NOTICE.

The Mother's Club will meet at Mrs. Snyder's next Thursday evening at 9 o'clock.

NOTICE.

Prof. C. D. Smith will address the union meeting of the Y. W. and Y. M. C. A. Sunday evening, Feb. 7. Short course students are especially invited. All are welcome.

NOTICE.

Alumni visiting at the College are invited to call on Prof. Holdsworth at the Mechanics building second floor. He has some interesting facts to present to alumni and former students of the College.

ORATORICAL CONTEST.

The Seventeenth Annual Contest of the M. A. C. Oratorical Association will be held in the College Armory on Friday evening, February 5th, at 7:30 o'clock.

PROGRAM.


Father Marquette, Eva Keesey, Sororia Society.

Bolivar, H. D. Hahn, Union Literary Society.

Vocal Solo, H. L. Kinball, Waterloo, D. A. Gurney, Olympic Society.

Her Serenity Spirit, R. C. Fowler, Hesperian Society.

Martin Luther at the Diet of Worms, Bessie Benix, Perennis Society.

Marin M. A. C. Orchestra.

Presentation of Melobis, Winnie Tyler.


Judges on Delivery: Clarence Bennett, Lansing, Michigan; Prof. W. D. Sterling, Lansing, Michigan; A. M. Cummins, Lansing, Michigan.

The contest promises to be a very close one. The admission will be 25 cents and a large number should attend. You will have an opportunity to hear some good orations and at the same time help out the College.

JUNIOR GIRLS ON DRESS PARADE.

For the first time in the history of Domestic Art at M. A. C., a reception was given to the ladies of the junior class in dress-making. Each student wore the gown made by her in the class. A good looking girl wearing a brand new gown, hand and home sewed, was not only in the building, but very practical. Those present received new courage and many were very eager ever after to hear Mr. Pattengill speak when the opportunity presents itself.

TAU BETA PI.

The Tau Beta Pi fraternity this year elected the following officers: Wm. A. Taylor, assistant pomologist, president; B. McAlpine, W. P. Robinson, majors; and Dr. C. W. Clark, of Caro, Michigan, secretary.

The Tau Beta Pi fraternity is an organization of the upper classmen of the college who have shown ability and interest in the study work. They are to be especially helpful in answering questions in any branch of the sciences. The fraternity also takes an interest in other study work. The addresses which could be used advantageously first half hour of every day should be set aside for Bible Study.

The Junior class intends to publish the Junior Annual. It is a semi-annual and will be in print by the last of July. The Junior class expects to have a successful year. A slight change of address is necessary.

The distance from chapel to Woman's Building is 125 feet, chapel to Williams Hall is 272 feet, chapel to Abbot Hall is 379 feet. Total 972. Average distance 524. No. students in Woman's Building 579; Williams Hall 113; Abbot Hall 50. Total 882.

From information received the average attendance for school days at chapel is 80.

WALTER P. ROBINSON, 
B. McALPINE, 
GEO. W. NICHOLS.

REPORT OF THE BIBLE STUDY INSTITUTE AT ALBION.

The first college Bible Study Institute was held at Albion Jan. 5th and 10th, and was a decided success. All the colleges of the state were represented and a vigorous enthusiasm was promoted.

Dr. H. C. Lathom's talk on "Qualification of a Leader" was especially instructive and beneficial. There is no doubt but that the Bible would be more carefully studied if his directions were carried out.

Prof. Goodrich said a man who had no time to study the Bible had more work than he ought to have. Mr. T. B. Backworth remarked that he had no time to read commentaries, but that the Bible was what he wanted.

Seely's talk on "The Morning Watch" were very inspirational. He was emphatic in urging that the first half hour of every day should be set aside for Bible Study.

H. Howard's talk on "I will do it right now!" in which he emphasized will, and right now, is one which could be used advantageously in other study work. The addresses by Dr. G. A. Waterman, Rev. J. L. Proctor, of Lansing, and many others were great helps to the attendants at the convention.

