An historical, scientific, and practical essay on milk, as an article of human sustenance : with a consideration of the effects consequent upon the present unnatural methods of producing it for the supply of large cities / by Robert M. Hartley.


THE ARMY MEDICAL LIBRARY, Washington, D.C.


THE ARMY MEDICAL LIBRARY, Washington, D.C.

AN

HISTORICAL, SCIENTIFIC AND PRACTICAL

ESSAY ON MILK,

AS AN

ARTICLE OF HUMAN SUSTENANCE;

WITH A CONSIDERATION OF THE

EFFECTS CONSEQUENT UPON THE PRESENT UNNATURAL METHODS

OF PRODUCING IT FOR THE SUPPLY OF LARGE CITIES.

BY

ROBERT M. HARTLEY.

Μὴ τῶν βοῶν μέλει τῷ Θεῷ.
Δι' ἡμας γὰρ ἐγράφη. PAUL.

NEW-YORK:
JONATHAN LEAVITT,
No. 14 JOHN-STREET.
MDCCCXLII.

University Press:
JOHN F. TROW, PRINTER,
114 Nassau-street,
New-York.

This Volume

IS DEDICATED TO THE AUTHOR'S FATHER,

ISAAC HARTLEY,

WITH

EVERY SENTIMENT OF REVERENCE AND

FILIAL AFFECTION.

RECOMMENDATORY NOTICES.

THE manuscript of the "Essay on Milk" was referred to the perusal of only two individuals, from whom the following letters were received:

From CHARLES A. LEE, M. D., late Professor of Materia Medica and of Medical Jurisprudence in the University of New-York.

To R. M. Hartley, Esq.

New-York, November 16th, 1841.

DEAR SIR:

I have examined with much care the manuscript of your work on milk, and I feel it to be a duty, as it is a pleasure, to commend it to the public, as embodying a vast amount of practical information interesting to all classes of our community. I can hardly speak too highly of the manner in which you have discussed the various subjects passed under review; but if there is any part of the work more important than another, it is that relating to the influence of impure milk upon the health and lives of children. The facts you have set forth in regard to this matter, are of a startling character, and calculated to arrest the attention of every philanthropist. That your opinions are sound, and your conclusions legitimate and impregnable, I have no doubt whatever. They are such as the observation and experience of fifteen years practice of medicine in this city, have irresistibly forced upon my own mind. The dissemination of your views must, therefore, prove of great benefit to our citizens. Every farmer, dairyman and producer of milk, every distiller, and especially every head of a family in which milk is an article of diet, should make no delay in possessing your most valuable and interesting work.

Truly yours,

CHARLES A. LEE, M. D.

From LUTHER JACKSON, Esq., New-York.

New-York, November 22d, 1841.

DEAR SIR:

You are about presenting to the world in your "History of Milk," an invaluable original work. I have carefully perused

the manuscript, and am unable in few words either to express my high estimate of the general importance of the essay, or my admiration of the manner in which the various topics introduced, are discussed. To the general reader, and to the man of science, it can scarcely fail to prove both interesting and instructive, whilst its startling disclosures in relation to the destruction of infant health and life, are calculated to strike a chord, to which every humane heart will instinctively respond. All your views and conclusions on the subject, are fully verified by my own observations. I regard them as indisputable, and so important, that every family in the community should be in possession of the work. I say *the work*, for the facts it contains can be found nowhere else. I consider it, in short, as an original development of an iniquitous system, affecting the health, life, and morals of multitudes in our own and other lands, which hitherto, under the most specious disguises, has been concealed from the public eye. To have discovered and pointed this out is so important, that it is not easy to commend extravagantly. No friend of temperance should be without the work, as it will give a new direction to his thoughts, and a new impulse to his labors.

That your philanthropic efforts may be successful in removing the evils you have so faithfully depicted, is the earnest desire of your devoted friend,

L. JACKSON.

Owing to the necessity of placing the sheets immediately in the hands of the binder, they were submitted to the examination of but few individuals, from whom letters have been received, of which the following are specimens.

From Professor JOHN W. FRANCIS, M. D., Resident Physician of New-York.

To R. M. Hartley, Esq.

New-York, December 16th, 1841.

DEAR SIR:

I have given your treatise on milk a careful perusal. It is most apparent that the deleterious consequences resulting from the distillation of alcoholic liquors had not hitherto been fully explored. Not satisfied with the destruction of life directly inflicted by the intoxicating cup, there lurks behind the disease and death induced on the sober part of the community, who mix with their daily food that secretion which had been universally recognised, as the most bland and nutritive of all alimentary substances. But the most important portion of your work, is that in which you have traced the morbific effects of unwhole-

some milk employed as infantile diet. The facts you have adduced, place your argument beyond the reach of successful contradiction, and deserves the serious attention, and solemn consideration of all. No physiological or pathological principle in the human economy is better grounded than that upon which you insist, namely, that the blood and secretions are modified by the nature of the material taken for the purposes of nutrition; hence an article so universal in its use as milk, when vitiated, must prove an abundant source of irremediable mischief, and to have pointed this out, entitles you to the applause of every well-wisher of his species.

Most respectfully yours,

JOHN W. FRANCIS.

From JAMES C. BLISS, M.D.

New-York, December 20th, 1841.

DEAR SIR:

I have been able only in a very cursory manner to look over your contemplated publication, entitled the "History of Milk." The plan of the work is judicious, and evinces no inconsiderable research; and the facts you have collected are well arranged, and calculated to arouse public attention to a subject of great interest to the well-being of society. As a member of the profession whose office it is to watch over the public health, I feel myself indebted to you for having directed the attention of physicians, as well as that of the community generally, to one of the most appalling evils connected with the destruction of human life. In common with my medical brethren, I have been aware for many years that milk, as it has been distributed in our city, was one of the most fruitful causes of disease in infants, and that its use as an aliment, was one of the greatest obstacles to the removal of maladies already existing. Until you were led to make the inquiries which you are now about to spread before the public, I was, however, ignorant of the fearful extent of the evil. The publication of this volume will, I doubt not, greatly subserve the cause of humanity, and will excite no inconsiderable interest in Europe as well as in this country, among those who wish to diminish the sum of human suffering.

I am, with sentiments of respect,

Your obedient servant,

JAS. C. BLISS.

From N. H. DERING, M. D.

New-York, December 27th, 1841.

DEAR SIR:

A hasty perusal of the sheets of your intended publication on "Milk," which you have done me the honor to submit to me

for my opinion, has impressed my mind with a strong conviction of the value of your researches.

Knowing, as every physician in this city does, the appalling effects of improper diet upon the health and lives of the children, of which impure and innutritious milk constitutes the greater part, I have often wondered that the corrective power of the law, or of public opinion, has not long since been applied. The reason can only be found in the fact, that the people have been ignorant of their danger. I trust that your interesting and valuable book, will arouse the community to a sense of the hidden dangers which surround them, and induce them speedily to correct an evil which annually destroys the lives of so great a number of the children attempted to be reared in this city.

I am, very respectfully,
Your obedient servant,
N. H. DERING.

From DAVID M. REESE, A.M. M.D. of New-York, Professor of the Theory and Practice of Medicine, in the Castleton Medical College, Vermont.

New-York, December 22d, 1841.

DEAR SIR:

I have availed myself of an early opportunity to examine the proof-sheets of your treatise on milk, which you did me the favor to leave for my perusal, and am pleased and gratified to learn, that to a just appreciation of the importance of the subject to human health and life, you have added a diligent and scientific inquiry into a topic hitherto comparatively unexplored.

In the historical disquisition with which the volume opens, there is an amount of information for which we may seek elsewhere in vain, especially in reference to the comparative physiology concerned in the investigation. Your scientific and philosophical analysis of milk, taken from different lactiferous animals, and from cows both under wholesome and unwholesome regimen; as well as in the tables, illustrations, and criticisms by which the analysis is accompanied, you have given proof of a thorough acquaintance with the subject in all its bearings. In the remedial provisions which you have indicated in the work, for the preservation of our population in large cities from the physical and moral mischiefs consequent upon the supply of impure and poisonous milk, you have practically demonstrated the utilitarian character of your researches, and merited the title of a public benefactor.

As one of the guardians of the public health, I owe you the expression of my grateful thanks, for the lucid and conclusive expose you have made of the iniquitous, demoralizing, and poisonous work of distillation, as carried on in New-York and

its vicinity, to so disgraceful an extent. Of the direct and palpable destruction of human life, especially among those children and feeble adults, who have been of necessity sustained by the milk obtained from cows fed on distillery slop, and housed in narrow, filthy. unventilated stables, I believe the half is not told, even in the forcible disclosures of this volume. Nor can I doubt that much of our infantile mortality, is to be ascribed to the use of such milk. I trust that your work will serve to open the eyes of the public to this important, though neglected subject; and that you may receive, as you deserve, the patronage of our community, to an extent which may remunerate you for your laudable and benevolent labor.

Respectfully your friend,

D. M. REESE, M. D.

From the Rev. ALONZO POTTER, D. D., Professor of Intellectual and Moral Philosophy, and the Rev. ELIPHALET NOTT, D. D., President of Union College, Schenectady, New-York.

New-York, December 16th, 1841.

DEAR SIR:

The subject of your proposed work is one of great importance. An examination of the history and physical qualities of a substance, which has exerted so remarkable an influence on human welfare, would merit, by itself, much attention. But the indispensable necessity of using the article in its pure form, and the great abuses which appear to prevail in the present methods of supplying it to large cities, invest the discussion, at this time, with peculiar interest. The startling disclosures contained in your work cannot fail to arrest attention; and I sincerely trust that your persevering and fearless exertions in this cause, may be crowned with success.

Yours truly,

ALONZO POTTER.

New-York, December 18th, 1841.

Having partially examined the above work, and being in some measure acquainted with the subject to which it refers, I hereby express my entire concurrence in the opinion above expressed by Professor Potter.

ELIPHALET NOTT.

From the Rev. THOMAS DE WITT, D. D., Pastor of the Collegiate Church, New-York.

SIR: *New-York, December 23d*, 1841.

I have looked over the sheets of your volume "On Milk," soon to be published, which you kindly placed in my hand. Two

years or more ago, I read with interest the essays on the subject prepared by you and published in some of our periodicals, and felt that they claimed the attention of the whole community. I feel gratified that you have since investigated the subject still more fully and thoroughly, and have prepared a volume at once elaborate, well arranged, and satisfactory in its statement of facts, arguments, and conclusions. The subject will now be placed before the public in this permanent form, instead of the pages of a periodical, soon laid aside, and perhaps forgotten. I cannot resist the conviction, that wherever your volume circulates, the community will be surprised at the ignorance in which they have been involved as to the adulterated and pernicious character of a large proportion of the milk used, particularly in our large cities, and the evil effects produced by it on human health and life, especially in infancy, and will be excited and led to adopt the proper measures suggested for procuring a supply of pure, healthful, and nutritious milk. I have no doubt that the gentlemen of the medical profession will unite in testifying to the importance of the subject, the satisfactory manner in which you have discussed it, and the value of the remedies for the existing evil you have suggested. I trust you will soon have abundant proof that your "labour of love" in the preparation of this volume, finds its reward in the cure of the evil, by the wide, and successful diffusion of the remedy, in the universal use of pure milk.

THOMAS DE WITT.

From SAMUEL A. FOOT, Esq., Counsellor at Law, New-York.

New-York, December 18th, 1841.

DEAR SIR:

I have looked over the first 280 pages of your book on milk, and am astonished at the extraordinary and startling facts you have collected and presented to the public, respecting the manner in which the milk is produced, and the deleterious qualities of an article upon which the families and children of a very large majority of our fellow citizens are fed. You have, in my opinion, conferred a great benefit on the inhabitants of this city and other populous towns by publishing this work; and I earnestly recommend its perusal to every person who uses milk for food, and especially to every parent who provides it as an article of nourishment for his children.

I am, respectfully,

Your obedient servant,

SAMUEL A. FOOT.

☞ See the Hon. S. STEVENS's letter in the Appendix.

CONTENTS.

CHAPTER V.

TESTIMONY OF PROFANE HISTORY TO THE ANTIQUITY AND UTILITY OF DOMESTICATED ANIMALS.

CHAPTER VI.

INFLUENCE OF EDUCATION ON CATTLE—THEIR INTRODUCTION INTO AMERICA, ETC.

CHAPTER VII.

CHARACTERISTICS OF MILK.

CHAPTER VIII.

ANALYSIS AND CONSTITUENTS OF COW'S MILK.

CHAPTER IX.

ANALYSIS AND CONSTITUENTS OF MILK CONTINUED.

CHAPTER X.

HUMAN MILK.

CHAPTER XI.

MILK OF DIFFERENT ANIMALS.

CHAPTER XII.

THE UNNATURAL METHODS OF PRODUCING MILK FOR THE CONSUMPTION OF LARGE CITIES.

CHAPTER XIII.

EVILS OF UNNATURAL FEEDING DEMONSTRATED FROM THE PHYSICAL STRUCTURE OF THE COW.

CHAPTER XIV.

APPROPRIATE FOOD, PURE AIR, AND EXERCISE, NECESSARY TO THE HEALTHY CONDITION OF DAIRY CATTLE.

CHAPTER XV.

ACTUAL CONDITION OF THE DAIRIES.

CHAPTER XVI.

CONDITION OF THE DAIRIES CONTINUED.

CHAPTER XVII.

THE CAUSE INFERRED FROM THE EFFECTS.

CHAPTER XVIII.

OTHER DEMONSTRATIONS OF THE EFFECTS OF PERNICIOUS DIET.

CHAPTER XIX.

DISEASES CONSEQUENT UPON THIS UNNATURAL SYSTEM.

CHAPTER XX.

THE POISONOUS EFFECTS OF DISEASE ON THE MILK OF COWS.

CHAPTER XXI.

FOREIGN INVESTIGATIONS AND EXPERIMENTS.

CHAPTER XXII.

NUTRITIOUS PROPERTIES OF MILK.

CHAPTER XXIII.

DELUSIONS ON THE SUBJECT OF MILK.

CHAPTER XXIV.

INFANT MORTALITY IN FOREIGN CITIES.

CHAPTER XXV.

INFANT MORTALITY IN AMERICAN CITIES.

CHAPTER XXVI.

INFLUENCE OF IMPURE MILK ON THE HEALTH OF CHILDREN IN CITIES.

CHAPTER XXVII.

INCIDENTAL TESTIMONY.

CHAPTER XXVIII.

LETTERS FROM CHARLES A. LEE, M. D. LATE PROFESSOR OF MATERIA MEDICA IN THE UNIVERSITY OF NEW-YORK, ETC.

CHAPTER XXIX.

MILK SICKNESS.

CHAPTER XXX.

FOREIGN MILK DAIRIES.

CHAPTER XXXI.

OBJECTIONS ANSWERED, AND THE DIFFICULTIES OF REFORM CONSIDERED.

CHAPTER XXXII.

FRAUDS AND IMPOSITIONS IN THE SLOP-MILK SYSTEM.

CHAPTER XXXIII.

FACTS AND ESTIMATES.

PREFACE.

SEVERAL years have elapsed since the Author's attention was first directed to the subject of Milk, as an article of human sustenance in large cities. He had observed, with regret, that in the management of the dairies, no regard was paid to the peculiarities of the animal organization, and a little reflection convinced him that consequences of an injurious kind, might be expected to result from this unnatural treatment. Desiring to ascertain whether such were its recognized effects, he had recourse to books; but, to his surprise, could discover nothing that had been written upon the subject. As the facts involved various consequences affecting the physical welfare and incidentally the morals of the people, he supposed they might be obtained from physicians or other men of observation and intelligence; but after extensive oral intercourse for information, he found that the subject, wherever introduced, was previously unthought of and unknown. It appeared, in short, that whatever relation it sustained to the well-being of the community, remained yet to be developed and published to the world.

Being thus urged to a personal investigation of the subject, he entered upon a careful survey of the dairies, and their appendages the distilleries. The latter he found surrounded with hundreds, and in some instances, with thousands of milch cows, confined in filthy pens, bloated, diseased and dying, and most

inhumanly condemned to subsist chiefly on the dregs of distillation, reeking hot from the whisky manufactories. He followed the distribution of the milk as it flowed from these polluted sources to his own family, where he beheld his youngest child rapidly sinking under the effects of this pernicious aliment, whilst the cause of the illness, until then, was unknown and unsuspected. Enlarging his survey, he ascertained that in this community alone there was more than sixty thousand families, and in these families more than twenty-five thousand children under the age of five years, among whom this impure milk was a staple article of diet.

He next examined the bills of mortality in some of the chief cities, extending back his researches as far as authentic data could be obtained, and discovered, that from some cause or causes unknown, the proportion of infant deaths was not only frightfully great, but steadily augmenting. From the year 1814 to 1841, the destruction of infant life had increased from about thirty-two per cent., to more than fifty per cent.; in other words, more than one half of the total deaths, occurred among children under the age of five years. This appalling fact, led him to examine the vital statistics of foreign cities, to ascertain to what extent this fatality was general and inseparable from the conditions of a city life; and he learned that in them it was *less* and *diminishing*, whilst the reverse was true of our American cities.

