Microbes in the Dairy.

It is now nearly 200 years since the compound microscope was so improved that observers were enabled by its use to detect in stagnant water, vegetable infusions and scrapings of the teeth, very minute, almost colorless organisms, so small that, viewed with a magnification of 500 diameters, mak ing their surfaces appear 250,000 times as large as the reality, they seemed not larger than pin-heads do to the naked eye. It is nearly a century since these organisms were classified according to their shape, but it was only in 1863 that they began to assume any economic significance, when Davaine, stimulated by Pasteur's researches upon the ferments, reported his investigations establishing the connection between certain bacilli in the blood of animals and the splenic fever that accompanied their presence. In 1869, Pasteur traced the contagious disease of the silk-worm to a special kind of micro-organism. In 1875, Koch took up the study of the bacilli of splenic fever (anthrax) where Davaine left off, and by cultures and inoculations proved beyond question the causal connection between the germ and the disease, and laid the foundation

tion for the science of bacteriology.

The new science rapidly enlisted a host of students and investigators in all civilized countries, and while the general public has had its attention called mainly, almost solely, to the results obtained so far as they relate to the practice of medicine, practical bacteriologists have been busy in many other fields, as witness a table in a recent manual setting forth the concise biology, products, culture characters, actions and habitats of 188 species that are either indifferent or beneficial, and but 93 species, all told, that are supposed to produce disease in man, lower animals, including insects, frogs, etc.,

FORMS OF BACTERIA.

(a) Micrococcus of gangrene.
(b) Bacillus megaterium, one with two spores; 600 diameters.
(c) Bacterium line ala; 3,000 diameters.
(d) Vibri rugula; 4,000 diameters.
(e) Spirillum undula and volutans; 2,000 diameters.

While it may be justly claimed that bacteriology has benefited mankind chiefly through its contribu-tions to the practice of medicine, yet we predict that within a few years it is destined to aid successful dairying to an extent that will defy computation. Lecturers at farmers' and dairymens' conventions, and the agricultural and general press, have begun to tell forth what the bacteriologist has discovered in the cow-byre, the milk-vessels, the creamery and the cheese factory, as well as in the cow's body. It was to be expected that these discoveries and their practical inferences would be collected and published in book-form. It is a pleasure to announce that this has been done, and in such a manner that he who

Two books recently published will be welcomed by the wide-awake dairyman and student, not only for the importance of the subject which they treat, but also for the practical and non-technical method of the treatment.

One (1), entitled "The Principles of Modern Dairy Practice," is by the eminent Scandinavian, Professor Grotenfelt. The key-note of this work is the pro-position laid down by Ernst Kramer, that "Dairying is an art, the success of which depends almost entirely on the extent to which we succeed in controlling the various fermentation processes in their and, although it is written from the bacteriological point of view, only about 20 pages are occupied with a general discussion of bacteria: the remaining chapters are under such titles as sources of infection of milk, milk for city consumption, sterilization of milk, cleanliness in butter and cheese factories, systems of gavity creaming, separator cream, skim-milk, treatment of cream previous to churning, manufacture of butter, diseases of butter, methods of cheesemaking. To illustrate the importance of bacteria in dairying, the author cites a case that occurred on the estate of H. Friis, well-known in Denmark as the winner of many prizes for high-grade butter. A year or two ago it suddenly became impossible, in spite of every care and precaution, to produce first-class butter on his estate. There was nothing wrong with the milk when taken from the cow, but in a short time afterwards a putrid smell and taste would develop in the milk and reappear in the butter. To remedy the evil, for the financial loss on this large estate was great, dairy experts were called to investigate, without avail. It became suspected that the cause was bacterial, and Prof. C. O. Jensen, the eminent bacteriologist, was brought from Copenhagen. He discovered that a minute species of bacterium had infected the stables and

every place where the milk was handled; it was over the udders of the cows and in the dairy buildings; he introduced the microbe into healthy milk and produced the changes characteristic of the diseased product. He further found that the germ could be killed at a comparatively low temperature, 149° F., and that it easily succumbed to disinfection. The natural course of treatment suggested by the results of his investigation was adopted, and in a short time first-class butter was again produced on this estate. The importance of cleanliness of the cow, of the stall, of the milker, of the utensils, is plainly shown from different points of view. The milk of a healthy cow, after the fore-milk is drawn off to clean out the germs that have multiplied at the mouth of the teat since the previous milking, if drawn through a sterilized tube into a sterilized bottle and hermetically sealed, is free of germs and will remain fresh and sweet for years. Examina-tions have shown that when the milk is passed through the air into bottles and pails in the usual manner, it contained:

