

ceptance impaired, if he continues to insist upon all these radical changes.

To show you what these changes are, I will briefly state that in the pamphlet already published, and which is intended as a forerunner of the author's great work on the butterflies, the following alterations are made in the received nomenclature:—The 223 species enumerated are distributed among 90 genera—almost a genus for every two species; of these 93 genera, 42 are entirely new, and 39 others are obsolete names of Hübner and others that have never been generally adopted; there are thus 15 familiar generic names left, but of these several are transferred from their present position to entirely different groups of species; for instance, the name of *Papilio* is removed from the genus of "Swallow-tailed Butterflies," and handed over to the sole use of the insect at present known as *Panorpa*. Further, among the 93 genera there are no less than 45 that include but a single species apiece; and among the 223 species there are only 18 left with their present names unchanged! These figures are pretty quite enough to show that I have not misapprehended the terms "sweeping," "revolutionary," and "radical," as characterizing this work of revision. I would, then, most earnestly entreat Mr. Scudder, for the sake of the science itself, to reconsider his project. I changes,—to discard all antiquated names in favor of those that have been for years in general acceptance, and to reduce his list of new genera to as small a number as he conscientiously can. If he does not; if he persists in his revision, I fear that his great work—most valuable as it will undoubtedly be in all other respects—will introduce more confusion, trouble and discord into American entomology than a generation can get rid of. If these difficulties can be avoided in no other mode, it will remain for us all to unite together and agree to ignore all old forgotten names that may be brought forward, and retain all remaining of familiar species, until a general settlement of the question can be satisfactorily arrived at.

I fear, gentlemen, that I have now completely exhausted your patience; I shall therefore listen to a close. But before doing so, let me remind you that, since our last annual meeting, our Society has lost by death one of its most valued members, Mr. B. Billings, of Ottawa, Ont. He was one of those devoted lovers of science who do good service by their honest, hearty work, but who, from their innate modesty and retiring disposition, shrink from all publicity. At times he contributed valuable papers to our little periodical, but he could never be induced to make any display of the knowledge he had acquired by his patient diligence both at home and in the field.

Permit me now, gentlemen, to resign into your hands the office that you have done me the honor of investing me with. I thank you for your kindness and courtesy towards myself and my colleagues, and with every wish for the continued success and prosperity of your Society.

I have the honour to be, gentlemen,

Your obedient servant,

CHARLES J. S. BETHUNE.

TRINITY COLLEGE SCHOOL, PORT HOPE,
September, 1872.

Mixed Food for Cattle.

A correspondent of the *Buffalo Live Stock Journal*, states some important facts relating to this subject in a very plain way. Not all who feed ground food to cattle understand fully what is meant by rumination and its relation to the question of economy in feeding. His remarks:

"The stomach of ruminant animals is a compound organ. It is divided into four compartments. When grass, hay, or any coarse food is eaten by the ruminant, it passes, after a partial mastication, down the oesophagus, or meat-pipe, and is lodged in the rumen, or first stomach, more commonly called the paunch.

"It is retained in this receptacle or reservoir till the animal has leisure to remasticate it. It does not lie at rest, but is constantly stirred up and kept in motion by the peristaltic action of the sack that contains it, and is mixed up and softened with mucus; by this means and by fermentation, preparation is made for the work of digestion, if it is not in the strictest sense actually here begun. For the purpose of remastication, according to Youatt, it is gradually moved into the second stomach, a honey-comb bag, and then, by a spasmodic motion, to the mouth. After sufficient mastication, it is swallowed again, but instead of going back to the place from which it was raised, or to the receptacle where it went the first time it was swallowed, it now goes, according to the authority just cited, to the third stomach, or manplies, where it undergoes a further and material change, and

thence to the last division, or fourth stomach, where the process of digestion is completed.

"Though digestion proper is only carried on in the fourth division of the stomach, it is evident that the action of the other divisions of that compound organ is useful to the digestive process, or they would not have been placed where they are. That the changes wrought upon the food in passing through the several divisions, hasten and perfect the action of the true (fourth) stomach, can hardly be questioned.

"MEAL ALONE NOT REMASTICATED.—But the food eaten by cows does not always pass through all the appendages to the real stomach. This complicated arrangement of the ruminant stomach, was made for coarse, herbaceous food, and not for that which is finely pulverized or very concentrated, and hence it does not manage such food alone to the best advantage. When meal alone is fed to cows, it drops in the fourth stomach, missing entirely the other three. It does not even stop at the third division, where the food that has been made fine by remastication goes. I learned this fact by accident some years ago. Finding, one spring, that I had not hay enough to carry my cows through, and believing that it was cheaper to purchase grain than hay, I bought corn-meal and middlings for a substantial support and barley straw for bulk. The straw was well cured and early cut, and with six pounds of ground feed per day they did well on it, rather better than they did on hay, and it was cheaper. After a while they seemed to get tired of the straw, and, to make them eat it up clean, I wet it and spread the meal over it. As I expected the straw was eaten up clean, but I found in a few days what I did not expect, that their milk increased a little in quantity and considerably in richness, the quantity of meal and straw being the same in each way of feeding. I changed the mode of feeding several times during the spring with the same result every time. The difference was not very large; I cannot now say exactly how much. The experiments were made for my own satisfaction only, with no thought of publishing, and the figures were not preserved. As the difference was evidently due to the manner of feeding the meal, I determined to be positive as to where it was lodged when eaten, conjecturing that it failed of perfect digestion from not being carried to the rumen where they would receive the necessary preparation for complete digestion. With this intent, I followed to the slaughter house a pair of four-year-old bullocks, sold to the village butcher, and, just before killing, fed them a peck of corn meal.

