

The M. A. C. Record.

VOLUME I.

LANSING, MICHIGAN, TUESDAY, MARCH 10, 1896.

NUMBER 9.

GOOD ROADS CONVENTION.

REPORTED BY O. C. HOLLISTER, '89.

At the good roads convention held in Lansing March 3, Gov. Rich, in a few well directed remarks, stated the purpose for which the meeting was called, directed attention to the present road labor system as existing in most of the counties of this State, some of its apparent defects, the stand taken by many of our neighboring states in the matter of roads, leaving the convention to say if they should recommend any measures looking toward a bettering of our country roads, and called for nominations for a temporary chairman and secretary. In response to this the Hon. W. L. Webber of Saginaw, and Mr. Frank Hodgman of Climax, occupied the positions.

Upon vote the convention deciding to form a permanent organization, the chair appointed a committee of five to draft a constitution. Pending this report the question of roads was discussed quite largely by members from the different localities. All seemed to agree that the labor system was inadequate to build and care for the roads. From the Bay county delegation, much of interest was gathered. In that county they are working under the county road system, using the proceeds from the "Labor Tax" collected in money and an addition of one mill highway tax. Their work is carried on under the direction of five commissioners elected one every year and holding for five years. In the work they have expended about \$300,000, which amount has built 63 miles of rock road, graded 30 miles more ready for the stone ballast and kept in repair in much better shape than under the labor system, all the roads of the county. In the outset their roads cost in the neighborhood of \$3,000 per mile but at present with the benefit of the first few years experience they are building better roads at from \$1,500 to \$1,600 per mile. This in a county where all stone ballast has to be shipped in by rail and the freight is half the cost, speaks encouragingly for the counties where stone is plenty along the line of the highway. It was also gathered that one man living eleven miles from Bay City was able to haul the same amount of grain in four, on the stone road that formerly required twelve days on the dirt road.

The constitution as reported on by the committee provided for the name of the association, The Michigan League for Good Roads, an executive force of four officers, an executive committee of twelve members, one from each congressional district, to act with the officers; that all present should be members of the League, that all funds should be raised by contribution. It also provided that county and township leagues might be organized to act with the State League, and that when so formed the president of the County League should be a vice president of the State League, *ex officio*, and in counties where no league was formed the President of the State League should appoint a vice president from that county.

It was also voted that the chair should appoint a committee of five to look over the existing road laws and recommend any measures, that in their minds appeared beneficial, to the next meeting.

After a collection which amounted to \$35.47 the convention adjourned to meet at the call of the President.

Among the M. A. C. men present were, Dr. Beal, Profs. Vedder, Babcock and Pashby of the College, C. J. Monroe, with '61, of South Haven, Frank Hodgman, '62, Climax, C. E. Hollister, '61, and O. C. Hollister '89, Laingsburg.

WORK WITH X RAYS.

W. J. MCGEE, '96.

On February 26, Mr. G. N. Eastman and myself began experimenting with the Roentgen or X rays. We directed our efforts merely towards getting a picture, or shadow, by the rays, and not to the discovery of any new properties. At the first trial we connected three cells of the storage battery with a large Ruhmkoff coil, and the coil we connected with a Crooke's tube by means of fine copper wires.

Then taking an ordinary 5x7 plate holder containing one Seed's plate, we set it directly under the Crooke's tube and put around on it a lead pencil, latch key, nickel five cent piece, and silver quarter. The slide of the plate-holder was in, of course, and these articles rested on it, as also did the Crooke's tube. We turned on the current and kept it on for about fifty minutes, after which we

took the plate to the dark room and developed it. But there was only a faint trace on the plate to show that there had been any action of the X rays. There was a spot in one corner which offered some encouragement and also a couple of straight marks corresponding to the metal guides inside the plate holder.

We decided that a longer exposure should be tried the next time. On February 28th we connected up the coil with three cells of the storage battery as before, but took a larger Crooke's tube. Then we took another plate holder and, wrapping it in about twelve folds of a black silk cloth, we placed it under the Crooke's tube. This time we suspended the tube about three inches above the plate.

On top of the cloth wrapped plate holder with a plate inside, we placed a pocket note book with a lead pencil in the back, and a silver dollar in the ticket pocket. Near this we placed various other objects, viz, a couple of letters cut from sheet lead, a nickel five cent piece, and a die with a silver pin on top of it.

This we exposed to the action of the rays about four hours. The Crooke's tube during action was filled with a pale greenish light which flickered and flashed intermittently. The distance between the points in the Crooke's tube was about four inches.

When we developed the plate we found we had a very good "shadowgraph." The dollar and nickel were of about equal density, though the nickel lay out on the cloth while the dollar was inside the note book. The lead pencil showed up plainly, the lead as a sharp line of black and the wood only as a thin shading. The die showed up as a black square, but the pin showed blacker. The die was of bone, and the pin of silver.

We were quite well satisfied with the results, but our desire for experimenting has not been satisfied yet, and we are planning to try to determine of the source of the rays, also to try the opacity of different metals to the rays.

STANDARD BOOKS AT LOW PRICES.

PROF. A. B. NOBLE.

Having some curiosity to know how far five dollars would go in the purchase of standard literature, I have recently given some time to looking up prices in the Publishers' Trade List Annual. I have not had time to go through the unwieldy volume, but I have gone far enough to reach the conclusion that, excluding copyright books, there are only a few well-known books of standard literature that cannot be had in fairly good paper, print, and binding for fifty cents or less. I have passed by all paper-bound books, also cloth-bound books that I had reason to believe were poorly made. For the prices quoted, the books can be secured of any reputable dealer; indeed, it is not an infrequent occurrence to find them on sale at less than the list price.

