Two weeks in the upper peninsula at the beginning of Indian summer, the last week of September and the first of October, are full of delightful memo­ries. We were in a happy mood to enjoy the view of Mackinac Island, which loomed up to the northeast gleamed with broad-leaved trees that the contrasts are re­markably striking at this season of the year. The poplars in yellow, the maples in scarlet and crimson are gorgeous and promising. About St. Ignace is very fertile and some good farms are seen.

Soon, however, the country becomes more level and the soil of a poorer quality, with numerous swamps alternating with low sandy ridges. Upon these ridges were norway and white pines of poor qual­ity. Octopus and a few small tracts of beech and maple land were met with where enterprising homesteaders were struggling to make themselves homes. These pioneers by working in the open fields during the cold weather are able to clear their farms and to provide for the wants of their families. Newberry, the largest town on the north of Marquette, is surrounded by a rich limestone rock and plenty of fine hardwood timber. In a drier up lake bottom near the city are to be seen some fine cedar woods. The clear water of a spring and we approach nearer the Superior shore, a large tract of hardwood timber is seen to the north. A buena town leads to the new and bustling town of Munising, lately started by T. N. Dexter. Large tanneries and stave mills are in operation here, using the hemlock bark and timber which is abundant and of good quality. As the road approaches the shores of the lake the soil becomes sandy and some typical jack pine plains appear. Low blueberry and cranberry ground, forming a dense but abundant of excellent fruit during the season. At a train sand dunes are plenty, reminding one of similar dunes along Lake Michigan. The dark blue waters of Lake Superior are now in full view and Grand Island may be seen far eastward. Nothing of interest is to be noted till the rocky hills about the bay, upon which the old city of Marquette is built, come in sight. Far out in the lake a couple of huge bare rocks appear; north of the city, only to be seen in a clear day. Presque Isle, which reminds one of Mackinac Island, looms up northwest of the city. This beautiful spot is now owned by the city and is being made into one of the most beautiful parks. Many fine residences are seen nestled on the hills. Numerous church spires show that we are nearing a beautiful city. Large ore docks lift themselves over the water of the bay and many steamers are passing out and in laden with merchandise and the rich ore from the many mines, back on the ranges of hills. The busy cities of Ishpeming and Negaunee, thirteen miles west, furnishes the ore, which long ago supplied the copper to the United States.

Avarlike Chiricahuas, who, under the skillful lead­ership of the celebrated Geronimo, achieved a world­wide reputation. On account of their notoriety it is of its movements, and the consequent results of his defection. After Geronimo's surrender, he and his band were first sent to one of our military posts in Florida, but were shortly afterwards removed to Mount Ver­non Barracks, where he was permanently located.

These rocky ridges stretch away on all sides, where enterprising homesteaders are struggling to make themselves homes. These pioneers by working in the open fields during the cold weather are able to clear their farms and to provide for the wants of their families. Newberry, the largest town on the north of Marquette, is surrounded by a rich limestone rock and plenty of fine hardwood timber. In a drier up lake bottom near the city are to be seen some fine cedar woods. The clear water of a spring and we approach nearer the Superior shore, a large tract of hardwood timber is seen to the north. A buena town leads to the new and bustling town of Munising, lately started by T. N. Dexter. Large tanneries and stave mills are in operation here, using the hemlock bark and timber which is abundant and of good quality. As the road approaches the shores of the lake the soil becomes sandy and some typical jack pine plains appear. Low blueberry and cranberry ground, forming a dense but abundant of excellent fruit during the season. At a train sand dunes are plenty, reminding one of similar dunes along Lake Michigan. The dark blue waters of Lake Superior are now in full view and Grand Island may be seen far eastward. Nothing of interest is to be noted till the rocky hills about the bay, upon which the old city of Marquette is built, come in sight. Far out in the lake a couple of huge bare rocks appear; north of the city, only to be seen in a clear day. Presque Isle, which reminds one of Mackinac Island, looms up northwest of the city. This beautiful spot is now owned by the city and is being made into one of the most beautiful parks. Many fine residences are seen nestled on the hills. Numerous church spires show that we are nearing a beautiful city. Large ore docks lift themselves over the water of the bay and many steamers are passing out and in laden with merchandise and the rich ore from the many mines, back on the ranges of hills. The busy cities of Ishpeming and Negaunee, thirteen miles west, furnishes the ore, which long ago supplied the copper to the United States.
these instances, however, have we forced upon the
Indian traits being so different
Children," and to a certain extent they should be
wise well-posted people, that the army is, or ought
Spring Use," O. C. Wheeler, '87. There will also be
topics will be presented by M. A. C. people: "Ladies'
illiterate classes. If such is the case, let the good
is an Agriculturist, she says, 'He is a-nag,' meaning
heroes. Any boy might be highly com­
is broken, observations being taken of the amount of
strength, ductility, and the ratio of the stress at elas­
proportionate increase of the elongation, is also
where an increase of the load produces a more than
stiffness of shafts and other pieces subject to torsion,
torsional tests are made. Such a test consists in sub­
jecting a prepared specimen of the material to suc­
creased extension.

