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UPPER PENINSULA NOTES.

PROF. C. F. WHEELER.

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. The early morning of September 21 found me in Mackinaw City. The sky was clear, the air bracing, and a good breakfast with a cup of genuine coffee, put me in a happy mood to enjoy the view of Mackinac Island, which loomed up to the northeast like a frowning citadel. The gorgeous tints on the rocky shores of this famous islet contrast strangely with the dark, blue water of the straits. The immense boat which carried our train over to St. Ignace was soon in motion,and our feet were soon standing on the rocky shores of the upper peninsula. The white limestone rocks crop out here and there covered with a dense growth of shapely cedars, white spruces, balsams and hemlocks. No evergreens can compare with the young symmetrical white spruces and balsams of this upper country. They are so mingled 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 indeed. The limestone soil 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. Towns were few and small. Occasionally 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 neighboring lumber camps during winter manage to clear their farms and to provide for the wants of their families. Newberry, the largest town on the line between St. Ignace and Marquette, has good soil and plenty of fine hardwood timber. In a dried up lake bottom near the city are to be seen some fine celery plantations. After the low watershed is passed and we approach nearer the Lake Superior shore, a large tract of hardwood timber is seen to the north. A branch road leads to the new and bustling town of Munising, lately started by Tim Nester. 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 shore of the lake the soil becomes sandy and some typical jackpine plains appear. Low blueberry bushes cover the ground, furnishing an abundance of excellent fruit during the season. At Au Train sand dunes are plenty, reminding one of similar tracts 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 large 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 trains of short low cars are dropping into the numerous pockets of the large docks mentioned before. The city covers a narrow valley and the sides of the rocky hills, with bare smooth tops, on either side. The effect of moving ice in the far back glacial times has left its marks plainly visible everywhere. These rocky ridges stretch away on all sides, making a most brilliant display of autumn color at this time.

A certain minister, while preaching, said that every blade of grass was a sermon. The next day he was amusing himself by mowing his lawn, when a parishoner said, "That's right, doctor; cut your sermons short.—*Harper's Bazar.*

APACHES AS SOLDIERS.

LIEUT. H. H. BANDHOLTZ.

The Apache tribe is divided into about eight principal clans: the Chiricahuas, Tontos, Yumas, Mojaves, San Carlos, Sierra Blancas, Mezcaleros, and Coyoteros. These all possess traits in common, but usually understood that their warriors, like the Sioux, were counted by the thousands; while, it is stated on good authority, that Geronimo's band never numbered much over eighty. This number, however, was magnified a hundred fold by the lightning rapid- are not united under a common chief, and were at one time frequently at war with each other.

Of these eight sub-tribes, the most noted are the warlike Chiricahuas, who, under the skillful leadership of the celebrated Geronimo, achieved a world-wide reputation. On account of their notoriety it is ity of his movements, and the extent of his depredations. After Geronimo surrendered, he and his band were first sent to one of our military posts in Florida, but were shortly afterwards removed to Mount Vernon Barracks, Alabama, and there permanently located. When Mr. Proctor decided to civilize the Indians by enlisting them in the army, the younger members of Geronimo's band reverted from their status of prisoners of war to that of soldiers, but no longer under the leadership of their chieftain. At the same time companies were organized among the Tontos, and other clans in Arizona and New Mexico.

The company at Mount Vernon Barracks was placed under the command of Captain W. W. Wotherspoon, 12th U. S. Infantry, who was also placed in charge of the three hundred Apache prisoners of war at that post. Under Captain Wotherspoon's able and energetic administration the company made rapid strides in discipline and military duties in general, including the construction of field fortifications, building of bridges, etc.

In drill the Apaches are quick to learn, but soon forget the details of the movements; in extended order, however, they are more at home, and instinctively take advantage of any cover no matter how small. With magic equal to Herrmann's, they seem to disappear behind a blade of grass. On guard an Apache is in his element; it is next to impossible to surprise him, no matter how dark the night. On the contrary, an inspecting officer is usually surprised by being challenged before he is aware that he is within sight or hearing.

To the company at Mount Vernon Barracks there were four excellent white sergeants attached, the rest of the non-commissioned officers being Indians. Although proud of their chevrons and anxious to perform their duties oroperly, the Indian "noo-coms" were not a success. When ordered to have their spuads perform certain duties, it would often be found that, in their mis-directed zeal, the non-commissioned officers had themselves done all the work required. In Captain Wotherspoon's company were to be found chiefs like Chato, Naiche, and others, and it would naturally have been supposed that their names would have graced the "non-com" roster. On trial, however, they were found to be unsuited for the position, and became private soldiers, while some of their quondam followers were their superiors in military rank.

The Apaches are strictly truthful and never seek to avoid punishment by resorting to falsehood. When tried by Summary or other Courts Martial they would do all in their power to bring out the facts in the case regardless of the consequences to themselves.

That the company at Mount Vernon Barracks was in such excellent condition may have been partially due to force of circumstances. Before becoming soldiers they were prisoners of war, and, upon enlisting, they improved their condition as regards pay, clothing, and rations, and were not deprived of any privileges they had previously enjoyed. With the Indians enlisted on reservations, the contrary was the case; at the time of their enlistment they were in most cases clothed and fed by the government, and were comparatively free in their movements. It was therefore but natural that they should soon weary of the restrictions of a military life.

The three years' term of the Apache soldiers at Mount Vernon Barracks expired during the summer of '94, and nearly every member of the company wished to take his discharge. This shows that, under the most favorable circumstances, even the martial and warlike Chiricahua soon grows discontented and restive, when governed by the same regulations that are successful with the white soldier.