He then traced the much abused cattle, which in a few months become so diseased as to be ever after unfit for the dairy, to the shambles, where they are slaughtered by thousands; and to the markets, where the flesh is sold at enormous prices to be eaten by our citizens. He ascertained, moreover, that the breweries and distilleries, in this way, were destroying nearly as much grain created for purposes of sustenance, as would suffice for

the consumption of the population. And to crown the whole, this vast and complicated system, with its wide-spread mischiefs, was produced and sustained by agencies the least likely to be suspected; it was, in short, so involved and ramified, that the people were unconsciously a party in bringing upon themselves the evils they suffered.

Having satisfied himself that these facts were indisputable, it became his immediate object to spread them before the public in a series of essays which appeared in the public journals, and subsequently by numerous lectures. For a season, the evil was arrested, several pure dairies sprang up, and many philanthropic individuals became interested in the subject. But it had by a growth of many years struck deep its roots, and acquired an amplitude and strength which resisted the puny efforts that were brought against it. The voice of the lecturer was heard by comparatively few, and soon forgotten; and the leaves of a public journal for reference, were scarcely less precarious and fugitive. The Author was thus, unfortunately, the chief depositary of facts on the subject, which drew on him from various quarters applications for information, utterly beyond his ability to supply. Those, consequently, who from a knowledge of general principles were eager to aid in their diffusion for the benefit of others, were deterred from engaging in the work, because unfurnished with the facts which were essential as a basis of all just reasoning upon the subject. In other departments of benevolent action, the materials were at hand; but in this they were so far asunder as to discourage ordinary effort to bring them together for practical effect. There was not, in brief, a page of written authority that could be consulted.

These circumstances explain the origin of this volume. It was undertaken to supply an urgent demand for information on an important, economical and moral subject, hitherto untouched

by any previous writer. In directing his attention to the plan of a work for this object, other topics connected with it, besides those mentioned, naturally presented their claims to consideration as branches of the subject, and necessary in a general history. He was, therefore, induced to take a wider range than was originally designed; and by thus treating it in a manner never before attempted, has rendered the work, he trusts, more complete and deserving of attention, than it would otherwise have appeared.

In the historical part, as the limits of the essay did not admit of detail, he has introduced only the best authenticated incidents and particulars, which were scattered through a variety of unconnected departments of literature; and endeavored to bring them into such succession and arrangement, as, whilst they illustrate the general subject, and instruct and interest the observer of nature, will, by the manifested evidences of design everywhere luminously displayed, naturally elevate the devout mind to communion with HIM, without whom was not any thing made that was made.

The scientific branch of the iniquiry he has endeavored to render as complete, as the present knowledge of the subject will admit. For this purpose the best and latest authorities have been consulted, including the most recent experiments and examinations. Hence the results which philosophical chemistry has developed of the elements of milk, their proportions and combinations, and the methods of obtaining them, may here be learned by the professional student; and the man in ordinary life who is not a practical chemist, and is without the convenience of a laboratory, may also gather such instruction as will, by easy experiments, protect his health and wealth from fraudulent impositions and injury. To the deductions of others, the Author's

acquaintance with the subject has enabled him to add some experiments of his own, with such practical hints and elucidations, as, he believes, will be useful and profitable. The arrangement of the matter is new, and elaborated with the design of condensing into small compass, the sum of what is now known on the subject.

The essay does not pretend to the character of a systematic guide to the dairyman; yet it contains valuable practical instructions on the subject, which, it is believed, will repay a perusal by persons engaged in such occupations. By an observance of the principles laid down, many serious mistakes, common in dairy management, will be avoided.

In the prosecution of the work, it has been his design, in every instance, to acknowledge his obligations to the authors he has consulted, and he is not aware of having deviated from this purpose. If, however, he has introduced any sentiment or expression without referring it to the writer, he trusts this general acknowledgment will atone for the inadvertence.

Having no other than a moral interest in the subject, it has been the author's object to exhibit facts, solely with reference to humane and benevolent results. In doing this, he has been anxious to avoid all reasonable occasions of displeasure to any class of men. If he has done injustice to any, it has been undesigned, and when made known, the acknowledgment shall be as public as the offence. If, however, in the discussion of the subjects that have come under review, some truths are brought to light which strongly reflect on the practices of those engaged in them, for this he is not morally amenable; and the odium and the guilt must rest upon those who, with better knowledge, pursue occupations that are disreputable in themselves, and injurious to their fellow men.

As the work has been written amidst the pressure of other employments little congenial to literary pursuits, the Author is not so presumptuous as to imagine that it is free from those inaccuracies and defects, which under any circumstances are usually inseparable from a first attempt to sketch a new subject. He has, indeed, painful apprehensions, lest its imperfections materially impair its usefulness. Beyond this his solicitude does not extend. But should the result disappoint his fears, and this unpretending essay become instrumental, to any extent, in vanquishing the evils he has endeavored to portray, the philanthropic will rejoice in its success, and his labor receive an abundant recompense.

R. M. H.

Clinton Hall, New-York,
September 17, 1841.

CHAPTER I.

INTRODUCTION.

Milk, derivation of the term.—Its peculiar properties and characteristics.—Primary design of.—Providence of successive nature:—Importance of the study.—Mutual dependence of the animal and vegetable kingdoms.—Parts of the system essential to the whole.—Evidences of design in creation.—Material things subservient to a moral purpose.—Tendencies of these considerations.

Milk, from the Greek *Μελ-γειν*, or the Latin *Mulgeo*, which literally signifies to press out by handling or softening with the hand, is the name of a well known animal fluid. It is the only material in the whole range of organic matter, that is designed and prepared by nature, expressly as food. Being a natural compound of albumen,* oil and sugar, which constitute the three great staminal principles that are essential to the support of animal life, it is a model of what a nutricious substance ought to be, and the most perfect of all elementary aliments.† Such being its characteristics, it possesses both animal and vegetable properties, and naturally takes its place at the head of nutrient substances. As it cannot be imitated by art, it occupies a

* The principles fibrin and albumen, which play so important a part in the constitution of the animal solids, are now, on the authority of Liebeg, stated to be identical. M. Dennis has communicated a letter to the Academy of Sciences, in which Liebeg states that he has been able to dissolve fibrin by a moderate heat in a saturated solution of nitre, and that the fluid has all the properties of a solution of albumen.—*Provincial Medical and Surgical Journal.*

† Prout's Treatise, p. 259.

place among aliments which nothing else can supply. It is, indeed, made essential by Infinite Wisdom to the existence not only of the human family, but also to many most useful orders of animals, to which man, notwithstanding his higher attributes, in physical organization, is nearly allied.

Milk was primarily designed to nourish the young of certain species of animals, during the early stages of their existence; its use, of course, as food, has been coeval with their creation. But as its nourishing properties and adaptation to the wants of man could not long have escaped his observation, it is not reasonable to infer that he who was the divinely appointed lord of irrational creatures, would hesitate to appropriate this unlabored gift of nature to his own use. And as this subservience of the creatures to the necessities and comforts of man, secured from him in return that protection which would tend to augment their numbers and increase their enjoyments, we may not doubt, that in this way, the beneficent intentions of the Creator were best fulfilled.

But, important as is the part which milk sustains in the animal economy, its history has never been written. Yet who will affirm that the subject, either in itself or in its relations, is devoid of interest and useful instruction? We refer not now solely to the fluid aliment which is of the highest economical value to man; nor yet to the lacteal system, which has been denominated a constant wonder; but chiefly to the providence of successive nature in the animal kingdom, which from the remotest antiquity has preserved for the use of mankind so valuable a class as the mammiferous domesticated animals from extinction. If the humblest production of the Creator deserves the consideration of the philosophical naturalist, much more should

the mass of mankind regard with interest an order of quadrupeds with which they have the nearest connection, and from whom the advantages derived are so important, that man with all his moral and mental endowments, has never yet attained a state of civilization without their subjugation. To enter, however, into an exposition of this department of zoological science, would be as foreign to our object as superfluous in itself, for it has already been a subject of careful investigation by others. But there is one view, which, so far as we are informed, has not been given by any writer. We refer to the distinction which has been assigned the bovine tribes in history, from the infancy of human society. The ox and his kind have followed man in all his migrations. There is scarcely a country in which they are not either indigenous or naturalized. And as in this we discover the wisdom and benevolence of a designing Providence strikingly illustrated, it is proposed to throw together a few proofs of the fact, as we find them scattered in the records of past ages. This, we conceive, will furnish a profitable subject of contemplation, and, perhaps, not inappropriately introduce the volume to the reader.

It may here, however, be preliminarily remarked, that means with reference to ends are everywhere manifested in the endless diversities of inanimate matter—also in the orders and gradations of animated beings, which appear reciprocally dependent and necessary to each other. An illustration of this principle, as manifested in the relation of the animal part and the vegetable part of the creation to each other through the medium of the atmosphere, is thus expressed by Mr. Madison: "It seems now to be well understood, that the atmosphere when respired by animals, becomes unfitted for their further use, and fitted for the absorption of vegetables; and that when evolved by the latter,

it is unfitted for the respiration of the former: an interchange being thus kept up, by which the breath of life is received by each in a wholesome state, and in return for it an unwholesome one. May it not be concluded from this admirable arrangement and beautiful feature in nature, that if the *whole class* of *animals* were extinguished, the use of the atmosphere by the vegetable class alone, would exhaust it of its life-supporting power: that, in like manner, if the whole class of vegetables were extinguished, the use of it by the animal class alone would deprive it of its fitness for their support ?"

If such is the constitution of nature, and these views are maintained with great distinctness and ability by Dr. Justa Liebig in his late work on organic chemistry, no part can be subtracted without disturbing the equilibrium of an exactly balanced system, and, so far as we know, without destroying the whole. Hence the wisdom displayed in the adaptation and nice adjustment of the several parts to each other; and also in securing, amidst incessant disruptions and changes, the continued action of such causes as are necessary to preserve that relative proportion of things, upon which the stability of the entire fabric depends.

There is another aspect in which the subject presses itself upon the attention. We are wont to admire the arrangements of inanimate nature; but beautiful as these appear, when viewed alone, they are without an object. In the order of nature, there are undeniable indications that this globe was destined to be the abode of living beings. And when we observe the various classes of irrational creatures distributed throughout the earth, the air, and the water, with the fitness of their nature and instincts to the circumstances in which they are placed, the propriety and harmony of the plan is most apparent. But

if in preparing the world as the habitation of living creatures the Maker had chosen to limit his power to the creation of insensate brutes, that were utterly incapable of understanding the admirable design and symmetry of his works, could we have discovered the congruity of the plan as we now behold it? If it were a mark of folly in man to construct a sumptuous palace for the accommodation and the unconscious gaze of brutes, can we conceive that such an arrangement would be consonant with the manifested attributes of the Deity? The spacious edifice was erected. It was garnished with beauty, filled with treasures, and "lighted up with unspeakable splendor;" but there was not yet found a suitable occupant. In the creation of man, therefore, a rational and contemplative being, of such excellence as to be capable of comprehending, in some degree, the designs of the Almighty Architect, the plan is complete. Here is exhibited the fullest exemplification of wisdom and benevolence. The work of creation being finished, Infallible Wisdom in the survey pronounced it "very good."

One other remark: Whilst these views are in coincidence with the sacred record, it does not permit us to rest here. It is not more certain that man is the chief inhabitant of the globe, than that external nature is subservient to a great *moral* scheme of which he is the object. Little interest is felt in the familiar forms of nature around us, although deserving the minutest investigation. Such a study, by showing us how little we know, and how incomprehensible is the Being who formed them, would tend to draw our reluctant minds to him who is the infinite source of all knowledge. But when these common forms of matter organic or inorganic, however humble or repulsive, are regarded as parts of a system that are merging

their operations in the mysterious and higher order of agencies which are connected with the moral condition and destiny of men, their importance appears immeasurably increased. Invaluable spiritual benefits suited to man's fallen state were early promised, and the means of their fulfilment gradually developed until their consummation; and the same designing hand may be also distinctly traced in the preservation and perpetuation of the race that was to become the recipients of the promised blessings. There is an unvarying harmony between the moral and the material economy of nature; yet while the former has been the theme of unnumbered treatises, how few have regarded the latter in this interesting relation, as deserving a careful investigation!

Every mind that is familiar with the proofs in sacred history of the Divine regard for man's physical condition, will at once perceive the relevancy of the foregoing thoughts to the subject before us. But as they cannot be pursued, in passing we remark, that to overlook the wisdom and beneficence displayed by the Maker of the material world in the relations which he has established between it and his rational creatures, is to throw into shade some of the brightest perfections of his nature; whilst to contemplate aright his designs in these relations, is fitted to inspire reverence, awaken gratitude, invigorate faith, and impress upon moral and sentient beings a deeper sense of their obligations.—As the leading objects, however, of the inspired volume, are to turn man in his ruin and departure from his Maker to the means of recovery, material things in it hold a subordinate place. But imperfect as is our information of particulars, enough has been recorded from time to time to demonstrate that God cares for man as a *physical* as well as moral being, and that he has formed all things for *one great purpose*.

CHAPTER II.

PRIMEVAL CONDITION OF MAN.

Our first knowledge of man.—His food.—Covering.—Condition.—Occupation, a hunter.—Early subjection of animals.—Occasion of the first use of milk.—The result of design.—Number of the domesticated species of animals, not increased by the lapse of time.

Our first knowledge of man, is not a matter of conjecture, but of inspired history. His first residence was a garden, planted by the Creator eastward in Eden; his first employment was "to keep it and dress it," whilst he was divinely instructed to subsist upon its fruits. After his expulsion from paradise his first indispensable want would be food; and his first resource, most probably, such productions of the earth, as without his culture or care would yield a spontaneous supply. The choice of these would be determined by their relative abundance, and their adaptation to his necessities. Until the use of fire was known, fruits would be preferred to herbs and roots, as the latter would need artificial preparation to fit them for his ever-returning wants. Hence, it is probable, that his first sustenance after his exile was derived from trees, as we know he was guided by his Maker to such a choice before that event.

But covering to protect his body from the immediate impressions of the cold and humidity of the atmosphere, would be nearly as necessary as aliment. It is written of the first pair, "The Lord God made coats of skins and

clothed them." Whence these skins were obtained, does not clearly appear. It is certain at that time no animals had died, for natural death had not yet entered the world. But as sacrifices at this period were appointed, it is probable that the skins of the victims which mystically prefigured the more perfect atonement, were used for this purpose. And having been once thus appropriated by the Creator himself, man in his future exigencies would not hesitate to apply them to his use.

Whatever might have been the habits and condition of man in his pristine state, we cannot with our knowledge of his constitution conclude that he was originally designed to subsist solely upon vegetable diet. His physical organization demonstrates that he is partly at least a carniverous as well as a graniverous animal; and many circumstances conspire to establish the opinion, that a mixture of animal and vegetable food is best suited for his nourishment. For reasons which are not revealed, it appears that flesh as food was not explicitly allowed before the flood; but man most probably took the liberty of using it, and in doing this, there was evidently no deviation from his original nature and destination, as without any change in these respects, he subsequently received a divine warrant for such use. In following, therefore, the instincts and propensities of his nature, he at first, most probably, became a hunter, and subsisted on the products of the forests and the waters, and the fruits of the earth. And to this mode of life he was imperatively urged, both by the peculiarities of his condition, and his pressing necessities. By nature, he is the most helpless and defenceless of all animals. The earth at this period, with its verdant hills, and vallies, and plains, and interminable forests, was an immense solitude whose silence was only broken by the

prowl of the wild beasts, to whose destructive ferocity he was constantly exposed. In a rude state, and with few stimulants to industry, man is ever averse to toil. But here were motives of sufficient force to overcome his native indolence. Food and clothing, but especially self-defence, would arouse his dormant energies, and excite him to activity in the chase. If the quadrupeds merely, to say nothing of other destructive animals, had increased in the ratio of their original stock, they must have outnumbered the human species more than five hundred fold, and threatened the depopulation of the globe. Motives of benevolence, therefore, might also incite to an offensive and a defensive warfare, and to the destruction of such animals as could neither be subdued nor appropriated. Hence we learn that the first heroes were destroyers of wild beasts; and being persons of remarkable energy and endowments, were ultimately regarded with idolatrous veneration. Nearly eighteen hundred years subsequent to the period under consideration, the sacred historian says, "Nimrod was a mighty hunter before the Lord."*

But if man was primitively a hunter from necessity, he would not from choice be likely to make this perilous and precarious mode of life his exclusive dependence. His superior sagacity, enabling him to subdue the inferior animals, the first permanent triumph of his intellect over the instinct of brutes, was probably evinced in the domestication of such of the larger kinds as were most tractable and remarkable for their useful properties. And where in his survey of all the subordinate tribes of animated nature could his choice be so happily directed as to the ruminant animals? Essentially herbiverous, they had no occasion

* Gen. 10: 9.

to war upon each other; of course, were distinguished for their comparative gentleness and docility; and yielding milk, and flesh, and clothing, with ability to labor, they were beyond all other quadrupeds endowed with such qualities as fitted them for his service. Once the acknowledged sovereign of flocks and herds, not only would his few simple wants be supplied, but he would also be furnished with many of the comforts and even luxuries of life which could be obtained from no other source.