For thirty cents one may secure Hawthorne's *Scarlet Letter*, House of Seven Gables, *Twice-Told Tales*, *Mosses from an Old Manse*, *Wonder Book*, or *Blithedale Romance* ("Salem" edition, Houghton, Mifflin & Co.).

For thirty-five cents each, one may get Adam Bede, *Autocrat of the Breakfast Table*, Emerson's *Essays* (2 vols.), Felix Holt, Ivanhoe, Jane Eyre, John Halifax, *Kenilworth*, Oliver Twist, *Our Mutual Friend*, Silas Marner, *Sketch Book*, and *Vanity Fair* ("Advance" edition, Donohue, Henneberry & Co.).

At forty cents Henry Altamus publishes *A Window in Thrums*, *Representative Men*, *Treasure Island*, *Tales from Shakespeare*, *Essays of Elia*, *Uncle Tom's Cabin*, and some others already named.

When we get to fifty cents, the list is greatly extended. To avoid repetitions, I omit books already mentioned at a lower price, also names of publishers. The list includes *Auld Licht Idylls*, *Bleak House*, *Daniel Deronda*, *David Copperfield*, *The Deemster*, *Dombey and Son*, *Heart of Midlothian*, *Last Days of Pompeii*, *Lorna Doone*, *Mill on the Floss*, *Middlemarch*, *Nicholas Nickleby*, *Old Curiosity Shop*, *Romola*, *Robinson Crusoe*, *Heroes and Hero Worship*, *In Memoriam*, *Abbé Constantin*, *Tartarin of Tarascon*, *Tartarin on the Alps*, *Bacon's Essays*, *Micah Clarke*, *Story of an African Farm*, and *Don Quixote*.

The cheapest edition of the poets that I should care to recommend is that published by Crowell & Co. at seventy-five cents. This edition includes Matthew Arnold, Browning (incomplete), Bryant (probably includes only the early poems on which copyright has expired, and if so, is not to be recommended), Burns,

Byron, Milton, Tennyson, and Wordsworth. It also includes Palgrave's *Golden Treasury* (a book of selections admirably chosen) and translations of Dante, Goethe, "Faust," Hugo, "The Iliad," and "The Odyssey." For those who can afford it, the "Globe" edition, published, by D. Appleton & Co. at one dollar, is to be preferred in all respects save external appearance. Of Shakespeare, the best cheap edition is probably the Leopold Shakespeare (\$1.50, Cassell Pub. Co.). The American Poets—still copyrighted—can be had at the same price in good, attractive form ("Household" edition), or in the cheaper "Cabinet" edition, for one dollar (Houghton, Mifflin & Co.).

Space does not permit me to name other standard books at seventy-five cents, or to say anything about sets of books. The making out of a list of books that can be bought for five dollars may be left to the reader. It is enough to say that five dollars will buy ten books of standard literature, giving the purchaser his choice out of the writings of the great novelists, Scott, Dickens, Thackeray, George Eliot, and Hawthorne, some of the great poets, and a few volumes from such authors as Lamb, Irving, Carlyle, and Emerson. A comparison of these prices with the price of the ordinary subscription book, to say nothing of comparing the merits of the two classes of books, would show up in clear light the outrageous price of the average subscription book, and ought to go far toward replacing it with a better class of reading.

Those who can afford it may prefer to get more expensive editions, but that is a matter of luxury, not of necessity. At the prices quoted above, who cannot afford to buy good books?

English Department.

Y. M. C. A. RECEPTION.

The usual spring term reception was given by the Y. M. C. A. in their parlors last Friday evening. These receptions are always pleasing affairs and this one was fully up to the average. One could not help remarking the unusually large number of ladies present—so much for the hope of co-education; what will the reality be?

After the opening exercises, which included short devotional exercises and a brief address of welcome by the president of the association, L. D. Sees, the following program was presented: Recitation, *Practical Farming*, by C. H. VanAuken; select reading, "Bill Nye on the Steam Radiator," by W. J. McGee; music, mandolin and guitar by Messrs. Partridge and Eastman; recitation, *The Director's Visit to School*, by Miss Bertha Wellman; a talk by Dr. Howard Edwards; and music, guitar and two mandolins, by Miss Lizzie Truman and Messrs. Partridge and Eastman. Mr. Frank Yebina was then called upon for a song and gave one in his native Japanese tongue.

The social hour which followed was not by any means the least enjoyable part of the evening. Sealed English walnut shells, each containing either a conundrum or its answer, were passed around, with the injunction to each who got a conundrum, to find his answer and take it into the next room for refreshments. This diversion instead of being followed by after dinner speeches, was followed by a potato walk, in which the contestants each picked up with a teaspoon five large potatoes, one at a time, and carried them to a pan in the middle of the room. Easy? Well just try it sometime when you are in a hurry. It is worthy of note that the married ladies seemed more skillful at it than did the bachelor girls.

Lectures in bacteriology began yesterday (Monday). The class in horse dissection also began work yesterday. Several additions, changes and improvements at the Veterinary Laboratory should be noted. The department has recently added to its equipment a considerable new apparatus for carrying on investigations in bacteriology, including sterilizers, metal and glass cages for rats and Guinea pigs, and a large variety of glass vessels, all of which the class will make use of during the remaining weeks of the term. The wing-room, on first floor, will be used for a dissecting room, and the second floor room formerly used for that purpose will be fitted up for a work room in bacteriology.

