. They purchased the paternal White homestead, then very much run down. They gave their attention from the start very largely to the production of fruit and poultry and, while at the start they were heavily handicapped financially, by energy, push, perseverance, and
good judgment, they were enabled to support themselves and families, to make many improvements on the farms and buildings, to materially decrease their indebtedness and to build up a series of remarkably productive orchards and one of the best bred and most profitable flocks of White Leghorn fowls in the country.

During this time Mr. Rice was occupied during the winters as a lecturer on the Farmers’ Institute force of the state. He is an enthusiastic, forceful and pleasant speaker, and the effectiveness of his work on the institute force is second to none. He traveled all over the state of New York, speaking in every county and at several hundred different places. He is also engaged more or less in the same work in Maryland, in New Jersey and in Minnesota.

In 1903 he became Assistant Professor of Poultry Husbandry in Cornell University. Prof. Rice has, by his sincere sympathy, earnest friendship, and cheer, won his way straight to the hearts of all students, and the Cornell Countryman takes the keenest pleasure in leading a good husky Cornell Short Yell for “Jimmie Rice.”

'04, Special—G. Farnsworth has a position with his uncle on a large stock ranch in Arizona.

'04, Special—Adam S. Hewettson, since leaving Cornell, has been engaged on a large ranch in the Northwest. He recently left there to engage in poultry farming in Washington.

'04, Special—F. V. Shearer writes enthusiastically of his love for Cornell. He is farming in his home town, Cortland, N. Y.

'04, Special—Henry Truckell finds life among the Holsteins on the Stevens’ Stock Farm, at Lacona, New York, all that it is “cracked up to be.”

'04, Special—H. S. Lippincott writes that he is undertaking a large poultry enterprise at Moorestown, New Jersey.

'04, Special—William W. Zimmer has made a marked record as an expert agricultural advertisement writer with the International Harvester Company of America; he has recently gone a step higher and is engaged on the editorial staff of White’s Class Advertising Company, Chicago, Ill.

'05, W. P. C.—E. O. Britten is establishing a successful poultry plant at Manlius, New York.

'05, W. P. C.—Sarah Buchanan is employed at the Rhode Island Agricultural College.

'05, B. S. A.—James G. Halpin is instructor in Poultry Husbandry at the Rhode Island Agricultural College. He writes that they have 32 students enrolled in their Winter Poultry Course.

'05, W. P. C.—Wilbur J. Hunt has charge of the large poultry department at Hardecourt Farm, North Andover, Massachusetts.

'05, W. P. C.—Charles H. Lain has met with marked success during the past season in rearing several thousand chickens on the extensive poultry ranch of W. H. Miner at Chazy, New York, where they have a poultry building 283 feet long and 30 feet wide, costing $17,000, and are now building one 425 feet long and 15 feet wide, at a cost of $10,000, also two brooder houses 200 feet by 30 feet.

'05, W. P. C.—Louis A. Ripley writes for a poultry manager for his extensive farms at Litchfield, Connecticut.

'05, B. S. A.—C. A. Rogers is on the home farm at Bergen, New York, working with enthusiasm. His specialties are fruit growing and poultry raising.

'05, W. P. C.—C. L. Roynar formed a partnership with his father at Manorville, Long Island, soon after leaving Cornell, where he is making a specialty of poultry.
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THE ENTOMOLOGICAL PROBLEM OF NEW ENGLAND

E. D. Sanderson.
Entomologist, New Hampshire Experiment Station

CALIFORNIA has its scale insects, Texas its boll weevil, the southern states the cattle tick and the Mississippi Valley the chinch bug; but in New England the chief entomological problem is the control of the gypsy and brown tail moth.

The spread of the gypsy moth since the unfortunate stoppage of the magnificent work of the state of Massachusetts in 1900, has been most remarkable. In 1905 it had spread over six times the area occupied in 1900, whereas in the previous ten years the gypsy moth commission had by their thorough work almost entirely prevented its spread and had reduced its numbers to a minimum within the infested area, in some places having absolutely exterminated it. Outside of an introduction into Providence, R. I., which seems to have been malicious, the gypsy moth has spread from Massachusetts into New Hampshire only, now occurring as far north as Portsmouth and infesting all the towns along New Hampshire’s short coast line. This spread has undoubtedly been very largely due to the automobile which must therefore be considered as a new factor in the spread of insect pests. As is well known, the young gypsy moth caterpillars drop down from the trees by a strand of silk upon vehicles beneath, and are readily carried for considerable distances. In one case they were actually found on an automobile just south of Portsmouth, sixty miles from the point from which the auto had started. With the immense numbers of gypsy moth caterpillars swarming over the shade trees and woodlands in some sections of eastern Massachusetts, it is a wonder that the automobiles have not spread them farther and unless they are materially reduced in these sections, it will be surprising if they are not carried to other states in the near future.

The gypsy moth caterpillars not only affect fruit and shade trees, but devour the pine and other conifers as well. They are therefore a much more serious enemy of our forest interests than the brown-tail moth which does not injure conifers. A single defoliation of a pine tree usually means its death and considerable areas of woodland in eastern Massachusetts have been killed by the gypsy moth caterpillars in a single season. It is therefore with considerable alarm that we have seen the pest enter New Hampshire, for the forest interests of New Hampshire are much greater than those of eastern Massachusetts; lumbering is one of our most important industries while the forests covering our hillsides and mountains are one of the most attractive features of the landscape which brings thousands of visitors and accompanying revenue to New Hampshire during the summer season.

The gypsy moth, however, spreads but slowly and with thorough work by well-trained men, its advancement can be almost entirely prevented. Though seemingly well able to fly, the females never use their wings, but crawl only a short distance before depositing their eggs. The eggs are laid on the bark of trees, occurring there from August until May and are easily seen by one with an eye trained to find them. It is therefore entirely possible by creosoting these eggs during the winter to hold the pest in check and this is the principal
means of fighting the gypsy moth. This work cannot be well done by the individual property owner, for where the egg clusters are but few he will not find them and usually he does not interest himself to hunt them up. It has therefore been found that the state can take charge of this work to much better advantage and that the only way to secure results is through trained men employed by or under the supervision of some state official.

The brown-tail moth curiously enough, was introduced into this country in almost the same locality as the gypsy moth, being imported on roses from Holland into Somerville, Mass., about 1890. The two insects are therefore very commonly confused in the mind of the public and by the newspapers although their habits and the combative measures are very dissimilar. The brown-tail moth caterpillars feed on both fruit and shade trees excepting conifers, but greatly prefer fruit trees and as yet have proven by no means as serious a forest pest as the gypsy moth, though they threaten to become so on deciduous trees. Injury by the brown-tail is not so serious, however, as the trees are defoliated earlier in the spring and are able to leaf out again before the hot weather of summer, whereas the defoliation by the gypsy moth is done later. The most objectionable feature of the brown-tail moth is the eruption produced by the little barbed hairs which thickly cover the tubercles of the full grown caterpillars. When the caterpillars molt, the cast skins are wafted around by the wind and where the caterpillars are abundant they swarm over everything so that these little nettling hairs get into ones clothing and cause an irritation much like that produced by poison ivy. The nature of the trouble is not exactly known, the chemist of the gypsy moth commission having been unable to find any specific poison upon the hairs. The resulting eruption has a very similar appearance to that produced by poison ivy, and we understand has the property of reappearing when one previously affected becomes over-heated, which would go to indicate that some specific poison is involved. Where the brown-tail caterpillars become abundant, therefore, it becomes an exceedingly disagreeable place to live. Rents go down and it is difficult to find a sale for property in a badly infested neighborhood. It is needless to say New Hampshire and other New England states having a large number of summer visitors are not anxious to see this pest become abundant.

Unfortunately the brown-tail moths are strong flyers and are carried by the winds when they emerge about the middle of June, often for fifty or seventy-five miles, as occurred in the summer of 1904 when they spread northward from the Massachusetts line to the southern edge of the White Mountains, and eastward to Eastport, Maine. It is therefore impossible to prevent their spread in any thorough going manner. The eggs of the brown-tail are laid on the foliage and hatch in August near the tips of the twigs. Early in September the young caterpillars web up the leaves into a winter web or nest in which they are snug for the winter, from three to a dozen of them further surrounding themselves with a thin wall of silk within the web, altogether some two or three hundred caterpillars occurring in each web. In this stage they pass the winter. The webs are easily seen and can be readily pruned from the trees and burned. It is therefore possible for every property owner as soon as he has seen a picture of the winter webs, to distinguish them and remove them from his trees. The work of combating the brown-tail moth therefore devolves upon the individual property owner and will ultimately consist in keeping the fruit and shade trees free from them, as it will probably be impossible to prevent their increase in forest and waste land. Here the property owner must be depended upon to control the pest, but if he will not do so he should be compelled to remove the nests by law, and the cost of removing them assessed against his
property as is now done in Massachusetts. At present we have no such law in New Hampshire but there is a strong public demand for it. The individual towns are making generous appropriations for the control of the pest and it has so far been more or less held in check, though worse in 1906 than in 1905.

At the present time the New England states are greatly interested in bills before congress introduced in the House by Hon. E. W. Roberts of Massachusetts and in the Senate by Senator J. H. Gallinger of New Hampshire, providing the secretary of agriculture with sufficient funds so that a quarantine against the gypsy moth in Massachusetts may be made and the national government may proceed to stamp out the pest outside the lines of this quarantine and prevent its future spread beyond such a line. The present conditions amply justify such a movement for the protection of the other New England states by the national government. Massachusetts has spent over one million and a half dollars in fighting this pest during the last fifteen years, which has during that time prevented its spread to other states. As the gypsy moth has now become so abundant in Massachusetts that it is a question whether with the present appropriations the state officials will be able to prevent its spread to other states, there would seem good reason for the national government protecting the other states from the pest as it has done in the case of animal diseases. There seems to be no good reason why the national government should not, were it feasible, as is clearly the case with the gypsy moth, to protect uninfested states from any serious insect pest, the same as it would protect them from disease. Had this principle been recognized at the time the gypsy moth was first imported into Massachusetts it could undoubtedly have been stamped out as could the brown-tail moth and probably many other of our more serious imported insect pests. It is therefore with great satisfaction from an entomological standpoint that we view the present interest of the Bureau of Entomology of the U. S. Dept. of Agriculture in supporting these measures toward a quarantine of the gypsy moth now before congress. It seems probable that the measure will pass the House and we believe that there is a good chance for it becoming a law although it is questionable whether its passage will be secured in time for funds to be available for work this year. This has been the great difficulty in all work against these and other insect pests; that is, legislative appropriations have been made so late in the season that they have not been available for making the best use of them.

Should the national government attempt such a quarantine in New England it will be watched with interest by entomologists throughout the country as being the beginning of a policy upon the part of the national government in aiding and co-operating with the states in the control of insect pests, and one which we believe will be welcomed by all who have had to do with such work or who are interested to see the devastation of imported insect pests checked in every way possible.

[Professor Slingerland informs us that the gypsy moth has just been located at Stonington, Conn., and may appear in New York state at any time, if not already here.]—Ed.
ABOUT 35 years ago there appeared in the vicinity of San Jose, California, a little insect which was destined in some ways to revolutionize fruit-growing in this country. It was a native of China, and nearly 20 years ago was unwittingly introduced into some Eastern nurseries. Its presence in the East, however, was not discovered until 1893, but it has spread with wonderful rapidity until it has gained a foothold in orchards in almost every State. It is being located almost every day in new localities, and thousands of acres of orchards have been and are being ruined by it in the East. A few progressive orchardists look upon its advent in the East as a blessing, and it certainly has brought about in many localities a much more thorough system of orcharding where the fruit-grower becomes better acquainted with his trees.

Practically all fruit-growers now understand that the San Jose Scale has come to stay, and it will continue to be an important factor in fruit-growing in this country for many years. Probably it has not yet reached its maximum period of destruction, but the time will surely come when it will take its place with the other standard pests, like the codling-moth, plum curculio and others, and like them will have its "ups and downs." It is undoubtedly one of the most destructive insect pests with which our Eastern orchardists have had to deal, and its small size and the fact that each tiny scale must be thoroughly hit before it can be killed, makes it one of the most difficult pests to control.

More printers' ink has been spilled
about this insect, more time has been
spent by experts in studying it, and
more money has been spent by gov-
ernmental authorities as well as fruit-
growers in devising and testing
methods for controlling it, than has
ever been used against any insect pest
of fruit trees.

Several insecticides have been thor-
oughly tested and found effective un-
der certain conditions by some ex-
perimenters, while with others the
same materials gave varying or uncer-
tain results. In the early days of the
warfare against this pest in the East,
kerosene emulsion and the kerosene-
water mixtures made with mechanical
pumps sometimes gave good results.
Then whale oil soap was largely used
for a time, sometimes with good re-
results except that often some fruit buds
were killed. Crude petroleum soon
came into prominence, and much ef-
fective work has been done with this
material, and it is still used in some
localities. It has to be used with
care and judgment and should be used
only on apple and pear trees. For a
few years past the leading insecticide
for the San Jose Scale has been the
lime, salt and sulphur wash so ex-
tensively used for many years in Cali-
ifornia. It has been demonstrated that
the salt is not a necessary ingredient,
and various modifications of this wash,
largely for the purpose of avoiding
boiling it, have been devised and test-
ed. This lime-sulphur wash has been
more uniformly successful in the hands
of experimenters and fruit-growers
than any insecticide thus far used
against this pest. Some failures have
resulted from peculiar weather con-
ditions, but more often the failure has
been due to its not being thoroughly
applied. It is generally conceded to
be as effective and the safest of any
of the materials thus far used against
the San Jose Scale.

Recently several so-called soluble
or miscible oils have been made and
are now being thoroughly tested as
insecticides for this pest. As they
readily emulsify with water in almost
any proportion and are much more
agreeable to use and do not corrode
the pumps or clog the nozzles like the
lime-sulphur wash, and best of all as
most of the preliminary experiments
indicate that they will kill a large per-
centage of the scales, fruit-growers
are now looking to these soluble oils
as a possible effective substitute for
the lime-sulphur wash against the
San Jose Scale. There certainly is no
question about the killing qualities of
these oils when they are thoroughly
applied so that the scales are well
soaked with them.

I believe the control of this de-
structive pest can be accomplished
with our present insecticidal batteries,
and that the secret of its control is
largely in thoroughness of applica-
tion of the insecticide. When fruit-
growers clearly understand that each
minute scale not larger than a pin's
head must be literally soaked with
the spray, its control by such orchard-
ists can be accomplished. No half-
way measures will ever prove effec-
tive in controlling this pest, and will
simply be a waste of money and en-
ergy, and will surely result in the
trees finally succumbing to the myr-
liads of tiny pumps with which the
scales suck out the life of the trees.

I think it is advisable to begin the
warfare against this pest in the fall
soon after the leaves drop, or even
just before on badly infested trees,
for it will do no harm if the leaves
are injured, as they have done their
duty toward the development of
fruit buds for the next year. In the
fall the insect is active in all stages
on the tree, from mothers which are
daily bringing forth their tender, liv-
ing, young lice to those which are get-
ting ready to go into hibernation as
small, black scales not larger than a
pin's head. Thus the insect is in its
tenderest stages at this season. First
prune off all the long, straggling
branches and others that can be
spared, then thoroughly drench the
bark on all parts of the trees with a
fine spray. I have killed from 90 to
95 per cent. of the scales at this time
with one application of one of the sol-
uble oils, using it at the rate of one
part of the oil to 15 parts of water,
five hundred young. Therefore, I would advise a second shot at the pest before growth begins, making the application just as thoroughly as possible, and try to reach the 98th or 99th scale in every hundred. While complete extermination is possible, I doubt if it can often be accomplished especially on large, rough-barked trees.

The Beginning of the Department of Entomology at Cornell University, 1875

MEETING OF THE EXPERIMENTERS' LEAGUE
Reported by E. L. D. Seymour and B. H. Crocheron

The third annual meeting of the Agricultural Experimenters' League of New York was held in Stimson Hall, Cornell University on Feb. 21st and 22nd, 1906.

The first session was on Wednesday evening, Feb. 21st. President H. B. Winters made the opening remarks and introduced Dean L. H. Bailey who welcomed the members of the league to the university. Mr. F. A. Salisbury of Phelps, N. Y., Second Vice-President of the league responded to the address of Dean Bailey.

President Winters then introduced Dr. W. H. Jordan, Director of the State Experiment Station, Geneva, N. Y., who spoke on "What Co-operative Experiments Imply."

Dr. Jordan drew attention to the dangers of co-operative experiments as a basis for the establishment of new data. The field for these experiments is in the application of facts already ascertained. The experiments carried on by the league should be for educational purposes rather than for the discovery of new truths which should be left to the Experiment Stations.
The next speaker was Professor W. J. Spillman of Washington, D. C., Director of the Division of Farm Management of the Department of Agriculture. Professor Spillman, in his speech on the “Principles of Heredity,” said that we probably can change any characteristic of any plant but that it was very necessary to determine the rate at which a plant, improved by selection, will tend to deteriorate and revert to its original type. Professor Spillman explained the practical application of the Mendelian Law which he has worked out extensively with wheat and polled cattle. A number of charts were shown in connection with the demonstration of the Mendelian Law. The results obtained by Professor Spillman were quite remarkable and interesting both in breeding a variety of club winter wheat and in obtaining still more difficult results with Polled Herefords. Professor Spillman showed a profound knowledge of his subject and succeeded in arousing the interest of his large audience.

In opening the session Thursday morning, Professor Craig, Treasurer, appointed the Committee for Election to report in the afternoon. President Winters then introduced Mr. F. A. Salisbury who gave a report in the form of “Notes on Field Work.” He called attention to the increasing success of legumes in this section and especially to the value of local experiments to the farmer. These he said would repay in actual results the time and labor expended. An interesting discussion followed. Professor Spillman, in answering one of the questions brought up for discussion, advised at any cost experimentation with the vetches. A disease of red clover now prevalent in the South is creeping North and will probably reach New York. In the event of this the vetch will prove invaluable as a substitute.

Professor U. P. Hedrick of Geneva, N. Y., Horticulturalist of the State Experiment Station read a paper on “Problems in American Pomology.” Professor Hedrick emphasized the difficulty of the most important problems of pomology. Most prominent among these are a new horticultural classification and a better momentclature, better knowledge of plant nutrition and breeding, the adaptation of plants to their environments, and a deeper study of plant pathology.

Professor Craig read a letter from Mr. H. Mason Knox of Canton, N. Y., in which Mr. Knox advocated a cow census of the state and a Farmers' column in local papers.

Professor H. H. Wing gave an address on the origin and present status of “Seven Day Milking Tests.” He outlined the history and growth of the movement, the usefulness of which is to determine the economic lifetime production and standing of the cow for purposes of breeding and selection. Breeders of dairy cattle have been most prominent in making production the basis of selection. The origin of the present record system is found in the competition of the Jersey breeders which began about 1870. From this the present complicated system of records has been evolved. All records are now based solely upon the production of butter fat. The high records are in most cases the direct result of careful feeding. Seven day records are all forced records and to accept them as a statement of the average productivity is unsafe unless all conditions during that period are known. Professor Wing’s paper gave a clear view of the present record system.

Professor W. J. Spillman, in an address on “Grasses,” which was distinctive for the explicit and straightforward statements used, gave much practical advice to the farmer. He called attention to the fact that according to the census of 1900 about 90% of the hay in the country is timothy grown with redtop or other grasses. In an area in the northeast section of the United States the tame grasses of America are grown. Professor Spillman noted that in this section of tame grasses practically no literature about them has been published by the Experiment Stations there. The average yield of timothy hay is 1.1 tons per acre, for which low yield Profes-
sor Spillman finds no excuse except the laziness of the grower. Fields are in many cases left down for hay too long. Timothy and clover sod should not be kept for hay more than one or two years. They then may be kept in pasture one, two, or even three years.

Attention was called to the excellence of red top for pasture. A rotation was suggested for an average stock farm in New York as follows:

1st year—Corn in spring. At last cultivation put in clover or rye, or even mammoth clover as a cover crop.
2nd year—Plow under cover crop and plant corn for silage, potatoes, or sugar beets.
3rd year—Grain crop (oats, wheat or peas and oats).
4th year—Clover with timothy continued for several years.

The afternoon session opened with the report of the Election Committee. The officers nominated were as follows:
Honorary President . . . . I. P. Roberts
President . . . . . . . . . . . . H. B. Winters
First Vice-president . . . . U. P. Hedrick
Second Vice-president,

F. A. Salisbury
Director of Experiments, J. L. Stone
Secretary and Treasurer,

G. W. Hosford

This ballot was then voted upon and elected unanimously.

Professor John Craig, Secretary and Treasurer for 1905-6, then made his report for the previous year. In a brief review of the history of the league, he gave the credit of its foundation to the Winter Course Students of 1903. Professor Craig continued by saying that though the membership has not increased in the last three years, yet the interest in the league, together with its good results, is steadily gaining. He spoke hopefully concerning a report, which, if an appropriation bill can be carried, will probably be published before long. As treasurer he reported a balance of $10.40 in the treasury.