This early subjection of the bovine tribes of animals, introduced the use of milk, which for thousands of years has constituted so important and valuable a part of human sustenance. Being ready prepared by nature for food, it could at once be appropriated by the rudest savage, as well as the more cultivated. This peculiarity indeed, in an unimproved state of society, before the arts were invented, and when culinary processes were unknown, was in itself sufficient to determine his choice in favor of this form of aliment before all other kinds, which required the intervention of cookery to fit them for use.

The first use of milk by man, doubtless grew out of the circumstances incident to his condition; but these circumstances were as certainly the result of design, as was the creation of man who was influenced by them. A late writer remarks that, "The art of domesticating animals, and so completely changing their natures as to efface the original type, requires more intelligence than we are accustomed to suppose, and it is not easy to conceive how the attempt could have been originally suggested. It is also very singular that the number of domesticated species have not been increased by the lapse of time, though at first sight there are many of the untamed animals which might seem more easy to be brought into subjection than

those which have been subdued and rendered serviceable."* But every difficulty is removed by the consideration, that man's dominion over the creatures and consequent appropriation of all they afforded that was available to his use, was evidently the fulfilment of an original purpose of Providence in its beneficent regard for a being so frail and dependent. Hence too the solution of a phenomenon otherwise mysterious, and yet so familiar that it ceases to attract attention or excite wonder—the instinctive dread with which man is regarded by brutes. Before the fall, the beasts were, doubtless, voluntarily subject to man; after that event, partaking of the universal degeneracy, they became ferocious and wild, and by the exercise of his superior sagacity as a subsidiary means, were again made subject to him. He now commands the fleetness of the horse, and the strength of the elephant. So absolute is his authority and their submission, that large droves of animals of prodigious strength and stature, stand in awe of a child, who unresisted guides them whither he lists.

* Taylor's Natural History of Society, Vol. I. p. 172.

CHAPTER III.

MOSAIC ACCOUNT OF THE INFANCY OF SOCIETY.

Quadrupeds domesticated before the deluge.—Adam a herdsman or shepherd.—Reasons why these pursuits preceded that of agriculture.—Miraculous preservation of animals at the deluge.—Occupation of the ancient patriarchs.—First mention of milk in sacred history.—Value of flocks and herds to the ancient Hebrews.

In the succinct account of the primeval ages by Moses, which no subsequent authority has been able either to enlarge or to refute, a particular description of society, of animals, and their subjugation, could not be expected; yet enough is related on these subjects to relieve the uncertainty of conjecture.

That ruminant quadrupeds of the genus *bos*, known in rural economy as those of the cow and ox tribe, were domesticated before the deluge, is most fully attested by the sacred historian; and also that the distinction between clean and unclean animals, according to their nature and instincts, was pointed out, and probably observed. The same record which describes Adam and Cain as "tillers of the ground," also informs us that "Abel was a keeper of sheep;"* and the inference is reasonable, that the no less docile and more serviceable kine and oxen, which in addition to the qualities of the former could be employed as beasts of draught and burthen, were subject to man at the same time. Josephus, who was well versed in the traditional,

* Gen. 4: 2.

as well as the written history of that early age, says that "Abel brought *milk* and the first fruits of his flocks as offerings to the Creator, who was more delighted and more honored with oblations which grew naturally of their own accord, than with the inventions of a covetous man whose offerings were got by forcing the ground."* Some of the oriental nations have a curious tradition about milk, which extends back to a still more remote period. They say, "that the four rivers of paradise consisted of *milk*, wine, honey, and oil; and that Adam, who required no sustenance, having drank of the wine and tasted the fruits contrary to the command of God, was driven from the garden, and subjected to the punishments which were thus entailed upon him and his posterity." But we are not left to draw conclusions from doubtful history or uncertain traditions, whose origin is obscure and often unknown. We are expressly informed that Jabal, the son of Lamach, who was born during the lifetime of Adam, was the father of all such as dwell in tents, and have much cattle.† Devoting his attention to this pursuit, he probably devised methods of conducting it to the best advantage, so that he became greatly distinguished as a herdsman, and was enabled to instruct others; or his children being brought up in the same employment, it became the family occupation.

The condition of man at this period, would naturally invite him to a nomadic or wandering life. In these earliest ages, before the art of agriculture was known, the earth's surface with all its appendages was common property and equally claimed by all. Every inhabitant and every family was free to pasture their flocks and herds and pitch their tents, wherever fancy might direct, or Providence guide. But this mode of life, would be obviously

* Book I. p. 9. † Gen. 4: 20.

incompatible with the regular establishment of property in territorial surface, consequent upon the pursuits of husbandry. If the occupations of the herdsman and shepherd were not identical, it is at least probable, that they were cotemporaneous in their origin, and that both were antecedent to the pursuits of agriculture. The cultivation of the soil implies a knowledge of working metals and of various arts, which were doubtless unknown at a very early period. Besides, "such is the fascination of that personal independence which belongs to the uncivilized state, and such the disrelish and contempt of the monotonous labor of tillage, compared with the exciting occupations of the chase, or with the indolence enjoyed by those who subsist chiefly on the mere bounties of nature, or on their migratory flocks, that a voluntary relinquishment of these latter modes of life, is little to be expected. We certainly perceive nothing in the character of our savage neighbors, from which it could be inferred that even the germs of agriculture observed in their spots of maize, and a few other cultivated plants, would ever be developed into the extent implied by an agricultural life. The first introduction of agriculture among a savage people, appears accordingly never to have taken place without some extraordinary interposition; where it has not been obtruded by colonies transplanted from agricultural countries, as from Phœnicia and Egypt into Greece, and from Greece herself, among her savage neighbors, the revolution has proceeded from some individual, whose singular endowments and supernatural pretensions, had given him an ascendency for the purpose. All the great reformers in ancient times, were regarded as more than men, and eventually worshipped as gods."* Reasoning, therefore, from analogy, and our know-

* Pres. Madison.

ledge of the habits of man in a rude state, there is strong probability in the conclusion, that the simpler occupation of tending flocks and herds was his employment soon after his expulsion from Eden, and long anterior to the more complex and laborious operation of cultivating the earth.

Of all the quadrupeds domesticated before the flood, the ruminant tribes were incomparably of the highest and most essential value to the human race. Their importance to man, was strikingly intimated by the special care which was manifested for the preservation and the propagation of the species. By Divine appointment, seven couple of clean animals were taken into the ark; whilst of others, but one couple, the male and his female. In many of the operations of Providence, the design is concealed from human view; but here it is so perspicuously displayed that it cannot be mistaken. By miraculous power certain species of animals are preserved from the abyss of waters in sevenfold greater numbers, than of others. Need we inquire wherefore this special interposition and indication of Divine favor? It certainly was not on account of the animals themselves, but evidently with prospective reference to the wants of the future families of man. "Doth God take care for oxen?"* was the inquiry of the inspired Paul; and from his own response we learn, that this care was altogether for man's sake.

After the catastrophe of the deluge, the population of the world was again reduced to one family; and the original grant of dominion over the kingdom of nature to man was not only renewed, but extended and established by a solemn covenant for "perpetual generations." Dr Robertson lays it down as a certain principle, that the necessary arts, when once introduced among a people can

* 1 Cor. 9: 9.

never be lost, and that the dominion over inferior animals when once enjoyed, will never be abandoned. Most probably the useful arts, and the general habits of life of the antediluvians would be possessed and preserved by the few who survived the universal ruin; and it is not likely that the subjection of animals so essential to their own wants and to their rapidly increasing offspring, would afterwards be neglected. Noah accordingly became a husbandman, and planted a vineyard;* and during the patriarchal ages, and subsequently in the rural economy of the Israelites, the possession of cattle constituted the chief portion of their wealth. It is recorded of Abraham and Jacob that they were rich in cattle;† Job, who was probably cotemporary with Isaac, because of his numerous flocks and herds was counted the greatest of all the men in the East.‡ Moses was a shepherd, and kept the flocks of Jethro in the land of Midian;§ such also was the occupation of David, who tended his father's sheep in Bethlehem, and when elevated to regal dignity, his flocks and herds were intrusted to the management of three officers appointed for that purpose.‖ The herds of many of the patriarchal shepherds were immensely great. So numerous was the stock of Abraham and Lot, that they were obliged to separate. From the present made by Jacob to his brother Esau, consisting of five hundred and eighty head of different sorts,¶ some idea may be formed of the countless numbers of cattle great and small, which he had acquired in the service of Laban.

Although the only certain history of the early ages nowhere explicitly asserts that animal milk, as human sustenance, was used soon after man's exile from Eden, or even anterior to the flood, yet we regard the evidence that such

* Gen. 9: 20. † Gen. 24: 35. 30: 43. ‡ Job 1: 3. § Ex. 3: 1.
‖ 1 Chron. 27: 29, 31. ¶ Gen. 23: 14, 15.

was the case, about as conclusive as positive testimony. We certainly know that the mammiferous ruminant quadrupeds, that is, animals which yield milk, chew the cud, part the hoof, designated by the same name, possessing, in short, all the essential and distinguishing attributes and properties which belong to the bovine tribes of our own day, were early subdued; and the supposition, either that these animals yielded no milk, or that it was unappropriated by man, would directly conflict with all known facts and analogies in the case, and is too improbable to be admitted. But subsequent to the obscure and remote antiquity referred to, sacred history on the subject is clear, and sufficiently explicit. About 1900 years before the Christian era, Abraham, who was an emir or chief of a pastoral tribe, received a visit of angels, in the plains of Mamre. According to the sacred narrative, "He lifted up his eyes and looked, and, lo, three men stood by him: and when he saw them," with the simplicity characteristic of ancient hospitality, "he ran to meet them from his tent-door, and bowed himself towards the ground," and said, "My lord, if now I have found favor in thy sight, pass not away, I pray thee, from thy servant." He then instructs Sarah to prepare the bread, while he goes in person to select the best calf from the herd, "and he took *butter* and *milk*, and the calf which he had dressed, and set it before them," who in his presence partook of the refreshment, beneath the shade of a tree near the door of his tent. The great abundance of milk, and the high estimation in which it was held, may be inferred from the frequent metaphorical use which was made of the term in the sacred writings. Palestine was described as a land "flowing with *milk* and honey," thereby denoting its extraordinary fertility in producing all the comforts and necessaries of life;

whilst the terms "wine and *milk*," were used to express all kinds of spiritual blessings and privileges.

The great importance attached to flocks and herds, may also be inferred from the numerous laws and regulations in relation to them laid down by Moses in the domestic history of the Hebrews: and it is evident that they were valued not merely for their milk, fleece, and flesh, but also for their labors. From the earliest times, the hopes of the oriental husbandman depended upon the services of oxen. When Elisha received the mantle of Elijah, the former was in the field, "ploughing with twelve yoke of oxen before him, and he with the twelfth." Very frequent allusion is made in Scripture to the importance and variety of their labors. So indispensable were they regarded in the days of Solomon, that he declares in one of his proverbs, "Where no oxen are the crib is clean," or rather empty; "but much increase is by the strength of the ox."

CHAPTER IV.

PASTORAL LIFE INDUCED THE FIRST CONNECTED CONDITION OF SOCIETY.

Influences of pastoral life.—Patriarch shepherds.—Their wealth and power.—Flocks and herds how managed.—Their numbers.—Scriptural allusions to pastoral occupations.—Spread of the human family from Ararat,—Antiquity of domestic animals, shown by ancient coins and medals.—Animals issuing from the ark.—Distinction conferred on the bovine race.

THE subject is so inwoven with the manners, civil polity, and even history of the different people to which it refers, that a passing notice of them in this hasty sketch appears unavoidable. The pastoral life in ancient times, induced the first connected state of society, and led to the adoption of the patriarchal form of government. When the numbers under one head or family became too great to subsist together, they separated; the seceding body pursuing in other distant and unappropriated territories, their roaming and independent life, and in turn sending out from themselves other erratic tribes to feed their stocks in the rich pastures of the unreclaimed regions still more remote. Sometimes by accident, and sometimes by compact or compulsion, the union of separated tribes was effected, and they became extremely formidable, especially as the leader was absolute, he could put himself at the head of the whole people. Hence the origin of the *Hycsos*, or shepherd kings, a nomadic people, who conquered the greater part of Egypt, and held it from 1,700 to 1,500 years B. C.; and who, ac-

cording to Manetho, overrun many nations, but were finally subdued by Tethmosis, king of Thebes.

"The patriarchal shepherds," says Watson, "rich in flocks and herds, and attended with numerous trains of servants, acknowledged no superior; they held the rank and exercised the rights of sovereign princes; they concluded alliances with sovereign kings, in whose territories they tended their flocks; they made peace and war with surrounding states; and in fine, they wanted nothing of sovereign authority but the name. Unfettered by the cumbrous ceremony of regal power, they lived a plain and laborious life in perfect freedom and overflowing abundance. Refusing to confine themselves to any particular spot, they lived in tents, and removed from place to place to find pasture for their cattle. Strangers in the countries where they sojourned, they refused to mingle with the permanent settlers, or occupy their towns, or to form with them one people. They were conscious of their strength and jealous of their independence; and although patient an forbearing, their conduct proved on several occasions that they wanted neither skill nor courage to vindicate their rights and avenge their wrongs."

"In the wealth, the power, and the splendor of patriarchal shepherds, we discover the rudiments of regal grandeur and authority; and in their numerous and hardy retainers, the germ of potent empires. Hence the early custom so prevalent among the ancients of distinguishing the office and duties of their kings and princes by terms borrowed from the pastoral life:—Agamemnon, shepherd of the people, is a phrase frequently used in the strains of Homer. The royal Psalmist, on the other hand, celebrates under the same allusions the special care and goodness of God towards himself, and also towards his ancient people. The Lord is my shepherd; I shall not want. Give ear, O

Shepherd of Israel, thou that leadest Joseph like a flock ;* thou that dwellest between the cherubim, shine forth. In many other places of Scripture, the church is compared to a fold, the saints to a flock, and the ministers of religion to shepherds, who must render at last an account of their administration to the Shepherd and Overseer to whom they owe their authority."

The patriarchs did not commit their flocks and herds solely to the care of menial servants and strangers; they tended them in person, or placed them under the superintendence of their sons and daughters, who were bred to the same laborious employment, and taught to perform, without reluctance, the meanest services. This primeval simplicity was long retained among the Greeks. This custom has descended to modern times; for in Syria the daughters of the Turcoman, and the Arabian shepherds, and in India the Brahmin women of distinction, are seen drawing water at the village wells, and tending their cattle to the lakes and rivers.

We have already alluded to the immensely numerous flocks and herds of the ancient shepherds. In modern times, also, the numbers of cattle in the Turcoman herds which feed on the fertile plains of Syria, are almost incredible. They sometimes occupy three or four days in passing from one part of the country to another. A man of wealth in a Tartar horde has been known to possess ten thousand

* The ancient shepherds used to go before their flocks, playing on the pipe, which call they readily followed. To this custom Virgil alludes in the following lines :

> Nor breathed Amphion notes more soft than mine,
> When he on Aracynthus call'd his kine.

Allusion to the same custom is frequent in the sacred writings.

horses, three hundred camels, four thousand cattle, twenty thousand sheep, and upwards of two thousand goats.*

The care of such overgrown flocks, says Paxton, required many shepherds. They were of different kinds; the master of the family and his children, with a number of herdsmen who were hired to assist them, and felt but little interest in the preservation and increase of their charge. To these the Saviour alludes, John 10: 12. In such extensive pastoral concerns the vigilance and activity of the master were often insufficient for directing the operations of so many shepherds, who were not unfrequently scattered over a considerable extent of country. An upper servant was therefore appointed over their labors, and to take care that his master suffered no injury. In the house of Abraham this honorable station was held by Eliezer, a native of Damascus, a servant in every respect worthy of so great and good a master. The office of chief shepherd, as before remarked, is often mentioned in classic writers; and in pastoral countries, being one of great trust, of high responsibility, and of distinguished honor, it is with great propriety applied to the Redeemer by the Apostle Peter: "And when the Chief Shepherd shall appear, ye shall receive a crown of glory which fadeth not away." The same allusion occurs in these words of Paul: "Now the God of peace that brought again from the dead the Lord Jesus Christ, that Great Shepherd of the sheep, through the blood of the everlasting covenant, make you perfect in every good work to do his will."

Without dilating on particulars, it may be observed, that what was true of the ancient Hebrews, the peculiarly favored people of heaven, whose line of ancestry and history has been so remarkably preserved, is probably also true with

* Glasgow Geo. Vol. I. p. 578.

certain modifications in regard to the general modes of life, of most other branches of the human family. In the repeopling of the earth after the deluge, as the inhabitants increased they appear to have spread southward from the mountains of Ararat, near the Caspian sea, to the plains of Assyria and Chaldea; and in the fertile regions bordering the rivers which run into the Persian Gulf, laid the foundations of the most ancient empires. Thence some retreated again northward of Armenia into Tartary; some eastward towards Persia and Hindoostan; and others dispersed west and southwest through Arabia into Egypt, and through Syria and Palestine to the shores of the Mediterranean. The early history of all these except the latter, it is true, is involved in deep obscurity; but from the period of authentic information and sober tradition, it appears that the ox and cow kind have accompanied man in all his migrations.