Like all other noble red men, our Apache brothers cannot resist fire water in any of its alluring forms, and their is evidence to show that they themselves have for ages manufactured from corn a fermented drink which they call "tiz-win." An Apache with his stomach swollen out with tiz-win has more combativeness per cubic inch than a game cock, and, for pure deviltry, could see Satan himself and go him one better. But tiz-win is not alone in its glory in producing this effect, for the white man's "fire water" is equally efficacious.

Knowing this effect of liquor upon the Indian system, it can be understood why the Apaches were not allowed to participate in the so-called benefits of the post-exchange at Mount Vernon Barracks. They were at first admitted on the same status as the white companies, barring the purchase of beer. In its place they were given soda water drawn from a fountain. Of this, however, they soon tired, and could not be made to understand why they could not have beer like the white soldiers. As this feeling might eventually have caused trouble, their share in the post exchange was disposed of to the white organizations at the post, and Captain Wotherspoon built them an amusement room near their own barracks. Here they were allowed to buy tobacco, bottled soda, etc. Of this bottled soda water they are very fond, preferring to drink it from the bottle, and caring little whether it is warm or cold.

It has been stated that Indian soldiers have shown themselves to be very poor shots, but this was not the case with the Apache company in question, as their figure of merit for '93 was higher than that of the white companies at the same post. To be sure none of the Apaches qualified as sharpshooters, but there were several marksmen, and none of them were really poor shots.

As a scout or courier an Apache would be superb; for he possesses independence of action, keenness of vision and hearing, coupled with rapidity of movement. To wonderful perceptive powers, he adds a retentive memory and an ability to impart acquired information in a brief and concise manner. These, combined with his physical qualifications, make him invaluable.

Dressed in the clothing allowance issued him at birth, to which he adds the modest breech-clout and possibly a few bead ornaments, an Apache runner will travel at the rate of about seven miles an hour for as long a time as may be necessary for him to reach his objective point. Nor is this flinty-footed Mercury delayed by cacti or rocks, rivers or mountains; with the speed of a grayhound, and the endurance of the camel he accomplishes his journey in spite of all obstacles, and this too under a blazing sun that withers all vegetable life and drives a white man to any shelter he can find.

Referring to the Apache powers of endurance, Lieutenant Schwatka says in the "Century," "My first visit to Apache land was in 1871. Then the favorite route to Arizona was to round Cape St. Lucas of Lower California, sail through the gulf till the mouth of the Colorado was reached, up which shallow river boats plied and distributed passengers for the few river villages and inland points where a scanty population wrested a precarious existence. From the mouth of the Colorado river it was deemed necessary to send through a courier with dispatches to Fort Yuma, distant ninety miles, I believe, by the trail. Three long days we were steaming up the swift, shallow, and tortuous river, and when we did finally reach Yuma we found that our courier, a lithe, active young Apache, had slipped across the trail in thirteen hours."

We know from sad experience that the Apache is a formidable foeman. Why then can we not utilize his abilities? It is simply because our efforts are in the wrong direction. Accustomed to act independently, he cannot be made to appreciate or understand the necessity of our complex regulations. In our Indian wars we have frequently, and with success, ranged one tribe or clan against another; we have also had our Indian scouts and police, and both have proved to be vey useful in their way. In none of

these instances, however, have we forced upon the Indians the same regulations with which we govern our white troops. Indian traits being so different from those of the Anglo-Saxon, it is hardly rational to suppose that they can be governed by the same methods, nor can they. Indians are called "Nature's Children," and to a certain extent they should be governed and treated like children.

One plea made for the enlistment of Indians is that it will civilize them. It is not surprising that this plea is made when we recollect that the impression prevails in some localities, and among some otherwise well-posted people, that the army is, or ought to be, a reform school for incorrigible boys, and a house of refuge for the unemployed, ignorant, and illiterate classes. If such is the case, let the good work go on; but, if we want an army to be depended upon in time of domestic disturbance or foreign wars, then we must obtain the best possible material for our soldiers; strong, healthy, intelligent men, and men that will understand and appreciate the necessity for self-control and discipline.

If we must enlist Indians, they should be selected from the very best and organized into the necessary number of small companies of scouts, placed under the command of energetic, able, and experienced officers.

Department of Military Science.

AT THE COLLEGE.

The crop of mangels on the farm yielded 55 tons per acre.

The Alfalfa in field number six has been cut the fourth time this season.

W. C. Marsh and wife, of the Sherman House, Quincey, visited M. A. C. October 10.

Mrs. Dr. Beal went to Chicago last Friday to spend several weeks with her daughter, Mrs. R. S. Baker.

Miss Georgia R. Russell, of Kalamazoo, spent Sunday, the eleventh, with her brother, E. R. Russell, '99 *m*.

The students have finished husking in number sixteen and have begun cutting wood back of number seven.

Mrs. Gunson has just sent a barrel of apples to her brother, Dugald D'Arose, who lives in South Africa.

Mr. and Mrs. E. W. Lake and Mr. and Mrs. Wm. Hartsach of Vermontville, were visitors here last Friday.

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

Mrs. M. G. Kains is visiting in Lansing. She attended the foot ball game at the College Saturday afternoon.

N. M. Morse, '96, and E. M. Kanter, with '96 *m*, were at Saturday's foot ball game. The latter umpired the game.

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

The Y. W. C. A. will give a reception in the Ladies' parlors in Abbot Hall Friday evening, October 30, from 7:30 to 10, to which all college people are invited.

