Short-horn bull, Duke of Woodland, and also for $6,000 as additional damages. It ought to be remembered that Megibben and Bedford jointly bought at New York Mills sales ,in 1873, the Short-horn heifer 4th Duchess of Onedia, for $25,000 and she gave birth to this one calf before dying on their hands. Megibben bought Bedford's one-half of the calf for $9,000, and alleges that Bedford insured the bull to be a breeder, and that he is impotent. Megibben, when he purchased the yearling bull, called at Bedford's where he and his mother had been kept, with Auctioneer Muir, and the latter testifies to Megibben's story of the contract. As the animal only had one seed, Megibben required a guarantee and wanted to take the bull home with him and test him to three or four of his cows, but Bedford required him to send the cows to his place, and after trial reported the cows as breeding, and received the $9,000 from Megibben. Mr. Bedford's testimony is different. Says other cows were also to be tested, and that they did breed, as did Ayers & McClintock's cow sent to the bull after he was taken to Megibben's.

THE DAIRY.

MICHIGAN BEE-KEEPERS.

The Michigan Bee-Keepers' Association held their annual convention at Lansing, Mich., on Wednesday and Thursday, March 14 and 15.

The attendance was quite large and the interest manifested by the meeting proved that the apiarists are a growing power in the country,

Want of space prevents a complete report of the convention being given, but in justice to the magnitude and importance of the subject treated, the following papers are presented :

The Reciprocal Benefits of Bees and Plants.

The following full abstract was prepared by the author, Professor W. J. Beal of the Agricultural College :

The mutual benefits of insects and plants are wonderful, varied, and manifold. With some plants, like Indian corn, pines, and spruces, the wind is the prominent agent in distributing the pollen. To atone for this imperfect method and the great waste likely to follow, nature secretes a profusion of the fertilizing dust. In the case of the trumpet-creeper and many tropical plants, the humming bird often transfers pollen from flower to flower. In some instances snails do a similar work ; in others, water, as in the case of our eel-grass. In many cases flies, butterflies, moths, beetles and bugs are very efficient in the same good work. Hornets, wasps, bumble-bees, and especially honey-bees, are also frequent visitors to the flowers of plants for the purpose of collecting the pollen and nectar for themselves and for their young. Of all insects, the hive bees and their allies show the most intelligence in their behavior toward plants. The flowers of all our willows and poplars are of two kinds—male and female. The flowers are on distinct trees which are often separated by considerable distances. In some cases the pollen may be transferred by the wind, but in most cases it is undoubtedly carried by the bees which are very active while the flowers are fresh in early spring. The flowers of all our melons, pumpkins, squashes, cucumbers, gourds and the like are of two kinds on different portions of the same plant. The flowers are each furnished with a long or rather deep corolla in many cases, and the plants often lie flat on the ground where the leaves cover the flowers from the action of the wind. Bees and other insects are the necessary agents in crossing the flowers, and to them we are indebted as one of the links in the chain which affords all our gourd-like fruits. In nature there are many other examples of plants in which the two kinds of flowers are separate, as in oak, chestnut, beech, hazel, walnut, hickory, and many more. But how is it with most of our flowers which are perfect, *i. e.*, those having both stamens and pistils ? I should have mentioned that notwithstanding the stamens and pistils are near each other on trees of the chestnut, and the pistils are evidently abundantly dusted with pollen, yet no fruit sets unless two trees are somewhere near each other, that the pollen of one tree may get upon the pistils of the other. In such cases the flowers of the two trees fertilize each other. The same is said to be true with one stalk of corn in a distant field. I intend to try this more fully the coming season, and in a similar manner test many other plants singly to see if they will produce seed, and whether the quantity and quality are good. Most of our cultivated strawberries have perfect flowers, and may be self-fertilized, at least to a great extent ; but the Hovey, green prolific, and some others, have poor or abortive stamens. That they may be fruitful, it is the practice to mix the plants with the Wilson or some other plants bearing perfect flowers. The bees carry the pollen and take the honey. But how is it with the majority of perfect flowers which have good stamens and good pistils in the same flower ? In many of these the pollen is applied to the stigma by insects, and such flowers are rendered more fruitful by these insects than they would be if the flowers were left to themselves. This has been proven by experiment to be the case in many instances, though some flowers are no more likely to seed with the help of insects than without. Very many of our perfect flowers present or ripen the anthers a day or so before the stamens are ready. Such are the lobelias, campanulas,—most all the compositae [which includes about one-ninth of all the flowering plants of this part of the country. The last order includes the sunflower, aster, golden-rod, dandelion, etc. Flowers of spilobrium or willow herb and clerodendron, thrust the stamens out straight when ripe, while the miniature stigma is curled back and unopened. On the following day, after the pollen is gone, the stigma straightens out and opens. In the case of clerodendron, the stamens curl back when the style straightens. The stigmas are the brides too late for the marriage of nearest relatives, for the pollen or bridegrooms have been carried off by the insect priests, and may be wedded to others not related or not very nearly related. All plants producing the ripe anthers before the stigmas are *protandrous*. Many others are *protogenous*. They present or ripen the stigmas before the anthers shed pollen. Of such we have the rib grass or *plantago*, forget-me-not, scropularia. [Full explanations are useless without illustrations. The Professor showed many of these by figures on the blackboard and on charts.]