President Winters next introduced Professor J. L. Stone, who gave an interesting report of his trip to the Ontario Experimental Union. The Union, he says, has grown surprising-ly in its 27 years of existence, and now is of much importance in Canadian agricultural progress. During last year experiments were conducted on some 4,000 farms. Altogether the Union has performed and written up over 37,000 experiments, many of which have been published in the form of reports, by the Agricultural Department of Canada. As a result each section of the country has definite knowledge concerning the possibilities of its land, and is able to do much more satisfactory work. An interesting feature of the Union's methods has been the enlistment of the help of the former students of the Ontario Agricultural College. A regulation of railroad and hotel rates and other reductions have assisted the students materially in attending the annual meeting.

The next address was by Professor J. B. Norton of the Department of Plant Breeding at Washington, who gave an interesting account of the work of that department. His speech was accompanied by lantern slides which gave a clear idea of some of the methods and results of experiments being carried along on different lines, especially the improvement of plants by cross-breeding.

Dr. E. M. Santee of Cortland, N. Y., then gave his opinions and told of his experiences in connection with the use of muslin curtains as ventilators in poultry houses. Dr. Santee, who was one of the first to use this method of ventilation, has found it satisfactory in every respect, and even advises its use in dwelling houses. He explained that as the cloth effects the exchange of oxygen and carbonic acid gas, without dampness, it is the ideal ventilating material.

Professor J. E. Rice then gave a review of Poultry Experiments, in which he dwelt principally upon this question of cloth curtain ventilation. He has found that cloth curtains are highly satisfactory when used on poultry houses in conjunction with glass windows for the admission of sunlight. Though he found only a difference of one degree between the temperatures of houses with the curtains and without, (that with curtains...
being the colder), the stock raised in the former was remarkable for its vigor and health, as compared with the low standard of the other flock.

Professor J. L. Stone next spoke, giving a report of the Field Experiments of the League. He said that in all, some 500 experiments were conducted by 400 people last year. After enumerating the various kinds of experiments and the numbers of those engaged in them, Professor Stone announced that, on the whole, the results of the work were excellent. While the Ontario Agricultural Union, referred to above, usually gets but 35% of satisfactory reports, our League receives about 50%. All this work, though of some value to scientific agriculture, is of much more importance because of the information and general good gained by the farmer himself in performing the experiments.

THE 1906 SHORT COURSE CLUBS

By H. H. Harriman.

As in former years the students of the Short Course have formed different clubs according to the different lines of work they were taking. Those students in general agriculture and horticulture have named their club The Brill Club after Mr. G. D. Brill one of their instructors. Many enthusiastic and profitable meetings have been held in the familiar old Trophy Room at Barnes Hall. Owing to the efficiency of its president, Mr. R. C. H. Fowler, the Dairy Club has had the best organization of any this year.

The class in Poultry was least in numbers but as active as the other two, and the members decided when a new arrival came to the home of their popular professor that he should furnish the club name, and so the James E. Rice, Jr., Poultry Club came into existence at the same time. The "Jimmie Junior" as it is familiarly called has held many lively debates, which showed in a striking manner the value of combining experience with theory.

All these clubs are combined into a federation called after our Dean "The Bailey Club," which has held several successful meetings. At one of these a warm debate between the Dairy and Poultry clubs took place. The debate was won by the Poultry club in spite of much smaller numbers. The Bailey Club has for its officers: H. W. Speares, president; W. E. Wright and R. C. Navins, first and second vice-presidents; H. H. Harriman, secretary, and Mrs. Brocker of Ithaca. treasurer.

The music furnished at the various meetings by the Mandolin club and quartette was greatly enjoyed. The former consisted of Miss Alice Simmons (a Senior) and Messrs. Boicourt and Knight, while the latter was composed of Messrs. A. Geffery, P. R. Steele, M. E. Roesch, and C. O. Reed.

On the evening of March 8th the Bailey Club gave a reception to the Agricultural College which was attended by 400 or more. The music was good and the stunts were very interesting and comical. One of the best stunts was a burlesque on the Poultry show which was presented by Messrs. Morrison, Morehouse, Hopper, Tyrell, White, Brigham and Harriman. Another very amusing stunt was a burlesque on a milk receiving station which wound up with some remarkably good clog dancing to the simple music of jewsharps, mouth-organs and bones. Those taking part were Messrs. Field, Wescott, Cuyle, dancers, and Blakeslee, Peabody, Burrows and Smith, musicians.

The Brill club furnished an interesting stunt which was followed by Miss M. Van Rensselaer, who read an original poem showing in a humorous light the many difficulties and duties of a Home Economics lady in her own home.

After this the program was concluded in the spacious rooms below where the ladies of the Home Economics Course served delightful refreshments, and after some time spent in social intercourse, farewells were said and the Short Course Entertainment for 1906 passed into history as a decided success.
THE different stages through which milk passes in the process of the manufacture of sweetened condensed milk may be conveniently grouped under the following headings:

a. Heating.
b. Adding of cane sugar.
c. Condensing.
d. Finishing or "stocking."
e. Cooling.
f. Filling.

HEATING.

Milk to be made into sweetened condensed milk is heated for three main purposes: The first and all important one is that of destroying most, if not all of the active fermentes (organized and unorganized), which are normally present in milk or which may have gained access to the milk accidentally on the farm, in transit, or at the factory. Secondly, the milk is heated in order to facilitate the dissolving of the cane sugar, which is added to it, and to insure a perfect solution. Thirdly, it is necessary in order to prevent the milk from burning on the steam jacket and steam coils in the vacuum pan or retort. The reduced pressure in the retort, causes the heated milk to boil as soon as it enters the pan. If cold milk were turned into the retort, it would stand undisturbed, and the introduction of steam into the jacket and coils would cause the milk to burn on to the heating surface.

From the weigh-room or receiving platform the milk is usually drawn into the vat-room. The equipment of this room consists of large vats which serve as reservoirs for the milk. Unless the condensing capacity of the factory is such that the milk can be condensed as fast as it arrives at the factory—which is rarely the case—the milk has to stand in these vats until the heaters are ready to take care of it. These vats should be provided with jackets or coils, through which cold water can be forced. This precaution is especially desirable in summer in order to keep the milk cool and sweet. Under ordinary conditions the milk is not held thus more than from three to five hours. When the factory is crowded to its utmost capacity, however, as may be the case during May and June, or when, as the result of a break-down of a part of the machinery, or through some other accident, the condensing is delayed, so that the milk may have to stand in the vats all day, the wisdom of these precautions becomes obvious enough.

From the vat-room the milk is drawn into the well-room where it is heated, where the sugar is added, and the finished condensed milk is cooled. The name well-room, in all probability, originated from the fact that the kettles used for heating the milk and for adding the sugar are called hot wells and sugar wells respectively.

The heating may be done in more than one way, and different methods of heating are employed by different factories. The old way and the way which is still in use by the majority of condensories is as follows: Open copper kettles of a capacity of about 5,000 lbs. are used. The milk is heated in these kettles by turning live-steam into it until the desired temperature is reached. A rapid and uniform heating of the milk is facilitated by attaching a "steam rosette" (a brass cylinder from six to eight inches in diameter perforated with innumerable fine holes) to the lower end of the steam pipe reaching to within from 12 to 18 inches of the bottom of the copper kettles. It is customary to heat the milk to a temperature of 180° F. to 190° F. A thermometer with a long stem inclosed in a brass casing is used for determining the temperature. This is a simple, and, indeed, a primitive way of heating the milk and it has its decided disadvantages. From the point of view of economy it is a waster of fuel. By the time enough steam has passed into the milk to heat it to the required temperature, enough condensation water has been added to the
milk to swell its bulk from 1-10 to 1-6 of the original volume of milk. Naturally, the wetter the steam the greater the amount of water that is added to the milk. All of this water must be evaporated from the milk again; and this means more time for condensing and much extra fuel. Aside from this extra expense in condensing, the direct access of live steam to the milk is of no benefit to its quality, and, where unclean and filthy water is used in the boilers, as is often the case, undesirable taints and odors may be incorporated in the milk. These facts seem to be entirely disregarded by many of our condensed milk companies. Superintendents of some of the old established concerns, who have been raised on condensed milk, who worked in the condensory from the time they left the school and who spent the best part of their lives in the condensed milk business, when asked why they are still heating their milk with live steam, are prone to tell the questioner that the introduction of live steam effects a "perfect emulsion" in the milk. Just what condition this refers to the writer is at a loss to say. If it means that the introduction of live steam into the milk will homogenize milk or change its physical condition so that the fat globules have lost their power to separate out again in form of cream, the statement is incorrect. Milk heated with live steam will cream as easily as milk heated in any other way. If it does not mean the above, then, in all probability, the term "perfect emulsion" as used above, does not mean anything.

To rapidly heat large volumes of milk to a temperature above 180° F. without burning the milk and without the use of live steam is a problem which has puzzled and which is still puzzling many a condensed milk man. Pasteurizers of all kinds and sizes have been devised but the temperatures to which they are able to rapidly heat large volumes of milk is generally below that to which milk must be heated in the condensory. Careful experiments have shown that a temperature of 76° C. or 180° F. is the lowest temperature at which it is safe to heat milk which is subsequently to be made into sweetened condensed milk. Where too low temperatures are used the sweetened condensed milk usually acquires a stale taste, within a comparatively short time after its manufacture and later tends to become putrid.

The simplest way to heat milk then would seem to be in a kettle with a steam jacket. This was found impracticable, because the cold milk that comes in contact with the hot jacket burns on to the heating surface when steam is turned into the jacket. All attempts to prevent the burning of the milk by the use of stirring devices have so far proved unsuccessful. But large volumes of milk can be heated to the boiling point without burning, where the milk entering the jacketed kettle has been previously heated to a temperature of say 160 to 170° F. For this reason it is of advantage to use two heaters; one a continuous pasteurizer of good capacity, preferably of the "Miller-type," and the other a copper kettle with a steam jacket. The milk runs first through the continuous heater and from there into the kettle. The kettle should be so constructed that when the milk begins to rise in it, it will overflow into the sugar tank or sugar well.

**ADDITION THE SUGAR.**

The sugar is added to, and mixed with the milk in various ways. In some factories it is added to, and dissolved in, only a small portion of the milk and in a separate tank, while the rest of the milk is drawn into a so-called ground well—a tank sunk into the floor of the well-room—from where it is drawn into the retort. Where this is done the sugar well is usually fitted with a reversible mechanical stirrer, revolving to and fro on an eccentric, thus stirring the milk and sugar thoroughly. In other factories the sugar well and ground well are one and the same tank. Where this is the case it is a good plan to set a wire mesh strainer (60 to 80 mesh
per inch) over the sugar well, transfer the sugar into this strainer, little at a time and let the hot milk run through the strainer, dissolving the sugar as it passes through. By stirring up the sugar in the strainer occasionally with a paddle, it will dissolve more readily. To save labor the sugar barrel and scales are placed on the floor above the well-room and the sugar is transferred through a chute with an adjustable "shut-off" into the strainer or sugar-well below. The manner of adding the sugar is unimportant. The main point is to use nothing but the best refined, granulated cane sugar and to avoid any undissolved sugar from being drawn up into the vacuum pan. The sugar must be in complete solution before it reaches the pan. The amount of sugar used varies in different countries and in different factories in this country. The usual ratio is 15 or 16 lbs. of cane sugar per 100 lbs. of milk. Some companies use only 12 lbs. while others use 19 lbs. of sugar. The price of sugar naturally has a tendency to regulate the amount of sugar used. Thus in summer when milk is cheap and the price of sugar is high the manufacturer is tempted to reduce the per cent of sugar in condensed milk. There are certain maximum and minimum limits, however, which should not be overstepped. Condensed milk is used as a substitute for crude milk. The more cane sugar it contains, the greater is the difference between the composition of condensed milk and that of crude milk, and a great excess of sugar in condensed milk certainly does not add to its wholesomeness as a food. On the other hand, cane sugar is added to the milk for the purpose of preserving it. Sweetened condensed milk is not sterile, and is prevented only from rapidly undergoing fermentative changes by the preservative action of the sugar. Therefore, the less sugar it contains the greater the danger of its spoiling.

Nothing but the best refined granulated cane sugar should be used. When buying sugar the manufacturers should bear in mind that the best is the cheapest. When the price of sugar is abnormally high the manufacturer is strongly tempted to buy a lower grade of sugar. Experience has amply shown that this policy is poor economy. Cane sugar of inferior quality is one of the most dangerous enemies of the condensed milk business, as such sugar lacks the preservative power of good sugar and may in itself be the source of ferments which lessen the keeping quality of sweetened condensed milk and hasten its decomposition. The effect of inferior sugar in the milk usually is not noticeable for from two to four weeks. This fact makes its use all the more dangerous and increases the losses therefrom, as the manufacturer will have processed the milk of perhaps 30 days before he knows that its quality is defective.

Great care should also be taken in storing the sugar at the factory. It should be kept perfectly dry; when exposed to dampness it is apt to become lumpy, moldy, and sometimes sour. Sugar conveyors such as sugar-chutes through which the sugar passes down into the milk should be kept dry and clean. Where the sugar-chute is placed directly over the sugar well, the vapors from the boiling milk below may cause the remnants of sugar to crust on the inside of the chute. This moist crust when contaminated with bacteria or yeast may start to ferment, and, when carried into the milk with the other sugar, will give rise to gaseous fermentations, causing the milk to "blow."

(To be Continued)
THE SIXTH ANNUAL BANQUET OF THE
COLLEGE OF AGRICULTURE

We are all glad that the College of Agriculture is noted for its spirit and enthusiasm; but, when, at some general gathering, we all shout together for our college and for agriculture, the enthusiasm exceeds our expectations. This loyalty is shown in the class rooms, on the campus, and most especially at the monthly assemblies. The one time in the year, however, when enthusiasm runs riot, when the college spirit stands forth in the most striking way, is at the Annual Banquet.

Washington preferred agriculture above all else and it is, therefore, particularly fitting that here his birthday should be celebrated by the annual banquet of the college. During several days the State Experimenters' League had been in session. Their meetings closed with this banquet so that many members of the league were present.

At eight o'clock 398 persons sat down to the banquet. The Armory was rendered beautiful for the occasion, for the decorators had been busy and had covered the walls with drapery of Cornell colors and national flags. The tables arranged like a fan radiated from a centre where the toastmaster and speakers sat. Candles glittered down the tables amid the flowers and decorative plants. The menu books contained a picture of the new buildings of the college, the menu for the evening, the list of speakers, and two pages for autographs.

The dinner was served with a promptness which reflected credit upon the caterer and those who had arranged the details. One of the most enjoyable features of the occasion was the abundance of music. The new Agricultural Glee Club, was seated at a table to the right of the speakers. The banquet was opened by the singing of "Alma Mater," led by the glee club, which was quickly followed by the "Alumni Song" in honor of the many alumni present. One popular song followed another in quick succession in all of which the diners joined. The Agricultural Mandolin Club at a table to the left of the speakers played at intervals during the dinner. The only music furnished by those not in the college was that which the Filipino String Quintette rendered with such great success. The thanks of the college are tendered the Quintette.

The toastmaster of the occasion was Charles W. Mann, '06, who performed his task greatly to the satisfaction of every one present. Mr. Mann extended a hearty welcome on behalf of the students to all the visitors present, friends, alumni and members of the State Experimenters' League. He emphasized the fact that this was the one occasion upon which the whole college body came together upon an equal footing for an annual celebration.

President Schurman was the first speaker. The short yell for "Prexy" rang out with a sharpness and volume that showed that the College of Agriculture has strong lungs and knows just when to use them.

President Schurman said that the banquet impressed him more as a large gathering of friends than as a purely public and formal affair; that the College of Agriculture was so knit together that faculty and students were friends. He quoted in that connection the definition of a friend by a small boy: "A friend is one who knows all about you but likes you just the same." President Schurman commented upon the large number of students in the Short Course present. He said that the Short Course was growing and that he appreciated that it would continue to grow as it was through the Short Course that the College of Agriculture touched the farmers of the state in perhaps the most direct way.
When agreeing in some cases with the old proverb that “a little knowledge is a dangerous thing,” President Schurman said this was not true in agriculture, that the Winter Course students took the knowledge that they had received here and in a short time put it to test on the farms of the state.

A little knowledge is not a dangerous thing when substantiated by practice. In introducing Dean Bailey, Mr. Mann said that although we had in the length of a four year course many opportunities to hear Dean Bailey that we realized that his life was an unusually busy one and that we appre-

The Experiment Station Insectary at Cornell. Familiar to many Entomologists

ciated the fact that the Dean so often took time to talk to the students. Dean Bailey, who spoke on “The Outlook to Education,” said that the members of the Chinese Commission who had recently visited Cornell remarked that the most impressive thing about the University was the Cornell yell. It was the loyalty of the students that had impressed the visitors. The Director wished to remind the students that they, in going out from Cornell, must go out to serve their day and generation as well as to be farmers. He said that the agricultural colleges themselves touch more nearly all branches of life because they are brought to face and to meet actual conditions and not theoretical facts. Because this is true the college has much to teach. The time has come when the short course, successful as it is, should be supplemented by an elementary course in agriculture in the elementary schools. That the winter course should not have to teach the fundamentals of agriculture but rather to act as a postgraduate course of the agriculture taught in the primary schools. To the winter-course students Dean Bailey said that they must not be satisfied with what they had learned here in a few months but should go home and tell all those interested that they should have a four year course. Dean Bailey concluded by saying that we are now in a state of transition in the College of
Agriculture and that in a way it is good to have it so that there is pleasure in work and in accomplishment and that it is a joy to be in the thick of it.

Miss Snowden was next introduced by the toastmaster and asked to respond to the toast "The Girls."

Miss Snowden in a short address told how the girls were coming to take agriculture in increasing numbers and how they were going to be more of a factor in the life of the college. The college is becoming more and more crowded and more room will have to be made for women here at Cornell.

The next speaker was Professor Hunt who spoke on "The Agricultural Student." He said he must be pardoned if he emphasized the noun more than the adjective and talked more of students as men than agriculture as a business for he felt that it was of greater importance to be an educated man than an educated butter-maker. Professor Hunt made the statement that the loyalty of the students to the college of agriculture was greater here than he had seen anywhere else and that it was because of this loyalty of which he knew, that he appealed to them to crush out all tendencies in the college, to keep their habits clean, and to discourage the type of man who would go away from the college a connoisseur in bull pups, cigarettes and sofa cushions. He emphasized the difference between mental intellectual and mental dyspepsia and stated that the former could not be obtained except through clean life and sober habits.

The toastmaster said that during a course of four years the student saw much of his college and obtained a different point of view from the man who was here for the winter or even two years; that Mr. Ross could perhaps tell us more of interest about the college than any other undergraduate. He introduced Harold E. Ross, '06, who spoke on "Our College."

Mr. Ross said that the time was soon coming when our college would be too large for one man to talk about, that on the campus, and among the students the college of agriculture had gained the respect and admiration of the whole university. In closing he called for a toast "to the greatest and best Alma Mater a man can have," "Our College."

On introducing Professor Craig, Mr. Mann explained that Professor Craig was not only a horticulturist but also a farmer. That this evening he would depart from his usual subject and talk on "The Farm."

Professor Craig mentioned the large predominance in the college of men from the farm. He commended them in their attitude toward the women in the college. He said that he regarded the correct attitude in co-education as being here reached where the women are treated with a certain degree of independence and yet a large amount of chivalry. Professor Craig emphasized his remarks with many interesting and instructive stories which he knows so well how to tell.

Mr. H. H. Herriman spoke on "The Short-Course." Mr. Herriman, who was also here last year, is an enthusiast upon his subject. He spoke of the value of the courses here and showed that in order to obtain the best results from them the man must go home prepared to find the girl who is somewhere waiting for each one of them and settle down with her to a useful life.

Mr. H. Mason Knox, '01, who was to have been the next speaker was unfortunately prevented by illness from being present.

Mr. Harry B. Winters, President of the State Experimenters' League, kindly consented to talk on the subject selected by Mr. Knox, "Reaching the Farmer." Mr. Winters said there was no necessity of telling Cornell University how to reach the farmer as it was already doing so in a way which could hardly be bettered. Mr. Winters illustrated his remarks by several anecdotes from personal experiences.

The program was closed by all singing the evening song led by the glee club.
The Cornell Countryman

J. ELIOT COIT, Editor

M. W. EVANS, - Alumni Editor

H. E. ROSS, E. KELLY,
MISS L. P. HASTINGS,
C. J. HUNN,
M. F. JONES.
J. H. BARRON,
H. C. PIERCE.

The Countryman Board

APRIL, 1906

Next Year's Board

We take pleasure in announcing that the election of the Cornell Countryman Board for 1906-7 has taken place. The new board consists as follows:

Charles H. Tuck, editor in chief; Milton P. Jones, business manager; B. H. Crocheron, alumni editor. Other associate editors are as follows: Miss P. B. Fletcher (general agricultural news), H. F. Prince (campus news), C. J. Hunn, E. L. Baker E. L. D. Seymour. Assistant business managers are H. C. Pierce and E. McCloskey.