These Institutes will be continued regularly and will certainly be very influential and beneficial to the several Y. M. C. A. societies at the colleges of the state.

THE JUNIOR ANNUAL.

The Junior class intends to publish an annual for this year in the spring term. H. S. Hunt is editor-in-chief; C. L. Atwood, business manager; Helen Baker, society editor; Belle Farrand, class editor; A. I. Anderson, literary editor; J. P. Estenfank, local editor; G. W. Nichols, athletics editor; V. R. Gardiner, historian; H. F. Tuttle, humorous editor; Elva Davis, artist. The annual promises to be an interesting one and should have a large sale.

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THE M. A. C. RECORD.

TUESDAY, FEB. 2, 1904.

ALUMNI.

01.

E. E. Claxbery is in the Bureau of Chemistry, Washington, D. C.

Marguerite A. Nolan, in charge of Household Economics in the Home Industrial Institute, has an article on that subject in the January number of the Institute Gazette. The article gives an interesting account of the work done in Idaho.

With '02.

Carl H. Smith is a senior in the Civil Engineering Department, University of Michigan.

With '03.

Scott Lovell is in the live stock business at South Lyon, Mich. He visited at M. A. C. last week while attending the masonic meeting in Lansing.

With '04.

William Hallock is editor of the Lansingville News. He visited M. A. C. while on his way home from the meeting of the Michigan Press Association in Detroit.

With '05.

William Lamoreaux is attending the Houghton Mining School and expects to graduate next year. He intends to follow mining engineering as a profession.

M. A. Kane entered the Mining School last fall. He worked in the West for a year after leaving M. A. C.

F. Roth is writing life insurance for the Penn. Mutual. He is doing well and enjoys the work. His headquarters are at Lapere.

A PRELIMINARY NOTE ON THE ASSOCIATIVE ACTION OF BACTERIA IN THE SCOURING OF MILK.

DR. G. E. MARSHALL.

While aiming specifically to secure further information concerning the "Aeration of Milk," I isolated two species of micro-organisms from the milk of our college dairy that should be as diametrically opposed as possible, one member of the group of lactic acid bacteria and the other belonging to the peptonizing class, constantly found in our college dairy milk and producing no acidity. Frequently I have brought together these two different species together in milk culture and have found an alteration in results which were unaccounted for by either, but on repeating this at a later time I was not satisfied with the effort to combine a species of lactic acid bacteria with one of a different class. So it is not my purpose at this time to go into a detailed study of these two species of bacteria from a cultural and biological standpoint, but rather to state as concisely as possible some of the conclusive experimental evidence which I have accumulated thus far.

The associative action is apparently more extensively understood in the case of fermentation that in the case of pathogenic bacteriology, although it has been known for a long time that bacteria of the same species may act upon other bacteria and frequently of great importance in the utilization of bacterial kindling. But in the case of pure culture mimicry we may tell if conditions are maintained, of their interaction and isolated activity of a bacterium, but by no means tell its action when brought into the influential company of another species of bacteria, especially if both are cultivated together in their natural environment. Analysis and synthesis should go together hand in hand, otherwise our conclusions might be very much like studies of the human organism apart from social relations.

The customary belief regarding lactic acid fermentation in milk is simple and has been so long established that modifications have not gained way. What we have to offer does not in any manner alter the understanding of the simple nature of fermentation of lactic acid under pure culture, but it has its bearing by its qualification of lactic acid fermentation when the bacteria are involved. We have always assumed that the lactic acid bacteria are a group of bacteria that remain uninfluenced by other bacteria in milk or at most would only be retarded in a struggle, and would gradually make the way by killing off or inhibiting the growth of other bacteria to the extent of their capacity to produce lactic acid from the lactose. With this working hypothesis, bacteriologists have made much advance, but have been unable to explain many phenomena attending lactic acid fermentation other than to attribute them to possible deviations, variations, alterations, exaltations of virulence, due to the disturbances of the life per se of the lactic acid bacteria.