We may almost say that flowers which are *protandrous* or *protogenous* are the rule and not the exception. Honey bees are the most prominent, but not generally the only insects which transfer the pollen. In the primrose of our greenhouses, Houstonia and partridge-berry and others, all the styles of the flowers on one plant, and those propagated from this by cuttings are of a certain length. They are long on some plants and short on others. On plants with long styles showing the stigma at the throat of the corolla, the stamens are inserted on the corolla below, near, or towards the base of the flower, while flowers with short styles have stamens at the throat of the corolla. Some experiments show that the plants are most productive of good seeds when stigmas of the long styles are fertilized by anthers occupying a similar position on flowers of other plants. And so of the short stigmas. The above plants are often called *dimorphous lytherum solicaria*, loose strips, and others perhaps are *trimorphous*, *i. e.*, there are stamens of three different lengths, and styles—of three different lengths, long, medium and short. If a flower has a medium style it has long and short stamens ; if it has a short style, it has medium and long stamens. What does this mean ? Why, that bees (I have seen them at work thus) carry the pollen to the styles of different lengths by different parts of their bodies which have touched the anthers on stamens of a corresponding length which were on other flowers of other plants. There is an endless number of special contrivances differing in plan and details in each flower or genus of flowers. Those interested are referred to Gray's "How Plants Behave," for details and illustrations of kalmia, milkweeds, orchids, iris, etc. Prof. Riley observed a small moth especially adapted to fertilizing a yucca. She layed an egg and then sipped honey, and so repeated the operation. The plant reared her young insects. She took the honey and transferred the pollen enabling the plant to set seeds. Insect and plant were useless each without the other. This is somewhat true of the striped cucumber-beetle. She eats the young plants, and, later, the pollen and honey, but she helps the plants to seed.

The flowers of *martynia* trumpet creeper, *mimulus catalpa*, bladderwort, and others have broad flat stigmas which curl apart. When touched by a bee's head in passing in, the stigmas close in a few seconds, and cover the surface which is sensitive to pollen. While taking the honey, the bees are dusted with pollen which is just in the right place to be left on the stigma when entering the next flower. In these flowers, self-fertilization is impossible unless in rare and exceptional cases. For particulars see *American Journal of Science* for October 1876, in article on the subject by the author of this lecture. Flowers of Dutchman's-pipe, some arums, and lady's-slippers entrap and hold as prisoners different kinds of small insects which enter them. They are no prisons like Libby or Andersonville in miniature, for they treat their prisoners well, with good shelter and an abundance of food and drink of the best that nature affords. The flowers of our common flax are absolutely sterile when close fertilized by the pollen which is ready in abundance, and often falls upon the stigma of the same flower. Bees cause the flowers to get seeds by crossing with the proper pollen. Our crop of flax seed, then, is benefitted in yield, and in some cases entirely dependent on the aid of the little busy bee. Our common garden beans are self-fertilizing to a certain extent, but the crop is more than doubled by the aid of the bees.