Not all the places on the business side are filled as yet. The Constitution allows the election of as many men as necessary to properly run the paper. Two more men could be used to advantage on the business side and if the competition warrants, it is probable that these places will be filled before the end of the present year.

The old board wishes to congratulate the new, and assure its members of our best wishes for a prosperous year and the biggest, best, most dignified and substantial Cornell Countryman ever published. The Countryman or any other similar enterprise cannot live without growing, and we have every confidence that the new board will not only stimulate an active growth, but will guide that growth in the right direction.

On the evening of the 9th of March, the Cornell Countryman board held its annual banquet. There were present as guests, Dean and Mrs. Bailey, Mr. H. W. Collingwood, editor of the Rural New Yorker, and Mr. C. S. Wilson, a former editor of The Countryman.

After spending some time with that part of the program which was embraced by the menu, attention was turned to a frank discussion of how The Countryman might be bettered in the future. Much kindly advice and friendly criticism was given by Mr. Collingwood, and the compliments he paid the paper were very encouraging to those who have labored on the board this year. Some there were who thought that the general run of the articles had been too long; others thought that more illustrations should be used; and still others thought that one or two pages of every issue should be given to the State Experimenters' League for the publishing of their experiments. This discussion proved very valuable and the editors wish to state that they invite friendly criticism at all times from anyone whether they are connected with the paper or not. Let the board know what you think of the paper, for how can we put out a paper that suits you if you have never told us what you like.

It leaked out at the banquet that Dean Bailey and Mr. Collingwood attended the Michigan Agricultural College at the same time, and that Bailey as editor and Collingwood as business manager organized and pub-
lished the first agricultural college student paper in the United States. Small wonder, then, that these men have grown into such giants in the publishing world. As a matter of fact, the advice born of such ripe experience, which they so freely gave to the members of the board at this banquet, was greatly appreciated and enjoyed, for it will always be a great help to them in their work.

It is with great pleasure that we announce that Good Precedent Established Mr. Harrison L. Beatty of Bainbridge, Chenango County, New York, has established a scholarship in the Winter Course amounting to $75.00 annually. This scholarship is open to any resident of the town of Bainbridge, the person to be chosen by competition.

We thus have a precedent established which we hope will be widely followed. If we are not mistaken this is the first instance of an Agricultural Scholarship being endowed by a private individual in the United States. Mr. Beatty has served the cause of agricultural education well by his action and he deserves the credit of having established a precedent which other benefactors may well copy after.

GENERAL AGRICULTURAL NEWS

SYRACUSE, N.Y.

The Cornell Countryman:

DEAR SIRS:—Thus far the season in this section has been altogether wrong, not that any seriously ill effects are noticeable but the lack of snow, the mild temperature generally and the bright sky make it seem unreal and out of place. A moderate mantle of snow over the ground would have better protected the fields and crops and would have made it quite as easy and pleasant for the average farmer or dairyman, and the merchants would have had a good chance to dispose of their winter goods which now they will have to hold over or dispose of at a sacrifice.

This section is getting to be a center for highly-bred, registered Holstein-Friesian cattle and we are continually acquiring a larger number of breeders and they in turn seem to inspire others to at least investigate, and as a consequence the sales have been splendid and some of the more progressive breeders have added to the wealth and glory of their cattle and the breed by making a large number of "official records," most of which are a decided credit to the herds and the breed. At Lakeland Farm, over whose destinies I preside, we test each and every cow and heifer as she freshens and can be gotten into shape to make a test. The results thus far, have been most flattering and Mr. John W. Evans, the supervisor of the tests, who is a Cornellian, is to be congratulated in having been so fortunate as to have cast his lines in such a well filled stream. For during the two months of his stay no less than fifteen official records have been made and most of them are highly creditable.

Yours truly,

WING R. SMITH.

* * *

West Virginia is considering moving its Agricultural College at Morgantown away from the University and locating it on a large farm, or separating it from the university without changing the location. West Virginia is having the same trouble that other colleges have had where the State appropriated funds ostensibly for the aid of agriculture, but which in reality, went to support the "mechanic arts" and the former was left to struggle along with little or no equipment.

In the arguments brought forward it is said that the agricultural colleges doing the best work are those which are located by themselves and have complete supervision of the funds. It
is a recognized fact that good agricultural colleges can and do exist connected with a university. Cornell stands pre-eminent in this class.

In any case whether connected with the mechanic arts, or without, the college should have complete control of appropriations, which should be liberal. If not allowed this right, the failure of the agricultural college to be of the greatest benefit to the state is not due to the motive, but to the method.

* * *

A committee has been appointed by the Minister of Agriculture of France to investigate the inadequacy of the French system of agricultural research as compared with similar institutions in Austria, Germany and United States.

* * *

Requests for information have been pouring in to the various experiment stations of late, concerning the reliability of artificial cultures for the inoculation of the soil in fields intended for leguminous crops. A few trials have been successful but many more have failed completely.

A recent bulletin from the N. Y. Experiment Station at Geneva explains a majority of the failures. The non-success has not been due to the idea that it is impossible to inoculate soil with bacteria for legumes, but to the fact that the cultures have been put up in an improper manner.

The bacteria cultures were procured in the open market from prominent seed firms. Bacteria were immersed in cotton, then the cotton was dried and in this condition was ready for commercial uses.

The treatment given the samples under experiment were far more careful than the average farmer could give them. Distilled water, sterile instruments and the best quality of culture media were used. At first great care was taken that no other bacteria entered the culture media; but the negative results suggested that the distilled water might have affected the growth of the bacteria. Then rain water was used with no better results.

Thinking possibly that something was wrong at the station, packages were sent to bacteriologists and experiment stations in Michigan, New Jersey and Delaware. When the reports from these places were received and were found to tally with those at Geneva, there could only be one conclusion—something was radically wrong with the culture when placed on the market. In many cases bacteria taken from alfalfa, clover and bean plants thrived in the same media as those in which the artificial cultures had been placed and failed.

The tests showed that the artificial cultures deteriorate very rapidly. The colonies of bacteria, when the right kind were found, were few in number and lacked strength and vigor. In too many cases none of the desirable bacteria were present.

The price paid for these cultures is out of bounds when the cost of production and value to the farmer are considered. They sell for two dollars a package while the cost to the manufacturer is less than ten cents. One package is considered sufficient to treat an acre of land.

Until a more efficient method of preparing them is evolved, the farmer is wise in not taking chances in buying these cultures.

* * *

It seems strange that in an agricultural state a great united effort must be made to get an appropriation from the legislature to put its agricultural college on a fair working basis. Virginia is now making such an effort. A bill is before the Assembly to appropriate $50,000 to complete the agricultural building, $25,000 to equip it, and $10,000 a year to maintain it. For a small amount like this, which is most reasonable, the farmers are compelled to exert all possible influence upon the legislators, and even then they hesitate.

The legislature is acting like a farmer who continually expects an abundant crop from his farm and yet returns nothing to it. If the legislature
of Virginia lacks confidence in its agricultural college and will not make a reasonable appropriation to maintain it, they should not expect great agricultural prosperity in their state.

There is little chance of Virginia securing immigrants and of solving the labor problem until she does something to make the farms and the farm boys prosperous.

* * *

In a previous editorial of the Cornell Countryman (Dec. 1905), was briefly pointed out the value of the Grange to the agricultural student.

Many students in the College of Agriculture are members of this order. Many have joined during the past year, a large proportion of those being Winter-Course students, but also including a number of the Faculty.

There are excellent facilities for active Grange work at the University, the local Grange being in a thriving condition, with numerous other strong Granges scattered throughout the county.

On Dec. 16, 1905, an open meeting was held, all students in the College of Agriculture being invited; and through this meeting much was accomplished towards bringing the Grange and the college into closer touch. Dean Bailey gave a very interesting address on "Farm Management."

The Winter-Course men have been closely in touch with the local Grange during their brief stay. To them must be given much credit for the enthusiasm of the meetings. Members of the Faculty have given suggestive and practical talks upon various pertinent agricultural subjects, but the students themselves have largely aided in making these meetings a success.

Several informal meetings have been held at the homes of prominent farmers, in which both the farmers and the students took part, the practical experience of the one confirming the principles of the other, and principles elucidating experience.

On March 17th, just before the departure of the Winter-Course students, a banquet was given in honor of the new members. Interesting talks were given by Prof. Wing and Prof. Rice, representing the Faculty of the college; J. E. Chenoweth, representing the Winter-Course students; and Mrs. Marshall, representing the farmers and their wives. This pleasant evening will be long remembered by the Winter-Course Grangers as their last and best meeting at Cornell. The Grange, in turn, will not quickly forget these earnest young men, and has wished them all true success.

Sp. '04—Glendy Farnsworth died at Cambridge, Mass., Jan. 23. Mr. Farnsworth went to Arizona after leaving college. Not liking the West he came East and took a position in Cambridge. While there he was operated upon for appendicitis, which after a short illness resulted in his death.

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CORNELL NEWS

CAMPUS NOTES

The class in Poultry Husbandry on March second and third visited Waterville and Greene, N. Y. While at Waterville they were the guests of the "White Leghorn Poultry Yards" and the "Columbia School of Poultry Culture." On the evening of the second the class attended a banquet at the Pickwick Club. After the banquet a number of informal speeches were made by those in charge of the work. Prof. Rice responded on behalf of the class. * * *

The following non-resident lecturers have been giving instruction in the poultry course: Prof. W. R. Graham of Guelph, Canada, on "Crate Fattening Chickens;" Prof. J. H. Stoneburn of the Columbia School of
Poultry Culture, Waterville, N. Y., on "Brooders and Brooder Houses," and "Poultry Advertising"; Mrs. Geo. E. Monroe of Dryden, N. Y., on "Poultry Keeping for Women."

* * *

Dean Bailey attended the annual banquet and "round up" of the State Institute workers at Syracuse March 15. On the following day he appeared before the State Normal School at Jamaica, Long Island, and delivered a lecture on "Nature Study." On March 17, he spoke before the New York Educational Council of New York City.

* * *

L. R. Tufts, sp. '05, left March 10, for Brighton, Island of Trinidad, to take charge of the farm of the New Trinidad Lake Asphalt Co. Special attention will be given to developing the tropical fruits.

Messrs. Ora Lee, Charles Mann, Walter Tailby, Harvey Westover, all '06, and Edmund Worthen, grad., have recently been appointed as scientific assistants in the Bureau of Soils, Washington, D. C.

* * *

The Jas. E. Rice Jr., Winter Poultry Club has adopted a class pin. It is in the shape of a white egg, inlaid with a red feather and a gold wishbone, with the words inlaid in gold, "Cornell 1906."

* * *

A number of the winter course poultry students have already received positions. Among them are, W. T. Knight in charge of the Whitehaven Sanitarium, Whitehaven, Pa.; W. G. Krum, superintendent of the farm of Floyd L. Carlisle of Watertown, N. Y.; E. Shevalier at the Robin's Nest Poultry Farm, L. A. Ripley winter course, '05, Mgr., Litchfield, Conn. P. K. White, Pencoyd Farm, Chas. H. Royce '91, supt., Balla, N. Y.; J. B. Soule in charge of Cragmore Inn, at Cragmore, N. Y.; W. S. Lyon, in charge of the poultry farm of H. A. J. Upham, Kilbourn, Wis.

Bulletin 237, "Reports of Alfalfa," by J. L. Stone, John W. Gilmore and Samuel Fraser will soon be in print. It gives complete and concise information on the conditions necessary for success, soil inoculation, fertilizers, nurse crops, etc.

* * *

Eighteen students in the College of Agriculture have received positions since June, commanding salaries from $800 to $3,500.

* * *

So far two lectures have been given before the College in the Course of Agricultural Journalism. The first was delivered on March 9th by Mr. H. W. Collingwood, editor of the Rural New Yorker, and the second on March 14th, by Gilbert M. Tucker, editor of the Country Gentleman.

* * *

L. F. Boyle will have charge of E. G. Wyckoff's poultry plant at Cornell Heights, Ithaca, N. Y.

* * *

C. Tyrell returns to his former place at Lake George in charge of G. F. Peabody's poultry plant.

* * *

The Dairy Department has received from John H. Munrad, associate editor of the New York Produce and Creamery Review, an excellent framed lithograph portrait of Prof. N. J. Ford, a noted pioneer teacher in Dairying in Denmark. The picture will be hung in the new Dairy Building of the Cornell College of Agriculture.

FORMER STUDENTS

'74, B. S. A.—John Henry Comstock was born in Janesville, Wis., Feb. 24, 1849. The following year his mother was left a widow and came east with her son. At the age of ten Prof. Comstock began to take care of himself, working all of his spare moments in return for winter schooling. Five years later, by the advice of one of his teachers, he began preparing
himself for a higher position in life. During the summers he worked aboard sailing vessels on the Great Lakes, and between seasons, he attended, first the academy at Mexico, N. Y., and the two years following, the Folley Seminary at Fulton, N. Y. Here he began the study of botany and continued this subject during the summer. While in search for a certain text-book of botany, he chanced upon a copy of Flint's edition of "Harris' Insects Injurious to Vegetation," printed with colored plates. As soon as he became aware that there was such a science as entomology, he determined to devote his life to that work.

Upon learning that Cornell was to establish a chair of entomology, Prof. Comstock, spurred on by his desire for further entomological study, entered the class of 1874 with which he graduated. During his college years, he was entirely self-supporting, acting as an assistant chime master, janitor, and even as a laborer upon the buildings in which he now lectures to classes in entomology. Largely through the influence of Dr. Wilder, a department of entomology was organized with Prof. Comstock at its head. In the fall of 1876, he was promoted to the rank of assistant professor. In 1879, he received the appointment of U. S. Entomologist, which position he held for three years, making a world-wide reputation. After resigning, he returned to Cornell as Professor of Entomology and General Invertebrate Zoology, which position he still holds.

In 1878, Prof. Comstock was married to Miss Anna Botsford, of Otto, N. Y., Cornell, A. B., '78. In his wife he found an efficient co-laborer in his scientific work because of her artistic and technical skill in both drawing and wood engraving.

Prof. Comstock's main publications are: The Reports of U. S. Entomologist, 1879, 1880 and 1881. The reports of '80 and '81 deal with the classification of Coccidae, for through his investigations, that classification was put on a firm foundation. This study was continued in the 2nd report of the Department of Entomology of Cornell University Experiment Station. He published in 1882, "The Elements of Insect Anatomy," followed in 1888 by a text-book, "An Introduction to Entomology," and the "Evolution of Taxonomy," in 1893. Together with his wife, he published in 1895, the "Manual for the Study of Insects;" in 1897, "Insect Life," and in 1904, "How to Know Butterflies." His works upon economic entomology are recognized as standards and in systematic entomology he has had an equally enviable reputation. In addition to his strictly entomological work, he is now preparing "A Manual of North American Spiders."

'77, B. S.—Leland Ossian Howard. Among the Cornell men who are carrying the world's work with energy and success, Dr. Howard is a notable example. He was elected to the board of trustees of Cornell University for five years in 1900. The consistent advancement of Dr. Howard in his scientific career is well shown in the biographical sketch which follows:

Although born in Rockford, Ill., his parents moved to Ithaca, N. Y.,
in 1858, when he was about a year old. He prepared for college in the Ithaca schools and entered Cornell in the fall of 1873. After graduating he took a year of post graduate work in the University preparatory to medicine. From his childhood, however, he had evinced the greatest interest in natural history, and during his University course had made a specialty of entomology. In Nov., 1878, he was appointed assistant entomologist under Prof. C. V. Riley in the Department of Agriculture at Washington, D. C.,

L. O. Howard, '77

In 1882, he took the degree of M. S. at Cornell. In 1894, he was promoted to Chief of the division of Entomology, and his department was made a government bureau in 1904, co-ordinate with those of Plant Industry, Animal Industry, etc. He has been a conspicuous figure in scientific circles in Washington and has served both as president of the Entomological Society and Biological Society of that city.

In 1897, he was made permanent secretary of the American Association for the Advancement of Science, which office he still holds. This is the largest organization of scientific men in America, and the office of permanent secretary involves the major part of the administration work of that society.

A noticeable feature of Dr. Howard’s work has been the solving of economic problems. He started the crusade against mosquitoes and is still the authority on mosquitoes. He is the author of a great number of bulletins and government reports on entomological subjects in their relation to agriculture, has contributed to the popular magazines and has published two books which have been widely read: “The Insect Book,” and “Mosquitoes and How They Live.” He is consulting entomologist of the U. S. Public Health and Marine Hospital Service, and in this connection has been intimately connected with the fight against the yellow fever mosquitoes.

His excellent work has brought him numerous honors from foreign countries as well as in this country.

Dr. Howard has at all times manifested a keen interest in his Alma Mater, and few alumni are better known to its faculty and board of trustees.

'86, B. S.—Prof. H. E. Summers, after holding the fellowship in Agriculture during the years 1886-1888, occupied the position of associate professor of biology at the Agricultural College of Tennessee from 1888 to 1891. He then served as assistant professor in the Illinois State Laboratory of Natural History until 1893, at which time he was appointed associate professor of physiology in the Univ. of Illinois. In the year 1898, Prof. Summers accepted the chair of Zoology at the Iowa State College where he is at present. At this time he was appointed State Entomologist of Iowa.

During the college year Prof. Summers spends most of his time in teaching, and nursery inspection. His chief scientific work has been the study of Heteroptera.

'88, B. S.—Prof. J. M. Stedman, was an instructor in entomology and invertebrate zoology at Cornell in
'88-'89. He accepted the position of professor of biology in Trinity (N. C.) College in 1891. From here he went to the Experiment Station, Alabama Polytechnic Institute. Prof. Stedman became professor of entomology at the Missouri Agricultural College and State Entomologist in 1895, which position he now holds. He has made a special study of economic entomology and general biology, having made a special study of the tape worms of sheep.

'89, B. S.—F. H. Chittenden. Since leaving Cornell, Dr. Chittenden has devoted his time to purely entomological investigations. At first, he was an editor of “Entomologica Americana” published in Brooklyn, N. Y. In 1891, he was appointed as an Assistant entomologist of the U. S. Dept. of Agriculture. Here his work has been varied, consisting of editorial work which soon developed into investigations of injurious insects. Now he is entomologist in charge of Breeding Experiments. It has been stated that up to the present time Dr. Chittenden has written about 200 articles on entomological subjects. About two years ago he received the honorary degree of Doctor of Science from the Western University of Pennsylvania. His chief publication is a pamphlet entitled, “Some Insects Injurious to Stored Grain.”


Yours for luck,

Nathan Banks.

Mr. Banks neglects to state that he has become an authority on American spiders, and that his scientific papers have attracted wide attention.

'91-'92, Graduate—Prof Vernon L. Kellogg is now professor of zoology and entomology at Stanford University. Some of his numerous positions have been assistant entomologist on the Samoan Explorations and a member of the U. S. Fish Commission. Prof. Kellogg has written many articles, some of which are: “Variation and Heredity in Insects,” “The Scales of Lepidoptera,” “The morphology and Development of the Mouth-Parts of Insects,” and valuable papers upon the Mallophaga and a large, finely illustrated volume called “American Insects.” He is co-editor with Dr. David Starr Jordan on the book called “Animal Life,” and has also written a zoology for use in schools.

'92, B. S.—Prof. Mark V. Slingerland has held his present position, that of Assistant Entomologist of the Cornell Experiment Station since 1899. He was made Assistant Professor of Economic Entomology in Cornell University in 1899.

Prof. Slingerland has done much original investigation work in studying the life habits of injurious insects, and in devising and testing methods of combating them. He has written many very important bulletins on insect pests, among which the bulletins on the Wireworm, Cabbage Maggot, Pear Psylla, Codling-moth, Bud Moth, Peach Borer, Grape Rootworm, Grape Leaf-hopper, Grape Berry-moth, and Trap Lanterns are especially notable and have given him an enviable reputation both in this country and abroad. Many important papers have been contributed by him to the proceedings of the horticultural societies in New York and other states, and he is constantly contributing to the agricultural press and entomological journals of the country.

Prof. Slingerland’s reputation as a photographer of insects is world-wide. His lantern slides taken from nature by himself and colored by his wife rank easily as the finest and most artis-
tic and accurate productions of the kind in existence.

'92, B. S. A.—Otajo Tackahashi returned to Japan soon after graduation and has been engaged as a teacher in the public schools of his country. In recent years he has been unable to do much work on account of ill health.

'92 and '98, Graduate—Prof. H. A. Morgan, B. S. A., who took graduate work here for several years, is now professor of zoology and entomology of the Univ. of Tennessee, and Director of the Tennessee Agricultural Experiment Station. Besides these two important positions he is state entomologist. Prof. Morgan's chief work has been a study of the life history of the cattle tick, having in view its complete eradication from the United States. Through his efforts there is a bill before Congress asking for an appropriation to carry on this good work.

'92, A. B.—Prof. C. O. Houghton tells us that he accepted the position of associate professor of Zoology in Delaware College and Entomologist in the Agricultural Experiment Station in 1902. At the college he has charge of general zoology, and entomology. Besides station reports and bulletins, Prof. Houghton contributes many articles to the "Entomological News."