The ductility of a test bar is determined by noting
that the elongation is a very delicate contact, and close and accurate meas­
dering becomes possible. Up to the elastic limit the
elastic limit is also specified.

The ductility of a test bar is determined by noting
the percentage of permanent elongation that is pro­
duced by breaking it and also the percentage of re­
duction of area which an increase of the load produces a more than
the plate shall have; and sometimes the
the percentage of elongation that the plate shall have; and sometimes the
the modulus of elasticity is cal­

During the summer term the Juniors in the Mechanical
Engineering course spend two and one-half hours per week in determining a trip to Adirondacks, iron,
steel, and other materials of construction.

Specimens to be tested are carefully prepared in the
machine shop, being cut to uniform length and turned
entire length. The ends of the pieces are left a quarter
and the middle portion is turned down about one-
eighth of an inch less in diameter for a length of about eight inches; great care being taken to get this
middle portion perfectly cylindrical.
The operation of making the test of a bar prepared
in this way is as follows: when applying loads until the piece
is broken, observations being taken of the amount of
stretch of the piece corresponding to each successive
increase of the load. The elastic limit, or that point
where an increase of the load produces a more than
proportionate increase of the elongation, is also
noted. The test as above described gives the three
most important properties of a material, i.e., its strength,
ductility, and the ratio of the stress at elas­
tic limit to the breaking stress, and its value for any
particular test bar is not necessarily the same for all.
Tests of the tensile strength only, without taking ac­
count of the ductility or elastic limit are usually of little use, as the failure of a given material to resist
shocks, and sudden applications of load, and continu­
antly varying loads depends upon its toughness, a term
that is understood to mean a combination of strength and ductility. Steel, however, is exceptional, and it is customary to state the
tensile strength and percentage of elongation that the plate shall have; and sometimes the
elastic limit is also specified.

The ductility of a test bar is determined by noting
the percentage of permanent elongation that is pro­
duced by breaking it, and also the percentage of re­
duction of sectional area at the point where the piece
is broken. In reporting the percentage of elongation
of a piece its length should always be stated, as differ­
ent results are obtained by varying the gauge length. This is due to the fact that besides a nearly
uniform stretching of the piece over its entire length
there is always a certain amount of elongation over the
jaw or both sides of the break and which is in­
dependent of the entire length of the specimen. It
has happened that a material will show a much larger percentage of elongation than a
long one.

The standard length of test bars in the M. A. C.
testing laboratory is 36 inches, while the cross-section
of 1.00 square inches is the same in every other testing laboratory in the State.
The test bar for a hardening test by being heated to a red heat and cold water quench is a
piece of steel, showing it to be rather high in carbon.

The King's Daughters will meet with Mrs. Davis
on Wednesday afternoon at three o'clock. Lesson,
L. John, Chapter II. Text, the word "go."

Mr. and Mrs. W. E. Lafe and Mr. and Mrs. Wm. Hartse of Vermilion, were visitors here last
Friday.

T. E. Quinlan, with '89, of the Detroit Free Press, was a guest of Prof. and Mrs. Woodworth last
Saturday.

Mrs. M. G. Kains is visiting in Lansing. She at­
tenched the foot ball game at the College Saturday
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N. M. Morse, '96, and E. M. Kaner, with '96 m,
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The King's Daughters will meet with Mrs. Davis on
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Mrs. Gunsen has just sent a barrel of apples to her
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Albany.
If there are any places where water will stand they must be drained as soon as possible; and steep hills must be graded down. In cutting down hills you must avoid filling up the bottom and creating other material that is easier to move than earth, so as to get the best possible grade with the least expense. In filling in this way logs or boulders built up against the soil may be used to hold the earth in place and prevent washouts. A road filled in with this kind of material will be likely to require continual attention. Better it is first to build the road so it can be made by filling in, and after a number of years you will have a solid and bankment which will be as good as if it had been built solid from the beginning. For from year to year as funds would permit, and there will be the advantage of having had a better grade from the first. It's a higher grade and usually the matching bed. In laying it will be profitable to cut through the top and take the earth both ways to fill the hollows; but if there is a stretch of level land at the top, it will be better to take earth from the sides of the road near the foot of the hill and fill at the foot. In grading hills two objects should always be kept in mind: first, to keep the road bed as nearly as possible, and second, to secure a uniform pitch throughout the entire length of the hill.