Most or all plants are better for a cross. This is not always so apparent at first, as it is after several generations of plants raised from self-fertilized flowers. In such cases, a cross adds increased vigor and fruitfulness. Many, very many flowers you see are as plainly intended for cross fertilization as the beak and talons of the eagle are intended for catching, holding and tearing prey. Not honey bees, but little insects nearly akin, produce the galls on oak. The oak kindly receives the egg, swells up a soft succulent house and gives the young worm an abundance of food. An insect lays an egg in the stem of a golden rod, or in the tip of a young stem of willow. A brush in one case, a cone in the other is produced to nourish the young worm and feed it and shelter it to maturity. Whether these insects repay these plants for their kind reception I have not been able to find out. Paid or not paid, they have food enough and to spare for these interesting litile creatures. With small bladders, the bladderwort is busy catching microscopic animals, and retaining them till dead, and then slowly transferring the nourishing juices to the rest of the plant. Here is cruelty even among humble plants. The queer common pitcher plant of our swamps is supplied on the inside with spines pointing downwards. This is the case with numerous others on the continet. Some of them prepare a honeyed secretion which grows more abundant until the lid or open mouth of the pitcher is reached. Insects are enticed, lured on, like a tippler in the dram shop to the open mouth of destruction. Curiously constructed lids make the mouth dark, and help to keep the incect from escaping. Most of them cannot walk up the inside of the pitcher. They are drowned by the liquid below, and devoured by the carnivorous plant. A few insects, among them a moth, is provided with sharp stiff spines on her legs which act like stilts to enable her to walk up and down among the stiff spines in the pitcher. When a boy, we used to make a box trap for squirrels and rats. To deceive them and make them waste their strength, in busily gnawing where it would not injure the trap, we bored small holes through the sides, and nailed over a piece of tin with a hole through it to let in the light. In the pitcher plant of the southern swamps are thin translucent spots towards which the insects are attracted instead of the open mouth above which is shaded by the overshowing lid. This is one of nature's cunning traps. The *martynia* plant and others catch and suck to death with their sticky glands innumerable small insects. The venus fly-trap of Carolina, every one knows about, and very likely they have heard of the several kinds of sun-dews which catch little flies with their glands.

Honey is secreted in different parts, or by different organs of the flower. Sepals, petals, stamens, pistils, and disk, each in different flowers is found to secrete nectar. By this. I mean, that one kind of flower secretes honey with its petals, another kind by sepals and so on. Petals attract bees, Saunders, of Canada, cut off the petals of raspberries and by so doing made it difficult or impossible for the bees to find the honey. Individual bees have been observed to behave differently about flowers, in some respects, from a majority of bees. Some are excentric. They have their own peculiarities. Nageli put artificial flowers to branches, and used essential oil on some, and on others he used no oil. The odor attracted them to the flowers containing it. Aristotle, 2000 years ago saw that hive bees worked continuously on flowers of the same species, They even do so when the flowers are not all colored alike, as in some plants in our flower gardens. By this means they economize time. They get the hang of it. They learn how better to make more rapid motions, and to make every motion count. The same as is true of people who become expert in certain parts of any trade after much practice in often repeating the same operation. In some cases, large numbers of honey bees soon learn to glean after bumble bees, where the latter have made holes into the nectar. I have seen orioles pinching the tube of the Missouri currant or yellow currant, to get the little honey from each flower. This left a small hole which the honey bees were not slow to find, and to frequently use as long as the flower remained fresh. We have thus seen some of the diverse contrivances by which plants are made to secure cross fertilization. The list might be almost indefinitely extended, and yet find something different in nearly all of them. Flowers shut up, go to sleep, bend over in all manner of ways to prevent themselves from wind and weather, to retain the essential parts in a fresh condition until the time when the proper insects are likely to be about. If they are intended for the visits of moths, they open when the moths are likely to fly, and do not waste their sweetness in daylight. If, like the dandelion, they are dependent to any degree upon bees and other day insects, there is no need of their remaining wide awake all night. They had better close up as they do, and keep fresh for the best part of several days. So you see, the honey is placed in the flowers as wages to pay the bees for serving the plants. The colors and odors are advertisements to call the attention of insects to the rich supplies of food in store for them. It may be said that the honey is there for the bees, but *primarily* it is there for the good of the plant, *secondarily* for the good of the insect. As has been said, "The flowers surpass in an incomparable degree, the contrivances and adaptations which the most fertile imagination of the most imaginative man could suggest with unlimited time at his disposal." You who like the honey bee so well, and have become so familiar with its habits and great worth, will think no less of her on account of my showing her value to the plants which are visited. Had good old Dr. Watts lived in our day, and become familiar with those parts of science, he would very likely have written the familiar stanza in this way.