Have you noticed the squirrels on the campus? Some are white, some have no hair and some have coats that are "tattered and torn." It is their moulting season.

The turnips sown on the "curiosity strip" for five successive weeks, beginning the first of July, have just been gathered. The earliest sowing gave the largest yield, but later sowings were of better quality.

Do not forget the entertainment to be given by the King's Daughters in the Y. M. C. A. rooms next Friday evening. Mrs. Esselstyne's talk on Persia will be worth hearing. Light refreshments follow. Admission, 10c.

The following is quoted from a co-ed. and so ought to be authentic: "If a co-ed wants to say that a boy is an Agriculturist, she says, 'He is a-nag,' meaning that he is "an Ag." Any boy might be highly complimented to be called 'a nag.'"

At the Ingham Co. Pomona Grange, which meets in Lansing next Friday and Saturday, the following topics will be presented by M. A. C. people: "Ladies' Course at M. A. C.," Prof. Edith McDermott; "Boys' Course at M. A. C.," H. E. Van Norman, '97; Discussion on "How to Keep Apples for Winter and Spring Use," O. C. Wheeler, '87. There will also be given an address by Mrs. Mary A. Mayo, whom we claim as one of ours.

Those taking the Ladies' Course have one hour a week of shop work. Last Friday twenty-two ladies took their first lesson in the wood-shop. Their first work is box construction, and they begin by making a plain box, 9¼x5½x5½ in. This one article brings into use planes, try-square, rip-saw, crosscut-saw, backsaw, scriber, hammer, marking-gauge, brace and bits, and screw-driver. One of our editors, who shall be nameless, has suggested that the first six lessons given the ladies be on "How to drive a nail."

One fine Saturday not long since four of our young "Bachelors" determined upon a trip to Grand Ledge. Messrs. Longyear and Newman wisely chose to go by train; while Messrs. Pashby and True, with a natural bent to pedestrianism, must take in the beauty of the autumnal scenery more leisurely and go afoot. The scenery was charming until they came to where the whole four rods of roadway was taken up by a pond of water, which extended to the swamp on each side. They tried crawling along the top of a fence on one side, but soon came to a place where there was no fence. Here was a dilemma, but "Cy's" mathematics and muscle soon overcame all difficulties. They went back to dry ground, Pashby took off his shoes and stockings, True mounted to his shoulders, and after considerable splashing and laughter, punctuated with commas and semicolons of mud, the two found themselves ashore on the Grand Ledge side. They all came back by train.

THE TESTING OF MATERIALS OF CONSTRUCTION.

Arthur L. Westcott.

During the summer term the Juniors in the Mechanical Engineering course spend two and one-half hours per week in testing the strength and other properties of 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 the entire length. The ends of the piece are left large 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 consists of 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 qualities of iron, that is, its tensile strength, ductility, and the ratio of the stress at elastic limit to the breaking stress, and its value for any given purpose may be largely determined thereby. Tests of the tensile strength only, without taking account of the ductility or elastic limit are usually of little use, as the ability of a given material to resist shocks, and sudden applications of load, and continually varying loads depends upon its toughness, a term that is understood to mean a combination of strength and ductility. Thus, in specifications for boilers, 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 produced by breaking it and also the percentage of reduction 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 different results may be gotten by simply varying the length. This is due to the fact that besides a nearly uniform stretching of the piece over its entire length there is always a local stretch, extending over an inch or two either side of the break and which is independent of the entire length of the specimen. It thus happens that a short specimen of 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 eight inches. That is, eight inches in the length over which measurements of elongation are made. The extension of the test bar under loads that are within the elastic limit being very small, a fine instrument is required to measure it. This instrument, called an extensometer, consists of a pair of fine and accurate screws, each one of which is provided with a micrometer dividing head, by means of which an extension of one ten-thousandth of an inch may be measured. The end of each screw comes in contact with a contact piece, and when contact takes place between them an electric circuit is closed, ringing a bell. This device insures a very delicate contact, and close and accurate measuring becomes possible. Up to the elastic limit the extensions measured by the extensometer are proportional to the loads applied. But when that limit is passed the extensometer shows it at once by the increased extension.

For the purpose of comparison of the elasticity of different materials the modulus of elasticity is calculated. By this term is meant the stress per square inch of section, divided by the corresponding elongation per inch of length, the stress being taken within the elastic limit. Thus, suppose a rod of round iron seven-eighths of an inch in diameter is subjected to a stress of 8,000 pounds, and the extensometer indicates a stretch of 4-1000 inch in a length of eight inches; the sectional area of the rod is 6-10 square inch, and the stress per square inch is 8,000 divided by 6-10, equals 13,333 pounds. The elongation per inch length is 4-1000 divided by 8, equals 4-8000 inch, and 13,333 divided by 4-8000, equals 26,666,000lbs. per sq. inch. By means of this coefficient the relative elasticity of different materials may be compared and the amount of elongation, deflection or other deformation of any member in a structure may be calculated when the stress to which it is subjected is known.

For the purpose of investigating the strength and stiffness of shafts and other pieces subject to torsion, torsional tests are made. Such a test consists in subjecting a prepared specimen of the material to successive increments of torsional stress, at the same time making observations of the amount the piece is twisted over a known length. There is in process of construction in the M. A. C. shops a simple torsion testing machine, and it is expected that the laboratory course in testing materials hereafter will include tests of this kind.

There are tabulated below the results of some tests of iron and machine steel made by students in the M. A. C. testing laboratory. The two specimens of machine steel tested are notable for the high tensile strength shown, combined with remarkable softness and ductility. A piece of this steel was subjected to a hardening test by being heated to a red heat and plunged into cold water. The result was a glass-hard piece of steel, showing it to be rather high in carbon.