After the roads have roved sufficiently a road machine can be used to advantage to grade the roadbed; and whatever work is done then should be done thoroughly. It is better to remove the material that will not make a good road should be removed. The roadbed should be graded perfectly smooth, well rounded in the center and packed as hard as possible. The drainage must be perfect if you wish a good road. If water is allowed to stand on the surface or along the side a large number of people will step in it and kick the mud. The drainage must be absolutely necessary to good roads. Having a road once free from roots and stones and thoroughly drained a little work every year will keep it in good order to keep it in repair and if the soil is good you have a fairly good road.

I do not think that any natural soil, however, makes a first class road except gravel; so to make a perfect road the surface must be covered with gravel or some other material. The broken rock from the road bed, gravel on the roadbed, and gravel on the ditches are all natural materials that will make a good road. The drainage of a natural road should be as good as, or better than, man-made roads. But such material can not be hauled very far without great expense. Before gravel or rock is applied the roadbed should be made perfect as regards both surface and drainage; and the thicker the coating of rock or gravel the better. When the material is spread on the surface it should be carefully raked over and all large pieces thrown out or raked aside so that they come at the bottom of the covering, and the covering should be evenly spread over the surface.

A roadbed once built in this way ought not to be disturbed. The drainage should be kept perfect and the gravel in place. By keeping the same same and the same material as the covering the whole object being to keep a perfectly hard, smooth surface, which constitutes a good road.

**SKETCH OF CLARA BARTON.**

**CLARA M. STEEL, '98.**

Perhaps one of the best prominent women of this age has been the noble woman known as Miss Clara Barton. Not only since her decision was made to go to Armenia has she come into prominence, but she has been in prominence in various positions where she has always worked for the good of mankind. Her education was good, but she was a self-made woman, working hard for several years teaching school in order to earn money to take her from Clinton Seminary in New York. Later she taught school again, for two years in Bordenham, New Jersey, and she steamed the title of opposition that she encountered for was then a daring woman, the first to measure the qualifications which have made Clara Barton a power in the world. Her health failing after that, she visited relatives in Washington, and here was in the evening parties of her life. At that time the patent office was in a state of confusion and discord. Clerks laid betrayed confidences, and the secrets of many who had filed their patents were known. Miss Barton's special character, her remarkable executive ability, and a very peculiar directive force, secured for her a position where she had charge of the office. At that time the entrance of a woman to so prominent a position was looked upon very differently from the way it is now, and the clerks there used their utmost ingenuity to make the place so uncomfortable for her that she might be made to quit. Clara Barton was not a yielding one; she remained three years in the office and when she retired she had brought order out of chaos and transformed treachery into honor. She was on the lookout for any evidence of her political convictions.

When the war came she nobly offered her services to the government, and Clara Barton was appointed to be second to her, was a passion second only to her love of human- lity. She was among those who awaited the arrival of the forty Massachusetts men who were hurt by the train for Winchester.

The instincts of her special vocation then asserted themselves, as she met the wounded soldiers in Wash- ington. Later in the war she went to her own country to the field, and the scenes which followed were tragic, indeed. She was at Bull Run, Cedar Mountain, Spottsylvania, and the Wilderness, among other places.

At the close of the war President Lincoln appoint- ed her to superintend the vast correspondence with the friends of missing soldiers. For four years she worked at this arduous task, and in that time the traced over thirty thousand of the living and the dead, by means of her own records and her skill, which entitled to positive genius, in following other clues. In this work she drew freely on her personal knowledge, and when Congress offered later to repay her, she refused compensation. If this had been asked for, she surely would have been made a national hero.

In this work she had done in sustaining and comforting the broken-hearted, Clara Barton was not only the author of thousands of letters to her friends, but she was not only the author of thousands of letters to her friends, but she was not only the author of thousands of letters to her friends, but she was not only the author of thousands of letters to her friends, but she was not only the author of thousands of letters to her friends.