As much light has been incidentally thrown on the antiquity of domestic animals, especially of the kind under consideration, by a careful study of ancient coins and medals, we cannot wholly omit the mention of them in this place.

Caucasus, is the name of a chain of mountains in western Asia, of which Ararat, where the ark rested, is a part; the names of Taurus and Ararat are general over the whole range, and denote nearly or altogether the same as Caucasus. Now it is very remarkable that the devices on the medals of most of the ancient cities and countries around the mountains of Caucasus, have the bull as the prevailing emblem; Caucasus itself, appears to be generally commemorated under the name *Taurus*, the bull, either alone, or united with other symbols. By an examination of the extremely ancient and instructive memoranda referred

to, the medals, the origin of the name is deduced, from the account of which the subjoined is an abstract.

"If we consider the animals as issuing from the ark on the mountain, and of what transactions it was the scene in consequence, we may see why the name of *Taurus* was given to it. The word *Taur* in many languages signifies a *bull:* it is so in Spanish, French, etc., at this time: it was so in Latin, Greek, Arabic, etc., and above all, as being most ancient, it was so in Chaldee; which language was little distant in time or place from the first settlement of Mount *Taurus*. To account for this name, observe first, that Noah on coming out of the ark sacrificed to God, no doubt a young *bull* or beeve, as the most acceptable offering in his power: so the place of sacrifice *might* be denominated from the first offering. Second; as Noah was an agriculturist, and of pastoral manners, no doubt he kept around him all the valuable domestic animals he possibly could; these he cherished, these he multiplied, these he employed, while the ferocious kinds he banished far away.

"Now, among domestic animals the *beeve* claims the first place; and for this reason, very credibly, this was called the 'mountain of the bull,' or beeve; and it was also as appears *commemorated* under the figure of a bull; though possibly sometimes under that of other domestic animals. The number of animals whose nature renders them companions to mankind, is not very great. There is the beeve, the goat, the sheep, the swine, the horse, and, perhaps, the elephant and camel; I say, *perhaps*, because the elephant could not breed in a mountainous region, neither could the camel walk upon crags; and the swine, though domestic, is unclean.

"Such," continues our author, "are the chief pastoral

riches of mankind; and such were the pastoral riches of Noah. From these must have descended whatever breeds afterwards ranged other parts of the earth; and the mountain on which these first swarmed, seems to have been typified by the figure and appellation of some one or more of them, while other parts of the same range of mountains, to which the savage creatures were exiled, were typified by figures and appellations of them; as the lion, the tiger, etc., among beasts; the eagle, etc., among birds. And in like manner, as one part of these mountains might derive its name from the bull, or beeve, so might other parts from the lion, or from the eagle. So Jupiter had the eagle, because he resided on or about Eagle Mountain, or in a district called 'the Eagle;' which is the Garoora-sthan of the Bramins. Dionysius had the bull; Cybele had lions; Venus had doves, etc. From a desire of uniting these into extremely expressive symbols, arose the combination of figures into unnatural forms: as a bull with a human form; meaning 'bull mountain,' with the man who resided on it, and governed it; this composes the minotaur, i. e., *menuhtaur*, the *taur* or bull of *Menuh*."* There is, indeed, a wonderful coincidence of testimony not only to prove the antiquity of the bovine quadrupeds, but also that wherever man's condition has been advanced beyond absolute barbarism, his attention has generally been occupied with the management of flocks and herds, whose skins and fleeces have yielded him covering, while their milk and flesh have afforded him sustenance. Pastoral pursuits appear to have constituted the transition state from that of the savage to agricultural employments, and to the introduction of the arts of civilized life.

* Calmet, Vol. V. p. 189.

CHAPTER V.

TESTIMONY OF PROFANE HISTORY TO THE ANTIQUITY AND UTILITY OF DOMESTICATED ANIMALS.

Cattle in Egypt.—In Greece.—In Scythia.—In Ancient Rome.—In Æthiopia and Lusitania.—Idolatrous veneration of cattle.—Indian, Egyptian and Roman cattle.—Consequences of the Roman conquests.—Pursuits of society during the "Dark Ages."—Cattle in France, Britain, &c.—Different opinions of naturalists.—Original race of cattle.—Varieties of the European cow.—Diversity of qualities in the cow family.—Indian and Tartar cattle.

EGYPT was distinguished as a mighty empire, and for its improvement in the arts, within four or five centuries after the flood; and though unsuited for pasturage, which the inhabitants affected to despise, when Abraham sojourned in that country, one hundred and eighty years before there is any mention of the horse, Pharaoh presented him with sheep and cattle. And we learn that at a subsequent period the monarch of that country had considerable herds; for being informed by Joseph that his brethren were shepherds, the king said, "If thou knowest any men of activity among them, make them rulers over my cattle."* Still later than this, Moses stipulated that not a hoof belonging to the Israelites should be left in Egypt; the very institution of the passover lamb, implied the general possession of flocks. Pharaoh's dreams of the kine also prove that the Egyptians were acquainted with the management of cattle; for it is said that the seven "well-favored and fat-fleshed" kine which he saw were fed on the *achū*,

* Gen. 47: 6.

that is, the succulent water-plants of the Nile, and not "in a meadow," as it is rendered in our version.*

The general views that have been presented, are fully confirmed by profane writers. Hesiod, one of the oldest poets of Greece, who flourished in the ninth century before the Christian era, praises the pastoral occupation, and referring to ages antecedent to his own times, speaks of the high honor in which it was anciently held. According to some accounts he was himself a shepherd, and tended his flock at the foot of Mount Helicon, in Bœotia. Homer, who is supposed to have been cotemporary with Hesiod, frequently mentions milk and cheese as common articles of food; they are also often alluded to by Theocritus, Euripides and other poets. Butter was probably unknown in Greece before the time of Herodotus, who lived in the fifth century B. C., as he is the earliest profane historian whose works have come down to us that mentions it.

Among the families that were dispersed abroad by the confusion of tongues, those who migrated northward, and afterwards known as the Scythians, were the most remarkable. Carrying with them the habits of pastoral life to which they had been accustomed in the more genial regions of the south, and coming in possession of a limitless extent of territory, stretching from the northern shores of the Euxine and Caspian seas, to the frozen regions of the north, they appear to have led wandering lives, living in tents, and devoting their attention to the rearing and management of cattle.† Hippocrates, who was nearly cotemporary with Herodotus, in his account of the Scythians, describes with great minuteness their process of butter-making, and highly commends milk, as a most healthy and nourishing food.

* See Bible Illustrated, p. 44. † Herodotus.

Aristotle, distinguished as the father of natural history, lived about one hundred years afterwards. In his book on animals, he describes the characteristics of some of the ruminant tribes with great judgment and accuracy; and from the many curious particulars relating to milk and cheese collected by him, it may be fairly inferred, that the importance of these, as articles of human sustenance, was in his age duly appreciated.

Ancient Rome was built by rude hunters and herdsmen. Romulus, its founder, 754 years B. C. traced a furrow round the Palatine hill with a plough drawn by two milk-white cattle, and caused the area within the furrow to be inclosed with a wall of earth; he then poured out libations of milk to propitiate the gods. Eight hundred years afterwards Pliny relates, that the devotional offering of milk, in commemoration of the custom of their fathers, was still continued. Anciently in Rome these animals were so highly valued, that they were only slaughtered on extraordinary occasions; and it is recorded of a citizen who slaughtered one of his own cattle for the entertainment of a guest, that he was, by the popular vote, banished the state. The cattle most esteemed in Italy,* according to Pliny, and which commanded the highest price, were imported from Epirus, a breed said to have been greatly improved by the celebrated king Pyrrhus, who was extremely curious in his knowledge of domestic animals. Several eastern nations are referred to, by the same writer, whose inhabitants subsisted upon milk and the spontaneous productions of the earth; and

* Timens, a Greek author, and Varro, both cited by Aulus Gellius, (Noct. Attic. lib. ii. cap. 1.) have said that Italy was so called from the abundance of oxen in it, which in the ancient Greek language were called ιταλοι: whence Gellius affirms that *Italia* signifies *armentosissima*.

who so managed their stocks, as to secure an abundant supply of milk throughout the year. Strabo gives substantially the same account of the Æthiopians, Lusitanians, and other oriental people, among whom milk was one of the chief means of subsistence. Virgil, as is well known, devoted his third Georgic to the subject of breeding cattle, and his Eclogues abound throughout with allusions to pastoral life. Apicius and some other writers of that day appear to have made the qualities of milk a subject of special inquiry. Both Columella and Varro, in their treatises *De Re Rustica*, give due prominence to this important department of rural economy, as then understood and practised by the most civilized nations. So far, indeed, as we can learn, the semi-barbarous countries of these periods, as in preceding ages, chiefly pursued pasturage, and subsisted upon the produce of their flocks. Such, according to the Roman writers, was the condition of the ancient German, and other European nations; such were the habits of the early Britons, as given by Cæsar in his Commentaries, who, he says, neglected the plough, undervalued husbandry, and lived upon the milk and flesh of cattle, a description which at that time was doubtless capable of very general application.

The superstitious, and even idolatrous regard for animals of this species, in many nations, is well known. Taurus, the bull, was deified, and his constellation placed in the zodiac. The same animal was worshipped as the god Apis, in Egypt, and dedicated to Osiris, to whom was ascribed the origin of agriculture; and from this, it is supposed by some, the Greeks derived the minotaur, and also the Israelites the idea of the golden calf they modelled and worshipped in the wilderness. At Heliopolis, divine honors were paid to Mnesis, under the form of the ox, while

the cow was consecrated to Isis. The Zor Aster, or sacred bull, appears to have been worshipped in some way, throughout Egypt. The Brahminy, or sacred bull of the Hindoos, rambles about the country without interruption; he is caressed and pampered by the people, to feed him being deemed a meritorious act of religion.* So great is the veneration of the Gentoos for the cow, that they would rather sacrifice their parents or children, than slay one of them. The traditions also of different nations, founded doubtless upon the universally acknowledged utility of the animal, invest it with peculiar honors. The Indians say that it was the first animal created by the three kinds of gods, who were directed by the Supreme Lord to furnish the earth with animated beings. And the traditions of every Celtic nation, it is said, enrol the cow amongst the earliest productions, and represent it as a kind of divinity.†

The causes which operated to the extension of the Roman arms over the greater part of the inhabited earth, also powerfully tended to ameliorate the condition of human life by the improvements in agriculture, the domestication of animals, and by the invention of numerous useful arts. In Italy, in Greece, in the middle and southern countries of Asia, in Egypt, in the northwest parts of Africa, even in Gaul and Spain, agriculture was diligently practised, and the husbandry of tillage and pasturage was cultivated so as to afford abundance of the prime necessaries of life. Nor were these benefits limited by the bounds of the Roman empire; they were gradually, but in some degree, very extensively diffused among the savage nations beyond these limits, so that a larger proportion of the human race participated in the advantages incident to civilization, than in any previous age.

* Hamilton's Descript. of Hindostan. † Youatt's History of Cattle.

But a period of retrogression at length arrived, that steadily kept pace with the decline and ultimate subversion of the Roman power, and which plunged Europe in nearly as deep a gloom as that from which it had been previously rescued. From this era onward, for ten successive centuries, we know but little, except that the arts were forgotten, agriculture was abandoned or extensively neglected, and anarchy and degeneracy universally prevailed.

> "Oblivious ages pass'd, while earth, forsook
> By her best genii, lay, to demons foul,
> And unchain'd furies, an abandoned prey."

During these ages of predial servitude and feudal rapacity, the toil of the many was appropriated to the few; and it was natural, when the great springs of enterprise and industry were broken, for men to sink back into the ignorance and indolence of savage life. Besides, in disturbed times, when there is continued exposure to the incursions of predatory hordes, every man is trained to arms, and of necessity adopts unsettled habits of life corresponding therewith. Hence, during what have been called the "dark ages," the assiduity of the sober and industrious relaxed, and pasturage was generally preferred to tillage; for while few would sow without the rational prospect of being able to reap, the management of herds invited to a more certain pursuit, as, on the approach of an enemy, they could with less difficulty be concealed or driven away.

In France, before the ninth century, as we learn from the perusal of their laws, cattle and sheep were pastured in the forests and commons, with bells about the necks of several of them, for their more ready discovery. At the arrival of the Anglo-Saxons in Britain, that island abounded with flocks and herds, which these conquerors seized

and pastured for their own use. This appears from the great number of laws made in Anglo-Saxon times, for regulating the prices of all tame cattle, for directing the manner in which they were to be pastured, and for preserving them from thieves and beasts of prey. The Welsh, even still more than the Britons, depended upon their flocks and herds for support. In Lombardy, they excelled in the care and treatment of cattle; while the wealth and subsistence of the Swiss farmers consisted, as at the present day, in the number of their cows, and sheep and goats.*

On the introduction of civilization into Europe, the rearing of animals suited to the objects of rural economy, was not neglected, although but little progress was made in the extraordinary art of improving the breeds, until the last century.

With regard to the origin of the domesticated races on that continent, there is a diversity of opinions. No certain facilities now exist of tracing the present breeds to the primitive stock. Some naturalists suppose them to have sprung from the *bos bubalus*, the Indian and European buffalo. Others again would trace them to the aurochs or wild cattle of Germany and Poland; but these, according to Major Smith's arrangement, come into subgenera different from the domestic breeds. Baron Cuvier rejects both the foregoing suppositions, and we think with sufficient reason. He considers our present cattle identical with a species no longer existing in a wild state, but which have, by the exertions of man, as in the instance of the camel and dromedary, been for ages entirely subjected to his power. The remains of this animal has been found in a fossil state, and it is upon the comparison of these remains

* Loudon's Enc. Agri.

with the skeleton of the auroch, the buffalo, and our domestic races, that he has founded his opinion.*

Whatever may have been the original race of animals, from which the domestic breeds are derived, it is generally conceded that some varieties of the European cattle are, in almost all parts of the world, the only kinds used, and, indeed, the only varieties that to any great extent have yet been found capable of domestication. They have extensively spread throughout Europe; in north and south Africa they have multiplied to innumerable herds, and such also is the case in America, particularly in the southern continent.

"The varieties of the European cow," according to Aiton, "are innumerable. The pliancy of their nature is such, that they have been formed into many diversities of shape, and various qualities have been given them, very different from the original stock. The uris, or cows of Lithuania, are almost as large as the elephant, while some of those of the Grampian hills are little above the size of a goat: and cows are found of every diversity of size between the one and the other. They are not less varied in their shapes. The bison, which is a species of the cow family, and which readily propagates with our cows, wears a long shaggy mane, like the lion; a beard, like the goat; as much hair under its neck and breast as covers its forelegs; a hump upon its shoulders, nearly as large as that worn by the camel (sometimes forty or fifty pounds in weight), with a tail that scarcely reaches the top of its buttock; and it resembles the lion much more than our domesticated cows, or other varieties of its own species.

"The diversity of qualities in the cow family, is also

* Jardine's Mammalia, Vol. IV. p. 194.

very great. Our cows are so grovelling and inactive, they scarcely know the road from their stall to their pasture; while those of the Hottentots are so tractable, as to be intrusted with the charge of other animals, and keep them from trespassing on the fields of grain, or other forbidden ground. They also fight their master's battles, and gore his enemies with their horns. Our dairies are so feeble and inactive, that they hurt by travelling twice a day, even slowly, one mile from the byre to their pasture; while those of Tartary are used as riding animals, and in drawing carriages. Those of Hindostan draw and maintain their rates with horses at the full trot; and the Hottentots teach their cows to hunt down the elk antelope. Cows of the wild neglected breed can with difficulty be removed from one inclosure, or one hill to another; while those on whom due attention has been bestowed are docile, and submit to all kinds of labor. Some cows will yield upwards of twenty Scots pints of milk per day, while others will not give so much in ten, perhaps not in twenty days. These are not so many different species of animals, but all of them one and the same species, and all of them capable of generating with each other a perfect offspring. All these varieties have been formed from the parent stock, partly by the diversity of soil and climate, or other accidental or adventitious circumstances; or partly of late by human skill and industry."*

Pliny mentions a breed of Indian cattle, in his time, that were as tall as the camel, and whose bulk was proportioned to their height. At the present day, "the largest domestic breeds known, are those of the Kirguise and Calmuck Tartars, and those of the Roman States. The color

* Dairy Husbandry, p. 17.

is generally of a bluish-ash, the horns remarkably ample and spreading. In Egypt, a large white breed was maintained; and in northern and central Africa, according to Major Denham, two varieties at present exist, both humped like some of the Indian breeds, the one with small horns, the other of a large size with immense horns, one which was measured being three feet six inches and a half in length, following the curve, and twenty-three and a quarter in circumference. Upon the banks of Lake Tchad, and in the kingdom of Bornou, these cattle were kept in great abundance."*

* Jardine's Mammalia, Vol. IV. p. 194.