Common Wrought Iron.

	Tensile Strength.	Stress at Elastic Limit.	Per Cent of Reduction of Area.	Per Cent of Elongation.	Modulus of Elasticity.
No. 1	52,600 lbs.	36,843 lbs.	45	24	30,000,000
No. 2	52,600 "	31,185 "	26	15	27,000,000
No. 3	51,900 "	32,093 "	22	22	28,100,000
No. 4	47,300 "	31.100 "	47	27	30,418,000
No. 5	54,000 "	30,200 "	22	25	27,000,000
No. 6	51,600 "	30,200 "	43	23	25,900.000
No. 7	50,000 "	33,766 "	21	16	27.000.000
No. 8	54,873 "	36,500 "	35	21	28,500,000

Machine Steel.

No. 1	96,500 lbs.	64,300 lbs,	53	18	29.400,000
No. 2	96,600 "	62,900 "	47	18	31,500,000

Mechanical Department.

ROADS.

[Read by Hon. George D. Crippen, at the Iron County Institute.]

The problem of making roads, always one of difficult solution in all communities, is especially difficult in communities like our own.

In older settled communities the energies of road-makers are confined almost entirely to the repair and improvement of roads which have been in use for many years. With us the problem is largely how to make new roads through the forest fast enough to meet the necessities of the settlers on our wild lands without expending more money than the law allows us to raise for highway purposes. The situation in the township of Stambaugh, with which I am perfectly familiar, is probably typical of the situation in every other agricultural township in this part of Michigan. Last spring we had about 25 miles of highway in the township, all of which had been cut out of the forest in the past 8 years; there was a very pressing demand for at least 6 miles of new highway; and our highway fund was one thousand dollars, or $40 per mile for the roads already in existence, all of which were sadly in need of repairs.

With this condition of affairs existing, the making of first class roads is out of the question with us at present, and the real question for us to consider is how to get the most benefit to the greatest number of people with the means at our disposal.

The first and most important thing to be considered in building a new road is its location. About all that can be done at present in the way of building new roads is to build main roads which shall serve as outlets for a large number of settlers, although they may pass the doors of very few. In locating these roads the benefit to the general public should always be kept in mind, rather than the benefit to any one individual. If you can only build two miles of new road in a year, it is better to build it to accommodate ten settlers than to build it to accommodate only five. If you can build three miles it is better to locate it so it will pass within half a mile of each of a dozen settlers who have no outlet, than to build it directly to the doors of two or three and leave the others as far from a road as ever. If you have $100 to spend in repairing a piece of road, it is better to spend it on a piece of very bad road, than to spend it making improvements on a piece of fairly good road; it is better to spend it repairing a road traveled by 50 persons than a road traveled by 10 persons. All roads should be located with reference to the future needs of the country, and great care should be taken not to locate a road for temporary convenience that will be likely to be abandoned at some future time because it does not serve the public, and thereby lose to the public the money expended on the road. In other words care should be taken to locate only such roads as will be of permanent convenience to the public; and when a road has been located and built it should not be changed except to benefit the public.

I think that the first proposition in geometry might be given as the first principle in road making: namely, that a straight line is the shortest distance between two points, and that in making roads this straight line should be a section line whenever practicable, as roads running across farms, and especially diagonally across, are a great annoyance to the owners. The highway, however, is a public institution and should be located so as to be of the most benefit to the public with the least expense. In locating roads reference must also be had to the surface and character of the soil. A road that is all up and down hill is not by any means a straight line, although it may follow a section line.

Sometimes it will be shorter and easier to go around a hill than to go through it; and again it will be cheaper and better to grade down a short steep hill to a reasonable pitch than to build a road around it, and you will have the advantage of a straight, short road. Swamps and sand plains should be avoided as much as possible. A sandy road is always a poor road. Good corduroy roads can be made across swamps at present; but the swamps may be more unfit for a roadbed in 25 years than now, and the time will come when timber for corduroys can not be found near the line of the road. All of these things must necessarily be left to the judgment of the officials, and for this reason only men of sound judgment should be chosen. My experience and observation lead me to believe that a large majority of our people know how to do good work in making roads after they are located; but many times a man who knows how to build a road has very poor judgment as to where it should be built.

Having selected the location of a road it should be laid out acording to law, and it is important that no mistakes be made in this, so that no litigation may arise later. When properly laid out the first thing to be done is to remove the timber, which, if possible, should be cut from the entire width of the road except that along the center, which should be grubbed to a sufficient width for the roadbed. It is much easier to grub out a standing tree than to grub its stump, and for this reason trees along the center of road should be grubbed.

In many cases it will be practical to lay out a road which can not be completed for several years. In such cases the road should all be cut out as soon as possible, and the grading done afterwards, instead of cutting out and grading a portion each year. Grading can not be done to advantage until the roots have rotted; and a road that is cut and grubbed makes a good winter road without grading, and a winter road is better than no road.

Everything that is done to make a roadbed should be done along the center line of the road unless there is a very strong reason for leaving this line. A roadbed that winds from one side of the highway to the other is a long one to build, a long one to repair, and a long one to travel.

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 and filling in ravines it is wise to use logs or any other material that is easier to move than earth, so as to get the best possible grade with the least expense. In filling in in this way logs or boulders built up along the sides of the embankment will be of use to hold the earth in place and prevent washouts. A road filled in with this kind of material will be likely to require considerable repairs; but after it is first built the repairs can be made by filling in earth, and after a number of years you will have a solid ambankment which will be as good as if it had been built solid from the bottom and added to from year to year as funds would permit, and there will be the advantage of having had a better grade from the first. If a hill is steep with a sharp top pitching both ways 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 reduce the difference in level between the top and bottom as much as possible; and second, to secure a uniform pitch throughout the entire length of the hill.