The study of her life is a very peculiar directive force, secured for her a position where she had charge of the office. At that time the entrance of a woman to so prominent a position was looked upon very differently from the way it is now, and the clerks there used their utmost ingenuity to make the place so uncomfortable for her that she might be made to quit. Clara Barton was not a yielding one; she remained three years in the office and when she retired she had brought order out of chaos and transformed treachery into honor. She was on the lookout for any evidence of her political convictions.

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**BALL-F M. A. C. vs KALAMAZOO.**

Last Saturday was an ideal day for foot ball, but apparently a cold day for M. A. C. At the end of the first half the score stood 16 to 0, in Kalama- zo. favor, and at the end of the second half 24 to 0. The ball was in Kalamouso's possession most of the time, and when it was down by the line of scrimmage substantial gain. To an outsider it looks as though our boys ran back too much with the ball. Whether this is because of poor interference or because of the least sensationalism. If we may judge by her past life, her work will do much, very much, for human- lity, and her tenderness and devotion to an unselfish cause are a great and powerful influence. For divine law will be manifested anew.

(Read by Hon. George D. Crippen, at the Iron county institute.)
The M. A. C. A. Record.

October 20, 1896.

THE SPECIAL COURSES IN HORTICULTURE.

PROF. L. H. TART.

The college will offer two courses in horticulture, that will be conducted along about the same lines as those in agriculture. On account of the growing importance of commercial fruit culture one of the courses will be devoted to that subject.

The instruction in fruit culture will embrace, (1) Nursery Work, including the propagation of trees and other fruit plants, budding, budding, and the handling of the stocks, and young trees in the nursery; and (2) Orchard Management, in which such topics will be considered as the selection of the soil, and the locations for the different fruits, the preparation of the land, choice of trees, care of the different fruits, and all of our more common fruits will receive attention. We hope also to secure the aid of some of the best fruit growers of the state, who will explain the methods that have been most valuable with them; the results of their observations and experience cannot fail to be of aid to beginners in fruit culture, while they return to their own homes to take advantage of the lessons presented but, feeling the shortness of the time they can stay here, they will want every moment of the time devoted to practical work, so the laboratory and field work will be devoted to making the students familiar with the more important greenhouse methods, such as firing, watering, ventilating, potting, and the general care of the plants.

Special attention will be paid to practical work in propagation and handling the various crops, and an effort will be made to render each student, so far as the time admits, familiar with the more important greenhouse methods, such as firing, watering, ventilating, potting, and the general care of the plants.

The florist has the same need as the fruit grower of understanding the habits of the various plants, fertilizers, soil mixtures, and insects, and the students in this course will have instruction in botany, chemistry and entomology, the subjects being grouped about the needs of the florist.

Horticultural Department.

THE SPECIAL COURSES IN LIVE STOCK HUSBANDRY AND THE DAIY.

PROF. C. B. SMITH.

In plowing these two courses the fact is not forgotten that the student will benefit who learns that the milk is not always fresh as it comes from the farm and that are either new engaged in one or the other of these important lines of farm work or intend later to become so. Without the provision for houses of various kinds, including the planning and locating of the heating systems. Considerable attention will be paid to practical work in the care of the various crops, and an effort will be made to render each student, so far as the time admits, familiar with the more important greenhouse methods, such as firing, watering, ventilating, potting, and the general care of the plants.

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group of Mexicans gambling. We visited many of the mines, and also old Spanish battle fields.

We went south through the Pueblo village where we procured a native guide, who took us to the ruins of some of the old towns, one in particular, about twenty miles from Ft. Wingate, which is about five miles from the continental divide between the Zuni and Navajo reservations. The Indian soldiers at the fort are mostly Chippewa Indians. We visited several of the Navajo villages and purchased several of their characteristic Indian blankets, which are in some cases required years of labor to make. I noticed that most of the Indians of that part of the country are much smaller and darker than our northern Indians. They live in an almost wild state and do all their hunting with bow and arrow, as the U. S. government does not allow them to use firearms. They herd cattle and sheep and seem to me to be the laziest and shiftiest class of humanity that I have ever seen.

The Apaches are brighter and cleaner than the other Indians and are mostly employed by the white people and as soldiers at the fort.