'94, D. Sc.—Dr. E. P. Felt was the University fellow in entomology during 1892-1893, receiving Sigma Xi in 1893. After teaching natural science in several schools, he became assistant to the N. Y. State Entomologist in 1894, and was appointed acting State Entomologist in 1898. Now he is State Entomologist with his address as Geological Hall, Albany, N. Y. Dr. Felt is very prominent as a writer, an investigator and as a leading member of many scientific societies.

'94-'97, Special—Inokichi Kuwana took special work in Entomology for several years, leaving to continue his studies under Prof. Kellogg of Stanford University. While there he published several important papers on the coccidae of Japan and of California. Now he is government entomologist at the Central Agricultural Experiment Station of Japan.

'95, M. Sc.—Prof. Lockhead has held a number of positions since leaving Ithaca. He was president of the Entomological Society of Ontario in 1902-04. For some time past and at present he occupies the Chair of Biology and Geology at the Ontario Agricultural College of Guelph, Canada. He is in the near future to become Dean of the School of Biology at the new McDonald Agricultural College near Montreal.

'95, B. S. A.—Rufus H. Petit is now spending his tenth year at the Agricultural College of Michigan. He is entomologist of the Experiment Station and a member of the Station Council. He has also charge of the Zoology department in that college, spending much of his time in teaching, while investigations fill up the spare moments.

'96, Grad.—Prof. S. J. Hunter became assistant professor of entomology at the Univ. of Kansas in 1896-99, being appointed full professor of comparative zoology and entomology in 1901. At present he is the head of the Entomological Dept. Besides publishing a text-book for general and advanced students, Prof. Hunter has devoted much time to the biology and taxonomy of Coccidae and the morphology of artificial parthenogenesis, and several kindred topics.

'96, Grad.; '96-'97, Sp.—Mr. A. S. Quaintance is at present connected with the Bureau of Entomology, U. S. Dpt. of Agriculture, having in charge the investigations of deciduous fruit-tree insects. At present, with three assistants, he is giving special attention to the peach tree insects. This work is expected to be of great value.

'96—Glen W. Herrick is now Professor of Biology at the University of Mississippi, and Experiment Station Entomologist. He has published many bulletins on insects including several quite important ones on the mosquito. His address is Starkville, Miss.

[On account of lack of space, former Entomological students, arranged by classes will be continued in our May number.]
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THE HORTICULTURAL, FORCING HOUSES, CORNELL UNIVERSITY

The portrait is that of Mr. C. E. Hunn, Gardener, who with a kindly and personal interest in each student has presided here for the past twelve years. The figure in overalls near the door is that of Prof. L. H. Bailey. Around this cluster of buildings, familiar to so many horticulturists, was gathered the inspiration and enthusiasm which resulted in the Rural Science Series, the Garden Craft Series, the Cyclopedia of American Horticulture and scores of minor publications.
AN excellent index to the horticultural progress of any country is afforded by the development of regions and locations in response to the discovery of their special adaptations. Time was when the commercial peach growing of this country was practically restricted to Delaware and New Jersey. New England produced a few for home use and local consumption but the two states named are responsible for such early advertising as the United States received as a peach growing country. Since that time great developments—almost revolutions—have occurred. Delaware is no longer pre-eminent; in fact no state is pre-eminently a peach growing state. The intervening period has been one of discovery and exploitation—sometimes hasty and ill advised. What is true of the peach is more or less true of the other leading orchard fruits of the North.

The peach like the apple is a great staple, and while the possibility of over production is frequently urged by the conservative, it is safe to say that in the average of years this has not occurred.

IMPORTANT PEACH REGIONS NOW BEING DEVELOPED.

In the East there is a good deal of planting activity in the hill lands of Connecticut, in Massachusetts to a less degree, while in New York, Ontario and Ohio the profitable area does not extend rapidly because it is more or less arbitrarily limited to the region over which Lakes Erie and Ontario spread their modifying influence.

Notable additions have been made to the peach orchards of Virginia and West Virginia in recent years. But the really phenomenal planting when measured by area, is that which has occurred in the South and Southwest in the last five or six years. The Ozarks of Missouri and Arkansas, the Carolinas, Georgia and Eastern Texas have been and are the scenes of gigantic peach orchard growing enterprises. This is the land of the promoting stock company. The company which plants, cares for, and brings the orchard into bearing and then sells in blocks to small holders, either outright as to management, or selling under agreement to manage the orchard and handle the crop. If these orchards were all cared for and all happened to come into bearing the same year, the effect on the market could hardly fall short of complete demoralization.

The retarding agents in these regions are, transportation problems, spring frosts, summer rains. But for difficulties and loss from these causes it is hard to say where the planting fever would cease. Ten years ago it was not supposed that peach growing could be successfully conducted in southern Georgia much less northern Florida. But the advent of the Peen-to race of peach has carried the southern boundary many miles to the south and has opened up new possibilities. Varieties of this race have fruited as far south as Tampa, Fla. What seedlings grown from these might do we can only conjecture.

APPLE REGIONS.

These have been opening and expanding in response to two lines of endeavor. 1. The effort to grow staple varieties as cheaply as possible.

2
The effort to produce the highest quality in a given variety. In the East and North—New England and New York—there is a well marked effort to find the locality where a high grade variety attains greatest excellence and cultivate it there by the most approved methods. So we find the famous Newton receiving attention in Eastern New York and in the elevated parts of Virginia. The Spitzenberg in New York, Massachusetts and, strange to say, in localized areas—as Hood River in the Northwest Pacific. There is a great opportunity in this line of endeavor. One might also mention the Grimes Golden in Southern Indiana where this fine variety is exceptionally handsome in appearance and of good quality.

The staple apples according to regional adaptation are being extensively planted in Western New York, the mountainous regions of the Virginias and North Carolina. A few years ago large apple orchards were projected and planted in the Ozarks of Missouri and Arkansas and the region sprang into prominence as an apple section. Considerable activity is still exhibited in the planting line but the furore has passed and future growth will undoubtedly be more conservative than that of the past. One of the most hopeful signs, is the steady development in Northern regions of elevated, rather rough lands poorly suited to the culture of farm crops but admirably adapted to the production of high grade apples. In these regions such as are found in Connecticut, Massachusetts, New Hampshire, the Lake Champlain section of Vermont and in Central New York steady progress is being made but not more rapid than the possibilities justify.

PEAR REGIONS.

The great pear plantings in recent years have occurred in the Middle South, where the Kieffer and Leconte, the oriental pears, reign supreme in the pear world. California, once noted as a Bartlett region, is battling with pear blight which threatens the life of the industry.

THE PLUM.

It is fair to say that outside of California and the north Pacific Coast, there are no great plum regions in this country, and of course in speaking of plums we are including prunes. Certain regions, however, are being developed in recent years in response to the origination of geographical varieties. As examples we may note the improvement of the Domestica race in northeastern United States, and Americana and its hybrids in the Mississippi Valley, the Angustifolia and its hybrids with the Japanese race in the Southwest.

NUT FRUITS—THE PECAN.

One of the most striking pomological epochs of this or any other period is the great activity now being exhibited in exploiting the pecan. This is a comparatively new fruit, that is from the standpoint of the cultivated varieties. The original home of the pecan is found in the lower levels of the Gulf region in Louisiana, Mississippi, and in Texas. Up to this time these states have enjoyed a monopoly of this truly delicious nut. The bulk of the pecans of commerce come from seedling groves in these regions. Latterly Florida and Georgia have acquired a strong faith in the ability of the soil and climate of these respective states to produce pecans equal to those of any country, and they are justifying their belief by very extensive plantings in southern Georgia and northern Florida. Not only is the pecan being planted by individual growers, but large stock companies are being organized and great tracts developed. In a recent tour through the South, the writer was deeply impressed by the pomological activity in this line. It is quite a counterpart of the ginseng furore of the East, but conducted upon a much more extensive scale and we hope a more stable basis.
CITROUS AND SUB-TROPICAL REGIONS.

In this discussion, California has been excluded because of the sharp contrasts occurring in this state within relatively short distances, and therefore the difficulty of treating it in a satisfactory manner without going greatly into detail. The evolution and history of the citrous industry in Florida is most interesting. Ten years ago the entire state was supposed to be in the orange belt. Growers acted upon this supposition. The story of the disappointments, losses, and failures following the successive freezes of the last decade is one as full of pathos as it is of pomological interest. These recurring cold waves have pressed the northern limit of successful citrous culture farther and farther south, till it has now reached the center of the state, and even there orange growers do not feel entirely safe. It should be noted, however, that there are striking exceptions, and one of these is the commercially successful plantation of Mr. G. L. Taber in the northern tier of counties. Mr. Taber has selected the hardiest strains, and has persevered and is making a success of the industry. However new varieties of hardy oranges, combinations of the Satsuma with the trifoliate species have been made, and vigorous seedlings have appeared which will undoubtedly again carry the orange growing region northward, possibly into Georgia.

The grape fruit belt overlaps the orange region on the south side and runs again southward. There is at the present time a well marked zone of activity in the grape fruit industry, along the southeast coast of Florida. In that coral rock land pomelos are being planted extensively and with much faith in their future. Again south of the grape fruit region we find a section mostly situated on the Keys well adapted to the culture of the lime, which is a fruit somewhat peculiar and particular in its soil requirements. In these Keys purely tropical conditions prevail and with the lime we can find the mango, the surinam cherry, the sapodilla, and on the low shore lands the cocoanut.

The great problem then of the pomologist of today as well as the pomologist of the future is the discovery of the most favorable climatic and soil conditions for the fruits we have and the development of fruits with special adaptations for lands now unoccupied. These finer adaptations are expressed in improved quality and handsome appearance of the fruit, and the discovery of regions where a given fruit will reach its highest excellence is not only the work of the experimental station, but also the field of the individual fruit grower and interested pomologist.

ACETYLENE LIGHT FOR FORCING PLANTS

By Martin J. Iorns, G.

In these days when the people are demanding the products of Summer at all times of the year, when they want strawberries for Easter and would like to have them for Christmas, when they want all kinds of flowers for all important occasions, be it July or December, the Forcing House becomes very important if not necessary. Anything that will increase the efficiency of the Forcing House, by either increasing the yield, bettering the quality, or shortening the time necessary for obtaining a marketable product becomes of great commercial value.

Light and heat are the two chief agents in forcing growth. Of these, it is easy to obtain and maintain the desired degree of heat; but the light is not under our control and in the Winter time with its short and very often cloudy days, the question of light is a very vital one. If we could only find an artificial light that would be a substitute for the sunlight, it
would solve many of the problems of commercial forcing and be of immense value to those engaged in the "Forcing" industry. Each illuminant, as it has been developed, has been tried as this substitute for sunlight, in almost every case, with negative or very indifferent results. Acetylene, which most nearly approaches the sunlight in its composition, has come into prominence so recently that it has not received the attention that the other lights have and it was suggested to me that it would be well to see what it would do for plant growth.

One of the first results worthy of mention is that of the absence of any injurious qualities in the light. All other illuminants thus far tried, have showed some of these. Plants of the tenderest foliage were grown so near the naked flame that they were almost scorched without any injury whatever, in fact, the best results were obtained with those plants nearest to the light. Not only was the foliage uninjured by the light, but also the flower and more especially the color and enduring qualities of the blossom were unaffected.

In its power to sustain plant growth, acetylene showed marked results. One of the photographs shows plants that have never seen any sunlight. They were taken into a perfectly dark room before sunrise and only brought out after dark. As will be seen, the bulbous plants produced their flowers and those that had to depend entirely on the soil for their food, produced quite strong plants. Under the power I was using, the latter would not have matured fruit or seed, but it is not improbable that, with much stronger power, they might be grown to maturity. They grew quite well and were of a healthy green, but were not as deep a green as those under the sunlight, neither could I find any starch in the tissues.

The effect on the period of maturing of flower or fruit varied considerably, both with the type of plant and with the house in which the plant was grown. As a general thing, it seemed that the warmer the house and the more sunshine received, the less the visible effect of acetylene light on the plants. It was also clearly shown that the individual plants showed a marked difference in the amount of response they gave to the stimulation of the extra light. This is strikingly shown by the accompanying photographs of the Sweet Peas and Easter Lilies. Last year the Sweet Peas under the Acetylene light blossomed over five weeks ahead of the others.
and there will be an equally great difference this year. The Easter Lily is another striking example of strong response to the additional light. As will be seen in the photograph, the buds are just beginning to show on the lily that has had only the sunlight. This means a difference of several weeks in the time of flowering. This result is also again showing in this year's work. As opposed to these very striking results, the tomatoes, pole beans and leeks showed very little, if any, response to the light. The tomatoes under the light have a stronger vegetative growth and in that respect are able to support a heavier crop of fruit, but the fruit is not ripened any sooner. In this they obey the general law, that when we increase vegetative growth we delay fruit development.

The root crops were the most uncertain in their results and it would seem from the results obtained, that soil conditions of moisture and especially of heat, had more effect than any above-ground conditions. Certainly the root crops obtained from the house where there was strong bottom heat gave very different results to those from the house where there was small bottom heat and these, in turn, are widely different results to those from a house where the soil was cool to cold and somewhat damp. No definite results can be given in this case.

In conclusion, I think I can safely say that for some special crops for some special time, the Acetylene will be of undoubted commercial value but as for being an entire substitute for the sunlight or being of commercial value in forcing all forms of plants, it is as yet doubtful, to say the least. What much stronger light will do will require further careful investigation, but even if it be shown that stronger light will support plants of all kinds, and bring them to maturity, the increased expense, at the present cost of calcium carbide, would prevent its being a commercial proposition. We can say, with all truth, that it is the nearest to being a complete substitute for the sunlight that we have found and that its use will increase in forcing houses, especially in those localities where sunshine in the winter months is at a premium.
STUDY MEN AS WELL AS METHODS

By S. E. Robinson, G.

In the study of orchard methods in apple culture, as in other scientific studies, we are apt to let classification or scientific arrangement obscure the real significance and purpose of the study. We classify orchards according to the methods of culture, forgetting that the reason for the classification is to be found in ourselves rather than in the orchards; that it is subjective rather than objective. For this reason, our artificial classification often gives us a distorted idea of values.

The agricultural economist, in considering the problem of production, recognizes three important groups of factors; under the terms land, capital goods and labor; and that production depends upon the combination of the different qualities and quantities of these factors. A scientific study of the methods of apple production in a given orchard would include, therefore, the consideration under "land" of its location in regard to climate and markets and its soil in regard to its mechanical and chemical condition and the means by which that elusive quality known as fertility is kept up. Under "capital goods" would be included the tools, machinery, and horses for cultivation, the spraying materials, fertilizers, seed for cover crops; and what is of chief importance, the trees. The term "labor" would include both the manual labor and management. But, since our classification is based on the means taken to make available the plant food in the soil and to supply that taken out by the crops removed, we are more than apt to regard these operations of too much importance. It leads us to consider rather the value of this and that fertilizer, method of cultivation, pruning or spraying in the care of an orchard than all those things which go to make one a good student of orchard conditions.

Recently during a trip to various orchards of Western New York the writer visited two orchards in close proximity to each other. The owner of the first was just leaving for town in his automobile, but in the course of a brief conversation he stated that he had paid for an orchard in two years with the crops taken from it. The second man was, together with his men, laboring with some large timbers. He briefly granted permission to examine his orchard, saying "Go where you want to. Yes, I pasture it; have no other grass. No, it is not profitable."

The orchards were similar in location, soil, age and varieties. The greatest difference between them was in the men who tilled them. One was a student of orchard conditions; the other was too busy with manual labor to be a student.

Perhaps the two most striking facts coming from a study of orchard methods in New York are that, by reason of the great variety of conditions which may reasonably be expected to influence the performance of an orchard, every orchard combines different factors or influences and consequently presents different problems and that the men who have the best success with their orchards are those who have been thorough students of their own problems. They have had the attitude of scientific students, accepting nothing as a rule of practice till they had tested it with careful thought and experiment.

There are as many methods of orcharding as there are orchardists; every man must meet his own peculiar problem with a method of his own development, the product of his own thought. A classification of orchards according to culture methods is useful in the study of orchard problems, but it should not stand in the way of a study of orchardists.
The art of forcing plants dates back to the days of the luxurious Romans. It is recorded that they were able to obtain fresh fruits and vegetables for their sumptuous banquets, the year round, by both retarding and accelerating their growth. The elaborate forcing-houses and hot-beds of today were unknown to the Romans. They forced their fruit and vegetables in pits covered with large thin slabs of tale. Heat was obtained from fermenting manure, and by means of hot-air flues. Since the time of the Romans the art of forcing has undergone a gradual development both in the structure of the houses, and in modes and methods of forcing. The present time finds us with elaborate houses, heated with hot water and steam, and with numerous methods of forcing based upon scientific principles. One of the latest of these methods of forcing, now coming into vogue, is the forcing of plants after treatment with ether.

The history of the use of ether in forcing plants is comparatively brief, dating only as far as 1878, when Claud Bernard, the famous French experimenter, described an experiment in which he placed a specimen of the sensitive plant under a bell glass with a small sponge dipped in ether and found that after a lapse of a few minutes the expanded leaves became insensitive and ceased to close when touched. Through this experiment of Bernard's contained, as it were, the germ of the new process, the real discoverer, for all practical purposes, was Dr. Johannsen, the well known Danish physiologist of Copenhagen, who, noticing that many plants push forth their buds after a period of repose such as occurs during the winter months, or even in unfavorable seasons during the summer months, conceived the idea that by inducing such a condition of rest by means of anaesthetics the plants would be, as it were, renovated and stimulated and rendered capable of developing their buds with greater vigor. Acting on this theory, Dr. Johannsen carried on the first experiments in the use of ether in forcing plants. His results, first published in Denmark and later in Germany, were so pronounced that they quickly attracted the attention of the growers, both in Germany and France. Numerous experiments carried on by these growers soon demonstrated the fact that many of the flowering shrubs could be profitably forced by the use of ether. That the European growers are convinced of the value of ether for forcing plants, is evident by the fact that many of them have installed etherization apparatus, in connection with their forcing-houses.
Of the plants used for winter forcing perhaps none are more popular than lilacs, *Syringa vulgaris* and *Astilbe Japonica*. Both of these respond quickly and surely to the action of the ether fumes. In experiments carried on in the forcing house here by the writer, a Persian lilac was placed in the forcing-house on Nov. 24th, after having been subjected to the fumes of ether for 24 hours. The first indications of growth were noticed three days later when the buds were seen to have markedly swelled. Two days later several of the leaf buds completely opened up and by Dec. 11th the plant was in full leaf. The first flower buds opened on Dec. 6th and full bloom was reached by Dec. 25th. The total time from date of placing plant in forcing-house until date of full bloom being 31 days. A check plant, placed in forcing-house on the same date and kept under exactly similar conditions, was considerably slower in its growth, not reaching full flower until six days after the etherized lilac. More marked results than this were obtained when the plants were exposed to the action of the ether fumes for a longer period of time. Thus, a lilac etherized for 48 hours came into full flower in 8 days less time than the check plant, while one etherized for 72 hours made a gain of 10 days over the check plant.

The results obtained with *Astilbe Japonica* are even more striking than with the lilacs. Clumps of *Astilbe Japonica* etherized for 24 hours and placed in the forcing house on Nov. 24th, were in full bloom from a month to five weeks ahead of a clump not etherized. Other *Astilbe Japonicas* etherized at a later date did not show such marked results in favor of the etherized plants but there was, however, in every case a considerable gain in time made by the etherized clumps.

A question which naturally arises is, what is the action of ether in accelerating the growth of plants? There are many theories advanced to explain this phenomenon, none of which have been definitely proved. It would seem, however, most reasonable to suppose that the ether acted in a manner similar to frost and dried out and ripened the plant cells, thus rendering them capable of active growth. If such is the case the ether performs in a few hours what it takes nature several months to accomplish.

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**THE EFFECT OF DIFFERENT CHEMICAL SUBSTANCES ON THE FLOWERS OF PLANTS**

*By J. C. Hogenson, G.*

It has long been believed by horticulturists and florists that the soluble mineral constituents of the soil have a great deal to do with the colors of flowers, fruits and foliage of the plants grown upon it. Not only do they play a large part in determining the color, but also in establishing the extent of growth, flavor, perfume, shape, time of maturity and other desirable qualities of flowers and fruits.

Plants differ most under cultivation because their condition there is unnatural, and they try to adapt themselves to the given conditions.

For a long time, people have been desirous of changing the colors of certain flowers. To do this, many potting mixtures have been recommended, such as: peaty earth, sand, iron filings, wood ashes, alum, and various chemical salts and acids.

This important phase of plant modification is in a very rudimentary state, and it is with a view of throwing some light upon this subject that I have undertaken the following investigations:

Each of the following substances were added to ordinary potting soil and plants potted therein: Iron filings, copper sulphate, sugar, lime, salt, potassium hydroxide, iron sulphate,
alum, pyrogallol, gallic acid, tannic acid, hydrochloric acid, ammonia, wood soot, malachite green, acid rhodamine, eosine, uranine and crystal violet. The following plants are being grown in soil prepared with the above mentioned substances: Hydrangeas, Primulas, Carnations, Geraniums, Narcissus, Spireas, Lily-of-the-Valley, Calla, Lilium longiflorum, Ten-week-Stocks, Heliotrope, Fuchsias, Roses and Hydrangea paniculata.