Let us designate our cultures as follows for the sake of brevity: A = Lactic acid bacterium in litmus milk culture. When used as a starter in milk it was pronounced by Mr. Michels, the College Dairyman, as excellent.

B = Peptonizing bacterium, eventually producing milky milk.

A + B = Equal amounts of a 24 hrs. bouillon culture of A and B in the same medium of litmus milk employed in each culture A and B, 100 cc in each instance.

The tests applied which will yield more convincing proof than to watch the culture closely over a period of several days, for in them may be read the entire history, although not furnishing the intimate knowledge of the changes.

Making cultures with definite amounts of cultural material, for inoculation into definite amounts of litmus milk, and placing these flasks, at constant temperature, results ought to be very apparent, if carefully observed. If it is found latter that bore specific data necessary for demonstration, we shall add the details in anticipated future articles on this subject.

The history of two gross tests cultural experiments will perhaps be sufficient to illustrate what I have already found to run very uniformly in a dozen or more trials.

The cultures were made by inoculating 100 cc litmus milk in Ehrenmeyer flasks of 250 cc capacity with very dilute cultures of A and B, and made by diluting 1 cc of bouillon culture in 100 cc of physiologic salt solution and using definite quantities of this for inoculating.

A received of A the same amount as culture A, and of B the same amount as culture B, that is:

A = 15 cc of diluted bouillon culture A, 24 hrs. old, 1 cc of litmus milk.

B = 5 cc diluted bouillon culture B, 24 hrs. old, in 100 cc litmus milk.

The gross changes in the milk may be indicated by the following scheme, temperature 20 - 22 C. throughout.

20 Hours After Inoculation.

A = No change other than very slight reddening of litmus.

A + B = Litmus redder than in A but not very marked. No change in milk.

44 Hours After Inoculation.

A = Litmus red. No other change in milk apparent.

A + B = No apparent change in milk. B = Litmus red in 24 hrs. excess, very thin red stratum on surface. Flasks may be indicated by the following scheme, temperature 20 - 22 C. throughout.

68 Hours After Inoculation.

A = Litmus red throughout, no other change in milk apparent.

B = Very slight peptonization on immediate surface, but otherwise unchanged to eye.

A + B = Firm curd with whey separation. Litmus reduced except on immediate surface where it is red.

92 Hours After Inoculation.

A = Litmus red throughout. No other change perceptible.

A + B = Firm curd with whey separation in 60 hrs. Litmus has become red throughout, probably through checked growth of micro-organisms and the permeation of curd by oxygen.

216 Hours After Inoculation.

A = Litmus red in upper half, lower half yellow. Milk is beginning to lopfer.

A + B = Same as at 92 hours.

141 Hours After Inoculation.

A = Cultured separated from whey. Litmus reduced throughout except layer on surface.

B = Milk peptonized and slimy. Litmus blue on surface.

A + B = Same as at 92 hours.

The associative action of the milk may be any criterion to the change taking place in A and in A + B, then there should be a difference of seventy-two hours, for A + B first manifested signs of lopfering at 44 hours after inoculation, and A did not begin to lopfer until the 116th hour after inoculation. By following the changes as recorded above, the differences are plainly evident.

In the second series, the temperature varied between 25 and 25 C, two to three degrees higher than the preceding test. I am satisfied everything is developing that I am going to find material modifications with the changing temperature, but as yet I am not ready to report on the temperature studies with these two micro-organisms.

The basement of the Horticultural Laboratory is undergoing some marked changes. The walls have been painted a cement floor put in on the east side. One room will be used for the compressing and testing of the lopfering milk. The other room will have a dozen or more kinds of spraying pumps, etc., and I hope to determine the relative merits of the different makes. Steam and water connections have been made. This arrangement is another step in the progress of the department. All work is made practical. Lectures and experiments go hand in hand.