How doth the little busy bee,
Improve each shining hour,
By carrying pollen day by day
To fertilize each flower.

CAN WOMEN KEEP BEES WITH PROFIT.

Upon this topic we take the following from a communication by Mrs. M. A. Bills, of Hillsdale Co. To the inquiry I might simply answer yes, decidedly, and append my signature. But I presume you wanted more—a little experience. Not having kept a journal, I cannot be very definite. After three years of loss and mishaps as amateur and beginner, in which the profit and loss about balanced, I began in 1875 with ten stocks, in the old American hive, none of them full. All were hybrid bees. I had some natural swarms, but generally prevented such. I lost three swarms which went to the woods, and closed the season with four strong stocks, with plenty of winter stores and something over 2,200 pounds of honey, all of which, except what the family used, was sold at 16 to 25 cents per pound, most of it at 20 cents. All the bees went to March in fine condition. All were heavy and breeding finely. It being cold and windy, they were replaced in the cellar from which they had been removed ; very warm spring weather followed. Illness prevented proper attention, and all but sixteen young swarms fretted to death. Sickness and death in the family prevented much attention to bees, but in autumn I had forty stocks again, but only about 1,300 pounds of honey. Honey sold for 16 to 25 cents and two stocks for $20. At present all the stocks are doing well. I now use the double American hive, with some of my own family improvements. I have given them very imperfect care, yet for every dollar I have spent the bees have returned me at least five. I feel sure I can do much better. It is a healthful, and interesting, and profitable pursuit. The lack of a suitable market is the only risky feature of bee keeping.

DESIRABLE COMBS—HOW SECURED.

Of this paper, by James Heddor, Dowagiac, we abstract the following : "My views are formed from an experience of nine years. For desirable combs for brooding purposes, I know of none so good as bee honey comb. I know of no better way to get them built than to put honey bees into a cavity and empty box in times of a year of nectar. Is this idea old ?. If novices go on in their wild career of artificial bee keeping, the above method will soon be patentable. We can take two hives, and, by assorting them, get all the drone comb in one, while in the other we shall have the worker comb ; but later some of these cells will be changed to drone cells. We cannot change their nature, but we can hedge it about *sometimes*, to our advantage. Colonies act differently in this respect. I can bring all hives up so near to the maximum point of working comb by *the proper construction of the hive* that further time spent would be useless. I doubt if it would be wise to keep a single colony devoid of drone comb. Stocks containing a fair amount of drone comb seem to be most profitable. If bees are guided by the right kind of wooden guides, properly spaced, we shall find mostly cheap, choice store comb, full of honey and free from brood and bee bread. Allow me a few words on other subjects. Three subjects on the programme seem to outweigh all the rest. I cannot but look upon the vending of patent hives as decidedly wrong. Let our association discuss this point, and post up bee owners in this regard. I have given away hours of time, dollars of stamps, and more or less of wood and nails, and am willing to continue doing so. I intend to put an article on this subject into our county paper, and hope you will do likewise."