I have used six Azeleas and six Rhododendrons No. 1 of each being used as a check, No. 2 to which was added ten grams of lime for every five pounds of soil, which would be at the rate of 4.42 tons per acre of calcium carbonate. No. 3 of each received ten grams of lime and ten grams of pyrogallol; No. 4 received ten grams of lime and four grams of tannic acid; No. 5 received ten grams of lime and seven grams of magnesium sulphate.

No. 6 received ten grams of lime and four cubic centimeters of concentrated hydrochloric acid.

The results so far obtained go to show, that with quickly growing plants like Narcissus and Lily-of-the-Valley, no effect is noticeable.

Another experiment is being carried on to determine whether or not such lime-hating plants as Azeleas and Rhododendrons, which grow naturally in an acid, peaty soil, can be successfully grown on a limestone soil, by adding a neutralizing agent which will overcome the injurious action of the lime. When such plants are grown in a limestone region, an artificial soil has to be provided for them.

No. 6 began growing well, but soon the leaves of No. 2 began to droop, the flower buds became limp and refused to open. The Rhododendron was dead by Feb. 25 (see picture.) The others all grew vigorously, came into bloom normally, and are apparently in a healthy condition notwithstanding the addition of the large amount of lime in connection with the other substances.

It appears from this that the lime in
limestone soils can be conveniently and economically neutralized, and Azaleas, Rhododendrons and other Ericaceous lime-hating plants grown therein. This may perhaps best be done by adding magnesium sulphate which upon coming in contact with moisture of the soil, hydrolyzes and forms magnesium hydroxide and sulphuric acid. The magnesium is absorbed by the soil and plant, thus setting the sulphuric acid free. This tends to neutralize the lime by acidifying the soil. Pyrogallol, tannic acid and hydrochloric acid will also neutralize lime, but care must be taken not to put in too much. The results of this experiment are quite satisfactory.

FORCING BULBS BY MEANS OF ETHER

By Claude I. Lewis, G.

In another article on etherization in this issue the history of the process and some of the results obtained with shrubs has been given. I will, therefore, give the general methods employed and results obtained with bulbs.

A galvanized iron box two feet and a quarter wide and deep and four and a half feet long was used. This had a cover which came down six inches over the edge of the box on a well-felted flange, making a practically air-tight box. To further insure that the box would be air tight, the rim of the cover was clamped securely to the box. Several trays were made to allow the placing of the material in layers thus giving the ether a better chance to circulate. In filling the box the shrubs and larger material were placed in the bottom of the box, care being taken to have the soil as dry as possible to prevent absorption of the ether, and the bulbs and smaller material were placed on the trays.
wad of cotton or felt was placed in the box and upon this the ether was poured and the box closed as quickly as possible. Ordinary sulphuric ether was used, the standard amount being one ounce for every fourteen gallons of space and, to allow for evaporation, small leakage, etc., a small extra amount was used, so that the normal amount of ether used was fourteen ounces. The amount of ether was, however, varied, as one of the objects of the experiments was to determine the amount needed. Accordingly, fractions of this amount were used such as: a quarter, a third, a half, etc. The time which the ether was allowed to act upon the material was also varied. We began with twenty-four hours, increasing to thirty-six, forty-eight and seventy-two. Thus, by combining the various amounts and periods together, a long list of experiments were tried, extending from November until April. The temperature of the room in which the tests were carried on varied from fifty to sixty-five degrees. Bulbs were etherized loose before being potted, after potting, in some cases after being cut and also after they were rooted. Combinations of these were also tried. After being taken from the box they were placed in a room where the conditions were suitable for rooting. In all cases check plants were used. Other experiments were tried in connection with etherization, such as, various soils, temperatures and time left in rooting room before being brought to the forcing room. A large number of varieties of such bulbs as Narcissus, Tulips, Hyacinths, Alliums, Callas, Gladiolus, Lilies, etc., as well as seeds were used.

The results with Narcissus have been very satisfactory, the time gained being from two days to about three weeks. Not only has this been a gain in the time that the first blossoms appeared but there has been a gain in the time that the whole pot was in bloom, a gain in uniformity over the unetherized plant. Narcissus were tried in many varieties and in large quantities and with the exception of "Par Whites" which were badly sprouted, the results were quite marked.

The first two lots of Lillium longiflorum, var. multiflorum, showed no gain in the time at which the first blossoms appeared but gave a decidedly taller growth. The third lot, which was exposed to the action of the ether longer, showed a considerable gain in time as well as in height. Experiments with other bulbs were quite satisfactory but were conducted on a smaller scale. Various seeds, such as peas, beans, radish, melon, lettuce, onion, etc., were tried. Those etherized germinated sooner and more uniformly. In conclusion I would state that, to obtain good results, the etherization should be done before the first of February, and the earlier the better. Plants to be etherized should be dormant, the ether acting as a stimulant to activity and not as an invigorator to existing growth.

**SOME EFFECTS OF SHADE ON PLANT GROWTH**

*By W. H. Homer, G.*

SHADE, as a factor in plant growth, is receiving considerable attention at present both among practical gardeners and those who are engaged in scientific horticultural investigations.

During the past twenty years many European botanists, notably in Germany and France, have devoted much study to the effects of shade upon plant growth and development. Many experiments of a more practical nature have been carried on in recent years in various sections of the United States. Large areas in the Connecticut River Valley and in the South are devoted to the culture of tobacco, grown in the shade of a cheese-cloth covering. Only such varieties as are most desirable for cigar wrappers are grown under such conditions, and the fiber of the leaf is
such that the product is said to equal that grown in the tropics.

The quality of such crops as lettuce, cauliflower, celery and rhubarb is materially improved, when grown in the shade. In pineapple and coffee culture shading is now extensively practiced.

Prof. V. A. Clark of the Arizona Experiment Station at Tucson, in a recent paper read before a meeting of the Society for Horticultural Science, held in New Orleans, said: "It is believed that the matter of shading is of greater horticultural importance in arid regions than fertilization is in the East." It is now a well established fact that excessively strong sunlight has a retarding effect upon the growth of most plants. In certain regions of the arid Southwest, tomatoes and cucumbers fail to bear fruit in midsummer. This is thought to be due to the inhibition of the growth of the pollen tubes by too strong sunlight.

Shading reduces transpiration, conserves the soil moisture, and where the cheese-cloth covering is used a slight increase in the temperature of the soil and atmosphere is noticeable. The covering also serves as a protection against frost, drought, damage by wind, hail and insect pests.

Young, vigorous plants with normal leaves often succumb when transplanted, because of a too rapid transpiration. This can be prevented by shading. Plants grown in the shade are usually characterized by having abnormally long stems and petioles, thinner and lighter colored leaves, and unless the shade is very dense the leaf surface is apt to be greater than when the plants are grown in direct sunlight. In the shade the fibrous, woody tissues are less developed, the epidermis is thinner and the plant hairs which seem to serve as a protection against too great transpiration, are reduced in number and size. The internal structure of leaves and stems also becomes much altered in plants grown in shade. There is a strong tendency for the tissues to become homogenous, that is, there is less differentiation as the density of the shade increases.

Long stems are often desirable, as in the case of many flowering plants. Last winter the Lily-of-the-Valley and the Narcissus were grown in the shade at the Cornell Forcing houses, with the result that the flower stems were from three to five inches longer than those grown in the light.

Etiolation may be looked upon, says MacDougal, as a method of reducing the strong and rank flavors of many plants in the effort to make them of economic use. It has been observed that the thorns of many plants tend to revert to the normal form of the organs from which they were originally produced—stems or leaves—when grown in a very damp atmosphere or dense shade. If they are no longer essential to the protection or growth of the plant they may entirely disappear. Strawberry plants when grown in a humid atmosphere and deprived of light may develop blossoms, but the white petals may be lacking. The essential organs, stamens and pistils, will be present, but the petals, not being absolutely necessary for the production of seed or for continuing the life of the plant, will be the first to disappear when the plants are placed in an unfavorable environment.

SOME RECENT WORK ON MUSHROOMS

By P. M. Növik, Sp.

The increase in interest in Mushroom Culture has been as rapid in this country as anywhere in the last few years. This increase is largely due to the knowledge gained through the investigations which are being carried on at the various experiment stations, and to the wide publicity given to such knowledge.

Mushroom growers have long known a few varieties, but as they were propagated by spawn, the improvement of these varieties was a
AGARICUS ARVENSIS. 54 MUSHROOMS IN ONE CLUSTER

slow and uncertain process. With Prof. Duggar's method of pure culture, the production and improvement of new varieties is easily accomplished and we may expect before long to have spawn on the market of as many mushroom varieties as we have seeds of beans, cabbage or other vegetables. It is much better, therefore, to start systematic variety tests early, before the different varieties and the nomenclature becomes too much confused.

The work done by the writer during the past winter has been confined to a variety test. The trial started last October included some 13 species and

CONTRAST OF VARIETIES
On right Columbia, on left No. 40 Brown. Note difference in thickness of cap and width of gills
varieties. While many difficulties due to lack of proper drainage of the house were encountered, still some definite results have been reached.

The ways in which the mushroom varieties differ are many. The skin may have all colors from dark brown to purest white. The cap may be either thick or thin with more or less broad gills. The proportion between the fleshy part of the cap and the layer of gills may vary from 2-5 of the thickness of the cap to 1-10 or less. The flesh may be either more or less solid or soft and watery, and its color greenish white or pure white or white and pink. The taste differs very much, from the most delicate aromatic flavor to some nearly tasteless. The stem may be long and thin or short and thick, or sometimes broad and then often with a very delicate flesh.

The stem of the common Agaricus campestris is ordinarily thrown away by the cook as worthless, but this will not be the case with some of the new varieties in which the stem often tastes better than the cap.

The habit of growth varies greatly in different varieties. Some kinds come one at a time, but others come in larger or smaller clusters. The picture shows one large cluster of Agaricus arvensis containing 54 mushrooms, the largest cluster the writer has ever seen.

It is with regret that the writer refrains from recommending any particular varieties, but the earliness of the date at which this paper is submitted precluded any reliable statement as to which had proved to be the best variety. The final results will be withheld for future publication.

PROPAGATION OF CONIFERS

By A. D. Taylor, G.

It can be little doubted that the art of growing Conifers by seed was practiced centuries ago. While the method of grafting the ornamental and fruit trees dates far back to the time of the Carthaginians and the Greeks, we may be quite certain that the method of propagation by seed, the most natural of all, began with the study of Arboriculture, years before. As time has advanced great changes have been brought about in this work by the development of new methods and the perfection of old ones. As the newer and the more perfected methods of propagation have been readily adopted in the production of deciduous trees and of fruit trees, we find that in the field of the Conifers these changes have been much less rapid. Even though propagators grafted and experimented with the most delicate plants, yet with great reluctance and much uncertainty did they venture to adopt new methods with these trees, which were fully as well adapted to the methods of grafting and cutting. Hence until comparatively recently they have been grown as a rule from seed almost exclusively.

Today, however, these trees are produced quite freely from cuttings, seeds and grafts. The greater number, including the more common species are raised from seed and imported each year to this country from France and Germany. Many of these are used as stocks upon which to graft the more delicate and finer species and horticultural varieties grown by our nursemens. The extensive importation of seedlings is mainly due to the cheapness of foreign labor.

The following short table will show the wide range of variation in the viability of the seed of a few of the Conifers:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Pine</td>
<td>70-80 percent</td>
</tr>
<tr>
<td>Spruce</td>
<td>60-75</td>
</tr>
<tr>
<td>Hemlock</td>
<td>30-60</td>
</tr>
<tr>
<td>Fir</td>
<td>30-50</td>
</tr>
<tr>
<td>Arborvitae</td>
<td>50-75</td>
</tr>
<tr>
<td>Cypress</td>
<td>25-45</td>
</tr>
</tbody>
</table>

With this uncertainty and the length of time required to obtain salable specimens from seed, it is certainly true that the method of cutting, by
which from 85 to 90 percent of the cuttings strike root is much more satisfactory. This method also has been subjected to many changes—varying from the older one by which cuttings were subjected to a long calousing process to the present one controlled by artificial top and bottom heat. This method with the commercial growers is confined to the genera of what is known as the opposite leaved group, including Arborvitae, Chamaecyparis, Cupressus, Juniper, and Thuja; the genera including the Spruces, Firs and Hemlocks are more easily raised from seeds and grafts than from cuttings.

Cuttings of the deciduous trees are best taken either during September and October or in the last spring, the time varying with the condition of the wood desired; those of the Conifers do best if taken between the months of October and January. Various propagators differ as to the best time of taking these cuttings. One class adheres to the principle that subjecting the cuttings to frost before taking impairs the quality of the wood for cuttings; the others uphold the opposite theory. My experience with cuttings has enabled me to see no apparent difference in the ability of either class to strike root. It is a maxim, however, that cuttings should never be made while in a frozen condition.

There are three distinct types of cuttings, each with its adherents among the different propagators and each with its advantages. Type (a) includes those made from green wood. Type (b) includes those of medium size (4-5 inches long) made from mature wood. Type (c) includes those which are extra large (7-10 in.) made from mature wood. When one considers which of these three types is the best, it is evident that the softer the wood the more easily should the cutting strike root, and also the greater the care needed to obtain the best results. Between the two largest types there appears during the first year no marked difference. The extra root growth of the smallest type and its size when fully rooted is more than overbalanced by the greater size of the larger cuttings with smaller root systems.

The sand and the temperature in the propagating house are strong factors in influencing the growth of the cuttings. Cuttings of these trees grown in a cool house are less apt to suffer ill effects from excessive watering and much less skill is required to make them strike root. Cuttings placed in a house with an average temperature, day and night, of from 50 to 55 degrees will show a much slower growth than similar cuttings in a house with a higher temperature; however the former will withstand a greater variation in the external conditions. The ideal temperature for the best results in rooting conifers ranges from 40 to 45 degrees at night to 60 degrees during the day with a bottom heat as near 45 degrees as possible; this to continue for the first five or six weeks; after which time the top heat should range from 60 to 75 degrees and the bottom heat from 55 to 60 degrees. The sand best adapted is very clean, coarse pit or lake sand as free from organic matter as possible; with the very smallest cuttings fine sand brings better results and for the larger hardwood cuttings the coarse sand is preferable.

It is commonly the case that cuttings of the same genus or species vary greatly in their ability to strike root; Chamaecyparis obtusa and the Siberian arborvitae are the most difficult, it generally taking two years before these have attained sufficient root growth to admit of their being taken from the cutting bed. Retinospora and Lawson’s cypress are the easiest to root, while Juniper, American arborvitae and Biot come in the order named, the last being the most difficult of the three.

The problems before the propagators today are to determine the best type of cutting to make, the portion of the tree from which they should be taken, and the finding of a method by which tardy cuttings may be made to strike root in a single season.
How all this has changed! Where ten courses covered all the studies offered by an entire college of agriculture, it is now found impracticable to condense into that number the studies which should be offered in the province of horticulture alone. Moreover, horticulture in those days was usually expected to include landscape gardening and often instruction in sylviculture.

The tendency towards differentiation has been constant and fairly consistent. Under the head of horticulture we may now group at least four large subdivisions each of which is divisible into two or more co-ordinate parts. These main heads are pomology, with its practical and systematic sides; floriculture, which may be divided in the same way; floriculture, with its plant growing, flower growing and structural departments; and lastly the manufacturing and utilization of horticultural by-products. This latter field has not thus far been exploited by institutions giving instruction in horticulture in this country. There is, however, much demand and vast opportunity.

These are all undergraduate subjects and their strongest features should be the laboratory part. The development of the laboratory is another distinguishing mark of the new teaching. It composes a large part of the undergraduate training and is quite as essential to the graduate student, especially in connection with his investigational efforts which should occupy the major portion of his time and energy.

The mere classification of the branches composing the horticultural group makes it perfectly apparent that it is hardly more reasonable to expect one man to possess a knowledge of or
an ability to teach all if it were physically possible, than it was to expect the professor of agriculture of twenty years ago to cover the field of agronomy, zootechny and dairying. Further separation of naturally divisible parts is bound to come in horticulture and from the standpoint of the student the sooner the better.

The past twenty years have seen marvelous changes in the pedagogies of agriculture. Not less portentous are those which are certain to take place during the next decade.

John Craig.

The receipt of a circular letter sent out by the Bureau of Nature-Study at Cornell, concerning school gardens, has reminded us that the season for beginning this work is at hand.

That the school garden has been a decided success, educationally, agriculturally and otherwise, there is but small room to doubt. Its influence has manifested itself in many ways. Pedagogically it is good, as it fulfills the fundamental principle of the Nature-Study idea, namely, that of bringing the child in close contact with the real and the commonplace, and guiding the education that springs spontaneously from this intimate personal touch with his environment. It is difficult to imagine a better method of impressing upon the child the idea of personal responsibility than through the school garden.

Again, the opportunity for vitally relating this garden work to the school studies is a large and profitable one. Indeed, in an ideal school, where Nature-study is not merely correlated with school studies, but is made the fundamental basis of the curriculum and of all school activities, in such a school the influence of a school garden is almost unlimited. Not only will it have its immediate effect upon the school and the child, but also a broader one upon the community. The planting of a single school garden may easily lead to the improvement of the whole town. Shade trees, parks, yards and gutters will be seen from a new point of view, through the eyes of these young gardeners; and in such cases, improvement becomes contagious.

The agricultural value of the school garden is so apparent, and so closely akin to the Nature Study value, that little need be said concerning it. The country school stands in the greatest need of these gardens. Here they should be used, not only for instruction, but also largely for the decoration of the school grounds.

That school gardens have done much good in the past is quite evident; still more obvious is it that, in the ideal day when every school house has its garden, and every school child is an evangelist of the beautiful in the commonplace, the possibility of good will be unlimited.

GENERAL AGRICULTURAL NEWS

The first number of the Agricultural Journal of India has been issued from the agricultural institute at Pusa. The new journal is a quarterly and is devoted to matters of general interest in the line of agricultural research throughout India. All the more technical papers are to be published in another series entitled “Memoirs of the Department of Agriculture in India.”

The first number of this journal
contains a long article by the inspector general of agriculture in India, in which he outlines the present condition of agricultural affairs and the measures which the government is planning to take for its development. All of the existing departments are to be enlarged and improved.

The system of Indian experiment stations includes thirty-nine stations and farms besides the research institute at Pusa. Some of these are devoted to the study of some particular product like cotton or the tropical fruits while the others are general in their nature. The government has recently made a grant of $660,000 which is nearly three times as large as the present income. It is to be hoped that even this may be materially increased in the future and will allow for the development of the stations and ensure a considerable increase in the practical work and experimentation.

* * *

Massachusetts Agricultural College has a new Horticultural Building.

The department of horticulture and landscape gardening in Massachusetts will soon be housed in Wilder Hall its new home. The building cost approximately $40,000 and is of red brick with terra-cotta trimmings and is practically fireproof in its construction.

The building is three stories high and contains besides the ordinary laboratories for the study of Pomology; grafting rooms, class rooms and offices, a well-equipped photographic room and a drafting room for the use of the students in landscape gardening.

The building is named in memory of the Hon. Marshall Pinckney Wilder, who has been closely connected with the progress of horticultural science in Massachusetts, and for the last quarter of a century a trustee of the college.

* * *

Reports from the North Carolina Agricultural Department announce the resignation of Prof. H. H. Hume, Horticulturist, to accept a similar position in the new McDonal Agricultural College of Quebec. It is expected that this college will be opened to students by September, 1906.

* * *

The main building of the Idaho State University and Agricultural College was burned March 30. This was the finest building on the campus being erected only a short time ago at a cost of $225,000. It contained all of the offices of administration and many of the class rooms.

* * *

Kenyon L. Butterfield, who recently resigned the presidency of the Rhode Island Agricultural College to take that of the Massachusetts College, will be succeeded in his work in Rhode Island by Prof. Howard Edwards who now holds the chair of modern languages in the Michigan Agricultural College.

* * *

The question of a standard agricultural course was brought up at the recent meeting of the Association of American Agricultural Colleges and Experiment Stations held in Washington, D. C., by Prof. F. W. Rane of the New Hampshire College.

Prof. Rane recommended that uniform requirements should prevail in all the institutions teaching agriculture. At the present time there is the utmost confusion in the various institutions. Senior subjects of one college are given in the freshman year in other colleges. All of the fundamental sciences should be given in the first two years. The junior and senior years should be largely elective to give the student an opportunity to take up the branches which appeal to him most.

The first two years of the course as outlined by Prof. Rane is practically the same as that given at Cornell.

* * *

The Madison Democrat reporting the investigations of the legislative committee at the University of Wisconsin, has the following:
While waiting for a witness to be brought in, the investigating committee fell to discussing informally the quality of students that had appeared before them, and finally agreed that the brightest, most self reliant young men they had examined in their investigation of weeks were those of the agricultural school. They seemed to have their work in hand most completely of any that have appeared before the committee; they think about their studies, and are not worrying about athletics or social functions. The committee spoke of this as the bright spot in the splendid work being done by the College of Agriculture.