"WILSON'S SUGAR BOWL"

For Party Supplies, Table Decorations, and the daintiest of Confections, we are HEADQUARTERS.

Come in and get a Hot Coffee and Sandwich.
THE M. A. C. RECORD.

FIRE UP!
Tell us what fuel you wish to burn and we will show you a stove that will please you. We have a choice variety to select from. We have the agency of the PEACH OIL HEATER, and it is a peach. Call and see it.

Norton's Hardware 111 Washington Ave. South.

THE JEWETT & KNAPP STORE
Lansing's Low Priced Reliable Store
Every Department full of New Fall Goods.
We also carry a Complete Stock of Lace Curtains and Draperies.

ABOUT THE CAMPUS.
The Freshmen won from the Sub-Freshmen in a basket ball game last Saturday by a score of 17 to 7. Next Saturday the Juniors and Sophomores play.
The course in cheesemaking will begin on Feb. 16. The course promises to be well patronized, two Canadians being among the number who expect to come. The course covers a period of four weeks.
Prof. John Hamilton, the farmers' institute specialist of the U. S. Department of Agriculture, expects to be present at the Round-up Institute. He is interested in the good roads movement and will speak on that subject on the evening of Feb. 24.
The students in creamery work are receiving instruction in pasteurization of ripened cream. In the use of hand separators, sourd cream is often received. The cream is heated to about 170° F. and then cooled to 60°. In this way a much better quality of butter is produced.
The experiment station has begun the licensing of fertilizer brands for the coming season. The fee is $2.00 per year for each brand. Over $200,000 are collected annually. Armour & Co. has recently applied for 14 licences. Analysis of fertilizers will begin in a short time.
The mechanical department will have an interesting exhibit at the St. Louis Exposition. Student work from the wood shop, engine shop, foundry and forge shop will be exhibited. The material has been collected and will be sent in the near future.
The bulletin on diseases of plants by Mr. Longyear will be ready for the printer in about two weeks. The manuscript work is all done and the illustrations are well under way. The drawings will all be new and original. The camera has been used whenever convenient and thus diseases are shown on the fruit and plants as they actually exist.

When you buy a Sweater
Why not get the best? SPAULDING'S SWEATERS AND ATHLETIC GOODS are the recognized standard of this country. We have the different qualities at four, five and six dollars, in white, black, maroon, navy and grey. All the late things in Hats, Caps, Neckwear and Gloves; in fact, everything in the way of Ladies' and Men's Furnishing Goods. Students' patronage solicited.

Elgin Mifflin.

The College Girl admires a Perfect Shoe, Perfect in Fit and Finish. Ask for Our 300 Shoe
Vel Kid, Velour Collar, Patent Collar. All Leathers and Many Styles.
Take advantage of the best. It is your duty. Call at our store.

C. D. WOODBURY, HOLLSSTER BLOCK.
Horticultural Club.

C. B. Cook, '88, of Owosso, gave a talk before the Horticultural Club last week on growing strawberries on a commercial basis. Mr. Cook has had considerable experience in strawberry raising, especially for fancy markets. He began this business in New York state, but for the last few years he has been in business at Owosso, Mich.

The talk was very interesting. The speaker discussed berry raising from the choosing of a location to the marketing of the fruit.

In choosing a location for a strawberry plantation he recommended that the amateur should select one spot on firm, well-drained soil, but clayey soil is more profitable if one understands how to handle it. He found it more profitable to plow the mulch under than to have it lie on the surface. A well balanced soil is considered equal to commercial fertilizers.

Mr. Cook practices the most advantageous methods in his operations. His plants are set in rows which are 16 inches and 32 inches apart and 4 to 5 feet apart in the row. This leaves a space between the picking season the loss by the picker is reduced. The layering is done by walking on the ground. On well balanced soil, the amateur should select one spot on firm, well-drained soil, but clayey soil is more profitable if one understands how to handle it. He found it more profitable to plow the mulch under than to have it lie on the surface. A well balanced soil is considered equal to commercial fertilizers.

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