After the roots have rotted sufficiently a road machine can be used to advantage to grade the roadbed; and whatever work is done then should be done thoroughly. All stones, roots, sods, and other 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 sides of a road it will not stand heavy wear; so perfect drainage is absolutely necessary to good roads. Having a road once free from roots and stones and thoroughly drained a little work each year with a road machine will serve 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 rock dumps of our mines is perhaps as good as anything, but such material can not be hauled very far without great expense. Before gravel or rock is applied the roadbed should be made as perfect as possible 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 ahead 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 any holes should be filled at once with 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 most prominent women of this age in which so many women are prominent is Miss Clara Barton. Not only since her decision was made to go to Armenia has she come into prominence, but a large part of her life has been spent in prominent 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 through Clinton Seminary in New York. Later she taught again, founding a free school for girls in Bordentown, New Jersey, and she stemmed the tide of opposition that she encountered for what was then a daring measure. One traces in this episode the qualities which have made Clara Barton a power in the world.

Her health failing after that, she visited relatives in Washington, and here we see the turning point of her life. At that time the patent office was in a state of confusion and discord. Clerks had betrayed confidences, and the secrets of many who had filed patents had become known. Miss Barton's special characteristics, a 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 would retreat. But Clara Barton's nature 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. In the administration of Buchanan she was dismissed on account of her political convictions.

When the war came she nobly offered her services to her country without payment. Patriotism, with her, was a passion second only to her love of humanity. She was among those who awaited the arrival of the forty Massachusetts men who were hurt by the mob in Baltimore.

The instincts of her special vocation then asserted themselves, as she met the wounded soldiers in Washington. Later in the war she obtained permission to go to the field, and the scenes which followed were tragic, indeed. She was at Bull Run, Cedar Mountain, Spottsylvania, and the Wilderness.

At the close of the war President Lincoln appointed her to superintend the vast correspondence with the friends of missing soldiers. For four years she worked at this arduous task, and in this time she traced over thirty thousand of the living and the dead, by means of her own records and her skill, which amounted to positive genius, in following other clues. In this work she drew freely on her personal funds, and when Congress offered later to repay her, she refused compensation. If this had been her last work, who could estimate the work she had done in sustaining and comforting the broken-hearted.

In 1869 her health failed, and she went to Europe for a vacation. There her last noble enterprise was begun. It is said of Florence Nightingale that the dream of her life was that there should be an order of nurses established. This dream was fulfilled in the Order of the Red Cross. At the time Miss Barton reached Geneva the treaty had been signed by almost every great power, except the United States. M. Moyneir called on Miss Barton and commended to her the new organization. She at once entered upon the work of commending it to her own country. It was she who was the connecting link, and the personal influence that caused the American branch to be formed. After incessant labor Miss Barton succeeded in getting the American branch incorporated into the international organization.

Since this action she has been engaged in furthering the work. At the fires at Washington, at the flood at Johnstown, and at the earthquakes at Charleston, the Red Cross has been to mitigate and relieve suffering.

And now she has again undertaken a dangerous work in sailing for Turkey under very trying circumstances. This work was undertaken without the least sensationalism. If we may judge by her past life, her work will do much, very much, for humanity, and her tenderness and devotion to an unselfish purpose, her love for humanity and her reverence for divine law will be manifested anew.

[Read by Hon. George D. Crippen, at the Iron county institute.]

FOOT BALL—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 Kalamazoo's favor, and at the end of the second half 24 to 0. The ball was in Kalamazoo's possession most of the time, and when it was not M. A. C. did not make very substantial gains. To an outsider it looks as though our boys ran back too much with the ball. Whether this was because of poor interference or because of thoughtlessness it should be remedied. Perfect your interference, boys; play faster and lower; and go ahead. You have good material, now make a good team.

Among the Kalamazoo players were several of the boys whom we met here last summer on the base ball diamond; Waterbury, catcher; Warwick, second base; and Smith, center field. Their whole team impressed us as being a fine lot of gentlemanly players.

There is nothing equal to live steam for cleansing dishes or utensils. Can't you manage to pipe some steam into the kitchen? It would make dishwashing a scientific operation. You can put up such a pipe for the cost of maintaining your tobacco pipe one year.—*Rural New Yorker*..

The M. A. C. Record.

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For various reasons THE M. A. C. RECORD is occasionally sent to those who have not subscribed for the paper. Such persons need have no hesitation about taking the paper from the post-office, for no charge will be made for it. The only way, however, to secure the RECORD regularly is to subscribe.

SPECIAL COURSES IN HORTICULTURE.

PROF. L. R. TAFT.

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 by grafting, budding, layers and cuttings, 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 and varieties, planting and pruning, cultivating, fertilizing, spraying, harvesting and marketing. The care of the different fruits will thus be considered in detail, and the methods employed by the most successful growers of this and other states will be discussed. One hour each morning for six weeks will be devoted to the consideration of the above topics, 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 those with years of experience will be able to obtain many points that will be of value to them.

So far as is possible, the lectures will be illustrated with actual specimens, and the principal operations will be shown in the same way.

Actual practice in the various operations of pomology will be a leading feature of the course. Two or more hours of each afternoon will be devoted to the making of cuttings, grafting, budding, pruning, planting, spraying and other such operations as the nature of the season will permit.