CHAPTER VI.

INFLUENCE OF EDUCATION ON CATTLE—THEIR INTRODUCTION INTO AMERICA, ETC.

Training cattle in central Africa.—Superior intelligence of Caffre cattle illustrated.—Swiss cattle, anecdotes of.—Proofs of bovine sagacity.—Attachment to their keepers —Transportation of cattle from the Canaries and Europe to South America.—Anecdote of their sagacity.—Introduction of cattle into New-England.—Bulls used for riding.—Clark's Island.—Importation of cattle to the middle states.—Cattle as a source of national wealth.—Importance of this species of animals.—Summary conclusion.

In no other kind of animals, perhaps, is the effect of education more strikingly exemplified than in that of cattle. In some countries, they are as remarkable for intelligence and activity, as amongst us for stupidity and sluggishness. Burchell, in the first volume of his travels into the interior of Africa, p. 128, gives the following description of the training of cattle in that country.

"These oxen are generally broken in for riding when they are not more than a year old. The first ceremony is that of piercing the nose to receive the bridle: for which purpose they are thrown on their back, and a slit is made through the septum, or cartilage between the nostrils, large enough to admit a finger. In this hole is thrust a strong stick, stripped of its bark, and having at one end a forked bunch to prevent it passing through. To each end is fastened a thong of hide, of a length sufficient to reach round the neck and form the reins; and a sheepskin, with the

wool on, placed across the back, together with another folded up, and bound on with a rein long enough to pass several times round the body, constitutes the saddle. To this is sometimes added a pair of stirrups, consisting only of a thong, with a loop at each end, slung across the saddle; frequently the loops are distended by a piece of wood, to form an easier rest for the foot. While the animal's nose is still sore, it is mounted and put in training, and in a week or two is generally rendered sufficiently obedient to its rider. The facility and adroitness with which the Hottentots manage the ox, has often excited my admiration: it is made to walk, trot, or gallop, at the will of its master; and being longer legged, and rather more lightly made than the ox in England, travels with greater ease and expedition, walking three or four miles in an hour, trotting five, and galloping on an emergency seven or eight."

Among other travellers, Major Denham gives the following particulars relating to the use of cattle in central Africa. "The beasts of burden used by the inhabitants, are the bullock and the ass. A very fine breed of the latter are found in the Mandara valleys. The bullock is the bearer of all the grain and other articles to and from the markets. A small saddle of plaited rushes is laid on him, when sacks made of goat-skins, and filled with corn, are lashed on his broad and able back. A leather thong is passed through the cartilage of his nose, and serves as a bridle, while on the top of his load is mounted the owner, his wife, or his slave. Sometimes the daughter or the wife of a rich Shouaa will be mounted on her particular bullock, and precede the loaded animals, extravagantly adorned with amber, silver rings, coral, and all sorts of finery."

"It is, however," says Youatt,* "in the southern part of Africa that the triumph of the ox is complete. His intelligence seems to exceed any thing that we have seen of the horse, and he is but little inferior to that most sagacious of all quadrupeds, the dog. Among the Hottentots, these animals are their domestics, and the companions of their pleasures and fatigues; they are both the protectors and the servants of the Caffre, and assist him in attending his flocks, and guarding them against every invader. While the sheep are grazing, the faithful *backely*, as this kind of oxen is called, stands and grazes beside them. Still attentive, however, to the looks of its master, the backely flies round the field, obliges the herds of sheep that are straying to keep within proper limits, and shows no mercy to robbers who attempt to plunder, nor even to strangers; but it is not the plunderers of the flock alone, but even the enemies of the nation that these *backelies* are taught to combat. Every army of Hottentots is furnished with a proper herd of these creatures, which are let loose against the enemy. Being thus sent forward, they overturn all before them; they strike down with their horns, and trample with their feet, every one who attempts to oppose them, and thus often procure their masters an easy victory before they have begun to strike a blow."

An animal so serviceable is, as may be supposed, not without its reward. The *backely* lives in the same cottage with its master, and by long habit gains an affection for him; for in proportion as the man approaches to the brute, so the brute seems to attain even to the same share of human sagacity. The Hottentot and his *backely* thus mutually assist each other; and when the latter happens to

* Youatt's Breeds of Cattle, p. 5.

die, a new one is chosen to succeed him, by a council of the old men of the village. The backely is joined with one of the veterans of his own kind, from whom he learns his art, becomes social and diligent, and is taken for life into human friendship and protection.*

Every one who is familiar with cattle, must have observed that some one in the herd usually takes the lead of the others, and if deprived of its rank, either by accident or otherwise, will manifest great uneasiness until it is again restored. We would hardly attribute to these animals a sense of vanity or wounded pride, yet the following amusing account of the Swiss cows seems to illustrate such a feeling.

"In the Swiss canton of Appenzell, pasturage being the chief employment of the inhabitants, the breeding of cattle and the subsequent management of the dairy, are carried to great perfection. The mountaineer lives with his cows in a perpetual exchange of reciprocal acts of kindness; the latter affording almost every requisite he needs, and in return they are provided for, and cherished by him, and sometimes more so than his own children. They are never ill-treated nor beaten, for his voice is sufficient to guide and govern the whole herd, and there reigns a perfect cordiality between them.

"In the Alps, the fine cattle are the pride of their keepers, who adorn the best of them with a harmonious set of bells, chiming in accordance with the celebrated *rans des vaches.* The finest black cow is adorned with the largest bell, and the two next in appearance wear smaller ones. Early in the spring, when they are removed to the Alps, or to some change of pasture, he dresses himself in

* Illustrations of Natural History, p. 88.

all his finery, and proceeds along, singing the *rans des vaches*, followed by three or four fine goats; next comes the finest cow, adorned with the great bell; then the other two with the smaller bells, and these are succeeded by the rest of the cattle walking one after another, and having in their rear the bull with a one-legged milking-stool on his horns, while the procession is closed by a sledge bearing the dairy implements.

"It is surprising to see the pride and pleasure with which the cows stalk forth when ornamented with their bells. One would hardly imagine that these animals are sensible of their rank, and affected by vanity and jealousy; and yet if the leading cow is deprived of her honors, she manifests her disgrace, lowing incessantly, and abstaining from food, and losing condition. The happy rival on whom this badge of superiority has devolved, becomes the object of her vengeance, and it is butted, and wounded, and persecuted by her, in the most furious manner, until she regains her bell, or is entirely removed from the herd."*

We take pleasure in transcribing from Youatt's excellent work on cattle, the following illustrations of bovine sagacity. "First, maternal affection, mixed with a process of reasoning:—A person was walking through a field, when a cow ran towards him, lowing most piteously. For a moment he was alarmed, and the suspicion of madness occurred to him; but when she came near to him, she turned and went back the way she had come, looking earnestly at him and lowing. He wondered, but passed on. Again she came close to him, gazed anxiously at him, and then lowing, trotted away in the same direction. His cu-

* Illustrations of Natural History, p. 72.

riosity was now roused, and he followed her. She led him to the farther end of the field, where her calf had fallen into the ditch, and was nearly drowned. He rescued the little animal, and the mother expressed her joy in many an awkward but expressive gambol.

"Next, attachment to their keepers:—Two *biparies*, or carriers of grain and merchandise on the backs of buffaloes, were driving a loaded string of these animals from Palamow to Chittrah. When they were come within a few miles of the latter place, a tiger seized upon the man in the rear, which was seen by a *guallah* (herdsman) who was watching a herd of buffaloes grazing. He boldly ran to the man's assistance, and cut the tiger very severely with his sword, who immediately dropped the biparis, and seized the herdsman. His buffaloes observing it, attacked the tiger, and rescued the herdsman; and they tossed the tiger about from one to the other until they killed him. Their aid, however, was ineffectual; for although the biparie recovered, the herdsman died."*

Anecdotes illustrative of the intelligence and reasoning faculty in these animals might be multiplied, but those already given are sufficient to show, that they are not only endowed with a measure of intellect which fits them for their humble station, but are also capable of exercising a degree of social affection in our service, which should secure for them far better treatment than they often receive.

Cattle appear to have been first transported to South America from the Canaries and Europe in 1527, and the rapidity with which they multiplied, almost exceeds belief. A few years after the Spaniards settled there, the herds of tame cattle became so numerous, that their proprietors

* Youatt, p. 286.

counted them by thousands. Valdeobro, a Dominican Spaniard, who lived some years in Mexico towards the middle of the last century, relates as a fact then generally known, that the cows belonging to D. G. Ordugna, a private gentleman, yielded him in one year thirty-six thousand calves, which produce could not arise from a herd of less than two hundred thousand bulls and cows taken together. At present there are many private persons who are owners of herds of fifty thousand head of cattle.* Less attention being paid to them as they continued to increase, they were suffered to run wild, and spreading over a country of boundless extent, under a mild climate, and covered with rich pasture, their number became immense. They range over the vast plains which extend from Buenos Ayres towards the Andes, in herds of thirty or forty thousand; and the unlucky traveller who once falls in among them, may proceed several days before he can disentangle himself from among the crowd that covers the face of the earth, and seems to have no end. They are hardly less numerous in New Spain, and in several other provinces. They are killed merely for the sake of their hides; and the slaughter at certain seasons is so great, that the stench of their carcases, which are left in the field, would infect the air, if large packs of wild dogs, and vast flocks of *gallinazos*, or American vultures, the most voracious of all the feathered kind, did not instantly devour them.*

Acosta states that in the fleet in which he returned from New to Old Spain, in 1587, about sixty years after the first bulls and cows had been transported to Mexico, they carried with them from that country, sixty-four thousand three hundred and sixty ox-hides; and from Hispan-

* Gobierno de Animales, Lib. IV. cap. 34.
† Robertson's America, Vol. IV. p. 68.

iola alone thirty-five thousand four hundred and forty-four ox-hides. Abbe Clavigero observes, that if the number of cattle carried from the old continent to the new, was compared with the number of hides returned by America to Europe, there would be found more than five millions of hides for every one of these animals. But nothing can show the astonishing multiplication of those quadrupeds so well as the cheapness of them in those countries in which they are necessary for the subsistence of man, and the labors of the field, and where, on account of the abundance of silver, every thing is sold dear. In the country around the city of Mexico, although it is well peopled, a pair of oxen for the plough are sold for ten sequins, and bulls by wholesale at forty-five paoli each. In the country round Guadalaxara, the capital of New Galicia, a pair of good oxen are worth from six to seven sequins,* a cow twenty-five paoli. In many other countries of that kingdom, those animals are sold for less. In many places of the provinces on the river of Plata, a cow is to be had for five paoli. According to an account obtained from a person of credit well acquainted with the provinces on the above river, the oxen which are in herds amount to about five millions in number, and it is computed that there are about two millions running wild in the woods. In short, horned cattle have multiplied in Mexico, Paragua, and other countries of the southern continent, more than in any other part of the world.† The exportation of their hides and horns is a lucrative branch of commerce at this day.

As the following incident related by a South American traveller exhibits the sagacity of cattle in another and an interesting point of view, it may not be here misplaced.

* The sequin is about two dollars, and a paola ten cents.

† Clavigero's Hist. Mexico, Vol. III. p. 232.

"I was suddenly," says Captain Cochran, "aroused by a most terrific noise, a mixture of loud roarings and deep moans, which had the most appalling effect at so late an hour. I immediately went out, attended by the Indians, when I found close to the rancha, a large herd of bullocks collected from the surrounding country. They had encompassed the spot where a bullock had been killed in the morning, and they appeared to be in the greatest state of grief and rage. They roared, they moaned, they tore the ground with their feet, and bellowed the most hideous chorus that can be imagined; and it was with the greatest difficulty that they could be driven away by men and dogs. Since then I have observed the same scene by daylight, and seen large tears rolling down their cheeks. Is it instinct merely, or does something nearer to reason tell them by the blood that one of their companions has been butchered? I certainly never again wish to view so painful a sight:—they actually appeared to be reproaching us."*

As the first introduction of cattle, and consequently the commencement of an important branch of husbandry in this country, is specially mentioned in the history of the pilgrim settlers, a few particulars can scarcely fail to be interesting.

In 1624, that is, four years after the arrival of the Mayflower at Plymouth Rock, "Edward Winslow, having been sent to England as an agent for the colony, on his return brought *three heifers and a bull*, which were the first neat cattle brought to Plymouth. The settlers, of course, had been destitute of milk, the first four years. In 1630, there was another importation of twenty-eight cows, but ten were lost at sea. In 1624, Mr. James Shirley,

* Travels in Colombia, Vol. II. p. 251.

merchant of London, and one of the adventurers, a warm friend to the pilgrims, gave a heifer to the plantation, to begin a stock for the poor. Fourteen years afterwards, that is, in 1638, the townsmen of New Plymouth met, at the governor's call, the inhabitants from Jones' river to Eel river, respecting the disposition of the stock of cows given by Mr. Shirley. The amount of stock, we are informed, was very considerable, and a respectable committee was appointed to dispose of the same.

"The first notice of horses on record is in 1644, when a mare belonging to the estate of Stephen Hopkins was appraised at £6 sterling. In 1647, in the inventory of Thomas Bliss, a colt was appraised at £6 sterling. In 1647, in the inventory of Thomas Bliss, a colt was appraised at £4 sterling. In Joseph Holliway's inventory, the same year, one mare and a year old colt were appraised at £14. In June, 1657, the colony court passed an act that every freeholder who kept three mares, and would keep one horse for military service, should be freed from all military service, training and watching. While destitute of horses, it was not uncommon for people to ride upon bulls; and there is a tradition, that when John Alden went to Cape Cod to be married to Priscilla Mullens, he covered his bull with a handsome piece of broadcloth, and rode on his back. On his return, he seated his bride on the bull, and led the uncouth animal by a rope fixed in the nose-ring. This sample of primitive gallantry would ill compare with that of Abraham's, when by proxy he gallanted Rebecca on her journey, with a splendid retinue of damsels and servants seated on camels, Isaac going out to meet her. Had the servants employed bulls instead of camels, it may be doubted whether Rebecca would have been quite so prompt in accepting his proposals. As soon as the question was put, Rebecca said, 'I will go,'

"The island in Plymouth harbor, called Clark's Island, contains little more than eighty acres of fertile land. It was upon this island that the first Christian Sabbath was kept in New-England, for it was the first resting-place of the pilgrims from amidst the storm which they encountered on the night of Friday, Dec. 18th, 1620, while coasting along the bay in their little shallop, before their final landing. These circumstances may have led our fathers to attach a superstitious reverence to this spot. It was neither sold nor allotted in any of the early divisions of the lands, but was reserved for the benefit of the poor of the town, to furnish them with wood, *and with pasture for their cattle.*"*

It does not appear that cattle were imported into the middle states, as they are now known, until a few years after their introduction into New-England. In 1625, De Laet, in describing the advantages of New-Netherlands (New-York) for colonization, says: "It is a fine and delightful land, full of fine trees and also vines; wine might be made here, and the grape cultivated. *Nothing is wanted but cattle*, and these might be easily transported." Among other inducements to the introduction of these animals into the colony, in 1629, by an act of the government, "liberties and exemptions" were extended to private persons who should plant colonies in New-Netherlands, or import thither any *neat cattle.* What effect this encouragement had on individual enterprise, does not clearly appear; but in 1632, some stock that had been sent by the company from Holland to the city of New-York, were pastured on the "Bouwery Farms," which had then been recently purchased from the Indians, and the management of the cattle was intrusted to the company's negroes for

* Vide Thatcher's History of Plymouth.

the benefit of the garrison. In 1630, a vessel commanded by Capt. De Vries, embarked from Texel with about forty immigrants, furnished with agricultural implements, seeds, *horned cattle*, &c., sailed up the Delaware, and commenced a settlement on the banks of that river, which from that period has been remarkable for the extent and excellence of its dairies.*

It is not our design, neither would it be in place in a work of this kind, to attempt, if practicnble, a statistical computation of the advantages resulting to mankind from the domestication of this animal. It will probably suffice to remark, that from the introduction of cattle into this country, a little more than two centuries ago, the number, as we learn by careful estimate, has multiplied in the United States to about eighteen millions; the annual product of the dairies is valued at sixty-five millions of dollars; and the hides, tallow, &c., as manufactured articles, amount to twenty millions of dollars. Of the value of the cattle slaughtered for the provision trade and domestic consumption, we have no official returns, nor yet for the horns, hair, feet, &c., for there is no part of the animal that is not convertible to some useful purpose; but estimating these, as we safely may, at fifteen millions of dollars, and we have from this source alone an annual contribution to the nation's wealth of at least one hundred millions of dollars. But this it will be seen is an extremely defective estimate of all the advantages thus conferred upon the country. To the aggregate already given, let there be accredited to this branch of rural economy, the stimulus it imparts to profitable industry in the rapid circulation of capital,—the materials it furnishes for commercial intercourse,—the em-

* Moulton's History of New-York.

ployment it gives to numerous manufactories and trades, and incidentally to artificers and laborers,—and last, but not least, the extent to which it furnishes the millions of the population with those indispensable necessaries of life, of which they would be destitute but for this supply,—and every reflecting mind will acknowledge, that whether considered as a source of national wealth, or as contributing to the necessities and comforts of private life, there are few objects which have superior claim to attention, or of greater subservience to the public weal.