10 bacteria per c. c. m. milked in pasture on a fresh, calm, damp, summer morning.
where cows were brought into the stable to be milked. from cow kept in stable, milked from cow kept in stable, milked into bottles. from same cow milked into open pail when the milkman disturbed the bedding, and shook the udder of the cow more than usual. from a cow in a filthy and dark stable, three-fourths of an hour after milking. 30,500 670,000

These calculations are not difficult to make with the cross-line micrometers as used on modern microscopes for counting blood corpuscles. A cubic centi-meter (c. c. m.) is about one-quarter of a teaspoonful

When to these rapidly multiplying fermentative and putrefactive bacteria we add impurities, such as the innumerable particles of manure from switching tails and crusted hips, dust from the bedding and off the cows' skin, spores of moulds and other fungi, gaseous taints arising from foul gutters behind the stalls, and other dirty places adjoining the cow stable, it is not to be wondered at that so much milk is more or less spoiled and fails to give satisfaction to its consumer—be it of milk, butter or cheese—or the highest rate of profit to its producer. In dairying, cleanliness is very near both godliness and financial success.

Theother work (2) is by Prof. Russell, Bacteriologist in the University of Wisconsin. It is divided into three parts, dealing respectively with bacteria in general, relation of bacteria to milk, and relation of bacteria to butter and cheese. Its style of treatment and abundant reference to the bibliography of the subject will render it particularly valuable to students in agricultural colleges endowed with good libraries. It abounds throughout with precautions and suggestions deduced from the observations described. The causes and treatment of the conditions known as soapy milk, red milk, blue milk, and other infectious states of milk, as well as abnormal conditions of butter and cheese, are discussed in the light thrown upon these phenomena by the science of bacteriology.

(1.) The Principles of Modern Dairy Practice, from a bacteriological point of view, by Grotenfelt, translated by F. W. Woll, Professor of Agricultural Chemistry, University of Wisconsin. Illustrated. New York; Wiley & Sons. Pages,

(2.) Outlines of Dairy Bacteriology, by H. L. Russell, Ass't Professor of Bacteriology, University of Wisconsin; Madison, Wisc. Published by the author. Pages, 186.

Dairying in Eastern Ontario.

The eighteenth annual convention of the Dairy men's Association of Eastern Ontario was held in Gananoque, on Jan. 2nd, 3rd and 4th. The meeting was largely attended by the representative dairy-men from the various sections of Eastern Ontario. Practical and stirring addresses were delivered by leading Canadian dairy authorities and Mr. John Gould, of Ohio. The convention was considered to be one of the most successful held in the Eastern part of the Province. The dairymen were enter-tained to a well-ordered banquet on Tuesday evening by the citizens of Gananoque.

Officers-elect. -The officers elected for 1895 were President, Edward Kidd, North Gower; 1st Vice, E. J. Madden, Newburg; 2nd Vice, John McTavish, VanCamp. Directors—Wm. Eager, Morrisburg; R. N. Craig, North Gower; J. R. Dargavel, Elgin; Jas. Whitton, Wellman's Corners; T. B. Carlow, Warkworth; Henry Wade, Toronto. Auditors-Morden Bird, Stirling; Wm. Bissell, Algonquin. Secretary, R. G. Murphy, Elgin.

One of the pleasing features of the convention was the presentation of an address to the Hon. Mr. Dryden, Minister of Agriculture, by the Gananoque Board of Trade, and one to Mr. N. Awrey, Ontario's Commissioner at the World's Fair, by the dairymen of Eastern Ontario, for excellent services rendered the dairy industry.

The following are some of the salient points brought out on the various subjects discussed: Cow. Should be bred for dairy purposes only.

Pay more attention to the individual cow than to the breed. A cow's breeding is what she inherits. Do not have them drop the calf before they are twenty-four to twenty-six months old. After first calf a heifer should run sixteen months at least before the next calf is dropped.

Feed. - Should be succulent and nourishing. The silo affords the best means of preserving such food. Milking cows should have some grain every day in the year. [Note. All do not concur on this point. Ed! In caring for the cow recognize her maternity. Wooden silos give best satisfaction. Corn should be planted shallow, and should not be cultivated, but harrowed frequently with a light harrow when young; cultivate frequently afterwards.