We visited several canons, which are quite numerous in that country. Some are of great depth. One, in particular, the Boxwood canon, through which we passed, was of such depth that when at the bottom the sun could be seen in the heavens above.

The climate of New Mexico is all that could be desired. The light sky and pure air are praised by all who have ever had the pleasure of enjoying them. Hard work is a thing unknown, the only undisputed peculiarity of the climate are the high winds and tremendous thunder showers which occur at frequent intervals at certain seasons of the year.

KILLING WEEDE WITH ELECTRICITY.

Prof. Philip B. Woodworth.

The October, 1886, number of the College Speculum contains an abstract of a talk before the Natural History Society on electrical weed killers. The basis of the talk was the experiments made by a couple of men in Chicago. They equipped a flat car with a thirty-five horse power engine and dynamo and delivered the current to the vegetation within a few feet of the railroad tracks. Fairly successful results were obtained when the car traveled at a rate of about three miles per hour. Apparently all the energy expended was consumed into heat and the heat burned up the plants. At the Natural History Society meeting mentioned the writer proposed the use of an induction coil and condenser arranged to give a disruptive discharge in hope that such action would prove its supposed similarity to lightning and destroy the life of plants through which it might be led to the surface of the ground. The outfit was tried repeatedly with the same result. The scheme did not go down to the roots.

If you wish to kill all vegetation by the heating method you would probably find a gasoline torch cheaper and easier to apply than the electrical engine and dynamo. And the disruptive discharge method is a failure except in case of green house plants. A petal plant can be arranged so as to send the discharge through the plant from top to bottom by placing the pot in a shallow pan of water. If a discharge is sent through the pot the plant will appear frozen and top over in a few minutes and will not revive on application of water. But here again, if you really want to kill green house plants you will find it cheaper and easier to pull by the roots.

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### Official Directory

#### Sunday Chapel Service—Preaching at 2:00 P. M.
- Y. C. A. — Holds regular meetings every Thursday evening at 6:30 and Sunday evenings at 7:30. S. H. Fulton, President; C. W. Loomis, Cor. Secretary.
- Y. W. C. A. — Regular weekly meetings for all ball-room dances on the campus Tuesday evenings at 8 o'clock, in the ladies' parlors. Meetings on Sunday evenings with the Y. C. A. Miss Edith F. McBerney, president; Miss Alice Georgia, vice-president.

#### Natural History Society—Regular meeting second Friday of each month in the chapel at 7:30. H. C. Skala, President; W. R. Kidzicz, Secretary.

#### Botanical Club—Meet first and third Friday of each month in Botanical Laboratory at 7:30. T. Gunson, President; W. R. Kidzicz, Secretary.

#### Delta Tau Delta Fraternity—Meets every two weeks on the campus at 7:30. F. H. Smith, Secretary.

#### Phi Delta Theta Fraternity—Meets on Friday evening at 7:00. Jonathan L. Snyder, Ph. D., President.

#### Eclectic Society—Meets every Wednesday evening at 7:00 in Prof. W. O. Hedrick's office, College Hall. Prof. A. B. Noble, President.

#### Phi Alpha Delta Fraternity—Meets every Thursday evening at 7:30. H. W. Mumford, B. S., Instructor in Agriculture.

#### Columbia Literary Society—Regular meeting every Saturday evening in their rooms in the middle ward of Wells Hall, at 7:00. E. H. Sedgwick, President; C. P. Wykes, Secretary.

#### Natural History Society—Meets every fourth floor of Williams Hall, at 7:00. W. H. Judson, President; C. P. Wykes, Secretary.

#### Zoetic Society—Meets on fourth floor of Williams Hall every Saturday at 7:30. P. M. C. D. Butterfield, President; Manning Agnew, Secretary.

#### Delta Tau Delta Fraternity—Meets every Friday evening at 7:00 in the west ward of Wells Hall at 7:00. J. D. McLouth, President; R. H. Osborne, Secretary.

#### Olympic Society—Meets on fourth floor of Williams Hall every Saturday at 7:30. H. W. Hart, President; C. J. Perry, Secretary.

#### Phi Delta Theta Fraternity—Meets on Friday evening in the chapter rooms in the west ward of Wells Hall at 7:30. J. D. McLouth, President; R. H. Osborne, Secretary.

#### Union Literary Society—Meets in the hall every Saturday evening at 7:00. E. A. Robinson, President; S. F. Edwards, Secretary.

#### Try and Trust Circle of King's Daughters—Meets every alternate Wednesday evening.

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