Of this class of animals an accomplished zoologist remarks: "It is scarcely necessary to say, that they supply us with the most truly precious of our earthly gifts. What in themselves are ingots of pure gold, or the most dazzling lustre of barbaric gems, compared in value with the ample covering of our fleecy flocks? Without the ox, the horse, and the sheep, how different would be the social, commercial and political condition of the most civilized of the human race! Without his reindeer how would the forlorn Laplander support either 'his sleepless summer of long, long light,' or the desolate gloom of a snow-enshrouded winter? Without the enduring camel, the desert sands of Africa, if notl ifeless solitudes, would at least be nearly impassable to human race, and as useless for all commercial purposes, as an ocean without ships."

But we must close this part of our work, which has insensibly increased to an unexpected length. In the desultory account which has been given of this herbiverous race of animals, it will have been observed that no attempt has been made to follow their migrations from country to country; nor yet to describe their changes as these have been affected by food, climate and habits; for there are no authentic records which can be consulted for

this purpose. Without enlarging we think it sufficiently evident, that the animals now reared and domesticated, are the same in kind, as those originally made subservient to man in the earliest times. And in nothing is the benevolence of Providence more remarkable, than in the continuity and multiplication of a race of animals, which in all former ages, as at present, has so largely contributed to increase the happiness of man, and improve the resources of human subsistence.

CHAPTER VII.

CHARACTERISTICS OF MILK.

Design of milk, its properties and appropriation.—Kinds of milk used in different countries.—Superior value of cow's milk.—Its appreciable qualities.—Color of good milk.—Smell and taste.—Alkaline property.—Summary description of good milk.

Milk is a well-known, white, opaque fluid, secreted in peculiar vessels by females of the mammiferous class, which, of course, includes those of the human species, of quadrupeds, and of cetaceous animals. Its principles, so far as they have been chemically examined, are essentially alike by whatever animal produced; yet these are so modified by the different proportions in which they exist, as to constitute a peculiarity that distinguishes the milk of one animal from that of every other. The milk of animals was, doubtless, designed by the Author of nature for the nourishment of their offspring. But man has extensively appropriated this admirably adapted nutriment to his own use; and in this, as in numberless other instances, has asserted that superiority over the brute creation which was originally conferred by the Sovereign Creator, who in giving him dominion over every living thing that moveth upon the earth,* appointed him lord of this lower world.

The milk of animals is more generally used as aliment by man, than any other description of animal food. That of the camel is chiefly confined to Africa and China, and of the mare to Tartary and Siberia. In China, especially

* Gen. 1: 28.

about the city of Canton, no other milk, it is said, can be obtained but that of the sow; while in India, the milk of the buffalo is preferred to that of the domestic cow. In Lapland and in some other northern countries, the milk of the reindeer is highly valued and extensively used. Goat's milk is more generally used in Italy and Spain, than in other countries in Europe. The animals are driven into Leghorn, Florence, Madrid and other towns in flocks early in the morning, and milked in the streets.* Ewe's milk is gradually wearing out of use. We will hereafter examine the relative peculiarities of these different kinds of milk.

But the milk of the cow (*lac vicinum*) forms a very essential part of human sustenance; and for several reasons is deserving of special consideration. It is the best and most palatable aliment for the young; it is suited to nearly every variety of temperament; and is adapted to the nourishment of the body in every age and condition. Being most abundant and in general use, it holds a very important place both in domestic economy and in medical dietetics. It should, therefore, be the study of the professed guardians of health, and of those intrusted with the management of infancy; it deserves the vigilant inspection of the public authorities in our large cities; and, indeed, the careful attention of all who acknowledge an interest in the health, and happiness, and well-being of their race. In order to arrive at a competent knowledge of its nature and properties, we propose to confine our observations and analysis chiefly to the milk of the cow. Previous, however, to a chemical investigation, there are a few particulars appreciable to the senses, which deserve a passing notice.

* Loudon's Enc. Agr., p. 1037.

I. *Color.* Milk, fresh drawn from the cow, should be of a beautiful white color, slightly tinged with yellow. It has the deepest color at the commencement of the period of lactation ; but this is often varied by the seasons and by food without materially affecting the nutrient and healthy properties of the milk. The juicy herbage of the pastures in the spring brightens the yellow tint, which gradually fades as the fields become arid and the season advances ; and the dry fodder of winter produces milk comparatively white. The *ranunculus*, or butter-cup, with which some pastures abound, imparts not only an unusually deep color to the milk, but also an acrid property which is extremely pernicious.* The milk of cows which are fed on distillery slops, brewers' grains, the refuse of kitchens, and similar food, owing to a deficiency of the oily and albuminous principles, is generally of a pale bluish color, and comparatively innutritious; as is also the milk of cows confined in pens, although supplied with proper herbaceous aliment. The white, opaque appearance of milk, is obviously owing to the curd or albumen which it contains ; for when this substance is perfectly separated from the milk, the serous residuum becomes colorless and transparent as water.†

II. *Smell.* Although taste and smell are different senses, and employ different organs, they are so closely connected, that the impression made on the one, in many instances produces a corresponding excitement in the

* Whitlaw's Materia Medica, p. 175.

† The *color* of milk can be modified by mixing saffron or madder with the food, the *odor* may be affected by various cruciferous and alliaceous plants, the *taste* may be altered by the use of bitters, as wormword, &c. ; and the medicinal effect may be influenced by the administration of drugs.—*Pereira's Materia Medica*, Part II. p. 1407.

other. It is thus with milk, which may be said to smell as it tastes. Good milk, has a peculiar animalized aroma, which is very pleasant, especially when new. By exposure to the atmosphere, it loses this odor in some degree, but the application of heat will restore it. The grateful and savory smell of milk, is often destroyed by certain kinds of food. In the case of cows confined in stables, and fed with the refuse of the distilleries, the milk is generally rank and nauseating.

III. *Taste.* The taste of milk is peculiar, slightly saccharine, and of a rich agreeable flavor. But this, of course, is affected by particular descriptions of food. Rank grass, noxious weeds, acid apples, sorrel, a plant of the genus *rumex*, which is found in many pastures, turnips, cabbage, wild-garlic, distillery slush, fetid water,* &c., will, when taken by the cows, impart their peculiar flavor to the milk; as will also impure utensils and the atmosphere of filthy rooms or pens where it is milked and allowed to stand. Milk of inferior quality is insipid, often somewhat acid or bitter, and unpleasant to the palate.†

IV. Good milk is slightly *alkaline.* This is too important a characteristic to pass unnoticed, and we are not aware that it has been observed by any previous writer. This quality is not perceptible to the taste, but is readily discovered by litimus paper, or any other vegetable blue which will detect acesency. If the color of the paper

* It is found by experience that the milk and butter of cows which drink fetid water, has a very bad taste, which plainly shows that the water retains its putridity when mixed with the blood and milk. —Vide *Phi. Trans.* Vol. XLIX. p. 345.

† In autumn the decayed leaves, particularly of the ash tree, communicates a rank and bitter taste to milk. The poisonous quality of the leaves of the yew tree, should prevent its growth in or even near to such grounds as are used for pastures.

remains unchanged when dipped into fresh drawn milk, it has alkaline properties; but if the paper becomes red, the milk has a predominance of acidity. We would not hastily deduce conclusions from, perhaps, too limited a range of experiments. But personal observations have induced the conviction that the alkaline property, in some degree, is essential to healthy milk, and is the unfailing characteristic of the fluid secreted by animals that are in healthy condition and properly kept. On the contrary, where the natural conditions of the cattle have been reversed, the milk, as shown by appropriate tests, was as uniformly acid. We have not known an exception to this rule. It would appear, therefore, that these results could scarcely become general, except on the supposition that they happen in accordance with established laws.

The characteristics of good milk, are thus summarily described in a valuable English work recently published. Good milk should be quite liquid and homogeneous; not viscid; and should contain only spherical transparent globules, voluble in alkalies and ether; should not become thick when mixed with ammonia; and should form a flocculent precipitate with acetic acid, but not be coagulated with heat.*

* Pereira's Materia Med. Part II. p. 1408.

CHAPTER VIII.

ANALYSIS AND CONSTITUENTS OF COW'S MILK.

Microscopical examination of milk.—The specific gravity of various kinds.—Difference of quality.--Specific gravity, how affected.—Analysis of several kinds of milk.—Constituents of milk.—Its elementary principles.—I. Cream—its specific gravity and constituents.—How resolved into butter.—Insoluble in spirits of wine, &c.—II. Curd--how formed.—Effect of heat on milk.—Coagulable by acids.

THE appearance of milk is so well known, it scarcely requires a more minute description than that already given.* It boils and congeals at nearly the same degrees of temperature as water. Being slightly viscid, its consistence should be such that a drop will preserve its roundness. Pliny says good milk will not run off the nail. Its average specific gravity, is about 1.030, whilst that of blood

* The following additional particulars may possess too litle interest for the general reader, but will doubtless be valued by the scientific inquirer.

Milk subjected to a microscopical examination, is observed to consist of myriads of *globular particles*, floating in a serous liquid. These globules are exceedingly minute; according to Raspail (Chem. Organ.) the diameter of the largest does not exceed in size 0.0003937 (about 1-2500th of an inch). They instantly disappear by solution on the addition of a drop of caustic alkali. Both Donné (Lond. Med. Gaz XXV. 302) and Sir A. Cooper (on the anatomy of the breast, 1840) have separated the globules by repeated filtration. The filtered liquor was transparent. The milk globules consist essentially of butter. Donné denies that they contain any caseum, since they are soluble both in alcohol and ether, which do not dissolve caseum.—*Pereira's Mat. Med.* Lond. 1840, Part II. p. 1407.

is about 1.052, water being 1. Brisson, whose authority on this physical property of bodies stands high, has given the following as the specific gravity of the milk of different animals.

Woman's Milk	. . . . .	1.0203
Cow's	"	1.0324
Goat's	"	1.0341
Mare's	"	1.0346
Ass's	"	1.0355
Ewe's	"	1.0409

Our experiments do not agree with the above results. In some kinds of milk, we have observed important variations. The specific gravity of woman's milk, for example, is stated by Brisson to be 1.0203, and cow's milk, 1.0324. The average of numerous examinations of woman's milk, made at different periods of lactation, we found to be 1.027, and the highest of cow's milk 1.030. If these results be established by subsequent examinations, human milk resembles cow's milk more closely than has generally been apprehended. In that case the propriety of largely diluting the latter milk, as is the custom, when used for the nourishment of young infants, may justly be questioned.

It will be seen, however, from the foregoing results, that the milk of different animals, has each a specific gravity peculiar to itself; and it is found that the milk of the same animal is not, in this respect, uniformly the same, but is varied by numerous causes which affect the proper and healthy condition of the milk. The milk of cows which have insufficient or innutricious aliment, or of those which are kept in an unnatural state and fed on the refuse of the distilleries, or any other improper and unwholesome food, has uniformly an excess of aqueous fluid, and is of little spe-

cific gravity. The adulteration of milk, as is frequently practised, by the addition of starch, sugar, plaster of Paris, and various other ingredients, will necessarily increase its density; it is not possible, therefore, always to infer the quality of milk from the indications merely of a specific gravity instrument.

The subjoined is a recent analysis of several kinds of milk, published by M. M. O. Henry and Chevallier: *Journ. de Pharm.* Tom. XXV. p. 340.

Constituents.	Cow.	Ass.	Woman.	Goat.	Ewe.
Caseum	4.48	1.82	1.52	4.02	4.50
Butter	3.13	0.11	3.55	3.32	4.20
Sugar of milk	4.77	6.08	6.50	5.28	5.00
Various salts	0.60	0.34	0.45	0.58	0.68
Water	87.02	91.65	87.98	86.80	85.62
Total	100.00	100.00	100.00	100.00	100.00
Solid matter	12.98	8.35	13.00	13.20	14.38

Cow's milk deprived of its cream (*cremor lactis*) according to Berzelius, consists of

Water	928.75
Curd with a little cream	28.00
Sugar of milk	35.00
Muriate of potash	1.70
Phosphate of potash	" 25
Lactic acid acetate of potash with a trace of lactate of iron	6.00
Earthy phosphates	" 30
	1000.00

Milk being apparently analogous in its properties to the chyle of mammiferous animals, and admirably suited in its natural state to repair the waste of life, the opinion for a time prevailed that it required no assimilation; and that

when introduced into the stomach, it was taken up by the absorbents and thrown into the blood unchanged. Mr. Clark, member of the Royal Irish Academy, in a dissertation upon the subject, defends this position so far as it relates to human milk, with great plausibility; and we have not seen it disproved. But in all other cases where milk has been examined, it has been found to coagulate, suffers a decomposition, and is subjected to the same processes in the stomach as other aliments. When first obtained from the animal it is apparently an uncombined or simple fluid; but it is found to consist of an admixture of three staminal principles which, so far as we know, are essential to all milk, viz. an *oleaginous*, a *saccharine* and a *caseous* or an *albuminous*, imperfectly combined, and suspended in an aqueous medium. The fluid is readily separated into *curd*, *cream*, and *whey;* and each of these being compounds of organization, are by chemical agents reducible to their ultimate elements. It is proposed to consider each of these compounds separately in the order suggested.

I. *Cream.* When milk is allowed to stand, a thick, unctuous, yellow substance soon rises to the surface, which gradually thickens by exposure to air, and is called *cream*. This, when carefully separated from the milk, contains an animal oil, a caseous matter, and a limpid fluid denominated whey. The specific gravity of cream, was found by Berzelius to be 1.024; and its contituents to consist of,

Butter	4 5
Cheese	3.5
Whey	92.0
	100.0

When violently agitated by the familiar process of churning, the fluid oily matter by combining, according to some

chemists, with the oxygen of the atmosphere, becomes concrete, and the cream is resolved into butter, which is solid at a natural heat; and butter-milk, that partakes of the properties of the milk before the butter was taken from it. In three or four days the cream becomes solidified, so that it will not pour. In eight or ten days more, its surface is covered with a mouldiness or a muculent substance with the pungent odor of fat cheese.

Cream is found by experiments to be insoluble in spirits of wine, or oils. At boiling heat, oily matter in small portions rises to the surface; but in this way the oil is with difficulty separated from the caseous matter. Many of the properties of cream are analogous to oil. It is unctuous to the taste and touch, leaves a greasy stain on cloth like oil, and like it becomes rancid by exposure and age. Cream, then, is the oil of milk in combination with a caseous substance, and serum or whey.

II. *Curd* (*lactal bumen*). If milk is exposed for some time at a temperature of about 65 or 70 degrees, lactic acid isdevelop ed, and coagulation spontaneously takes place. By this process, the milk is separated into two parts; the one, the concreted portion or caseous, is, as is well known, denominated *curd;* the other, the fluid, as before remarked, is called whey. Curd, before the whey is expressed, is a soft, grayish white, semi-transparent mass, and when fresh agreeable to the taste, nearly inodorous, and somewhat elastic. When the moisture is chiefly expelled by percussion and pressure, the curd becomes opaque and brittle, and for a time retains its agreeable flavor. If all the moisture is dissipated by evaporation, it forms a semi-pellucid substance like gum, is not readily subject to change, and by incineration yields phosphate of lime. But particles of oil and serum being interposed between the particles of caseous matter, on

exposure to the air it softens, becomes acid and acrid, assumes various hues, and exhales a very disagreeable odor. In passing to the putrefactive process a soapy compound is constituted by the union of acetate of ammonia with the oleaginous matter, and the substance is dissolved.

Milk will not coagulate by boiling so as to separate the curd in mass; but this process forms a pellicle or thin skin on the surface, which has all the properties of curd. If the scum is removed others succeed, and if the boiling is continued, all the coagulable matter may in this way be abstracted. If the scum is allowed to accumulate, it sinks, and coming in contact with the vessel where the heat is greatest, it becomes browned and imparts a disagreeable flavor to the milk. A free infusion of sugar or gum, or of any neutral salt into boiling milk, will cause it to coagulate.*

All acids, both vegetable and mineral, will coagulate milk, as will also alkalies both fixed and volatile; but the action of these opposite principles in producing the same ultimate result, is marked by circumstances peculiar to each. The curd, for illustration, produced by vinegar, falls to the bottom of the vessel, and the whey has the appearance of that which has been separated by spontaneous coagulation. If pearlash is used, the curd, in the form of a thick, tough skin, rises to the surface, and the whey assumes a greenish appearance. If acids and alkalies are simultaneously introduced into the milk, they neutralize each other to a greater or less degree, and no coagulation ensues. But these substances possessing opposite energies in relation to each other, it is found that the coagulum formed by acids, is broken down by alkalies; and when formed by alkalies, it may be redissolved by acids; but the intimate

* Thompson's Chem., Vol. IV. p. 387.

combination of the parts having been disturbed, in neither case is the milk restored to its original appearance and properties. Alum, fixed sal ammoniac, green and blue vitriol, sugar of lead, &c., will curdle milk, as will also most other of the middle salts, the basis of which is an earth or a metallic body. All astringent vegetables will have the like effect, as the flowers of the thistle and the artichoke,* and many other substances which have a strong affinity for water, such as molasses, gelatin and alcohol. But an infusion of the inner membrane of the fourth stomach of the calf is preferred by dairymen, and is usually employed for this purpose; for it produces more white coagula, and with greater speed and certainty than most other substances, and will not, as many of them do, re-dissolve it.