The committee to whom was referred the matter of continuing the class in physical culture, decided that though such a class is desirable, no time could be spared for it this term.

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To one who has been at the college the greater part of the winter the contrast between the stillness of the vacation and the present bustle and life must bring many and varied thoughts. All winter long the walks and halls have been deserted. At long intervals a lonely footstep has waked the startled echoes, but they have been as infrequent as those of the miserable wanderers on the banks of the Styx. Now all over the grounds one meets bright, young faces, one hears cheerful laughter and song, one feels the pulsating energy of the human spirit. It is the contrast between darkness and light, between chaos and cosmos, between death and life.

Our class rooms are filled with earnest workers. Our professors report that never was better work being done. There seems to be scarcely an idler among our students. Many have come back with high resolves against past errors and are earnestly striving to carry out their purposes. It is well just at this point to remember that reforms that are worth anything cost pain and effort and steady persistence. Habits are not made or unmade in a day. Habit is effort crystallized by repetition. Time and effort must enter into its formation. At the west end of Williams hall there is a stone threshold. Originally its upper surface was a plane. Thousands of restless, hurrying feet have passed over it and each, whether it danced its careless way to the ball ground or bore a stunned and bleeding heart to a motherless home, carried away particles of the stone threshold; till today its center is sunken two inches below the sides, and its surface is a curve whose equation even Mr. Pashby would shrink from attacking. Thus, repeated actions wear channels in our being, and the courses of our very nature are irrevocably determined. Good channels, bad channels; right courses, wrong courses—which shall it be?

Habits of study are formed according to the same law. He who has formed here, or shall form here, good habits of study, has reaped incalculable benefit from his course. It is better to learn that than a thousand other things combined. The central features of good habits of study, are abstraction and concentration—power to withdraw your mind from other things, and power to concentrate the whole attention on any designated subject. These are powers which angels might well covet, and yet they come to those who are diligent, determined and persistent. When you take up a given subject, keep the mind steadily fixed on it; never let the attention wander to anything else until you are through with that in hand. When the attention does stray (and it will do this every few minutes at first), bring it back again all the more earnestly, and do this *again* and *AGAIN* and *AGAIN*, and still once again. Slowly, very slowly, you will recognize an added power. Then you may begin to rejoice. But never let mere lip repetition take the place of mental tension.

AT THE COLLEGE.

Prof. Taft was in Monroe on business last week.

Hon. C. J. Monroe was at the College Wednesday.

Mr. and Mrs. Fulton are moving into the herdsman's house.

Two large cases for animals are being erected in the museum.

The M. A. C. Grange will hereafter meet once in two weeks, on Friday evening.

Editor J. H. Dennis, of the *Hastings Journal*, looked over our College last Tuesday.

George W. Rose, with '95, m., Benton Harbor, is renewing old acquaintances at M. A. C.

B. O. Longyear, Instructor in Botany, was on the sick list a couple of days last week.

The Juniors are having forcing-house work with Mr. Dean, Assistant in Horticulture.

Messrs. Crozier, True, and Yebina visited the Williamston Grange last Wednesday night.

Miss Essie Singleton of Caseville, who was mentioned last week as a guest of Prof. and Mrs. Woodworth, is so

well pleased with our college that she has decided to remain with us as a student.

A. W. Chase, with '94, and J. C. Adams, with '95, both of Detroit, were at the College last Friday.

Mr. Norris Vedder, of Sandstone, Jackson Co., Mich., was the guest of Prof. H. K. Vedder last week.

Some of the co-eds are taking work in grafting, and are reported as being skillful at the business.

Sixty acres on the farm were sown to clover seed last week, much of the work being done by students.

We are glad to have Mrs. Babcock with us again, and to see her looking so well. She returned last Tuesday.

Miss Carrie L. Holt of Lansing, and Mr. C. M. Krentel, a brother of A. C. Krentel, are among our new students.

Those who heard the sermon of the Rev. Knight of Saginaw, who preached in the chapel March 1, speak very highly of it.

Mrs. M. L. Dean has returned from Grand Rapids, where she has been spending the past week with her mother and sister.

O. C. Hollister, '89, Laingsburg, was one of the delegates to the good roads convention, and made the College a visit the next day.

The *Detroit Journal* of March 5 contains a cut of the photograph taken by the Roentgen system by our students, McGee and Eastman.

Mrs. Emma A. Thomas, superintendent of penmanship in the Detroit city schools, and her sister, were visitors at the College last week.

Prof. P. B. Woodworth has just returned from a trip to Madison, Wis., where he has been examining Prof. King's equipment and methods in soil physics.

The Board of Visitors was with us again last Wednesday. This is the first time they have had an opportunity of visiting us while school was in session.

Mrs. Smith has recently received a photo. of Margaret Kennedy, the little daughter born to Prof. and Mrs. F. B. Mumford, Columbia, Mo., Dec. 11, 1895.

J. V. Kinsey, with '97, m., was a caller at the College the 29th ult. He was on his way home to recruit from a severe attack of sickness contracted while canvassing in Ohio for "A Practical Book for Practical People."