As supplementary studies that will enable the fruit grower to better understand the requirements of his soil and plants and to better protect them from their insect and fungous pests, some time will be given to botany, chemistry and entomology.

Fifteen hours in *Botany* will be devoted to learning something about the structure of roots, stems, leaves, and the different parts of the flowers and seeds, and how flowers are pollenized and crossed. Fifteen lessons will also be given to the peculiarities of plants that are cultivated for fruit, and to the nature of some of the more common parasitic fungi. Besides this thirty hours will be spent in the laboratory, handling and observing plants with the aid of microscopes, charts and books.

In *Chemistry*, fifteen lectures will be given that will treat of the soil and the sources of plant food; of the nature and uses of fertilizers; the chemistry of plant growth and the ripening of fruits and grains.

The fifteen lectures in entomology will treat of the structure and life history of the insects that are most troublesome to the fruit grower, while thirty hours will be spent in the entomological laboratory.,

The course in FLORICULTURE AND WINTER VEGETABLE GARDENING, will be of such a nature that it will be of practical value to all persons having anything to do with the growing of either flowers or vegetables in glass houses. It will include lectures and practice work along the following lines: (1) *Construction of Greenhouses*—for the growing of the various crops. Among the topics will be location, materials, walls, roof, ventilators, glass and glazing, benches, heaters, pipes and piping. In addition to the consideration of the general subject, attention will be paid to the requirements for special crops.

(2) *Propagation of Plants*, which will deal largely with the methods employed by florists, such as seedage, cuttings of various kinds, etc.

(3) *Growing and Care of Greenhouse Crops*, such as roses, carnations, chrysanthemums, violets and other crops of the florist, and lettuce, radishes, cucumbers, tomatoes, mushrooms, rhubarb, aspargaus, etc.

As in the course of pomology we expect to enlist the services of some of the leading florists in the state, who will treat of the growing of the crops with which they have been particularly successful.

The College greenhouses afford admirable examples of methods of construction, and as all of the crops commonly grown will be found in them, they will be used in illustrating the lectures.

The afternoons for three weeks of the course will be devoted to practical work along the various lines covered by the course. The students will be required to make a special study of greenhouse construction, to draw plans for and make an estimate of the materials required for houses of various kinds, including the planning and locating of the heating systems. Considerable attention will be paid to actual practice work in propagating 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 nature of plants, soils, fertilizers and insects, and the students in this course will have instruction in botany, chemistry and entomology, the subjects being treated with especial reference to the needs of the florist.

Horticultural Department.

THE SPECIAL COURSES IN LIVE STOCK HUSBANDRY AND THE DAIRY.

PROF, C. D. SMITH.

In planning these two courses the fact is not forgotten that the young people for whose benefit they are offered come from the farm and are either now engaged in one or the other of these important lines of farm work or intend later to become so. Without previous training, perhaps, in the sciences related to agriculture farther than they are given in the common schools or high schools, they will not care for the purely technical and scientific aspects of the questions presented but, feeling the shortness of the time they can stay here, they will want every moment of it devoted to something of practical value, to something of which they can make practical application when they return to their own homes to take up the work again. For this reason, if no other, prominence is given in both courses to the actual practical work which will occupy most of their time in later life, and as much of the scientific matter is introduced as is absolutely necessary for the understanding of the reasons for the different steps of the work.

Following this rule, the most prominent feature of the special course in Live Stock Husbandry is stock judging, and the other factors of the course are grouped about it. The first element in his training grouped about it. The first element in his training that a successful stock raiser must acquire is the ability to discriminate between different animals of the same strain of blood and tell which is the better of two or more animals submitted to inspection. A sixth sense must be developed, an instinct which perceives almost at a glance the peculiar merits or demerits of animals. To educate this faculty the student will be given constant practice every day next winter in examining and comparing good specimens of each of the different prominent breeds of live stock and carefully studying the significance of variations in their forms.

Along with the selections of animals, naturally comes instruction in breeding and management. No attempt is made to go into the scientific discussion of doubtful questions, but the plain fundamental rules are explained and illustrated in the most practical way to better prepare the young man for the better handling of his own stock.

In this connection, too, a course of lectures is given first on the theory of stock breeding and later on the practical application of the known laws of animal nutrition to the feeding of stock. Daily demonstrations are also given at the barns of the matter taught in the class room, and each student may expect to feed each of the different kinds of live stock for a short period until he demonstrates his thorough understanding of the subject.

It is impossible for the veterinarian to cover in a short course of lectures the whole subject of veterinary anatomy and medicine. The importance of the subject, however, renders the partial training, given in this short time, of inestimable value to the man that has to deal with live stock in a money making way thereafter.

The growing of the field crops on which the animals are to be fed is a very important one, and occupies an hour a day for the entire course. The profit depends as much upon getting the food stuffs cheap as upon feeding them economically.

In the special course in dairy husbandry there are two factors of equal prominence, the selection, care and feeding of the dairy cow, and the manufacture of the butter.

Due attention is given to the former by a systematic study of the dairy form and continual practical experience in judging dairy cows whose records are known; by work in the stable management and feeding of dairy cows; by lectures on feeding; and by a course of lectures on bovine anatomy and hygiene.

Daily practice in the butter room in handling milk and cream and churning; working, salting, and packing butter, occupies the attention of the student in the special dairy course for three hours. The only way to learn how to make good butter is to make good butter until every step in the process has been gone over, so often as to become a habit. The work in dairy chemistry is intensely practical and gives the student a clear idea of the reasons for the successive steps in dairy work as far as they are related to chemical changes. The lectures in dairy bacteriology supplement the chemical work, often explain the causes of chemical changes and emphasize the importance of perfect cleanliness and of a thorough knowledge of the reasons for the precautions taken to prevent infection with bad and undesired germs and the cultivation of the microbes which give the best flavor to gilt edge butter.