* Scheele, II. 52.

CHAPTER IX.

ANALYSIS AND CONSTITUENTS OF MILK CONTINUED.

Properties of curd.—Soluble caseum how obtained.—Combination of curd with mineral acids.—Analysis and constituents of curd.—Its ultimate elements.—III. Whey.—Its appearance and properties.—Sugar of milk.—Processes of obtaining it.—Its properties—Muriates of potash and soda.—Phosphate of lime, how separated.—Gelatin, &c., &c.

The properties of coagulum appear to remain the same, whatever be the means employed to obtain it. That, however, which is formed by the natural acesency of the milk, is less cohesive and firm than the curd which is produced by rennet or other agents; and being of less difficult solution, it is in this state best fitted for food. The proportion of curd to the volume of milk, is usually estimated at about one-eighth; but this is found in varying proportions according to the richness of the milk.

Milk cannot be made to coagulate at all, when diluted with about eight or ten times its own weight of water. When the coagulum is formed, it is found perfectly insoluble in water, although, as we have stated, the acids and the alkalies have power to dissolve it. Braconnet maintains that its insolubility depends upon its combination with some foreign substance, generally an earthy salt or an acid; and when separated from these, it is soluble both in hot and cold water. In this pure state, it cannot be coagulated either by heat or air; and when concentrated, it becomes viscid like mucilage. He says, soluble caseum may be obtained from curd spontaneously formed in milk,

by washing the curd, and then digesting it with water so thoroughly impregnated with carbonate of potassa as is sufficient to unite with the acetic acid. By this process acetate of potassa, is generated with the disengagement of carbonic acid, and the curd is dissolved. Now in order to separate the curd from the accompanying acetate, the solution, after removing the cream which collects on its surface by repose, must be mixed with a little sulphuric acid, and the precipitated sulphate of curd being carefully washed, is readily dissolved in water by the smallest possible quantity of carbonate of potassa. If the alcohol is then freely employed, the caseum itself is thrown; but if the solution is mixed with about its own volume of alcohol, a deposit of the sulphate of potassa with some curd and cream takes place, and the filtered liquor contains soluble curd in great purity.*

Curd thus prepared still contains a little potassa; but Braconnet considers its solubility as not dependent on the presence of the alkali. When evaporated to dryness, it forms a diaphanous or pellucid mass which strongly resembles gum-arabic, may long be preserved without change, and still retains its solubility in water. It has an acid reaction, and combines readily with alkalies, forming very soluble compounds. With the metallic oxides, as well as with their salts, it forms sparingly soluble compounds. Its affinity for acids is equally marked, and it is precipitated by all the mineral acids, except the phosphoric.†

We must not infer from the difficulties experienced by chemists, in dissolving the residuum of milk after its separation from the whey, that it is equally insoluble in the stomach, for the contrary is abundantly established. The perplexities of chemists merely show how little is known of

* An. de ch. et de Ph., xliii. 337. † Turner's Chem., p. 623.

those affinities which are essential to the assimilation of alimentary substances. If those were understood and were united in the same proportions, the like results would probably follow out of the stomach as in the stomach.—But after all, much must be allowed to the energies of the living organs, which often effect with ease what art cannot accomplish.

Curd forming with mineral acids the same compounds as albumen and fibrin, it is supposed by some to possess analogous properties; but in the opinion of others it more resembles gum than albumen. The distillation of this substance exhibits ammonia, empyreumatic oil, and carburetted hydrogen gas; it has, therefore, been denominated a quaternary compound.* According to the analysis of Gay-Lussac and Thenard, the constituents of curd are:

Carbon	59.781
Oxygen	11.409
Hydrogen	7.429
Azote	21.381†
	100.000

Dr. Thompson says, "As we are ignorant of the equivalent number for curd, we are unable, from the preceding analysis, to determine the constitution of that substance." He, therefore, attempts a solution of the ultimate elements by assuming the smallest number of atoms that accord with the analysis, which is expressed thus:

7 Atoms carbon . . .	= 5.25 . .	60.87
1 Atom oxygen . . .	= 1.00 . .	11.60
5 Atoms hydrogen . .	= 0.625 . .	7.24
1 Atom Azote . . .	= 1.75 . .	20.29
	8.625	100.00

* Gorham's Chem. Vol. II. p. 454. † Recherches, Tom. II. p. 334.

By duplicating the number of atoms, it will be in our power to compare curd with gelatin, albumen, and fibrin. "On that supposition its composition will be 14 atoms carbon = 1.25, + 2 atoms oxygen = 2.0 + 10 atoms hydrogen = 1.25, + 2 atoms azote = 3.5, = 17.25." He, therefore, concludes that this composition approaches nearest to that of gelatin, from which it differs by the absence of 4 atoms water, and 1 atom carbon.*

From the foregoing general analysis, curd appears to consist principally of albumen, gelatin and oil, which constitute the chief nutrient properties of milk. When all the whey is expelled from the concreted mass, and it is moulded and pressed, it is, as is well known, called cheese. On the manufacture of this article, it would be foreign to our purpose to dwell.

III. *Whey* (*serum lactis*). We have before remarked, that the serous or watery residuum, after the separation of the curd, is denominated *whey*. This liquor is far less nutritious than any other part of the milk. It has a peculiar sweetish smell and taste, and is rather agreeable. Whey of the dairies usually retains minute particles of curd and butter which render it turbid; but when separated from these by repeated purifications, it becomes as limpid and almost as colorless as water. By successive evaporations of the pure fluid, and the use of appropriate chemical agents, whey is found to consist of sugar of milk, gelatin, muriates of potash and soda, phosphates of lime and soda, with a certain quantity of water. The sulphate of potash, and the phosphates of iron and magnesia, have also, it is said, been detected in this liquid.

* Thompson's Chem., Vol. IV. p. 386.

*Sugar of milk** (*saccholactin*) is the saccharine principle upon which the sweetness and also the fermenting properties of milk depend. It is held in solution by the whey after the separation of the curd. Cream also contains it in the proportion of forty-four parts, and skimmed milk in the ratio of about thirty-five parts of this substance in a thousand. As the process of obtaining this and the other constituents of whey may be interesting to the general reader, we will concisely refer to it.

Take a quart of milk perfectly creamed by repeated skimmings; separate the curd by adding to the milk one table-spoonful of vinegar, or what is a better coagulator, a small quantity of fresh rennet. When the curd is formed, strain it through a fine hair sieve, and afterwards filter the liquor through unsized paper. Now slowly evaporate the whey to the consistence of a viscid syrup, allow it to cool, and it will concrete into a thick gluey mass. Dissolve this mass in water, and the whey will be sufficiently pure for chemical examination. Evaporate a second time as before, and the syrup will be of a faint yellow color, and of rather an agreeable flavor. Upon cooling the fluid in this state, it deposits numerous prismatic crystals, of a darkish yellow color, which are called *sugar of milk*. If this substance is re-dissolved and purified by means of albumen, it becomes white and semi-transparent. It is inodorous and of a peculiarly sweetish taste, and appears to partake of the properties of both gum and sugar.

* Fabricius Bartholdi, an Italian, was the first European who mentioned this sugar. He described it in his *Encyclopædia Hermetico-Dogmatica*, published at Boulognia in 1619; but it seems to have been known in India long before that period. For the best account of its properties we are indebted to Mr. Lichtenstein.—*Thompson.*

Its crystals are six-sided, or what are denominated regular parallelopipeds, terminated by four-sided pyramids.

The properties of this substance are essentially different from sugar. It requires for its solution five times its volume of cold, or two and a half its volume of hot water. It is insoluble in alcohol and ether, except with the addition of a little sulphuric acid. At the temperature of 55, its specific gravity is 1.543. Great importance appears to be attached by some physicians to the medicinal virtues of this substance, but it has never, we believe, been shown that they are very considerable. In Switzerland and in other places, it is separated in a large way for pharmaceutical purposes.

Near the end of the evaporation of the whey, muriates of potash and soda are deposited, and some phosphate of lime. If the fluid, which on cooling assumes the appearance and consistency of animal jelly, be diluted and slowly evaporated a second time, an additional quantity of the muriate of potash is separated in crystals, and also of the phosphate of soda and lime. Phosphate of lime may be obtained by pouring into the clear whey a little of the oxalate of ammonia, which occasions a precipitate of the oxalate of lime. If the nitrate of lead or the nitrate of mercury is used, the phosphates of lead and mercury are precipitated. The residuum of the whey now consists chiefly of gelatin. If alcohol is poured upon the whey after it is evaporated to the consistence of syrup, a flaky precipitate is formed consisting of gelatin and the sugar of milk, which substances may be separated by a decoction of nut-galls or tannin.

CHAPTER X.

HUMAN MILK.

Pliny's opinion of different kinds of milk.—Artificial ass's milk, its reputed virtues.—Peculiarities of human milk.—Whiter than cow's.—Yields more cream.—In what respects it differs.—Variations of it at different periods.—It is incoagulable.—Less prone to acidity than other milk.—It is affected by mental emotions.—Illustrated by an anecdote.

So far as known, the principal elements in the milk of all other animals are the same as in that of the cow, but so varied in their proportions as to give to each kind of milk its own peculiar characteristics. To the senses, indeed, the difference is so clearly cognizable, that the ancients, who were but little acquainted with analytical chemistry, appear to have entertained nearly as correct notions of the dietetical properties of milk as the moderns, notwithstanding the great improvements in this branch of science. Pliny, the natural historian, was not only a man of learning and observation, but also the chronicler of the wisdom of the ancients, and yet we have not seen his writings quoted on this subject. He says, human milk is sweetest, and camel's is next; cow's milk will yield twice as much butter as the same quantity of goat's milk, and is better than any other for butter. Camel's milk is thickest, and as it regards consistence, mare's milk ranks next. But goat's milk he supposes to be most nourishing, and hence originated the mythical legend of the poets, who feigned that Jupiter was suckled by a goat. Sow's milk was regarded

as an efficacious aperient, and was prescribed for various maladies.* But ass's milk, on account of its reputed medical and cosmetic properties, was valued beyond any other kind. Such confidence was reposed in its virtues as a beautifier of the complexion, that the Empress Poppæa, wife of Domitius Nero, used it for this purpose; having five hundred asses continually in her retinue to furnish her with a fresh bath every morning. Artificial ass's milk, reputed to possess similar properties, was prepared as follows:

P. x. limac terrest. contns. xviii. Rasur. C. Cervi. Hordei perlati. Rad. cryngii, sing. unc. i. aquæ puræ lib. vi. coque coni igne in vase singulino vitriato ad lib. iii.; dein cola et adde sympi balsamici seseuncian. Capiat quotidie unc. iv. hujus liquoris mistas cum lactis vaccin. recentis p. æ.†

The milk of the animals named does not, as will appear from modern observations and experiments, essentially vary from the foregoing account.

Assuming cow's milk, because most familiarly known, as a standard of comparison, we propose to refer with some particularity to the milk of other animals.

Human milk is whiter and thinner than that of the cow, and contains more saccharine and oily matter, but less caseum. It contains, indeed, less than a sixth part of the curd that is yielded by cow's milk, and it is imperfectly coagulable either by rennet or acids. Heat does not increase its coagulability; but when it is boiled a pellicle is thrown up to the surface, which has the properties of caseum. The difficulty in forming the curd, is attributed by Thompson and others chiefly to the superabundance of

* Pliny's Natural History, Lib. XXVIII. c. 11.

† Med. Trans., Vol. II. p. 341.

water with which the curd is diluted. As it contains, however, less than one per cent. more water than cow's milk, which so readily coagulates, this reason is evidently inconclusive.

Woman's milk yields abundance of cream, which is generally whiter than cow's, and after it is separated, the milk is extremely thin, and of a pale bluish color. No butter can be obtained from the cream. After long churning, a viscid unctuous matter is separated, but it cannot be changed into perfect butter. If it is allowed to remain at rest a day or two after the agitation, it spontaneously separates into two parts; the one a colorless, pellucid fluid, which occupies the inferior part of the vessel; and the other a thick, white, oily fluid, which floats upon the surface. The lowermost fluid contains sugar of milk and some curd; the uppermost does not differ from cream, except in consistence. But as the oily part of this cream cannot be separated by agitation from the curd, it is found extremely difficult to determine the relative proportions of the component parts of human milk.* When the whey, after the curd is separated from it, is slowly evaporated, it yields crystals of sugar of milk, and of muriate of soda. The quantity of sugar is greater than in cow's milk. According to Haller, the sugar obtained from cow's milk is to that obtained from an equal quantity of woman's milk, as 35:58, and sometimes as 37:67, and in all the intermediate ratios.

Woman's milk appears, therefore, to differ from that of cow's in three particulars.

I. It contains a much smaller quantity of curd.

II. Its oil is so intimately combined with its curd, that it does not yield butter.

* Parmentier. Jour. de Phys., XXXVIII. 419.

III. It contains more sugar of milk.*

Parmentier and Deyeux ascertained that the quantity of curd in woman's milk increases in proportion to the time after delivery. They also observed that when milk is drawn from the breast *often* and at short intervals, the milk is constantly thin and affords very little nourishment to the infant. They, therefore, recommend as essential to healthy nutrition, that the intervals of suckling be as great as possible without injury to the nurse or child; and that when the infant is placed at the breast, it should be allowed to remain until it draws away all that will come freely, for the last is invariably the richest and best.

The prevailing opinion that human milk is coagulable, has arisen from the single circumstance that infants frequently vomit the milk which they suck in a state of apparent coagulation, but this idea is disproved by high authority. Mr. Clark having utterly failed after numerous experiments to coagulate human milk, says, "I am persuaded that rich milk in a healthy state will be found to contain little or no curd, and that the general opinion of its nature is founded upon fallacious analogy and superficial observations made upon the matter vomited up by infants. We may presume that the cream of woman's milk, by its inferior specific gravity, will swim on the surface of the contents of the stomach; and being of an oily nature, that it will be of more difficult digestion than any other constituent part of the milk. When an infant, then, sucks very plentifully so as to over-distend the stomach, or labors under weakness in the powers of digestion, it cannot appear unreasonable to suppose, that the cream will be first rejected by vomiting. Analogous to this we know that adults, affected

* Thompson's Chem., Vol. IV. p. 389.

with dyspepsia, often bring up greasy fluids from the stomach by eructation, and this especially after eating fat meat."* He appears to derive a confirmation of this opinion from the observation that curds vomited up by infants of a few days old are yellow, whilst in the course of a fortnight or three weeks they become white. This he accounts for from the yellow color of the cream yielded by the milk of women, during the first four or five days after delivery. We have dwelt the longer on this particular, as these views are at variance with the generally received opinion on the subject.

Another remarkable property of human milk is, that it is far less prone to acidity than other milk. It is well known that the milk of ruminant animals will become acid at a medium temperature in the course of from twelve to twenty hours, and in the course of a few days offensively putrid. But healthy human milk, exposed in the same manner, will not undergo the same change in many weeks, and sometimes not in many months.

There is, moreover, greater variations in the quality of woman's milk, than in any other. This is observable not only in different persons, but in the same persons under different circumstances. These irregularities may generally be attributed, either to diet, the alternations of health or disease, or probably more frequently to the influence of the mental emotions, which as they happen to be unfavorably affected, produce corresponding changes in the milk that seriously injure the health of the infant, and in some instances have proved fatal.

The following case related by Dr. Von Ammon, physician to the king of Saxony (as quoted by Dr. Combe),

* Enc. Britan., Vol. XV. p. 75.

very strikingly illustrates the destructive influence of strong excitement in the mother, on the system of the infant.* "A carpenter quarreled with a soldier billeted in his house, and was set upon by the latter with his drawn sword. The wife of the carpenter at first trembled from fear and terror, and then suddenly threw herself furiously between the combatants, wrested the sword from the soldier's hand, broke it in pieces, and threw it away. During the tumult, some neighbors came in and separated the men. While in this state of strong excitement, the mother took up her child from the cradle, where it lay playing and in most perfect health, never having had a moment's illness; she gave it the breast, and in so doing sealed its fate. In a few minutes the infant left off, became restless, panted, and *sank dead on its mother's bosom.* The physician who was instantly called in found the child lying in the cradle as if asleep, and with its features undisturbed; but all his resources were fruitless. It was irrecoverably gone." Were it necessary, other instructive cases might be cited, but this may suffice. It is no objection to the foregoing illustration that it is a strong one. Similar effects from like causes may in all ordinary cases be expected to follow, proportioned in degree, of course, not only to the suddenness and violence of the paroxysms, but also to their duration.

* Die ersten Mutterpflichten und erste Kindespflege, p. 102, 3d Edit. Leipsig, 1839.

CHAPTER XI.