After trying both ends, Instructor Crosby has concluded that he can get over the ice with less friction and bloodshed if he stays on the end where he wears his skates. Several times during the past week he has been mistaken for an animated bill board, advertising "English Taffeta" court plaster.

Gager C. Davis, instructor in Zoology, who with his wife has been spending the winter in California, returned to M. A. C. March 2. Two days later he received a telegram from Redlands, Cal., announcing the birth of a daughter. Mrs. Davis and the baby will not return to M. A. C. until about the first of June.

Dr. Grange returned Thursday from Pontiac, where he has applied the tuberculin test to a herd of about 100 cattle, belonging to the Eastern Asylum for the Insane, without finding a single case of tuberculosis. One cow coughed and showed other symptoms of tuberculosis, but a post mortem showed that she was affected with chronic bronchitis.

Among the visitors at M. A. C. last week were the following: D. D. Walton, Lake City; A. C. Bird, Highland; H. Ries, Goodrich; Alex. McDonald, Jeddo; H. J. Trupp, Cedarale; R. H. Millteer, Stockbridge; Wm. Blow, Thornville; H. Poucher, Brooklyn; H. F. Shultz, Grand Ledge; John Ure, Saginaw; Mrs. R. Henderson and Frank E. Sutton, Detroit; W. H. Canfield, Portland; R. E. Brackett and Rev. A. S. Zimmerman, of Lansing; Rev. Wm. Service, of Howell.

The College has purchased from the Western Union Telegraph Co. a second's beat self winding clock. The clock is supposed to be one of the best made. The guarantee reads that the clock must not vary more than fifteen seconds per month. The clock is in the Physical Laboratory, and is corrected daily by the Western Union Telegraph Co. The clock is expected to keep *Western Union standard time*, and must not be expected to keep as good time as various local chronometers. The minute jumpers are controlled by the self winding clock.

An experiment is in operation at the poultry yards to determine the net profit in raising poultry. Three yards of equal dimensions have in them an equal number of fowls which are treated in exactly the same manner as regards feed and care. They were weighed before beginning the work and will be again weighed at the end. A strict account is kept of all feed bought and eggs produced and the three pens acting as a check on each other will produce, it is hoped, comparable results. For some unknown reason one pen

just at present is producing more eggs than either of the other two. The outcome is looked forward to with interest by those in charge.

FOR AGRICULTURAL SENIORS.

The attention of the Agricultural Seniors is called to the following rules of the faculty in regard to theses:

1. Each Agricultural Senior, after consultation with the head of the department in which the subject he desires to select appropriately belongs, shall hand in the subject of the thesis to the chairman of the committee on senior theses on or before March 1 of each year.

2. Within one week after March 1, the committee shall pass upon the subjects presented and assign the student to the proper instructor for guidance in the conduct of the investigations and the preparation of the thesis.

3. The theses shall be completed and submitted to the committee not later than three weeks prior to commencement.

4. After approval, each thesis shall be typewritten on unruled paper, 8½ by 11 inches in size and bound with cloth sides and leather backs and corners. The color to be black or dark brown. The cover shall bear the inscription:

THESIS

ON

BY

1896.

Will the members of the class of 1896 please attend to this matter at once.

CLINTON D. SMITH,
Chairman of Committee.

NEWS FROM GRADUATES AND STUDENTS.

Students in Mechanical Course designated by "m." and specials by "sp." after name.

E. J. Frost, with '90, m., is a draughtsman at Jackson, Michigan.

Fred Stockwell, with '90, resides at Pontiac and travels for a Detroit dry goods firm.

Jas. Adams, with '95, is in the shipping department of Strong, Lee & Company, Detroit, Michigan.

John P. Finley, '73, first lieutenant 9th U. S. infantry, Fort Ontario, Oswego, N. Y., has been transferred to Fort Leavenworth, Kas.

Wm. Petrie, '90 m., until recently at Conneaut Lake, Penn., is now superintendent of the St. Johns Electric Light and Power Company, St. Johns, Michigan.

The editor's desk today is graced with an elegant collection of fragrant carnations, the gift of Frank M. Paine ['89], the South Side florist.—*Traverse Bay Eagle*.

D. S. Cole, '93, m., has recently been engaged by Berkey & Gay of Grand Rapids to assist in the business management and introduction of specialties in the bicycle line.

Prof. W. V. Sage '84 of the Decatur schools read a paper entitled "The Science Innovation Requires What?" at a recent meeting of the Van Buren County Teacher's Association.

A resolution endorsing Supt. C. L. Bemis, '74, as candidate for member of the State Board of Education, was unanimously adopted by the Ionia teachers at their late T. A.—*Moderator*.

The *Mirror* is one of the best exchanges received by the RECORD. It is published by the pupils of Broadway High School of West Superior, Wisconsin. William T. Langley, '82, is superintendent of schools in that city.

Geo. C. Nevins, '73, who has been principal of the Otsego schools for the past six years, placed his resignation in the hands of the school board January 1, to take effect at the close of the present school year. Poor health makes the change necessary.

D. D. McArthur, '94, superintendent of the Omaha Agency of Nebraska, writes that he finds his work very pleasant. Five gentlemen and ten ladies are employed in caring for the 100 pupils and the superintendent's position is one of some consequence. His life is a busy one and he has no time to get lonesome.