In both courses the time of the student will be fully occupied every hour of the day, for the most part in actual practical work, but opportunity will be given for daily study in the library and habits of reading will be encouraged. Systematic reading courses will be marked out for students who desire, and the Farm Home Reading Circle will furnish the books at a very low price.

Farm Department.

WHAT I SAW IN NEW MEXICO.

G. D. MILLER, '99.

About two years ago the opportunity of a visit to the west presented itself to me, and as I had since a child longed for such a trip, I was not long in making up my mind to go.

I will not mention the scenery between here and Colorado, as most people are familiar with western plains, if not with the Colorado cannon. In the border line between Colorado and New Mexico, or nearly so, there rise three large mountains called the Spanish Peaks. We could see snow on their tops, although it was then summer.

We traveled up the pass between the mountains, rising gradually until we were 8,000 feet above sea level. This height was calculated by means of a barometer. After crossing into New Mexico we followed the Rio Grande river as far as Santa Fe. We crossed many a basin, plateau and desert plain, and also many miles of solid red sandstone standing out from 500 to 800 feet high, like blocks set down in the plain.

We stopped at the Albuquerque, which lays claim to being the second oldest town in the United States. It was settled by the Spaniards shortly after the settlement of St. Augustine. This town contains the second oldest church in the U. S., which is in a good state of preservation even at the present day. Here we called on an old priest who took us through his vineyard and garden and also into his wine cellar, where he had some wine which was nearly one hundred years old.

The streets are narrow, and all the houses look nearly alike, being made of "dobie" brick and only one story high. Many of these houses have no windows whatever, all the light being admitted through the door. It is a very common thing to see a native woman leading a "razor back" pig along the street, or a Mexican man lying full length in the sun, or a

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

One of the most interesting sights to me was a stream of lava which had flowed down the mountain side and out onto the plain. It was many miles long and from ten to twenty feet deep, honeycombed, and containing many deep fissures. In leaving Albuquerque we went south through the Pueblo village Saguna.

The natives are of a tribe of ancient Aztecs, which is nearly extinct, only a few villages now remaining. Their villages are usually built in the side of a rock, and in a half circle, with one building above the other. The town is entered over the tops of the houses by means of ladders. The houses themselves are entered from the roof. This is for defense against invasion. This industrious people (I say industrious for they form and build villages, construct dams for irrigation, and have a good local government) inhabited all of New Mexico up to the time of the Spanish invasion.

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, where we resurrected some good specimens of their ancient pottery and other work. You may yet distinguish the form of some of these ancient towns, although nothing but mounds are left to mark the spot. In the land where once stood many cities, but a few now remain and they are gradually becoming things of the past.

We spent two weeks in the neighborhood of 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 blankets, which in some cases requires years of labor to make. I noticed that most of the Indians of that part of the country are much smaller and more slightly built than our northern Indians. They live in an almost wild state and do all their hunting with the 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 filthiest 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 cañons, which are quite numerous in that country. Some are of great depth. One in particular, the Boxwood cañon, through which we passed, was of such depth that when at the bottom the stars 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. Dew never falls and mist is a thing unknown. In fact the only undesirous peculiarities of the climate are the high winds and tremendous thunder showers which occur at frequent intervals at certain seasons of the year.

KILLING WEEDS WITH ELECTRICITY.

Prof. Philip B. Woodworth.

The October, 1895, 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 converted 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 pass.

The abstract published was copied extensively throughout the United States and was re-edited and published in magazines in Ireland and England. Letters of inquiry were received from almost every State in the Union. The largest number came from farmers, next from park commissioners and electric light station owners. One letter was received from a Cuban land holder.

The last time the abstract came to my notice the words "proposed—apparatus costly—results questionable" had been changed to "accomplished—cheap outfit—grand success." The result of such newspaper scientific work is that the older experimenters refuse information which might be invaluable to others, because they fear to be themselves set up as claiming impossibilities.

The past season Mr. H. A. Williams, '98, assembled a new killing machine on the lines proposed. A two-wheeled push-cart was loaded with three storage batteries, an induction coil and condenser. The outfit would deliver a torrent of sparks through an air space of six inches. The apparatus was arranged to distribute the discharge to a strip four to six inches wide when the cart was pushed along at ordinary walking gait. Almost all vegetation under the sparks would appear within a few minutes as though it had been badly frozen. This was true of such plants as the dandelion and most of the grasses. We hoped they were dead clear down, that the discharge had passed through the roots. But the first shower proved that the roots were not damaged at all. The discharge seems to be lost when it reaches 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 potted 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 from the top of the plant to the pan the plant will appear frozen and lop 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.

Department of Physics.

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SUB-STATIONS.

Grayling, Crawford county, 80 acres deeded.
South Haven, Van Buren county, 10 acres rented; 5 acres deeded.

OFFICIAL DIRECTORY.

Sunday Chapel Service—Preaching at 2:30 P. M.

Y. M. 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 ladies on the campus Tuesday evenings at 8 o'clock, in the ladies' parlors. Meetings on Sunday evenings with the Y. M. C. A.; Miss Edith F. McDermott, president; Miss Alice Georgia, cor. secretary.

Natural History Society—Regular meeting second Friday evening of each month in the chapel at 7:30. H. C. Skeels, President. W. R. Kedzie, Secretary.