Dairy Practice.—The washing of gassy curd at a temperature of from 108° to 110° recommended in order to get out the foul odor. Returning home whey in the milk cans thought to be the cause of sweet milk thickening, especially in the late fall. The paying for milk for cheesemaking according to its quality strongly recommended. Winter dairying a profitable business for the winter, when proper stabling and proper food is provided.

The Trade.—The appointment of a competent inspector at Montreal to decide as to the quality of cheese when there is a dispute between buyer and salesman; to apply more particularly to Eastern Ontario. Necessary to keep up the quality of goods in order to keep up the price. If the quality is good there is not much danger of overstocking the

Further Development.—The Ontario Minister of Agriculture announced his decision to establish a pioneer dairy farm in north-western Ontario, along the C. P. R. route. The object is to develop dairy ing in that portion of the Province, and to provide farmers, who contemplate settling, with practical knowledge of what can be done. It is proposed to locate this farm between Port Arthur and Rat Portage, probably near the crossing of the C. P. R. at Wabigoon River, where there will be good enough land in a single block to make two or three townships. The country is well watered and wooded, lakes full of fish, and the soil very rich. Its agricultural possibilities are most promising.

Educational.—More active efforts towards improving the quality of the cheese by the Association through its instructors. Dairy schools at Kingston and Guelph highly recommended, and makers strongly urged to attend.

The New Eastern Dairy School.—The new dairy school in connection with the School of Mining and Agriculture, Kingston, was successfully in-augurated by a grand banquet on the evening of Jan. 4th. A large number of convention delegates remained over for it. Addresses were delivered by prominent men connected with both of these branches of industry. The Dairy School at Kingston is in successful operation, with as many students as can be accommodated. There are already nearly enough applicants to keep it supplied till spring. The building is in the beaut of the city. till spring. The building is in the heart of the city. It is compact and well adapted for the purpose, containing separate rooms for cheesemaking, buttermaking, milk-testing, with a curing-room for cheese and a store-room for butter. There is also a commodious lecture-room in an adjacent building.

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The Bothwell Dairy Farmers' Club.

few issues ago we gave an account of the establishment of a large and splendidly equipped cheese and butter factory near the town of Bothwell. The promoters of that enterprise and the patrons have now taken another step which ought to prove beneficial. At a well-attended meeting in the Bothwell Town Hall they organized "The Bothwell Dairy Farmers' Club," with the object of holding fortnightly meetings of the farmers of the locality where all matters connected with dairying locality, where all matters connected with dairying would be discussed, papers on various subjects read by members and discussions to follow each A series of practical addresses upon dairying and other subjects are being arranged for the remainder of the winter. It is hoped that this Club may be the means of showing the advantages which may be gained by organization. There are very many localities where a similar course might be taken with great advantage.

Mr. J. W. Wheaton, of the Western Ontario

Dairymen's Association, gave a short address on the need of organization in all trades and professions, and showed the advantages arising there-from, and pointing out what assistance this Club could be to the dairy farmers of Bothwell.

Twenty-five members entered their names on the Club's books, and appointed the following officers:—President, Alexander Brandy; Vice-President, John Sheppard; Treasurer, Geo. Smallwell; Secretary, S. C. Mason. A committee was also appointed to further the Club's interest in their particular districts, consisting of Messrs. A. Mc-Lean, S. Rush, A. Marcus, T. McCrutchie, H. Powell, John Buchanan, J. Tenney, J. Sheppard and S. C. Mason.

The Club then adjourned until Thursday, Dec. 20th, when a lecture was to have been delivered by Mr. J. B. Millar, Instructor of the Western Ontario Dairymen's Association, but owing, however, to illness, he was unable to be present, and Mr. Wheaton took his place. About thirty members were present, Mr. John Sheppard in the chair. Mr. Wheaton's subject was "Winter Dairying." He paid a tribute to the agricultural press as a means of advancement in farming. Too many farmers, instead of moving with the times, travel in the old rut. Winter dairying is a step in advance. He dwelt upon the fact of increasing competition from distant countries-Australia and New Zealand, for instance—whose dairy products in the English markets threaten to displace Danish butter from the premier position held for so many years. Why cannot Canada occupy the same position in butter that she does in cheese? If this is to be done, greater attention must be paid to winter dairying. Cheese factories and winter dairies are a help to a district, giving more employment, raising the renting and selling value of surrounding farms, and