Loomis & Root, dealers in bicycles and bicycle sundries, 307 Washington Ave. N. This is the name and number of a new firm that began business in Lansing March 1. M. F. Loomis was for some time with the class of '94, m., and O. J. Root graduated in '89 with the first class to graduate from the mechanical department. Mr. Loomis will assume immediate charge of the new

business, while Mr. Root will remain for a time with the Lansing Iron and Engine Works, where he is now superintendent.

J. R. Saylor, with '96 m., left college last fall, going to Chicago where he secured employment in the shops of Fraser & Chambers, the day after his arrival. He finds the work interesting and profitable and hopes to continue in it for some time. John Churchill, '95 m., is now rooming with him at 368 Washington Boulevard.

Charles E. St. John, '87, who spent the past year as a student at Heidelberg University has recently presented his thesis for a doctor's degree, which appears in the current number of *Annalen*. It treats of the exceptional amount of light emitted by the Welsbach burner. It is a paper of exceptional merit and a credit to its author.

THE WILSON-SQUIRE BILLS.

PROF. C. L. WEIL.

Two bills have recently been introduced in congress to promote the efficiency of our naval service—one by Senator Squire of Washington, the other by Representative Frank H. Wilson of Brooklyn, N. Y. Both these bills are drawn, in the main, on the same lines, and have for a principal feature the proposal that the government establish and aid in maintaining courses of instruction in naval engineering at the several scientific and technological schools of the United States. Other interesting features of these bills are the proposals that the government detail an engineer officer from the navy department, as professor, to every scientific school which shall undertake to provide education in naval engineering and furnish such schools with models and plans of ships and naval machinery.

By the provisions of the Wilson-Squire bills the graduates of scientific and technological schools that maintain, with the assistance of the government, courses in naval engineering, may be appointed as engineer cadets in the United States navy and when so appointed are to be given first a year of practical naval engineering instruction on board a war vessel, then a year of practical engineering instruction at a government navy yard, or a year of advanced work at a post-graduate school; they will then be permitted to compete with similarly trained graduates from the United States naval academy for appointment to the engineering corps of our navy.

In view of the fact that modern methods of conducting naval warfare demand the services on each ship of a large body of highly trained and skilled engineers, and that of the graduates from our naval academy but a small number are commissioned, each year, as assistant engineers—in the neighborhood of ten men yearly—it would seem that the Wilson-Squire bills deserve most careful consideration on the part of congress. Moreover, according to those who have made a study of the condition of naval affairs in this country, our present engineer corps is overworked, and is constantly being depleted by resignations on the part of men who desire to escape the hardships of an inadequately supported service.

In considering the necessity for increased opportunities along the line of naval engineering education in our country one must bear in mind that the modern warship is a very different affair from the wooden frigate employed at the time of Farragut, and that such advances are being made in marine engineering at the present time that those who direct and aid in the manipulation of the enormous machinery of a modern battle ship will in the near future, in all probability, comprise nearly one-half the entire crew.

Undoubtedly, as held by some educators, the course of instruction at the naval academy would be stimulated by bringing the academy into friendly competition with other schools of learning.

In case such courses of instruction as described should be undertaken in the various scientific and technological schools of this country and the number of available graduates of these courses should be in excess of that demanded by our navy then a portion of such graduates could be utilized in the development of a reserve of naval engineers who would be ready for duty in time of emergency or war, and who would, during times of peace devote themselves, being specially qualified, to industrial pursuits.

The plan proposed by these bills has received the approval of the leading technical educators of our country as it contemplates the conferring of benefits upon engineering education in general and the promotion of the industrial development of the country.

We believe, considering the existence at the Michigan Agricultural College of a mechanical engineering course which is supported in the greater part by the federal government, and the natural advantages offered in this State by the proximity of the lakes, for practical naval

engineering instruction on board ship, also the requirements along our border in time of war, that the Wilson-Squire bills merit the approval of the people of Michigan.

Mechanical Department.

CHEMIST OR FARMER.

E. C. KEDZIE.

Among the many sensational questions of the day, the newspapers discuss the startling question, "Who shall feed the future race, the chemist or the farmer?" Such a question would naturally arouse curiosity and awaken discussion—two important points for the news man. The products of the soil have so long fed man and beast that any suggestion about the supply coming from a different source will excite ridicule. Yet chemistry has done so much to modify the conditions of living, may do so much in the future, and its possibilities are so great, but unknown, that persons stop to consider this absurd question.

Sensational statements are often sprung upon the public apparently for the purpose of creating an interest and filling the columns of newspapers. For this reason persons will often read the startling headlines, yet turn away from the body of the article because it is sensational. But when a chemist of world-wide reputation comes forward with the deliberate statement that the chemist of the future will displace the farmer; that the food of the future will come from the laboratory and not the farm, and gives facts and figures upon which to base his statements, we raise the question, Is this possible?

In April, 1894, the great French chemist, M. Berthelot, in an address before the Society of Chemical and Mechanical Industries in Paris, publicly announced his theory of the coming suppression of agriculture and the chemical manufacture of food products to take its place. The following excerpt gives a fair idea of the newspaper presentation of this new gospel of food:

M. Berthelot, the new French minister of foreign affairs, is now about 68 years old. In his special domain of chemical knowledge he ranks among the first of his contemporaries. Chemical synthesis—the science of artificially putting organized bodies together—may be said to owe its existence to him. The practical results expected to flow from his experiments and discoveries are enormous. Thus, sugar has recently been made in the laboratory from glycerine, which Prof. Berthelot first made direct from synthetic alcohol. Commerce has now taken up the question, and an invention has recently been patented by which sugar is to be made upon a commercial scale from two gases at something like one cent per pound. M. Berthelot declares he has not the slightest doubt that sugar will eventually be manufactured on the largest scale synthetically, and that the culture of the sugar cane and the beet root will be abandoned because they have ceased to pay.