The committee seem to have found little to criticise and a good deal to commend in the investigation of the College of Agriculture.

CORNELL NEWS

CAMPUS NOTES

As the Dairy Building had to be given over to the contractors of Goldwin Smith Hall by April 1st the occupants had to seek new quarters. Prof. Wing’s office is now directly under the Treasurer’s office in Morrill Hall, Prof. Pearson is on the first floor of Stimson Hall at the west end, in the old Faculty room; Prof. Rice has moved up to the Poultry Building. It is hoped that this temporary arrangement will be only necessary for a short time.

* * *

At a recent meeting of the Agricultural Association, E. H. Anderson was elected captain of the college baseball team and E. Kelly, manager; C. B. Tillson, commodore of the college crew, and W. H. Alderman, manager.

* * *

On April fifth Dean Bailey addressed the Oneida County Grange at Utica; on the seventeenth he attended a meeting of the Executive Committee of the Association of American Agricultural Colleges and Experiment Stations at Washington, D. C. On the twenty-seventh a lecture was given at Middleboro, Mass., before the Massachusetts State Federation of Woman’s Clubs. The next day he appeared at Hamburg, N. Y., before the Erie County Teachers’ Association and spoke on “Manual Training, Nature Study and Agriculture in the Schools.”

Twenty students are engaged in the soil mapping course under Prof. Fippin. Before the course is completed the Roberts pasture, alfalfa field and the Mitchell farm will be mapped.

* * *

Arrangements have been made to make an “Agricultural Survey of Tompkins Co.” during the summer. The soil types and conditions are to be investigated. The whole county will not be surveyed this summer. The work will be in charge of Paul J. White, graduate student.

* * *

A Soil Survey of Tompkins County, carried on by Profs. Bonsteel and Fippin for the past two years has been completed.

* * *

Work on the University Farm has commenced. The investigations concerning timothy will be continued. Five thousand new plants were set out this year, making a total of 17,000 plants. Some new experiments to find out the life of a clover plant will be started this year.

* * *

A bulletin on buckwheat has gone to the printer and will be published in a short time.

* * *

Charles F. Clark, Grad., has been appointed Assistant Agronomist in place of Samuel Fraser, resigned. Mr. Fraser will take charge of the 14,500
acre estate of Major Wadsworth in Genesee County.

* * *

The new type of colony house and gasoline heaters recently perfected by the Poultry Department are proving a success and it is hoped that a bulletin on that subject may be published early this summer.

* * *

Prof. Craig has recently returned from a three weeks' trip in the South. His time was spent mostly in Florida and Georgia in the fruit orchards. He spoke concerning the trip before a meeting of the Lazy Club, illustrating the talk with photographs and specimens of the fruits which he brought back.

* * *

The week before the Easter vacation Prof. Wing took a party of seventeen students to some of the prominent dairy farms around Syracuse. The annual judging competition also took place. At Wing R. Smith's, G. W. Myer took first prize, C. B. Tillson second, O. F. Ross and J. B. Shepard tied for third. At Stevens Bros.-Hastings Co., at Liverpool, N. Y., G. H. Moody and A. H. Knights tied for first place. The following students went on the trip: Myer, Tillson, O. F. Ross, Shepard, Moody, Knapp, Knights, Meeker, Hale, M. P. Jones, Osborn, Spencer, Barber, Bingham, Davis and Merry.

* * *

The Agricultural buildings have a large force at work on them. The manufacturing part of the Dairy Building is completed with the exception of setting doors, windows, stairs, floors and plumbing. The main building has the outer and inner walls carried above the first story.

* * *

The announcements concerning the Traveling School of Agriculture for this summer are now ready for distribution. An itinerary has been adopted. It is as follows:

Ithaca, N. Y.
Rochester, N. Y.
Buffalo, N. Y.
Painesville, Ohio
Cleveland, Ohio
Hudson, Ohio
Apple Creek (Wooster), Ohio
Columbus, Ohio
Washington C. H., Ohio
Xenia, Ohio
Springfield, Ohio
Champaign, Ill.
Bloomington, Ill.
Chicago, Ill.
Wayne, Ill.
Elgin, Ill.
Freeport, Ill.
Dixon, Ill.
Ames, Iowa
Omaha, Neb.
Fremont, Neb.
Lincoln, Neb.
Grand Island, Neb.
Scottsbluff, Neb.
Greeley, Colo.
Port Collins, Colo.
Colorado Springs, Colo.
Manitou Je., Colo.
Pueblo, Colo.
Trinidad, Colo.
Texline, Texas
Amarilla, Texas
Clarendon, Texas
Childress, Texas
Wichita Falls, Texas
Henrietta, Texas
Bowie, Texas
Fort Worth, Texas
Waco, Texas
Houston, Texas
Galveston, Texas
Beaumont, Texas
Lake Charles, La.
New Orleans, La.
Baton Rouge, La.
Vicksburg, Miss.
Jackson, Miss.
Starkville, Miss.
Meridian, Miss.
Demopolis, Miss.
Selma, Ala.
Mapsersville, Ala.
Montgomery, Ala.
Tuskegee, Ala.
Auburn, Ala.
Fort Valley, Ga.
Macon, Ga.
Cannan, Ga.
Augusta, Ga.
Williston, S. C.
Branchville, S. C.
Sumterville, S. C.
Charleston, S. C.
James Island (boat)
Columbia, S. C.
Charleston, N. C.
Danville, Va.
Richmond, Va.
Washington, D. C.
West Chester, Pa.
Newark, N. J.
Ithaca, N. Y.

This tentative itinerary is intended to show, in general, the region to be covered. It is printed for the purpose of securing the names of persons owning farms, plantations and ranches or other forms of agricultural activity of interest to the students of this school and, also, for the purpose of securing suggestions as to any changes in the route which may make the trip more valuable. In most instances, the towns mentioned are of no particular interest.

It is desired to sidetrack the car on which the party expects to live (including dining) as near to the places to be visited as possible. Where farms, plantations and ranches have their own siding, we would prefer to use it. We will be obliged to those making suggestions as to stops or extending invitations, if they will kindly state where the car can best be placed.

Address, Thomas F. Hunt, Professor of Agronomy, Cornell University, Ithaca, N. Y.

Miss Emma M. Lewis, who has been a student in the Nature Study department for the past two years, recently received an appointment from the Board of Education of Philadelphia, Pa. From April until the sea-
GRADUATE STUDENTS IN HORTICULTURE, CORNELL UNIVERSITY, 1905-6

P. M. Novik  I. B. DeMajumdar  J. E. Howitt  P. J. White  M. J. Iorns  L. F. Pauli
C. I. Lewis  J. C. Hogeuson  A. D. Taylor  J. Eliot Coit
son closes in October, Miss Lewis will have entire supervision of the school gardens of that city. Philadelphia was one of the first cities to use vacant lots for gardens for the school children—a phase of education which is now becoming of great importance in many cities.

* * *

The Poultry Department of Cornell University wishes to thank the following persons and firms for kindly donations.

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FORMER STUDENTS

'98, M. S. A.; '00, Ph. D.—Dr. Stevenson Whitcomb Fletcher was born at Littleton, Mass., Sept. 10, 1876. He attended the district school until he was thirteen years old. During the following three years he lived at a logging camp at Cape Cod. In 1892 he entered the Massachusetts Agricultural College, where he graduated in 1896. While in College he worked for his own living, paying all of his college expenses himself. Immediately after graduation Dr. Fletcher accepted a position as assistant horticulturist at the Massachusetts Agricultural Experiment Station. In

S. W. FLETCHER, PH. D., '00

September he came to Cornell as Fellow in Horticulture, and received his master's degree the following June. From 1898 to 1900 he was assistant in the Experiment Station at Cornell; in 1900 he received the degree of Ph. D. In the summer of 1900 he was instructor in nature study in the summer school.

From 1900 to July 1902, Dr. Fletcher was professor of horticulture at the Washington State College. From July, 1902, to 1903 he held a similar position at the University of
West Virginia, which position he resigned to come to Cornell in September, 1903. At Cornell, Dr. Fletcher’s work was primarily to direct the Farmers’ Reading Courses in the state; he also had charge of the winter course in agriculture, and assisted in the department of horticulture. While here, he took an active interest in the school gardens in the city of Ithaca.

In 1905 Dr. Fletcher accepted the chair of horticulture and landscape gardening at the Michigan Agricultural College.

In July, 1905, he was married to Miss Margaret Ralston of Chattanooga, Tenn.

'00 W.—Archibald S. Calkins, after a short illness of typhoid fever, died last November at Longmont, Colo. Mr. Calkins went to Longmont in 1903; he was employed as division foreman in the sugar factory at that place. The following item, taken from the Nov. 17th, 1905, issue of the Longmont Ledger shows in what high esteem he was held in that place:

"In disposition he was one of the most exemplary of young men and we cannot speak too highly of his Christian character. Always genial and kindly to his friends and acquaintances, it was a pleasure to meet and know him."

'08, Ph. D.—Prof. James G. Needham held the Goldwin Smith fellowship at Cornell in 1896. After leaving he was entomologist in charge of N. Y. State Field station for the study of aquatic insects and associate editor of the American Naturalist. At present he is professor of biology at Lake Forest College. Within a short time Prof. Needham will complete a college text-book of general biology, a Monograph on American Stone-flies and a handbook of N. American Dragon-flies.

'98, B. S. A.—Prof. E. Dwight Sanderson was State Entomologist of Texas for two years before going to New Hampshire to take a similar position in the entomological work of the Experiment Station. He is also in charge of zoology and botany at the N. H. Agricultural College. At present the attention of the station is devoted to the control of the brown-tail and gypsy moths. Although the fruit and trucking industries of New Hampshire are not well developed, Prof. Sanderson says that there is no lack of entomological studies.

'99, B. S.; '00, M. A.—Mr. Chas. B. Simpson is Government Entomologist of the Transvaal with his headquarters at Pretoria. He has been very successful in his fight against the locust plague and malarial bearing mosquitoes. The first of March, Mr. Simpson was to start for the United States and plans to be in Ithaca early in May. One of our students, Mr. Chas. W. Howard, A. B., '05, is assistant to Mr. Simpson, and writes that he is finding plenty of new problems to keep him busy. In addition to his regular office and field work, Mr. Howard is devoting considerable time to the insect pests of the cabbage.

'00, B. S. A.; '01, M. A.—In reply to our letter, Mr. Gordon M. Bentley tells us he is instructor of invertebrate and vertebrate zoology and of entomology at the University of Tennessee, Knoxville, Tenn. He is also assistant State Entomologist of that state.

'01, B. S. A.—Mr. D. L. Van Dine is the U. S. Government Entomologist of the Hawaiian Exp. Station, Honolulu. Mr. Van Dine is doing fine work especially along economic lines.

'05, Ph. D.—Prof. R. V. Chamberlin’s present address is University of Utah, Salt Lake City. During the years 1902-04 he was the Goldwin Smith fellow at Cornell. After leaving here, he became assistant professor of zoology at the University of Utah and is now full professor in charge of that department. He has spent considerable time on the morphology and classification of Chloplods, Diplodods and Arachnida.

'01, B. S. A.; '04, A.M.—Mr. A. G. Ruggles wishes the Cornell Countryman every success in its mission, writing from the University of Minne-
sota and Experiment Station. St. Anthony Park, Minn., where he is assistant entomologist. During the first semester of the college year, he enjoys teaching, while the rest of the year is spent in investigations. Elected to Sigma Xi, 1906. At present he is assisting his chief, Prof. F. L. Washburn, in preparing a text-book of zoology.

'00, Ph. B.; '04, Ph. D.—Dr. Alex. D. MacGillivray became connected with Cornell during the years of 1889 and 1891, after receiving his bachelor's degree at Wooster, Ohio. Since 1892 he has held the position of assistant entomologist at Cornell University. Dr. MacGillivray's chief publications are: "Classification of Thysanura," "Classification and Description of New Species of Saw Flies," and "The Embryo of Corydalus cornutus." At present he is interested in the study of the wing venation of the Hymenoptera and the classification of North American Insects. Dr. MacGillivray has in addition to his regular teaching work, developed a very thorough laboratory course on scale-insects.

'03, Ph. D.—Dr. Wm. A. Riley was fellow at Cornell during the years 1898 and 1899, and is now instructor. His main studies have been upon insect morphology, histology and embryology. His thesis was upon the Development of the Skeleton of the Head of Blatta, besides issuing many minor papers on insect histology. At present Dr. Riley is working upon the structure of the insect eye and making preparations and photographs illustrating insect morphology.

'00, B. S. A.—Franklin Sherman, Jr.—After graduation taught in the Nature Study School at Cornell in the summer of 1900 and in September went to the position of Entomologist in the North Carolina Department of Agriculture at Raleigh, where he was also made entomologist to N. C. Crop Pest Commission and to the N. C. Experiment Station and Instructor in Entomology in the Agricultural College. In summer of 1902 Mr. C. O. Houghton, Cornell '02, was appointed temporary assistant, but not until June, 1904, was provision made for a permanent assistantship, when G. M. Bentley, Cornell '00, B. S. A., then at Union Academy, Belleville, New York, was appointed. Mr. Bentley remained for a year, resigning to accept a similar position at the University and Experiment Station at Knoxville, Tenn. Mr. R. S. Woglum (M. S. A., Cornell '05) was then appointed assistant, but almost simultaneously with his arrival in North Carolina, Mr. Sherman accepted the professorship of Entomology and Zoology at the Ontario Agricultural College, Guelph, Canada, leaving North Carolina for his new duties at the end of August,—almost exactly five years from time of beginning work there. On May 12, 1903, married Miss Grace Berry of Ashgrove, Virginia. "We have a toddler boy whose first unusual word was "bu" (bug,) so perhaps he will become a naturalist."

'95-'97, Sp.—Suguya Hari is Government Entomologist at the Island of Formosa near Japan.

'03, B. S. A.—E. J. Glasson, who has been in the employ of the Bureau of Plant Industry of the U. S. Dept. of Agriculture, having had charge of the investigation of the trucking industry of the Southwest, has recently returned to the Florida Peninsula to take up vegetable growing on his own account.

'05, W. — Mortimer F. Barrus of Silver Creek, N. Y., became especially interested in Botany while attending the winter course here. Last fall he entered as a Freshman, Wabash, College, Crawfordsville, Ind. Mr. Barrus expects to take the four year course and specialize in botany and plant disease, after which he will return to Cornell for graduate work.

'05, W. P. C.—Elmer Phillips is managing the poultry department on the farms of the Solvay Process Company at Tully, New York.

'05, W. P. C.—George A. Seaman is poultryman on the Pencoyd Farm at Bala, Pennsylvania.
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NEW BUILDING OF THE COLLEGE OF AGRICULTURE; NORTH CAROLINA A. AND M. COLLEGE, RALEIGH, N. C.
HOW CAN A COLLEGE OF AGRICULTURE KEEP CLOSE TO THE GROUND?

By L. H. Bailey.

The evolution of agricultural education has been two-fold, the working out of a system of pedagogy, and the development of means of aiding the farming people directly in the problems of their business. In this evolution the trend has always been towards the soil rather than away from it, although this has not always been recognized since an educational system does not and cannot follow a farming system. Farming is one thing; education in terms of farming is quite another thing. However, the farm and the college are coming closer together, both because the college is finding ways of using agricultural practices in teaching, and because the farmer is coming to a better understanding of what education is. The colleges are losing their apologetic attitude, and are accepting agriculture and country life frankly.

There are many great special movements that are now taking the colleges of agriculture directly to the farm, chiefly in that field conveniently known as extension work; but more is yet to be done. It was an old idea that the college was sufficient unto itself, having its own farm, developing its own farm practice, and holding to its own point of view. In fact, the old farm itself was dominated by a similar spirit,—it raised its own products for food and clothing, depended on itself rather than on neighbors or market or society, developing a kind of personal feudalism.

At present, I have no mind to discuss the inter-relations of the college and the farm, but only to mention certain ways in which the regular academic teaching may be kept close to the ground, by which I mean in close touch with good farm practice and in sympathy with the farmer's point of view, for the good of both the student and the farmer. These means are clearly in the nature of an intimate interchange of ideas and experience, resulting in friendships in the broadest sense. They fall into two classes,—those in which the student goes to the farmer, and those in which the farmer comes to the student. This touch of the student with the farm and the farmer should be continuous throughout his college course, and should come naturally and never be forced. It will be noticed that I speak always of the student and not of the teacher. The student should get his touch with these questions himself, as a part of his own personal experience, in the same spirit in which he now comes in touch with his formal subject-matter through his laboratory work.

I look on the "County work" recently inaugurated by the students in this College as one of the means of acquiring this personal experience of farm men and farm affairs. It is good for the farm boy or girl as well as for the city boy or girl, because it broadens experience and keeps the sympathies alive. It should not be confined to one laboratory, that is, not to Tompkins County alone; and I look for the time when something will develop out of it for the entire state. This work, however, must be very carefully supervised. There is great danger that it may not only fall short of its purpose but may do positive
harm if not managed with unusual care and good judgment. It must never have in it anything of the doctrinaire.

I have felt that a system of student correspondence with farm youth may sometime develop in such a way as to be advantageous to the cause.

There are two special ways, however, that I wish now to emphasize. One concerns the way in which the student may secure farm practice, and the other the way in which he may secure farm advice.

It is an old question as to how far a college of Agriculture can supply farm practice. The mere physical difficulties of supplying it to a large body of students are insurmountable. At best, a college farm is not a commercial actual farm. It is not surrounded by normal farm conditions. Therefore its farm practice may or may not be the farm practice of farmers' farms. It is not the sphere of a college of agriculture to engage in farming, but to teach. If it merely ran a farm it would not be a college. Yet every college must have its farm, and I think that all these colleges can make more use of their farms as teaching agents than they have been able to do thus far. One must carefully distinguish, also, between the grades of instruction that it is proposed to develop,—whether it is of training-school grade, preparatory-school grade, college grade, or university grade. The more advanced the grade of instruction, the deeper does the student go into fundamental questions and the greater are the facilities and opportunities at his disposal; and the less can he afford the time for acquiring skill in mere hand practice. As a matter of money economy, also, it is cheaper to acquire the hand practice when not in college. The fact is, that the student should have his farm experience before he comes to college; or if he has not had that privilege, he should secure it on a farmer's farm sometime during his college course.

Now, I look on the good farms of New York State as laboratories for the College of Agriculture. I have long had in mind the making of a list of the best farms to which students desiring to learn advanced farm practice can be recommended. These farms should be classified as to their kind,—dairy farms, fruit farms, poultry farms vegetable-garden farms, floricultural farm, and the like. No farm should be entered on the lists till it has been inspected and approved as to its general prosperity, sanitary conditions and moral surroundings. Students should be sent to these farms as students, that is, to learn; if they render the farmer service they should be paid by him just what the service is worth. When we enter the new building, I hope that we may begin this "book of life." All this would not in the least relieve the College of the responsibility of maintaining farm-practice and of extending it; but it should be the means of supplementing the work of the institution and of bringing the people and the College still closer together.

The other special matter that I have now in mind is the providing of means whereby the students can have the advantage of advice by farmers. It is an excellent plan to have lectures by experienced men now and then, but this is not sufficient. This past winter we began the practice of asking farmers to visit us for some days at a time in order that they might inspect our work leisurely, offer such suggestions as occur to them, and be in readiness to consult informally with students. I should like an office room that can be given over wholly to such visitors; and I should like to have it occupied throughout the college year, different farmers coming for, say, a week at a time. These farmers would represent, in the course of the year, the many kinds of farming in the state. The students could always drop in, at certain hours, for counsel. This arrangement would be of mutual advantage to the College and the visitor. The College should contribute the expenses.
AGRICULTURAL EDUCATION IN THE MIDDLE SOUTH

By C. W. Burkett,

I am requested by the editor of the Cornell Countryman to say a few words in reference to agricultural education and its development in Virginia, North Carolina and South Carolina. These three agricultural states have recently awakened to great agricultural possibilities, and are manifesting in every way a decided interest in this, the most important phase of national education. One of the most striking features of this development has been the material equipment that has accumulated for the purpose of agricultural instruction in Virginia, North and South Carolina. And it is well to bear in mind that the first essential in developing agricultural education is to have the means and the equipment for instruction in agriculture. One cannot farm without land, teams and tools. On the other hand one can study Latin or Greek under an apple tree.

Evidence that this idea is correct is seen in the fact that five years ago none of these institutions had either equipment or agricultural students. Today, more than five hundred agricultural students are enrolled in the agricultural courses of these three institutions. Five years ago the graduating class of these three institutions showed no more than one agricultural student to twenty-five in other lines. Today the number has been changed to the proportion of about one in four. This year from these three institutions forty agricultural students will be graduated.