HOW MAY WE IMPROVE OUR BEES.

From the paper read by Charles Dadant, of Hamilton, Ill., we abstract the following :

The law of variation in the way of improvement is as eternal as matter itself, and as indestructable. It is a living force which all beings obey. The natural changes continue even under our eyes. The paper notices some of the changes which have taken place among large domestic animals. The same may be done for bees. Man can increase in them what he thinks desirable, and diminish the peculiarities considered noxious. [Is there much prospect of doing away with the sting or in reducing its sharpness or poison. Reporter.] To aid in improving bees take any advantage of a spot or variation in color. We have the black, the grey, the Italian, the Carolina, the Egyptian, the Cyprian, and the Albino bees. They vary in other respects. If we find a kind having some desirable qualities, we can take advantage of it. In my opinion, the most desirable qualities to be striven for are activity, fertility, endurance, peacefulness, and beauty. By activity, I mean active to work in gathering honey ; by fertility, a queen that can fill the combs with brood early in the spring. Both of these qualities would be useless unless our bees could endure our hard winters. Of the kinds mentioned, suppose we had twenty pure colonies. We select two of them, one to raise drones, one to raise the queens. We take care to replace all the drone combs by worker combs ; and we take the advantage of a warm temperature in March to slip drone combs between two worker combs, in the colony intended to raise drones. As soon as a few drones are hatched we begin to raise queens. To this end we deprive one of our colonies of its queen, and change all its brood combs with a similar number of our selected colonly, taking care to brush every bee from the comb before introducing them into the hives. Ten days after, we can introduce in other colonies, rendered queenless on the preceding day, the queen cells obtained ; or make swarms as we like. During the season we watch to see which colony possesses the desired qualities in the highest degree. The best queens are raised in good season, in strong colonies having a quantity of fresh pollen and unsealed honey, while queens raised in the cold season in small swarms are generally poor. Twenty years ago a French writer advised changing colonies with others some distance away to avoid too close in-and-in breeding and thus get more active bees and more fertile queens. My experience has confirmed this view. The lazyest bees I ever saw were all in one neighborhood where all the swarms came from one hive. Many have noticed how much superior the bees became after introducing Italians. I cannot close my essay without saying a word about the *ne plus ultra* of the present, past, and future, the Cyprian bee. I had five colonies sent me, but all the queens were smashed. The peasants do not know how to put them up and the changes, and delays are many.

VETERINARY.

EFFECT OF FOOD ON DIGESTION.

A great number of diseases among domestic animals arise from the bad economy of blood induced by excess of water and deficiency of nitrogenized matter. The practical farmer knows that if in the lambing season he gives his ewes too much green food, which, growing rapidly, contains a large amount of water, it will form the foundation of a bad quality of blood, and that he will very probably lose a number of his flock. Whereas, if he put them on dry food, or food deficient in water, and containing *per se*, weight for weight, a large proportion of nitrogenized matter, a good quality of blood would be produced, and the health of the animals be preserved. Admitting that cooked food has the effect of accumulating weight, to say nothing about flesh, in a certain space of time, we would be inclined to think that that resulted in a great measure from the facility with which such food was digested. It was in fact, partly made into a pulpy mass, which must be the process that took place with reference to the action of the gastric juice. If we took the food in a crude state, and gave it to a pig or other simple-stomached animal, it became converted into such a pulpy mass.