The chemical advantages promised by M. Berthelot to future generations are marvelous. He cites the case of alizarin, a compound whose synthetic manufacture by chemists has destroyed a great agricultural industry. It is the essential commercial principal of the madder root, which was once used in dyeing wherever dyeing was carried on. The chemists have now succeeded in making pure indigo direct from its elements, and it will soon be a commercial product. Then the indigo fields, like the madder fields, will be abandoned, industrial laboratories having usurped their place.

But these scientific wonders do not stop here. Tobacco, tea and coffee are to be made artificially. Not only this, but there is substantial promise that such tobaccos, such teas and such coffees as the world has never seen will be the outcome. Theobromine, the essential principal of cocoa, has been produced in the laboratory. Thus, synthetic chemistry is getting ready to furnish the three great non-alcoholic beverages in general use. The tea plants, coffee shrubs and cocoa trees must some day follow the lead of madder and indigo.

Tobacco will be obtained in a similar fashion. Prof. Berthelot has obtained pure nicotine, whose chemical constitution is perfectly understood, by treating salamine, a natural glucoside, with hydrogen.—*Philadelphia Record*.

In an interview in September, 1894, he elaborated this chemical source of food more fully, claiming that our staple foods, starch, flour, meats, milk, sugars, etc., will soon be made so much better, purer and cheaper by the chemist that the farmer and stock grower will soon be "out of a job."

It is true that the chemist has done much to purify and refine the products of the field and fit them for use on the table, and has done much to furnish the materials and appliances for cooking and preserving food. The chemist has done wonders in evoking from most repulsive materials (like coal tar) the most brilliant and beautiful colors, has made unnecessary the madder crop by making the alizarin, its coloring material. I have in my laboratory oil of Spiraea (Meadow Sweet) which I made from Salicin, and oil of pears and of apples made from fusel-oil, and vanilla that never saw a vanilla pod. The chemists are daily making hundreds

of such material but *always out of some organic substance*. No chemist has ever made out of inorganic matter an ounce of flour or a pound of beef; he never will make a peach or a pear. He appears to have made at enormous cost per pound some materials that have some of the properties of sugar, but it is not certain that these can be digested even if made at moderate cost. A process has lately been patented for making chemical sugar, but it would cost a dollar a pound. The chemist has changed thousands of tons of starch into glucose by adding a molecule of water, but has never succeeded on a commercial scale in changing glucose to cane sugar, though the chemical change seems simpler.

The fatal defect in this scheme of the chemical manufacture of food supplies is the element of cost. Take an illustration that every chemist and most people can readily understand. Water is made of oxygen and hydrogen. Every tyro in chemistry has made hydrogen by placing some zinc clippings or iron nails in dilute sulphuric or muriatic acid, and its manufacture is thus very easy. He knows that hydrogen is inflammable, and when burned in air, that water is formed. To form water therefore is a very simple process and requires no complex apparatus. Taking this for our starting point and yoking together Bellamy's "Looking Backward" and Berthelot's looking forward, let us see what is the outlook for our race under the guidance of these "busy B's."

The great want of the past season has been water. This State lost millions of dollars from the drouth. Other parts of our country have suffered from the same cause, and other parts of our country suffer from this cause every year. Look at the vast sums expended for irrigating purposes. Yet the largest part of "the American desert" is left a barren waste for want of water. Now comes the beneficent chemist with his hydrogen apparatus to form the needed water whenever and wherever required. No more dependence on evasive cloud or fickle wind. We can make our own water, and no thanks to anyone. How simple and beautiful become the problems of civilized life under such a scientific dispensation. You shake your head! What's the trouble? The water thus formed would cost a dollar a pound and the wealth of the nation would not pay the cost of such water to irrigate our western plains for a single year.

If we cannot bear the expense of making so simple a material as water, how about the cost of making the more complex and costly materials for the food of the race?

In the choice words of Prof. Wiley: "Even if food products can be formed in the crucible there is no reason whatever for supposing that they can ever play any role in an economic sense. The untold billions of laboratories which nature builds are infinitely cheaper in construction and operation than those filled with platinum and porcelain. The sun ignites the crucibles of nature at an expense far less than attends the use of the city gas works. The director of nature's laboratory depends upon no endowment nor legislation for his salary, and his bills for supplies are not disallowed by any board of auditors on the score of economy. Night and day his patient, faithful assistants work without thirst for fame, without hope of reward. They fight not for priority of discovery and their anonymous papers are printed in rich profusion in the great *Berichte* of the universe. The chemistry of the chlorophyll cell is far more wonderful than any of the achievements of Lavoisier, Berzelius or Fischer."

The promise of the infinite Father in the infancy of our race still holds good: While the earth remaineth SEEDTIME AND HARVEST, and cold and heat, and summer and winter, and day and night shall not cease.

Chemical Department.

HUSKING CORN BY MACHINERY.

W. F. WIGHT, '94.

The article in the RECORD of February 25, by Prof. Weil on "Mechanical Engineering and Agriculture" contained a sentence which suggested the following:

Perhaps the husking of corn might be mentioned as one of the operations of the farm concerning which the farmers "twenty years ago" said "could never be done profitably by machinery." And I dare say that the successful operation of such a machine was very much doubted ten years ago. Even so late as 1894 and '95 farmers came for miles to see the "human sausage grinder" as it is called in consequence of its having performed a few amputations.