Not only has there been a growing interest among the young men that are in these colleges in favor of agricultural education, but the sentiment in favor of agricultural education is changing in a marked way in all of the states, to the end that our people realize that in order to reclaim and improve our soils, and make them truly prosperous, agricultural development all along the line is necessary; and that this can be brought about only through equipping the agricultural colleges to the end that trained men may be turned out, to go back to the farms as leaders of the people. That this is so, is evidenced by the fact that these three states now have agricultural buildings, which in value and extent surpass those devoted to other lines of education in the A. & M. Colleges. In every case these buildings are fitting monuments to agriculture, and representative of the dignity and esteem in which agriculture is held. When we remember that five years ago not one of these colleges, in fact in not one college in the South, was there a good agricultural building connected with the college, and that the equipment consisted generally of a broken down farm, and a few old outbuildings with no livestock, it seems to me that all friends of agricultural education have reason to feel encouraged and to feel that the South, in proportion to her wealth, is coming to the assistance of her agricultural colleges in a most liberal way indeed. As soon as we can turn out enough men to make an impress on the agricultural communities, and to supply the growing demand for managers of orchards, gardens, stock farms, and dairies; and to let the people see the value of agricultural training, the future of the agricultural college in the Middle South is assured and agricultural education will go forward by leaps and bounds.

While I do not have the figures at hand I am inclined to believe that the graduating classes in agriculture in Virginia, North Carolina and South Carolina of this year and of last year contain more agricultural men that all of the previous years from the time the agricultural colleges were first established until two years ago.

This change of feeling has been brought about by a change of point of view. As errors are cleared away, as necessary equipment is provided, and as time demonstrates correct princi-
amples, so we may expect that another
decade will show no more prosperous
agricultural students than found in the agricu-
tural colleges of the Middle South.

Another evidence of this change of
feeling toward agricultural education
is the fact that it has been the experi-
ence of every professor of Agriculture
a few years ago that it was generally
impossible to get newspapers to publish
an article relating to agricultural edu-
cation, the agricultural college, or to
the agricultural experiment station,
and when done it was only as a great
accommodation. There has been a
wonderful change in public sentiment
in this respect. Today even the daily
papers are after these institutions con-
tinually for practical articles about the
relation of agricultural education and
agricultural improvement to general
state conditions.

Another phase that is being gradu-
ally changed—I would emphasize
this point also—is that men in the
southern agricultural colleges are sim-
ply worked to their utmost capacity,
calling into action absolutely all of the
nervous force they can command;
working in a great many directions
entirely beyond their capacity and
possibilities; and this for the simple
reason that specialization is not possi-
ble because of the scarcity of teachers
and funds. But this condition of af-
fairs is being bettered gradually and
those responsible for this agricultural
awakening are filled with hope and
faith in their work and even now are
being rewarded by many proofs of
appreciation and by the many answers
to their calls. A rather marked mea-
ure of this agricultural work has been
the method of not only bringing to-
gether young farmers to the college,
but old ones as well; for it has been
the custom each year to have a State
Farmers' Convention or Institute;—a
week during the summer months
when the buildings and dormitories
are turned over to farmers, and the
time devoted to a discussion of agri-
cultural principles, practices and
farm problems. I presume in all, that
more than two thousand farmers are
in attendance during these three an-
ual conventions held at the agricu-
tural colleges.

But more than this is being done.
Agricultural education has been car-
ried to the rural school; and I do not
hesitate to say that more children are
being taught agriculture today in
schools in the South and in a more sys-
tematic way and with more enthu-
iasm as a whole than anywhere else in
the country. Teachers have not only
endeavored to teach agriculture in a
pedagogic form in their schools, but
they have endeavored to train them-
selves as well to do this work in a
systematic and correct way. In North
Carolina for instance, I think I am
altogether safe in saying that as many
as one-third of our teachers in the
rural schools have received instruction
in agriculture either at a teachers' in-
stitute, a County Summer School, or a
State Summer School; for it is the
rule that agriculture shall be taught
in each of these teachers' meetings
sometime during the year. The accu-
mulative effect of this plan is going
to be manifest within a few years, for
the consolidated school has already
come in many counties, and is growing
in favor constantly. It has been the
agricultural college that has been back
of the movement; it has been the work
of the State officers, the county officers
and of the teachers to make this work
a success, because they have felt the
need and they see the necessity and
value of the new school education and
are doing their share in affecting the
change and the evolution.

All in all then, there is nothing but
a very bright future indeed before
agricultural education and the agricu-
tural college of the Middle South.
The delightful climate, the wonderful
agricultural possibilities, and splendid
environments unite in making the fu-
ture of all agricultural colleges of the
Middle South pregnant with tremen-
dous possibilities and magnificent op-
portunities.
RURAL ECONOMY

By G. N. Lauman.
Assistant Professor of Rural Economy, Cornell University

The term rural economy is found in few modern dictionaries and is little known and less understood even among those who follow closely the developments of agriculture. The English use the term somewhat as equivalent to agriculture and some English universities have a professor of rural economy whose lectures seem to be in the main along the lines we now call agronomy. Beyond agronomy, animal husbandry, horticulture and all other distinctly technical branches of agriculture there are those relations of the farmer to his neighbors, the community and the world in general which are beginning to be considered of equal importance to the purely technical problems which confront him. When the farm was a self-sufficient entity and in the days of the pioneer and settler the question uppermost was one of wrestling with nature and wrestling with man or even seeking the co-operation of neighbors for common good was not much in evidence. This is the history of man wherever found. He does not feel the necessity of interesting himself in questions beyond his immediate horizon until surrounded by others striving in the same way when common questions need to be solved from the standpoint of the community, state, nation or nations. Such questions in all communities, whether urban or rural, may be either social or economic, to adopt the common classification. Rural economy may be tentatively outlined as that field of knowledge dealing with the facts deductions and theories concerning the economic side of agriculture, particularly such as concern more than the individual farm unit and group. It is, therefore, scarcely a question of individual farm management. This distinction should be clearly kept in mind for in the limited development of the study in the United States may be seen the confusion caused by the lack of distinction between individual economy of the individual unit on the one hand and the economy of the aggregate units or masses of varying numbers. Managing a shop whether for the sale of groceries or the manufacture of binders is not the content of economics, neither is farm management rural economy.

Among the tentative general divisions of the subject which have in varying degrees of intensity been the object of much study in the older countries, particularly of western Europe, is that dealing with the relations of the state to agriculture. These have assumed serious aspects for example in Germany where an agrarian past is struggling with an industrial present. In many of its aspects this question comes to every nation presenting itself as an internal question or a foreign question, or both. The rise or fall of particular crops and with these the welfare of larger or smaller areas is often intimately associated with such struggles and such questions cannot be intelligently solved without a knowledge of the fundamental technical principles of agriculture.

The question of the department of learning in which such studies are to be made is thus raised. Perhaps without conscious direction rural economy finds itself in the United States in two faculties or departments of agriculture and economics. In some European schools it is found in its varied aspects in both departments, while in others either agriculture or economics provides for it. The late Professor von der Goltz, of Bonn, was the head of the Agricultural Academy of the University, whose lectures and writings on agrarian problems had more than national influence. On the other hand there have been issued from the Staatswissenschaftlichen Seminar of Professor Conrad at Halle a number of valuable monographs on agric-
cultural development, in addition to his own studies in this field. As stated above, this condition of division obtains in the United States and at present it seems that the colleges or departments of agriculture are to develop rural economy rather than departments of economy. Perhaps this is due to the historical apathy of departments of economy to the fundamental economic development of the United States, that is along agricultural lines, and secondly to the great expansion of agricultural colleges and departments all over the country.

It is fortunate for rural economy that it had its origin in the civilization of Europe rather than that of America. It was a part of the agriculture of the Kameralwissenschaften in the days when there was no real economy and almost all economy was necessarily rural economy. Among the works on the fundamentals of political economy is v. Thuner's Isolirter Staat, based on agriculture from beginning to the end. Foreign economic journals are scarcely ever without articles on the economic side of agriculture and yet the greatest of agricultural countries has not had until lately any genuine students of its past and present agricultural conditions to guide it in the future with the increasing struggle for existence.

Aside from those problems of agriculture which call for governmental aid in their solution there are the many questions which depend for their solution on the enlightened opinion and action of the rural community. Among these perhaps the most pressing are the development of co-operation and the adjustment of the labor problem or of agriculture to the labor problem. In the former field spasmodic effort and some progress have been made, while the latter field has not yet been touched. What is needed is a general knowledge of the fundamentals of these problems, their evolution and attempted solution in other countries, studied and solutions attempted or offered in terms of agricultural conditions and not in terms of the so-called urban economy. It is necessary to recognize that there are two distinct fields of production, that of the factory and that of the farm, each with its own distinctive fundamentals. The former is much more amenable to man's wishes and the latter has an intimate and inseparable connection with nature.

The agricultural departments of the colleges and universities of the United States are training each year more and more men and women who go back to the farms. It is one of the aims of rural economy to give these leaders of agriculture such facts and theories as are necessary to an enlightened sympathy with the economic problems of agriculture and to furnish a solid basis for the logical development of an agrarian policy, in harmony with the conditions of nature under which agriculture must be conducted, benefiting the whole community, state and nation.
The Cornell Countryman

THE MANUFACTURE OF CONDENSED MILK. V.

By O. F. Hunziker.

CONDENSING.

From the well room the boiled and sweetened milk is drawn into the vacuum pan (Fig. 1) which is usually located on the second floor directly over the well room. Here the actual condensing of the milk takes place. The vacuum pan is a retort in which the milk is evaporated under reduced pressure. Just why the retort used for condensing milk is known in the Condensed Milk industry as the “Pan” has not been satisfactorily explained. Probably the name originated from the fact that in the early and experimental days of the manufacture of condensed milk the milk was evaporated in open kettles called “Pans.”

The vacuum pan is made of copper throughout. It consists of four main parts: Part I, the jacket or bottom; part II, the body; part III, the dome or upper part, and part IV, the condensor. These retorts are made of various sizes and shapes. Most condensories have adopted the so-called “six-foot-pan” with the shape similar to that of Fig. 1. By the term, “six-foot-pan,” is meant a pan measuring six feet in diameter. Part I is com-

![Diagram of a vacuum pan with labels](attachment://fig1.png)

---

**Legend:**

pletely surrounded by a steam jacket and has, in the center of the bottom, an outlet for the finished condensed milk. Part II is equipped with copper coils which extend downward into the jacket. Most six-foot pans are fitted out with two coils, though there are some pans in use that have three coils. The coils vary somewhat in size, the larger and upper coil measuring from 4 to 5 inches, the smaller and lower coil 3 inches in diameter. The jacket and coils are connected separately with the main steam line and are the means of heating the milk. The total heating surface of a six-foot pan covers about 110 to 120 square feet and such a pan will condense from 15,000 to 20,000 pounds of milk in one batch.

![Cooling Tank](FIG1-Cooling Tank

Courtesy Jas. Baizley, Iron Works)

The man-hole in part III is made large enough (15 to 18 inches in diameter) to allow the pan-washer to enter the pan. This opening is closed with a well fitting, heavy brace cover, carrying in its center an eyeglass through which the processor watches the boiling milk in the pan. In the rear of the dome there are two more eyeglasses. Through these the interior of the pan is illuminated either with lamps, gas, or electric lights. The thermometer which perforates the dome has a long stem enclosed in a brass casing, and reaches down into the milk. Some processors prefer a short thermometer which registers the temperature of the air instead of that of the milk in the pan. The vacuum gauge is in connection with the interior of the retort, and indicates the number of inches of vacuum. The blow-down valve serves to break the vacuum which is sometimes necessary in case of accident and must always be done when the condensing is completed, in order to facilitate the drawing off of the finished condensed milk.

Part IV, the condenser, consists of a huge, hollow, copper cylinder, usually but not always, in horizontal position. In its interior there is a spray pipe—a large copper pipe perforated with innumerable holes. The spray pipe is connected with the water inlet of the condenser, and, when the pan is in operation, a shower of water issues forth from these holes in all directions, owing to the reduced pressure in the condenser. This spray of cold water condenses the vapors arising from the heated and violently boiling milk in the pan. The condensation water together with the water from the spray pipe is carried off through the pipe that connects the condenser with the vacuum pump. In the manufacture of condensed milk wet vacuum pumps are now used exclusively.

Before introducing the milk the pan should be thoroughly rinsed with water, then steamed till the temperature rises to about 180 deg. F. This should be done in order to prevent the sudden chilling of the hot milk when it enters the pan. Then the man-hole cover is inserted, the vacuum pump started, and the water valve partly opened allowing some water to run into the condenser. When the vacuum gauge shows 26 to 27 inches of vacuum the pan is ready for the milk. The milk valve is now opened and the milk rushes into the pan because of the partial vacuum in the retort. Steam is turned into the jacket and coils as soon as they become covered with the milk. When the upper coil is completely covered with milk the milk valve is partly closed and the milk inflow so regulated that the boiling liquid is held as nearly as possible at a constant level. In other words, the milk is drawn into the pan continuously, and only as fast as it condenses. When all the milk of one batch, say
15,000 pounds, is in the retort the evaporation is nearly completed.

The steam pressure used in the jacket and coils varies from 10 to 25 pounds; it should be governed according to the temperature and the water supply in the condenser. The use of less than 15 pounds of steam retards the condensing, while an excess of steam pressure above 25 pounds tends to injure the quality of the condensed milk. The temperature is governed by the amount of steam in jacket and coils, the amount and temperature of the water in the condenser and the completeness of the vacuum. The milk is condensed at temperatures ranging from 120 to 150 deg. F. Other things being equal, the more steam, the higher the temperature of the milk; the more spray water in the condenser, and the more nearly perfect the vacuum, the lower the temperature. A slight air leak in the retort will reduce the vacuum and cause a rise in the temperature.

The time required to condense a batch of 15,000 pounds of milk at a temperature of 130 deg. F., with about 25 pounds of steam pressure and in a 25 inch vacuum is from 2½ to 3 hours. The more steam and the more water used, the temperature being the same, the more rapid the condensing. The process should not be hastened, however, to the extent of using more than 25 pounds of steam pressure. Aside from the capacity of the vacuum pump and the presence or absence of leaks in the pan, the vacuum is governed largely by the temperature. A rise in the temperature is followed by a fall in the vacuum and vice-versa, and a decrease of the vacuum means less rapid condensation. Therefore, the higher the temperature, above a certain limit, say 130 deg. F., the slower will be the evaporation. The more evenly the pan is operated, the fewer and the less abrupt the changes in steam pressure and in temperature, the shorter will be the process of condensing and the better will be the quality of the condensed milk.

When all the milk is in the pan the steam pressure should be gradually reduced so that the batch can be finished with not more than about 5 pounds of steam. The reasons for this precaution are manifold: when the inflow of fresh milk stops, the contents of the pan thicken rapidly and the boiling becomes less violent. If the heating surface is too hot the syrupy milk is liable to stick to and burn onto the jacket and coils; too high steam pressure at the end of the process tends to cause the milk to thicken after it is put into tin cans; again, a reduction of the steam pressure will lower the temperature of the condensed milk so that the change of temperature when the condensed milk is subsequently cooled is less abrupt.

In some factories a somewhat different process is applied. The milk is condensed with a view of swelling it in order to increase the yield of condensed milk. The heated milk is drawn into the pan without first adding the sugar. When it has nearly reached the proper degree of condensation, all the valves are closed and the vacuum pump stopped. Live steam is then turned directly into the condensed milk until the temperature rises to 180 deg. F. and the vacuum has fallen to about 12 inches. Now the vacuum pump is again started and the process continued and finished in the usual way.

FINISHING OR "STRIKING."

The "striking" of a batch of milk is the term used to express the operations incident to the sampling of the condensed milk and completing of the condensation. To know just when the proper degree of condensation has been reached is the most difficult part of the entire process. It is here where the processor can easily make or lose his wages. There are various conditions that show the processor when the milk in the retort is nearly "done"; viz., the time required for the evaporation, the number of minutes elapsed since all the milk has been drawn up, the amount of condensed milk left in the pan and most of all, the appearance
and behavior of the boiling milk itself. Milk that has been sufficiently condensed assumes a glossy and glistening lustre, it boils over from the circumference towards the center, forming a small nucleus of foam in the center of the pan. If the pan-man be a careful observer he is able to tell within a few seconds when the batch is done just by looking into the pan. This does not mean, however, that he should wait to the last minute till he "strikes" or samples the milk, for even the most skillful and experienced processors are easily deceived by the mere appearance of the milk through the eyeglass. Samples can be drawn from the pan by operating the two valves at the outlet, (see Fig. 1). While the pan is in operation the reduced pressure in the retort would make the drawing out, by simply opening the outlet, impossible. Instead of the milk running out the air would rush in with violent force and would cause the milk in the pan to be thrown over into the condensor. For this reason the outlet is equipped with two valves. The lower one is closed and the upper one opened allowing some milk to run down into the nipple between the two valves. Now the upper valve is closed and the lower one opened and the milk in the nipple can run out freely. The first sample should be rejected and the operation repeated. The second sample is caught in a dipper or cup where it is examined. Many methods have been invented and apparatus devised with the endeavor to determine accurately the point of the desired density of the samples thus obtained, but, so far, none of the devices tried have given as good satisfaction as the experienced eye and good judgment of the processor. Attempts have been made to determine the density of the sample by means of resistance-meters, specially prepared hydrometers, or by weighing a definite quantity of the condensed milk on sensitive scales. All of these methods proved inaccurate and unsatisfactory and have, therefore, been abandoned. The principle objection in every case was, that they operated too slowly.

When the milk has been condensed to a point where one minute more or less means the success or failure of a batch there is not time to fill a cylinder and wait until the hydrometer has adjusted itself in the syrupy solution nor to measure out a definite quantity and wait for the scales to find their equilibrium. Again, a change in the temperature, a difference in the percent of fat, or a mistake in the amount of sugar added would so change the specific gravity of the condensed milk that these devices would naturally give misleading results. A decided improvement over the above methods is the following: The sample is drawn into a dipper; the dipper, containing the sample, is lowered into a pail containing ice water and, with a metal back thermometer, the contents of the dipper are stirred rapidly till a constant temperature, say 70 deg., has been reached and the viscosity and resistance of the cooled condensed milk will tell the processor whether the milk is condensed enough. While this method is far in advance of the above described ones and while it is used today in many factories, its objection is that it occupies too much time. The best results are obtained by finishing the batch at a constant temperature, taking a sample into a cup and, with the aid of a teaspoon judging its consistency at that temperature. With a little practice, a quick eye and good judgment the processor soon becomes efficient in the operation of "striking," and is able to make a condensed milk of very uniform density from day to day.

When the evaporation is completed the steam is shut off from the jacket and the coils, the water valve is closed, the vacuum pump stopped and the vacuum broken by opening the blow-down valve in the dome. As soon as the man-hole cover is removed the vacuum pump is started again for the purpose of removing the hot air from the pan which is liable to cause the milk to crust over while it is being drawn off. The milk is drawn into 40-quart cans which are subsequently
set into the cooling tanks. The condensed milk should be removed from the pan as rapidly as possible in order to prevent its superheating while lying idle in the hot retort. In some factories a wire mesh or cloth strainer is attached to the outlet of the pan and the milk strained before it runs into the cooling cans. This practice is unnecessary and objectionable as it tends to retard the removal of the milk from the pan.

**COOLING.**

When the finished condensed milk leaves the vacuum pan its temperature stands above 100 deg. F., generally 115 deg. to 120 deg. F. If it were not cooled at once it would become thick and cheesy in texture in a short time. In the early days of the manufacture of condensed milk the hot condensed milk, drawn into milk cans (40-quart cans), was set in cold water or ice water and stirred with a stick or paddle by hand. This was very hard and tedious work, increasing the cost of production and, the stirring being imperfect and irregular, the quality of the condensed milk was far from being perfect. It was soon observed that imperfect stirring caused some of the sugar to recrystallize and make the milk sandy. The sudden chilling of a saturated sugar solution like sweetened condensed milk is favorable to the formation of sugar crystals. Where the stirring is imperfect all of the milk is not kept in sufficient motion to insure uniform and gradual cooling. The milk bordering the sides of the can is exposed to such an abrupt change of temperature that the formation of crystals is almost inevitable.

Gradually the method of cooling was improved and the hand stirring has been completely abandoned. Paddles closely scraping the sides of the cans are now used. Instead of setting the paddles in motion they are made stationary and the cans filled with condensed milk revolve. The principle is similar to that adopted in the ice cream freezer. Heavy iron tanks with a capacity of from 12 to 48 cooling cans are used for this purpose. The bottom of these tanks is equipped with a system of cog wheels set in motion by means of a gear at one end of the tank, (Fig. 2). The wheels are little larger in diameter than the cooling cans and are so cast as to allow the cans to rest in a rim or flange which prevents them from sliding out of position. The cooling cans are either ordinary 40-quart milk cans or cylindrical cans made especially for this purpose. The main point is that they are made out of heavy material. They should be substantial enough to stand rough usage without suffering indentations. Cans with irregular, uneven, depressed or bulged sides will not make a thorough scraping of the sides by the paddle possible. Such cans should be slipped over a wooden horn and the indentations hammered out with a mallet. The paddles are forced against the periphery of the cans and held stationary by the cross bars and springs. See Fig. 3.