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

Dante Club—Meets every Wednesday evening at 7:30 in Prof. W. O. Hedrick's office, College Hall. Prof. A. B. Noble, President.

M. A. C. Athletic Association—C. B. Lnaiter, President. G. B. Wells, Secretary.

Columbian 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. F. Austin, Secretary.

Delta Tau Delta Fraternity—Meets Friday evenings in the chapter rooms on fourth floor of Williams Hall, at 7:00. W. Judson, President. C. P. Wykes, Secretary.

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

Feronian Society—Meets every Friday afternoon at 1:00 in Hesperian Rooms. Miss Sadie Champion, President. Miss Marie Belliss, Secretary.

Hesperian Society—Meetings held every Saturday evening in the society rooms 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 evening at 7:00. H. W. Hart, President. C. J. Perry, Secretary.

Phi Delta Theta Fraternity—Meets on Friday evening in chapter rooms in Wells Hall, at 7:00. W. G. Amos, President. F. H. Smith, Secretary.

Union Literary Society—Meetings held in their Hall every Saturday evening at 7:00. E. A. Robinson, President. S. F. Edwards, Secretary.

Tau Beta Pi Fraternity—Meets every two weeks on Thursday evening in the tower room of Mechanical Laboratory. G. A. Parker, President. E. H. Sedgwick, Secretary.

Club Boarding Association—I. L Simmons, President. H. A. Dibble, Secretary.

Try and Trust Circle of King's Daughters—Meets every alternate Wednesday. Mrs. W. B. Barrows, President. Miss Lilian Wheeler, Secretary.

THE LATEST PLATFORM.

A college professor received a letter from his daughter in Kansas which gives the latest sample of platforms.

"Blanche is eight years old and has a friend of the same number of summers. She said to me: 'Irene and I have a club—a McKinley club. We have speeches, and Irene is President and Vice President, and I am Secretary and Treasurer. We have a platform and it's such a nice club! We're going to have badges!' I was much interested, of course, and said 'How nice! What is your platform?' 'Oh, a box,' was the answer, with a most satisfied air. And, truly, I thought it was not much more empty and would do less harm than some 'platforms' belonging to clubs that count themselves wiser than those children."

NEWS FROM GRADUATES AND STUDENTS.

L. B. Hall, '82, is stumping Ionia county for the Republican ticket.

B. A. Holden, '91, superintendent of Hastings schools, visited the College Saturday.

L. C. Brooks, '92 *m*, has returned to Detroit in response to a request to come back and take his old position in a draughting office.

Phil. Porter, with '99, expects to enter the U. of M. sometime this fall. He is at present reading medicine in his father's office, 508 Seventh street, Detroit, Mich.

L. A. Wilson, '94, writes: "I spent the month of September stumping through Kalamazoo and adjoining counties for the "Free Silver" cause, and on October 1st, I entered the law department of the university."

H. M. Howe, with '97, is still working for the D. M. Ferry Seed Co., Detroit, Mich. At present he is at Columbia, Tenn. He intends to return to Detroit about January 1, but will canvass Alabama and Mississippi before his return. He says, "I send my regards to all the boys."

During two sessions of the legislature Mr. Hammond had immediate charge of educational measures advocated by the Department, and the large number of important laws enacted is proof of his ability. He not only won his measures, but by his honesty of purpose, loyalty, and never failing courtesy, won the esteem and good will of every legislator. The members did always like his cause, but they always liked Hammond. It is probably true that no Superintendent ever took the office who was so familiar with the details of the work, both in the office and in legislative halls. Mr. Hammond has grown up in the country schools and has supervised them. He has attended higher institutions of learning and made much of private study. He has had the discipline of a large experience with men.

From the *Rural New Yorker* we clip the following stanza and wonder if it is not from the pen of Maurice G. Kains, '95:

Of "bugs" that chew there's not a few;
Their poison must be eaten:
But bugs that suck, outside we duck,
Or else they'll keep on eatin'.
Then Paris green, 'tis plainly seen,
Has got to go inside, sir!
But kerosene with soap, to cream—
It kills them through the hide, sir!
One ounce of soap, one quart of oil,
One pint of hot, soft water;
One quarter hour churn up with power,
Dilute ten times you oughter.
Of Paris green, one pound, I ween,
To each two hundred gallons;
Then keep well stirred. It is inferred
These rules will save you millions.

M. G. K.

From the *Michigan School Moderator* we clip the following regarding one of our honored graduates, Jason E. Hammond, '86, republican candidate for Superintendent of Public Instruction:

Mr. Hammond's first intimation that his name was being considered for the position of deputy superintendent, was when Mr. Pattengill came to Hillsdale and offered him the place. For nearly four years he has served in this position, and it is not too much to say that he has been a model deputy. His organizing and executive power is marvelous. Every person coming to the office finds a most courteous and obliging official in Mr. Hammond. His earlier experience in a law office gave him much assistance in considering questions of school law, and his compilation of the school laws and decisions is unexcelled. In carrying out the wishes of his chief he has shown a loyalty and heartiness most noteworthy. The Superintendent knew that the details of the office were well cared for, and therefore has spent the greater portion of his time visiting schools and holding educational meetings.

THE PARABLE OF THE WHEAT.

The favorite advice given in his later years by President Martin B. Anderson to the "boys" of the University of Rochester, was not to be in a hurry. "Remember always," he said, "that the first growth of any seed, and that the most important to its after success, must be made below the ground. Be content if for a long time you have to work without seeing results. By the amount of work that you do unseen by men and unknown except to God, your ultimate success will be very largely determined."