Today I know of three firms manufacturing corn huskers, and their extensive use particularly in the west the past two years proclaim the success of the machines.

The Keystone Mfg. Co., of Sterling, Ill., have perhaps

been most successful in their efforts, and as I have operated one of their machines the past two years I will endeavor to describe it briefly and point out a few of its advantages.

The stalks with the ears of corn on them are fed to the machine. The feed rollers crush the stalks and snap off the ears. The stalks pass on to the shredder or cutting head (either is furnished as desired) which shreds or cuts the stalks when the carrier elevates the fodder to the mow. The ears drop below the feeding table to the husking rolls. These are iron rollers grooved and set with short pins that tear off the husks and silks which are thrown into the fodder. The ears drop into the elevator and are delivered to the wagon.

By this method the corn crop is secured in a few days; an advantage which those who have seen the amount of corn standing in the shock the past winter in nearly every part of the state will appreciate.

The value of the fodder has been estimated to be about one third greater than of uncut fodder; some place it even higher. Prof. Henry of the Wisconsin station tested the value of cutting corn fodder by feeding one lot of cows upon uncut fodder and another lot of equal milking qualities had fodder from the same mow cut in pieces one half inch long. As much milk was obtained from 721 pounds of cut fodder as from 1,133 pounds of uncut fodder. The stalks from one of these machines are however better than those from the ordinary hand cutter as the stalks are crushed and torn in small bits as well as cut.

The machine I have has a 20-inch cutting head and two pairs of husking rolls. The amount of work which it will do varies much with the condition of the fodder as to moisture and the yield per acre. In good corn, and when the stalks are not too dry, it will husk 350 or 400 bushels per day.

There is much to learn in handling the crop, as fodder prepared in this way is as difficult to keep as in the old way, though not more so I think. The fodder with ears on is also awkward to handle, though the use of corn harvesters may obviate this.

I predict that in the fruit section of this State, where some corn is grown, but where so little stock is kept that the silo is not in use, that this machine will find favor. Whether it will do away with the silo in other portions of the State is a question for the future to decide.

Chicora, Allegan Co.

HOT BEDS.

THOS. GUNSON.

Every farmer, whether his acres be few or many, should have a hot bed to aid him in the work of growing at least what vegetables are needed in his family, and these should be of sufficient variety and quantity to supply his table with the home grown product every day in the year. The experience gained in the work of caring for seeds and plants in a hot bed will be of value to him in the larger operations in the field. As this is the season of the year when the regular duties of the farm are not so pressing, time can be spared for getting ready this simple and useful auxiliary to garden operations.

Select a well sheltered spot, facing the south, and as near the house as convenient, and commence by laying on its edge a plank 2 inches thick by 12 inches wide, and not less than 6 feet and 1 inch in length for the back. The front plank should be set 6 feet from the back, and should be 2 to 3 inches narrower, and let into the ground so that its upper edge will be 5 or 6 inches lower than the back, so as to carry off the water. End pieces should then be fitted. A piece 1 inch by 3 inches is laid across the center and dovetailed in so that its surface is flush with the upper edges of the back and front. In the center of this is nailed a strip 1 by 1½ inches so as to keep the sash independent of each other. A strip should also be nailed on the outside of the ends so as to keep the sash from slipping off when pulled up or down.

Proceed to dig out the soil at the back to a depth of at least 18 inches, and at the front to 12 or 15 inches, laying the soil against the outside of the frame, so as to protect the sides and ends in severe cold weather.

One good wagon-load of horse manure thrown loosely into a conical pile for a day or two until it gets thoroughly heated, will be sufficient to fill such a place as we have described. The manure should not be too rough, and when possible a few oak leaves may be added, to keep the manure from heating violently, and to lengthen its period of usefulness. The manure should be made as solid as possible by thorough tramping, and good rich soil to the depth of six inches should be spread over the surface. When finished the soil should not be more than four or five inches from the top of the frame. The sash should then be put on

and the frame left closed up for a day or two, until the soil is thoroughly warmed through, when seeds can be sown. While plants seem to enjoy more heat in this than in any other way, it is not advisable to let the temperature get much above 60° unless with sunlight. A piece of board twelve inches long and six inches wide, cut diagonally in two, and attached to the back of the frame with a cord to ventilate with, is a better and more efficient way than the practice of pulling the sash up and down, especially during the early spring days.

By having the two sash, a temporary division can be made in the center with a piece of board, so that plants requiring different temperatures can be given something like their natural condition.