It has been stated above that sudden changes of temperature are conducive to the formation of sugar crystals, which rob the sweetened condensed milk of the desired smoothness and, which, later, will settle to the bottom of the sealed cans. This is a very common defect and settled milk is usually rejected on the market. For this reason it is necessary to cool the sweetened milk gradually, uniformly and slowly. This is
best accomplished by warming the water in the cooling tank to about 90 deg. F. before the cans are lowered into it. Then let the cans revolve for about 20 minutes without the addition of cold water. After that cold water may be run into the tank little by little till the temperature of the milk has fallen to 70 deg. F. The entire time for cooling should occupy at least two hours. In some factories the milk is cooled in 40 minutes and, if the water is not cold enough to accomplish it in that time ice is added. These factories invariably put on the market a sandy and settled milk. Naturally the time necessary for cooling will vary according to the temperature at which the milk is finished in the pan. Where the evaporation is completed at a very low temperature the time for cooling can be reduced accordingly. It must be remembered, however, that to finish a batch of milk at a low temperature means a corresponding increase in the time necessary to condense; therefore, the gain of time in one part of the process is generally offset by a corresponding loss of time in another. The lower the natural temperature of the water used for cooling, the greater the danger of the milk becoming sandy. Too much attention cannot be paid to this very essential but generally overlooked fact. When the milk is sufficiently cooled the cans are stopped, the paddles taken out and the cans removed from the tank.

Attempts have been made to improve the above methods of cooling, but without success. It seemed plausible that the finished condensed milk might be cooled in the vacuum pan before drawing it out, by turning the steam off and running cold water through the jacket and coils. This method proved highly unsatisfactory. The condensed milk, when cooled in this way, was very sandy and gritty, owing to the precipitation of large crystals of sugar. Moreover, the milk adhered with great tenacity to the cold jacket and coils and could only be removed with great difficulty, resulting in much waste of time and material.

Then, some ingenious mind, ignoring the fundamental principles underlying the crystallization of sugar in saturated solutions, conceived the idea to reverse the above method. For this purpose a large cylindrical water tank was constructed. In the interior of this tank a large copper coil extended from top to bottom with an inlet at the top and an outlet at the bottom. This tank was filled with cold water and the hot condensed milk coming from the vacuum pan passed through this coil and, when it left at the bottom it was cold. This was, indeed, a clever idea, but, as a means to cool sweetened condensed milk, it was utterly worthless. The main objection to it was the fact that it caused the milk to precipitate its sugar to such an extent that the milk could not be placed on the market. Nor did it operate well, as the inside of the coil became coated rapidly with sugary milk reducing the passage until it clogged up completely.

(To be continued.)
SYNONYMY OF BEANS

By C. D. Jarvis, G.

In the yearbook of the U. S. Department of Agriculture for the year 1900 it is stated that American seedsmen catalogued the preceding year 815 real or nominal varieties of beans. In such a maze of names, with such looseness of nomenclatorial practice, and such inadequacy of description, growers, especially owners of private gardens, have great difficulty in securing the varieties best suited to their purposes. Anyone studying the modern seed catalogue may almost wish for the simplicity of the early days when he could number the varieties of any one vegetable on the fingers of one hand.

The list of varieties is so large that one is inclined to say at once that many of the names must be synonymous. Many of the names differ from others only in the addition of some unimportant word, such as new, select, choice, famous, etc., which undoubtedly do not mark any varietal difference. Such descriptive words as improved, stringless, rustless, early, large, and the names of persons frequently do indicate varietal differences. Examples are: Henderson Bush Lima and Improved Henderson Bush Lima, Golden Wax and Rustless Golden Wax, Refugee Wax and Stringless Refugee Wax. The indiscriminate use of such words, however, make the distinctions in varieties very confusing. The variety Red Valentine, for example, is listed under 67 different forms, a few of which follow: Early Red Valentine, Improved Early Red Valentine, Extra Early Red Valentine, Improved Extra Early Red Valentine, Improved Valentine, Round Pod Valentine, Improved Round Pod Valentine, Red Speckled Valentine, New Improved Round Pod Extra Early Red Speckled Valentine, Tait's Extra Early Valentine, Cleveland's Improved Valentine, Mammoth Stringless Valentine, Lightning Valentine.

The prefixed seedman's name often denotes superiority in stock, especially in point of purity, but the practice has been so much abused that it has little or no significance and therefore may as well be left to the reputation of the seed house.

The confusion is intensified by the practice of re-naming old varieties, examples of which are common, and the giving to new varieties names similar to names already used; for example, Stringless Green Pod, Giant Stringless Green Pod, and Grennell's Stringless Green Pod.

Occasionally an old varietal name is entirely superseded by a new one. Examples are: Golden Wax, Lightning, and Henderson Bush Lima, which were first known as York Wax, Fegee, and Dwarf Carolina respectively.

The seedsmen are not responsible for this confusion, for among them similar difficulties exist. A seedman may secure some seed of what he believes to be an unnamed variety and, in the absence of any published descriptions of the varieties in commerce, he introduces it as a new variety. As only a few of the larger seed houses maintain trial grounds a supposed new variety is often sent out without being tested and, as a result, it often happens that the seedman catalogues the same variety under two or more names. Seedsmen sometimes purposely list a variety under several names in order to maintain the trade in localities where a certain type is known by a local name.

It is evident from what has been said that there is a strong demand, both from the seed trade and from the public, for more precise information about varieties. This not only applies to beans but to all our garden vegetables.

During the past summer the writer tested 380 apparently different varieties of beans. The other names listed
JUNE, 1906

Our College Woods

Just in the rear of the new buildings of the College of Agriculture there is a strip of woods nearly half a mile long fronting Lake Beebe. A number of men have been busy clearing out the undergrowth and preparing the ground for putting in cinder paths. Although this is a north slope, it has one of the prettiest settings of any forest ramble about Cornell, for the famous Forest Home Path traverses this same tract. This will be put in good shape and used as a picnic ground for the many school and grange picnics which will be held at the College of Agriculture.

It has been suggested that the students of the College take the responsibility of naming the various walks and seats after those persons whom the students decide that the College owes most for its existence and development. Furthermore, if certain classes wish to leave memorials it is suggested that permanent seats erected at the various good view points would be very fitting. We venture the opinion that very few, if any, colleges of agriculture in the country can boast of such a magnificent stretch of mature, natural woods as a close background to the buildings, which lying as it does along a beautiful lake makes a feature of our college in which every student should take a deep and personal pride.

CANDIDATE FOR THE DEGREE OF PH.D., 1906

Mr. Iorns was born in 1868 near Red River, La. Raised in Louisiana, Ohio, Illinois and Iowa. Was farmer, merchant, grain and stock dealer, and postmaster till 1886. Graduated from Cornell College, Mt. Vernon, Iowa, B. S. in B. C. E. in 1892. Civil Engineer C. & N. W. Railway till injured and compelled to drop that profession. Superintendent village school and later principal city high school. Instructor in Cornell College, graduate student University of Chicago in chemistry, botany, physics and geology for three years. Held Chair of Science, Fort Worth University, four years, and was also lecturer in Medical College. Entered Cornell University for graduate work in 1904. Major, horticulture; minors, physiography and soils.
CANDIDATES FOR THE DEGREE OF M. S. IN AGR., 1906

Mr. Fletcher was born in Bainbridge, N. Y., in August, 1879. He graduated at the Bainbridge High School and entered the College of Agriculture at Cornell from which he graduated in 1904. Appointed to the position of Scientific Assistant in office of the Pomologist, Bureau of Plant Industry, Washington, D. C. Mr. Fletcher has been assisting Mr. Gould, another Cornell man, in his orchard investigations in 1905-06.

Mr. Homer was born July 30, 1875. Was graduated from the scientific department of the State Agricultural College of Utah in 1900. After graduation Mr. Homer spent one year teaching in the Oneida Academy, Idaho. The following three years were spent in travel and study in Europe. In the fall of 1905 Mr. Homer resigned his position as Instructor in Agriculture at the L. D. S. University of Salt Lake City, Utah, to take up graduate work in the department of horticulture at Cornell University. Next year Mr. Homer will be at the head of the horticultural department of the Brigham Young University of Provo, Utah.
Mr. Howitt was born in 1881 at Guelph, Ontario. After attending the Guelph High School, he spent a year on a farm before entering the Ontario Agricultural College at Guelph. He graduated in 1905 and entered Cornell. In the summer school he specialized in entomology. He aided in the orchard survey work in Niaraga County, N. Y. Major, horticulture; minor, entomology. Member of Lazy Club and Sigma Xi.

Mr. Hogenson married Miss Lydia Baker in 1903; they have one child.

Born in 1874; raised on a farm; received the degree of B. S. from the Agricultural College of Utah in 1899. Taught school three years. Graduate student Michigan Agricultural College in 1902. Employed in the Bureau of Soils, U. S. Dept. of Agr. three years as Soil Expert. In the fall of 1905 he resigned his position with Bureau of Soils and took up graduate work in horticulture and agronomy at Cornell University. Mr. Hogenson married Miss Lydia Baker in 1903; they have one child.

Mr. Lewis was graduated from the Massachusetts Agricultural College in 1902. In 1903 he was Master of Science at the Rockland High School at Rockland, Mass. During the years 1903-1905 he was head of the Dept. of Nat. History and Agriculture at Alfred University. He entered Cornell as a graduate student in horticulture and landscape gardening in the fall of 1905. He has accepted the position of Professor of Horticulture at the Oregon State College of Agriculture. Mr. Lewis is married and has one child.
Mr. Swaine was graduated from Yarmouth Academy, Yarmouth, N. S., and later from the Provincial Normal School of Truro, N. S. After teaching for two years at Ohio, N. S., he entered the Truro School of Agriculture from which he was graduated. For two years he was principal of St. Ninian High School, Antigusish, N. S. Graduated B. S. in Agr. from Cornell, 1905. Sigma Xi.

A. D. Taylor

Mr. Tan was born in Canton, China, in 1878. He graduated from the mining college of Tientsin University in 1899, after which he entered upon his duties as an assistant engineer of an iron mine in Hu Peh. Later he became interested in Agriculture, came to America in 1901, and entered the University of California, from which he received the degree of B. S. in Agriculture in 1904. He entered Cornell University in February, 1905, specializing in agricultural chemistry and agronomy. Mr. Tan is the first Chinese student to graduate from an agricultural college of an American University.
Mr. White was born in Moravia, N. Y., but soon moved to a farm in Kansas. He attended the Southwest Kansas College, receiving the degree A. B. in 1900. The next two years he spent at the University of Oklahoma as an assistant in botany, taking the degree A. M. in 1901. During the summers 1900 and 1901 he was engaged in a geological and natural history survey for that university. In 1904 he studied agriculture at Harvard where he was an assistant in the chemical laboratory. In the fall of 1905 he entered Cornell as a graduate student in Agronomy.

MISS LAURA GANO
Miss Gano is a native of Ohio. She is a graduate of Earlham College, Richmond, Indiana, and a graduate in science of the University of Chicago. She has been a teacher of Natural Science and Nature Study in the schools of Cincinnati, Ohio, and has also taught in the Earlham College Summer School.

Miss Gano is interested in practical farming and country life.

CANDIDATES FOR THE DEGREE OF B. S. IN AGR., 1906

Mr. Barron was born in June, 1883, near Nunda, N. Y. He early went to live on a farm where he acquired a taste for things agricultural. When a small boy he went to district school and later to Nunda High School from which he graduated in 1900. He entered Cornell with the class of 1906, and has been on the Countryman Board for two years. Sigma Xi in 1906. Cayuga Club. During his college course he has specialized in soils, agronomy and horticulture.
Born in 1885 at Dover, N. H. Prepared for college at the Dover High School and entered the New Hampshire State College of Agriculture in the fall of 1901. After completing his sophomore year, he entered Cornell in the fall of 1903 with the class of 1906. He has specialized in horticulture and botany and intends to follow this line of work. Member of Cayuga Club and of the Granite Chapter of Alpha Zeta.

Mr. Brinckerhoff was born in Mt. Vernon, N. Y., in 1884. After graduating from the Grammar and High Schools he entered Cornell in the fall of 1902. Entered College of Forestry but when that course was discontinued entered the College of Agriculture. Mr. Brinckerhoff has specialized in Outdoor Art. Captain Varsity Basketball team in Junior year. Member of Delta Tau Delta fraternity.

Mr. Bues was born in Achim, Germany, in 1874. He attended the Real Gymnasium, Bremen. Cornell Winter Course, 1902, and later entered class of 1906. During vacations has been employed as State Nursery Inspector of Wisconsin. After graduation he will go to Peru, South America, to aid in the development of large tracts of land. Mr. Bues identified himself with the foundation of the Cosmopolitan Club, Cornell Countryman, N. Y. State Experimenter’s League, and Traveling Summer School of Agriculture. Alpha Zeta, Sigma Xi, Cosmopolitan Club.
Mr. Coelho was born in São Paulo, Brazil, 1882, where he studied at Mackenzie College.

For three years he managed his father's coffee-plantation at Jahu, then studied law for a time. In 1903 he entered Cornell. After Commencement Mr. Coelho intends to go to Europe for a few months before returning to Brazil to take charge of his father's business where he will put his Cornell experiences into practical use.

Mr. Coelho is a member of the Cosmopolitan Club.

Mr. Button was born on a farm near Canastota, N. Y., in 1879. He came to Cornell as a Winter Course student in 1901. Returning as a special he worked off his conditions and became regular. He has devoted much of his time to animal husbandry and is an expert judge of dairy cattle, swine and poultry. He has done some work in the Home Nature Study department and is a lecturer at Farmer's Institutes. After graduation Mr. Button will hold the position of Supt. of the estate of Mr. G. E. Tarbell.

Born in Scotland in 1881; came to this country in 1887; obtained his early and high school education at Claremont, New Hampshire. Was graduated from Stevens High School in 1900. After working on his father's farm one year, he spent two years at N. H. State Agricultural College, and then entered Cornell and has specialized mostly in horticulture. Member of C. U. lacrosse team, Agr. Col. baseball team, Lazy Club, Agr. Association, Cayuga Club, and Granite Chapter of Alpha Zeta.
Mr. Evans was born at Neath, Bradford County, Pennsylvania. After attending the district school in that place, he studied for two years at the Susquehanna Collegiate Institute, Towanda, Pa., and later graduated from the Towanda High School. Taught school one year. At Cornell he has taken a general agricultural course, taking considerable work in botany, soils and agronomy. He has been on the Cornell Countryman two years; is a member of the Cayuga Club.

Mr. Fagundes was born in 1881 at Sao Paulo, Brazil. After he had finished his preparatory work at Mackenzie College, Sao Paulo, he managed his father's coffee plantation at Riberias Preto. In the fall of 1902 he came to Cornell. After June, Mr. Fagundes intends to spend some months in the South investigating Southern agriculture before returning to Brazil to take charge of his father's business.

Mr. Fagundes was born at Sao Paulo, Brazil. Prepared at Mackenzie College in Sao Paulo and entered Cornell in 1901. In the summer of 1904 he went to Brazil and remained there the rest of the year. In 1902 he was an active member of the Cornell Fencing club and won the 2nd Amster medal. He finished his college work in the fall of 1905 and is now traveling in Europe. He intends to return to Brazil and take charge of his several coffee plantations. Member of Cosmopolitan Club.
Mr. Holton prepared for college at the Montclair High School, Montclair, New Jersey, and entered the Agricultural College at Cornell in 1902. Mr. Holton has specialized in chemistry and dairying and when through college expects to go into business.

Mr. Herrick was born in New England but has spent the most of his life in the Southern States. He came to Cornell University to specialize in agricultural chemistry and expects to be located in Cuba after graduation.

Mr. Johnson was born at Youngstown, N. Y., in 1881. He attended grammar school and Masten Park High School in Buffalo. Entered Cornell in 1902 and took work in forestry, but later, after that college had been discontinued entered the College of Agriculture to specialize in horticulture. Elected manager of basketball team 1905. Varsity lacrosse team two years but won his numerals in the Junior class crew. Kappa Sigma, Scalp and Blade, and Gemel Carm.

Mr. Johnston expects to enter the Government Service.
Ora Lee, Jr., after preparing for college at his home town High School, at Albion, N. Y., entered the Agricultural College in 1902. He has taken a general course, specializing in his senior year in soils and agronomy. In April, 1906, he received an appointment in the Bureau of Soils of the United States Department of Agriculture. He was business manager of the *Cornell Countryman* in 1905-06.

Mr. Libby was born in Province of Quebec, Canada in 1882. He came to the United States in 1894. In 1900 he was graduated from Worcester, E. H. S. He entered Cornell Agricultural College in 1902.

P. L. Lyford was born at Waverly, N. Y., August 7, 1884. After preparing for college at the Waverly High School he entered the College of Forestry at Cornell in 1902. As the Course in Forestry was discontinued the following year, Mr. Lyford entered the Agricultural College in 1903 and has specialized in landscape design. Member of Basketball team '02-'05 and captain '05-'06. Member of senior ball committee and Sigma Alpha Epsilon.
Charles W. Mann was born at Hawkins, Allegheny Co., Pa., on Jan. 4, 1879. He was educated at the common and high schools of Pittsburg. After working four years at civil engineering he entered the Western University of Pennsylvania to study the same and then took his Sophomore year in the civil engineering course at Cornell. He has taken his last two years in agriculture and expects to enter the Bureau of Soils.

Mr. Mathewson was born in Pictont County, Nova Scotia, Canada. He received his primary education in the schools and academy of that province, and later attended the school of Agriculture at Truro. Mr. Mathewson is specializing in entomology.

Mr. Zevallos was born in Paris in 1885, and moved to his home in Peru in 1894. He prepared for college at the "Institute de Lima" and also spent one term at the National School of Agriculture at Lima. He entered the Cornell Agricultural College with the class of 1906, and has specialized in agronomy. Before returning home Mr. Zevallos intends to travel in the South in order to become acquainted with the agricultural conditions there.
Mr. Peck was born in New Brunswick, Canada, near the head waters of the Bay of Fundy. Later his family moved to Wolfville, Nova Scotia, where his home now is. He prepared at Mt. Hermon Boys' School, Mass.; entered Cornell as special student in Agriculture in fall of 1902. He intends to remain at Cornell another year, continuing his studies along a special line.

Mr. Ross was born at Leadville, Colorado in 1881. Since 1883 he has lived on a farm in Southern New York. He prepared for college at the Waverly High School from which he graduated in 1902, and in the fall of the same year entered the Agricultural Course at Cornell, with the class of 1906. Mr. Ross has specialized in dairying, and was student assistant in the dairy laboratory during the short Winter Course of 1906.

When through college he intends to take up some branch of dairying as his life work.

Mr. Shaw was born on a farm in West Henrietta, N. Y., in 1881. He graduated from Starkey Seminary in 1902 and entered Cornell the succeeding fall. He specialized in soils, agronomy and dairying. Was assistant in soils in Junior and Senior years. In February, 1906, Mr. Shaw accepted an appointment as scientific assistant in the Bureau of Soils, U. S. Department of Agriculture. Mr. Shaw hopes to take up farming on his own account after a few years of soils work.
Mr. Swiggett was born in 1831 at Morrow, Ohio. He graduated from the Woodward High School, Cincinnati, Ohio, in 1902. Mr. Swiggett entered Cornell with the class of 1906 and has specialized in landscape gardening and horticulture.

Mr. Slocum was born at King Ferry, N. Y., in 1883. His home has been in Ithaca since early childhood. He entered Cornell with the class of 1906 and chose the Forestry Course. When this course was discontinued he tried Arts for one year and then changed to Agriculture. He has specialized in poultry husbandry and expects to make that his life work.

Mr. Tailby, Jr., was born in Ithaca, N. Y., and prepared for college in the Ithaca High School. He entered Cornell in the fall of 1902. After completing his work for graduation, he left April 1, 1906, and has since been employed by the U. S. Bureau of Soils as field assistant on the Soil Survey.
Mr. Tibirica was born in Sao Paulo, Brazil, in 1882 and took a preparatory course at Mackenzie College. After studying agriculture for one year at Escola Polytechnica Mr. Tibirica returned to Mackenzie College and prepared for Cornell, which he entered with the class of 1906. He has devoted himself to the study of malt and hop products which he will continue in Europe. After his studies are completed Mr. Tibirica intends to return to Brazil and manage his father's coffee plantation. He is a member of the Cosmopolitan Club.

Mr. Westover was born at Austerlitz, N. Y., in 1879. After graduating from the Chatham High School, he taught in the district schools for a few years. In the fall of 1902 he entered Cornell as a special student in agriculture and the next year entered the regular course. He has specialized in chemistry and soils.

by seedsmen were known to be synonymous and were not tested. Of the number tested 196 proved to be distinct sorts. One important lesson learned from this work is found in the fact that many of the synonyms under certain conditions may possess economic characters, such as vigor, productiveness, disease resistance, etc., which are not found in the original type. As a rule, however, synonymous forms are identical in every way. We apparently, then, have two kinds of synonyms; those which have been produced by the re-naming of a variety or what we may call a true synonym, and those which have been originated independently or have been modified by environment, selection, or other influences. The characters of the latter kind are not always manifest, but are apparently latent and are likely to become apparent when conditions are favorable. In variety tests no distinction is made in these two kinds of synonyms. The determination of these latent characters must be left to the individual grower.

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