"As soon as the stomachs could be reached, they were examined, and the meal was found deposited in the fourth stomach. Not a particle could be found either in the first, second, or third divisions. Since then I have several times made similar tests with cattle slaughtered on the farm, with like results. Whether the meal took this direction by the will of the animal, or whether the papillae which line the rumen and lower part of the gullet, were too large to grasp and work along into the rumen such fine food, as they are supposed to do with the coarser food, I cannot say. It must suffice for the present to know where it went. But I will say on this point that finer food goes into the rumen or paunch of young cattle than into that of old ones. When I fed corn in the ear to cattle, one, two or even three years old, just before killing them, I found nearly all of it in the paunch, but when I fed full grown cows in the same way, especially old cows, I found nearly all the corn in the fourth stomach. Nothing but the whole kernels or large pieces went into the first stomach. But I found all of it there when the ears were fed with a wisp of green hay wrapped around them. In this way corn may be fed with very little loss from having it pass the cattle whole. The masticated corn mingles with and adheres to the hay, and goes along with it to the first stomach, the natural reservoir for coarse food, whence it passes through all the digestive apparatus and receives the most thorough digestion.

"MEAL TO BE FED WITH STRAW.—So when straw or hay, cut or whole, is well wetted, and finely ground meal is sprinkled on and mixed with it, the whole goes, in like manner, to the first stomach, and the action of every part of the stomach is made available for complete digestion. Not only can the dairyman derive better results from meal when fed in this way, but more of it can be consumed in a given time; because more of it can be fed without producing scouring. Meal produces scouring when more is fed than can be digested. It is imperfectly digested meal, more than anything else, that disturbs the bowels in this way. Less meal will produce scouring in cattle when fed alone than when fed mixed; evidently because, when mixed, by having the action of the first three stomachs upon it, the work is well along by the time it reaches the last division, and hence will be done not only more thoroughly, but also more easily and rapidly."

Abortion in Cows.

Over the signature of "Physician" the following article appears, in the *National Stock Journal*:

While it would be impossible always to assign an undeniably cause for abortion, it is certain that many circumstances contributing to bring about so unfortunate an event are within the scope of our knowledge, and are, to some extent, controllable.

As gestation in the cow is a purely physiological condition, it is apparent that in order to bring about a premature expulsion of the ovum, embryo or calf, there must be engendered, either from within or without, a diseased condition, of sufficient gravity to cause premature expulsive action of the womb muscles. This may, certainly, arise, 1st, from morbid conditions within the cow; 2nd, from disease affecting the ovum or embryo; 3rd, from external violence; and 4th, from roots, plants, or seeds taken as food, and which have the medicinal effect of exciting the motor power of the womb.

The cow may have a diseased womb, which, of itself, would operate as a fruitful cause of abortion, or, if free from such disease, she may, from some unknown cause, or through the influence of excessive or irritating food, be attacked with profuse scouring, diarrhoea, or, as may happen, with discharge of acrid burning urine, either of which could, by the sympathy existing between the uterus and the intestines and urinary apparatus, set up premature action of the womb, with consequent expulsion of its contents.

Again, while the cow may be healthy and remain free from intestinal or urinary affections, abortion may occur from causes operating upon the ovum or embryo calf, and originating in anything which compromises its life. The membrane forming the sac or covering of the embryo, and which contains the liquid in which it floats, are like other structures, subject to disease. The after-birth, through which all the blood of the cow must pass on its way to nourish the embryo, may be diseased, and thereby rendered unfit for the performance of its important functions; or the after-birth, from disease or other cause, may separate, either wholly or in part, from its attachment to the womb; or the cord connecting the cow with the embryo may become twisted, knotted, or compressed in such a manner as to cut off the flow of blood necessary to its nutrition and growth, and, consequently, to its life. And in either of these events there ensues embryotic death, which is followed, sooner or later, with expulsive uterine efforts, resulting in abortion.

Again, while neither the cow, the embryo, nor its belongings are diseased or mechanically disarranged, abortion may be produced by violence, such as falls, blows, concussions, excessive or sudden exertion, straining, or severe coughing, producing separation between the ovum and the uterus.

Lastly, it is probable that among the many causes inducing premature expulsion, it is frequently the result of medicinal agencies unwittingly taken with the food. The fact that abortion occurs with frequency in certain localities where the members of a herd, subject to it, are similarly grazed and fed, while neighboring herds, with dissimilar surroundings and different food, escape this accident, would seem to indicate that either in the plants, seeds, or roots growing with the grass or cured with the hay, and partaken of by the aborting cows, there resides a power capable of exciting contraction of the womb and consequent abortion. Among these may be mentioned spurred rye, tansy, Indian hemp, and the root of the cotton plant.

As abortion can, and does, occur from any of the above-mentioned causes, and having once taken place is likely to repeat itself again and again, it becomes a matter of moment to determine the cause in each particular case, and apply some remedy for its prevention.

When the cause exists in uterine disease, or in a diseased condition of the ovum or its membrane, or in the after-birth, no remedy can be applied, but much can be done to prevent the accident by carefully guarding the cow from external violence. If, during gestation, active diarrhoea or the discharge of acrid urine should occur, these diseases could be successfully treated with appropriate remedies. Again, if a disposition to abort develops itself in a herd, it may be taken for granted that the pasturage, or other food, contains some one of the medicinal herbs or roots which act through the blood of the cow upon the uterus, and in this case it would be necessary to change both pasturage and food at once.

If any cow has aborted one or more times, and a record of the period in gestation at which the acci-