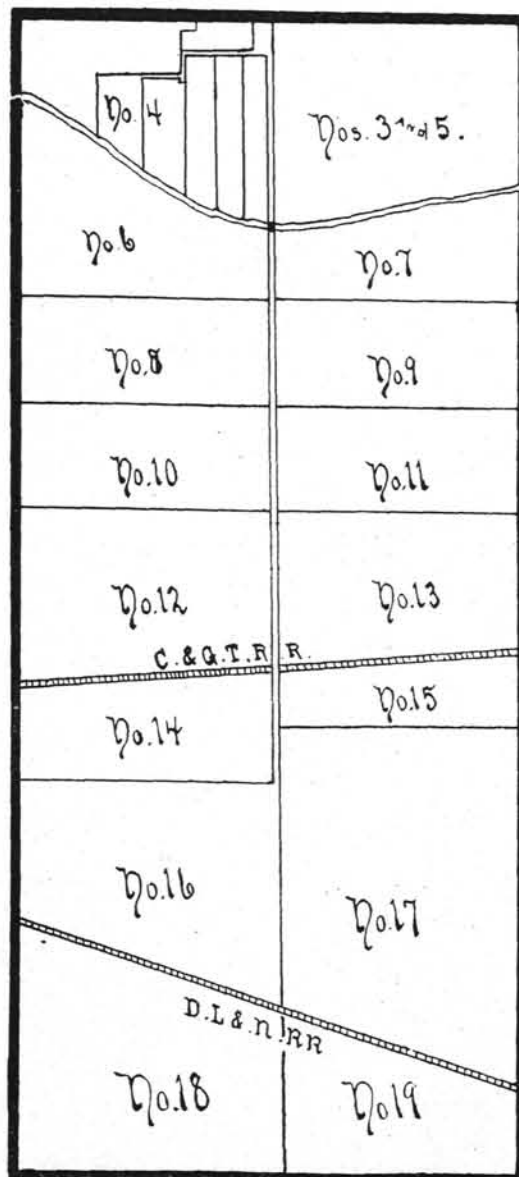
Such a frame will require two sash, 3 ft x 6 ft, which will probably cost two dollars each. The whole expense need not exceed five or six dollars, and will, if well managed, be worth to the average farmer, in one season, many times its first cost.

Greenhouse.

FARM CROPS FOR 1896.

PROF. C. D. SMITH.

The College farm serves two purposes, it furnishes the laboratory for teaching practical field agriculture and incidentally grows the feed for the farm stock. This is one phase of its utility. Again, it is the forum on which our field experiments are tried. On the general farm the educational feature is necessarily the dominant one. The distribution of the crops for the current year will be interesting to the readers of the RECORD. The accompanying diagram graphically represents the present arrangement of the fields. The lane running north and south divides the main part of the farm in the middle, making the fields on either side 94 rods long.



As indicated on the chart the fields bearing the even numbers are on the west side of the lane. North of the river the land is given up to experimental plots and to small lots for convenience in handling stock in the summer.

South of the river and east of the lane the fields will be in meadow except No. 9 which was sown to wheat last fall.

Field 6 contains 27 acres. Field 7, 17 acres. Fields 8, 9, 10 and 11 each contain nearly 24 acres, while 12 and 13 have respectively 34 and 30 acres. The total arable land on the farm exclusive of the Horticultural Department, includes approximately 330 acres.

Tests of various grasses alone and in mixtures are

being conducted in field 13, which on account of its variety of soils affords special facilities for this kind of work. We are much interested in testing the availability of fowl meadow grass (*Poa serotina*) and the taller fescue grass on muck. In the corner next the railroad and the lane a few acres of the heavy muck is sown to orchard grass. These grass plots will be suitably labeled and the attention of visitors and students is invited to Nature's solution of the interesting questions involved.

The side of field 6 nearest the lane is sown to foreign wheats, to test their relative hardiness and to afford opportunity for the selection of plants of special vigor and promise. Here too are sown in successive rows winter oats, varieties of rye and American wheats. In the corner by the river and the lane is an acre of Alfalfa, now fresh and vigorous, and whose behavior during the season will be watched with much interest.

West of these plots is an area to be devoted to forage and soiling crops to be planted and cared for by the sophomores in student labor. Still farther west comes the corn on which also will be tried a variety of experiments.

Fields 8 and 10 will be sown to oats. Field 12 is already sown to wheat and rye. No. 14, just south of the Grand Trunk R. R., will grow at the west end some 6 or 8 acres of rape. In the northeast corner will be three acres devoted to three varieties of orchard grass, two kinds grown from seed imported from Vilmorin & Co., Paris, France, and one American variety. The excellence of one of the foreign varieties of orchard grass designated as "small seeded" lies in the fact that it is later in maturing than our common variety and hence fits more aptly with clover. South of the orchard grass will be experimental plots for testing the economy of keeping breeding ewes on limited areas of land by the use of various forage crops.

No. 16 has lain in pasture for many years. The stumps are not yet all out, but the swamps were drained last fall. It will be planted to corn this year, and subsequently farther cleared up and leveled. The lane will be extended and graded to the D. L. & N. R. R. South of this railroad the land has been cleared west of a line extending south from the end of the lane. The swamp in the extreme southwest corner of the farm, 6 acres, was thoroughly burned over last year and sown to rape which made a magnificent growth. This year it will be planted to potatoes. The remainder of this tract will be pastured with sheep.

It will be remembered of course that 17 is now a permanent wood lot and is being managed as such. It contains approximately 75 acres.

By recent action of the Board we are authorized to set out in the spring two rows of white pine trees from the river to the south line of the farm along the west line. This will afford in coming years a protection from the violent west and southwest winds, and will be at the same time an attractive feature of the farm.

Agricultural Department.

The Questions

For Entrance Examinations to

M. A. C.

Have been placed in the hands of the

County

School Commissioners

If you wish to enter the College, go to the Spring Teachers' Examination in your County and ask for

M. A. C. Entrance

Examination Questions

Third Grade Teachers' Certificate also admits without further examination.

Next Term Begins May 25

FOR CATALOGUE ADDRESS,

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Agricultural College,
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