Food prepared by cooking supersedes mastication to a considerable extent ; by superseding mastication we supersede insalivation ; and by superseding insalivation, we will find that all we put in the place of it was just the chemical compounds formed by the process of cooking. The result would be, that this interfered with the first process of converting food into blood, and all food that ministers to the nutriment of the system must be converted into blood ; and thus we arrested the natural chemical process that ensued from the mingling of the saliva with the food. After the carbon has entered into a ruminant in sufficient quantity, and the animal's wants has been supplied, he ceases to feed ; but if we take the simple-stomached herbivorous animal, the horse, we will find him at pasture eating twenty hours out of the twenty-four ; and the reason is, that it takes a longer period to put into his system the proper quantity of carbon. In the case of the ruminative animal, nature has made provision for stirring up the food, and chemical changes are effected before it passes into the stomach to be digested. And not only was this provision made in the arrangement of the stomach for that purpose, but also for the remastication and reinsalivation of the food (the process of "chewing the cud"). When the food is within the rumen, or paunch, it undergoes a change, which is continued for a longer time than when it is in the mouth ; and being salivated, it becomes in reality mixed with a larger amount of saliva. There must be a certain repletion in the stomach to produce rumination, or throwing up of the "cud"; and the animal does not ruminate with a stomach only half filled with food. He ruminates when the rumen is fairly filled, and in the process the food is physically as well as chemically altered by being retained within the rumen, exposed to the action of the secretions that came from the rumen.

It is a mistake to suppose that food which has been ruminated goes at once into the digestive stomach. That depends materially upon the condition of the food ; and it is even possible, by giving cooked food, or food which is physically in the same condition with regard to fineness and moisture, to render animals non-ruminative which are naturally ruminative—that is to say, we might give them food that would be retained for a very short space of time in the rumen, pass quickly into the true digestive stomach, and become subject to the action of digestion without first undergoing remastication. Now there we would interfere at once with the law of nature ; and we hold that if we cooked food at all, we ought not to pulp it before cooking it, or reduce it too fine. A fine-cut chaff ought not to be cooked ; but we might with advantage cook chaff which is four to six inches long, because the cooking would set up the process of converting the amylaceous parts into sugar, and it would not interfere with the functions of the rumen ; such food would be remasticated, and become mixed with the natural secretions. A great deal depends, therefore, upon the state of the food before being exposed to the process of cooking ; and that ought not to be lost sight of. Speaking, then, on the subject generally, we would be inclined to think that cooking was not desirable as a whole, and that everything we wish to gain is to be obtained by giving food which is so prepared as to be assimilated to masticated food to some extent, and to food which has been exposed to the action of the rumen.

QUERY ANSWERED.

CRAMPS IN DOG, SCROFULOUS TUMOR IN OX.—J. S., Waterville, Kan.—*Statement :*—1st. I have a terrier slut, now five years old, that is subject to spells or spasms. When she has one of her spells, she seems to be stiff as if all the leaders in her body were stretched to their utmost tension. Her jaws are locked, but not so badly but what they can be pried open. She seems to be sensible, and will try to do anything that I bid her. Has been troubled for about two years. She has never frothed at the mouth. Can it be cured ? Is there any danger of it ending in hydrophobia ? 2d. One of my neighbors has a steer, 3 years old, fattening, whose eyes got very sore a few months ago, and mattered some afterwards. His jaw swelled very much, and he had it opened, when a large quantity of matter ran out. He washed it frequently with castile soap, and it healed. He put him back with the fattening cattle, and in a few weeks his jaw swelled up again, and it opened of its own accord, and mattered some. It is still open, and the lump is hard. The matter is very offensive, and he is losing flesh, but eats heartily. What is the disease and how is it cured ?

Reply :—1. As nothing is known of the cause, treatment must be guided by general principles. If the dog is fat and plethoric, it will be proper to reduce the condition by spare diet. If in poor condition, give nutritive food. The cramps may be caused by worms, or by some irritation of the brain, etc. A tape seton in the nape of the neck, is sometimes beneficial. An occasional emetic may be given, and also a cathartic. As an emetic give two grains each of tartar emetic and powdered white hellebore, in a little butter. As a physic give four grains of calomel, and a scruple of jalap powder, mixed in butter. These remedies may be repeated fortnightly or every three weeks. 2. The tumor is of a scrofulous nature, and is not likely to yield to any treatment short of a surgical operation. Such operation, however, requires some anatomical knowledge and skill in the operator to perform it properly.

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