MILK OF DIFFERENT ANIMALS.

Ass's milk compared with cow's milk.—In what it chiefly differs.—Mare's milk.—Its properties.—Less nutritious than any other.—Abounds in saccharine matter.—Method of obtaining an intoxicating liquor therefrom.—Goat's milk.—Its properties.—Evaporation of five kinds of milk and results.—Comparison of different kinds.—Ewe's, camel's, sow's, and bitch's milk.—Medicinal properties of the latter.—Whale's milk.—Its lactescent organs.—The constituents of six kinds of milk compared.—The differences in milk referred to the digestive process.—Evidences of design in milk.—Milk, the great alimentary prototype.

Ass's milk, is also very different from that of the cow. Its cream and milk are both very similar in color and consistence to woman's milk; containing like it fewer salts and less cream, but more saccharine matter than cow's milk. Butter may be separated from the cream by very long agitation, but it is always extremely soft, insipid and sour, and soon becomes rancid. If allowed to stand, the butter readily mixes again with the fluid from which it had been separated, and by renewed agitation the butter may again be obtained. The milk when creamed has a sweetish palatable taste. It does not spontaneously coagulate. Alcohol and acids will form, however, a little curd, but it is uniformly of a soft and flaky character. The whey yields sugar of milk in the proportion of 35:80; and muriate of lime, often mixed with common salt. The milk of this animal chiefly differs from that of the cow in three particulars:

I. Its cream is less abundant.

II. It contains less caseous matter.

III. It contains more sugar of milk.*

It is now generally admitted, that there is nothing peculiar in this milk more than in any other, to warrant a belief in the medical qualities which have been ascribed to it.

Mare's milk resembles good cow's milk in color, but it is thinner, being of a medium consistence between that and human milk. When the milk is creamed, it coagulates like cow's milk, but it contains far less caseous matter, and very few oily particles. The cream is very fluid, and cannot be converted into butter; the whey is nearly colorless, contains a large proportion of saccharine matter, and small portions of sulphate of lime, and muriate of lime.

This milk is more insipid and less nutritious than any other, yet it has been strongly recommended as a diet for feeble and consumptive persons. In such cases it is probably preferred, because its easy assimilation better adapts it to the weakened state of the digestive organs, and the generally debilitated condition of the patient.

From the quantity of saccharine matter which this milk contains, it is by particular management susceptible of vinous fermentation, and a small portion of alcohol is consequently developed. But this result is not so readily obtained from milk as from other substances which more abound with sugar or farinaceous matter. The Tartars, however, are famous for an intoxicating drink which they prepare from this milk, denominated *koumiss*; the Arabs make a similar liquor called *leban;* and the Turks a beverage of like qualities known as *yaourt*. But the saccharine principle

* Thompson's Chem., Vol. IV. p. 389.

in the milk is so weak, that in preparing the liquor there appears to be some difficulty in extending the fermentative process to all parts of the fluid at the same time. This, however, is overcome by preparing large quantities at a time, and subjecting the mass to frequent agitations. Fermentation is induced by adding to the milk about one sixth its volume of water, and about one eighth of the sourest milk they can obtain, or a smaller proportion of koumiss already fermented. The air is then excluded from the vessel by a thick cloth cover, and it is required to stand in a moderate warmth for twenty-four hours, and to be frequently beaten with a stick to diffuse the curdy matter through the aqueous, from which it had separated. The whole mass is now thrown into a high narrow vessel, and the agitation is continued until the liquor has become perfectly homogeneous. This liquor will keep some months, in close vessels and in a cool place; but must be well mixed every time it is used. Sometimes a spirit is extracted from it by distillation, in the ratio of six ounces of strong spirit from twenty-one pounds of milk.

Goat's milk nearly resembles that of the cow in three particulars: the richness and abundance of its cream; its convertibility into butter; and its coagulability. It differs also from cow's milk in several particulars. Its consistence is greater; its butter is always whiter and softer; and it yields a greater proportion of curd, which is firmer and retains less whey. It also gives out a peculiar animal aroma, which at certain seasons is strong and offensive. This odor is less perceptible in those without horns and the white, than in those of a black color. The whey contains sugar of milk, muriate of lime, and muriate of soda.

Dr. Lewis subjected four of the five kinds of milk we have

considered, to evaporation, and the following were the results.

Twelve ounces of	Left of dry matter	From which water extracted a sweet saline substance, amounting to
Cow's milk	13 drachms	1½ drachms
Goat's milk	12½ do.	1½ do.
Human milk	8 do.	6 do.
Ass's milk	8 do.	6 do.

The foregoing experiments would show, that the constituents of cow's and goat's milk very nearly approximate, while those in human and ass's milk are precisely alike. These results, it will be observed, agree essentially with the peculiarities we have ascribed to each of these different kinds of milk. But from the detailed analysis before given (p 81,) in which our experiments concur, the solid constituents of human and cow's milk differ but 2.100ths, which is a closer agreement than is found to exist in any other kinds of milk.

Ewe's milk in appearance can scarcely be distinguished from that of the cow; the cream is thick and unctuous, and the curd, which readily separates from the milk, is oily and viscid. The milk yields considerable yellow butter, which is always soft and prone to rancidity. The serum is semi-transparent like that of cow's, contains less saccharine matter than any other milk, with small portions of the muriate and phosphate of lime. The milk is impregnated with the odor of the perspirable fluids of the animal, and is by many considered too unpalatable for human use. The caseous matter of the milk being very rich, it makes excellent cheese.

Camel's milk is thin, yielding but little cream, and a little whitish butter. The proportion of caseum is small, the serum colorless, and slightly saccharine.

Sow's milk is sweeter than that of the cow, and is re-

markable for its laxative effects when used as an article of diet; in other respects it nearly resembles cow's milk.

Bitch's milk is said by those who have so far overcome their prejudices as to taste it, to be very sweet and palatable. Dr. Kenneda remarks, " that the milk of the female dog has been administered as a medicine to persons suffering from disease; and in these it almost always produced the mildest aperient effects. An epileptic lad took it to the amount of two ounces every morning, and with manifest advantage. It operates with considerable benefit when given in suitable proportions to nervous children, both before and after their being weaned. The influence of imagination in exciting disgust at its use, may be obviated to a reasonable extent by feeding the animal on a pure human diet."

Whales belonging to the class of animals denominated mammalia, nourish their young with milk, but inhabiting the sea, they are much less known to us than those found upon the land. But as opportunities have been afforded of examining different animals of this order, a tolerably accurate idea has been gained both of the lactescent secretions and the organs of these animals, a concise account of which we subjoin. According to John Hunter, Esq., F. R. S., the glands for the secretion of milk in the whale are two, one on each side of the middle line of the belly at its lower part. The posterior ends, from which go out the nipples, are on each side of the opening of the vagina, in small sulci. They are flat bodies lying between the external layer of fat and the abdominal muscles, are of considerable length, but only one fourth of that in breadth. They are thin, that they may not vary the external shape of the animal, and have a principal duct, running in the middle through the whole length of the gland, and collecting the smaller lateral ducts, which are made up of those still

smaller. Some of these lateral branches enter the common trunk in the direction of the milk's passage, others in the contrary direction, especially those nearest the termination of the trunk in the nipple. The trunk is large, and appears to serve as a reservoir for the milk. From this reservoir the milk is injected into the mouth of the young, by the action of powerful cutaneous muscles, arranged so as to compass the reservoir and dilated ducts of the mammary glands, and terminate externally in a projection which is the nipple. The milk is probably very rich; for in that caught at Berkley, England, with its young one, the milk, which was tasted by Mr. Jenner, and Mr. Ludlow surgeon at Jedburgh, was rich, it is said, like cow's milk to which cream had been added.*

But six kinds of milk have been chemically examined, viz. cow's, woman's, ass's, mare's, goat's and ewe's. The *quality* of the saccharine substance yielded by each of these milks, according to Parmentier, was precisely the same in all, whilst all the other constituents varied in quality as well as in quantity. From the general properties of these milks they have been divided into two classes: 1, the milk which abounds in serous and saline parts; 2, that which is rich in caseous and butyraceous substances. The subjoined table exhibits a comparative view of milk in the order in which the proportions of curd, butter, sugar of milk, and whey predominate.

Comparatively.	Curd.	Butter.	Sugar of milk.	Whey.	Proportions
Milk of the 1. Goat.		Sheep.	Woman.	Ass.	Yields most.
Milk of the 2. Sheep.		Cow.	Ass.	Woman.	" Less.
Milk of the 3. Cow.		Goat.	Mare.	Mare.	" Least.
Milk of the 4. Ass.		Woman.	Cow.	Cow.	Yields most.
Milk of the 5. Woman.		Ass.	Goat.	Goat.	" Less.
Milk of the 6. Mare.		Mare.	Sheep.	Sheep.	" Least.

* *Vide Phi. Trans.* Vol. LXXVII.

Chaptal justly remarks that "milk follows the nature of the aliment more than any other fluid of the body." But there is a difference independent of this circumstance. The cow, the goat, the mare, and the ass may feed in the same pastures, yet so peculiar will be the milk of each, that no experienced observer would mistake the production of one animal for that of another. Some of the distinguishing characteristics of different kinds of milk will be seen in the foregoing classification. In the milk of animals which are both *ruminant* and herbivorous, curd and butter predominate; whilst in the milk of animals merely *herbivorous*, curd and butter are found in defective proportions, and whey and saccharine matter abound. Hence we may fairly infer that there is something in the digestive process, or in the action of the absorbents or lacteals, that prepares and abstracts from the aliment the properties which impart to each kind of milk its distinguishing character and quality. And this diversity exists not only in the milk of different orders of animals, but in the milk of the same animal at stated periods. From the time of lactation onwards, there is a gradation in the nutrient properties of the milk, which corresponds with the wants, growth, and condition of the young it was intended by the Author of nature to nourish.

This chapter cannot, perhaps, be better closed than in the words of the philosophic Prout: "Of all the evidences of design in the whole order of nature, milk affords one of the most unequivocal. No one can for a moment doubt the object for which this valuable fluid was prepared. No one can doubt that the apparatus by which milk is secreted, has been formed specially for its secretion. No one will maintain that the apparatus for the secretion of milk arose from the wishes or wants of the animal possess-

ing the apparatus; or from any fancied plastic energy. On the contrary, the rudiments of the apparatus for the secretion of milk, must have actually existed in the body of the animal ready for development, before the animal could have felt wants or desires. In short, it is manifest that the apparatus and its uses, were designed and made what they are, by the great Creator of the universe; and on no other supposition can their existence be explained."

"The composition of the substances, by which animals are usually nourished, favors the mixture of the primary staminal alimentary principles; since most of these substances are compounds of at least two of the staminal principles. Thus most of the graminivorous and herbaceous matters contain the saccharine and glutinous principles; while every part of an animal contains at least albumen and oil. Perhaps, therefore, it is impossible to name a substance constituting the food of the more perfect animals, which does not consist essentially of at least two, if not of all the three great principles of aliment. But in the artificial food of man, we see this great process of mixture most strongly exemplified. He, dissatisfied with the spontaneous productions of nature, culls from every source; and by the force of his reason, or rather of his instinct, forms in every possible manner, and under every disguise, the same great alimentary compound. This, after all his cooking and his art, how much soever he may be disinclined to believe it, is the sole object of his labor; and the more nearly his results approach to this object, the more nearly do they approach perfection. Even in the utmost refinements of his luxury, and in his choicest delicacies, the same great principle is attended to; and his sugar and flour, his eggs

and butter, in all their various forms and combinations, are nothing more or less, than disguised imitations of the great alimentary prototype *milk*, as furnished to him by nature."

CHAPTER XII.

THE UNNATURAL METHODS OF PRODUCING MILK FOR THE CONSUMPTION OF LARGE CITIES.

Impure milk consequent upon the mismanagement of the dairies.—The evil avoidable.—Manner of producing milk.—Prevalence of its use.—Collateral mischiefs.—Connection of the dairies with distilleries.—Importance of the former to the latter.—Slop as food for fattening cattle.—Distilleries in the vicinity of cities.—Ignorance of the people on the subject.—Slop-milk only a branch.—Quadruple alliance.—Extent of the evils produced shown by the destruction of grain.—The production of whisky.—Diseased cattle and swine slaughtered.

What has been incidentally remarked in preceding chapters, of the value of milk as an article of human sustenance, refers of course to, that which is pure; for milk, without these attributes, or possessing such as are deleterious, is not only worthless for such a purpose, but its use should be universally deprecated. Milk, however, being a natural secretion, and not a manufactured article, it has been taken for granted, that in whatever way produced its nutrient and healthy properties are essentially the same; hence the inconsiderate consumption of the milk of animals which are kept in confinement and upon unnatural food, as is the case to a deplorable extent in cities and other populous places. That the use of such milk is extensively injurious to human health and life, and incidentally to the morals of communities, will, it is believed, in the course of this work, be made plainly to appear. A fatal delusion prevails on this subject, not only in this country, but throughout the

world; and until its mischiefs were exposed by the writer in a series of essays published in this city in 1836—7, he is not aware that the public mind was ever called to its consideration.

There are doubtless many natural and moral evils wisely permitted in the world, which no human sagacity or foresight can prevent or remove, and are therefore to be passively endured. But such is neither the kind nor the character of the evil under consideration. It is one which is inflicted upon the community, not by the providence of God, but by the recklessness or cupidity of men. The sufferings hitherto consequent upon it, have been the penalty of the ignorance and apathy which have prevailed upon the subject. If now, however, with open eyes and the remedy at hand, we choose to suffer, we deserve to suffer. But whatever may be the moral preferences of men, it is not in human nature to prefer sickness to health, or physical evil instead of physical good. When the subject in its relations to morals, health, and life, is fully understood, all will feel bound by the most weighty considerations to do all in their power to deliver the community from so grievous an evil.

The manner of producing milk to supply the inhabitants of cities and other populous places, is so contrary to our knowledge of the laws which govern the animal economy, that from a bare statement of the facts, any intelligent mind might confidently anticipate the evils which actually result from it. The natural and healthy condition of the cows, appears, for the most part, to be utterly disregarded. They are literally crowded together in large numbers in filthy pens, which at once deprives them of adequate exercise and pure air, both of which are indispensably essential to their health. Instead of being supplied with food suited to the masticatory and digestive organs of herbivo-

rous and ruminant animals, they are most generally treated as if omnivorous; and their stomachs are gorged with any description of aliment, however unhealthy, which can be most easily and cheaply procured, and will produce the greatest quantity of milk. Thus, in the vicinities of the cities of New-York and Brooklyn, in America, and indeed wherever grain distilleries abound, either in this country or in Europe, *distillery-slop* is extensively used.* In London and other places where *brewers' grains* can be obtained, they are in great requisition for milk-dairies; while in grape-growing countries, the *refuse of the grape* is used for the same purpose, and with effects as pernicious as those produced by the dregs of the distillery. Besides these unhealthy aliments, in other cases decayed vegetables, and the sour and putrid offals and remnants of kitchens, are in populous places carefully gathered up as food for milch cows. As might be expected, the cattle, under this most unnatural management, become diseased, and the lactescent secretions not only partake of the same nature, but are impure, unhealthy, and innutritious. Yet this milk is the chief aliment of children in all places where the population is condensed in great numbers; it is the nourishment chosen and relied upon to develope the physical powers and impart vigor to the constitution during the most feeble and critical period of human life, when the best possible nourishment is especially necessary, in order to counteract the injurious effects of the infected air and deficient exercise, which are often inseparable from the conditions of a city life.

So few are the exceptions to these modes of producing and using milk under the circumstances named, that they

* Distillery-slop is the refuse of grain diffused through water after it has undergone a chemical change, the alcohol and farina being extracted by the processes of fermentation and distillation.

may be said to be nearly universal, both in this and in most other countries. And when it is recollected that in the United States about one third of the population live in masses, and in Europe a vastly greater proportion, some adequate idea may be formed of the extent to which the evils consequent upon the use of an essential but an unhealthy article of food, prevail. If the importance of a subject, therefore, may be determined, either by the number of persons it concerns, or by its influence upon the welfare of individuals, this should rank high in the scale of interest, and receive the attentive consideration of every friend of humanity.

There are numerous other collateral mischiefs, vitally affecting the interests as well as the morals of the people, which must be taken into the account in order to a proper estimate of this unnatural system.—But not to anticipate the subject, it may be in place first to remark, that the facts from which the conclusions are drawn, are of recent development. The public has been *beguiled* into the support of the slop-milk business. Under the most specious pretences and disguises, this system has been secretly sowing the seeds of disease, preying on health and morals, and actually destroying the lives of thousands of innocent children, while it was supposed, so far as any thought was bestowed upon it, to be ministering merely to our daily wants and necessities. Its mischiefs were not even suspected. Who, indeed, could have imagined, that under the disguise of so bland and necessary an article as milk, was lurking disease and death? Yet such was the fearful fact; and by insidious and unnoticed processes had this vile business been silently extending itself, until it became an important and necessary part of a formidable system, replete with mischief in all its ramifications and results.

It is said that the business of distillation has not of late years decreased so rapidly in large cities and other populous places, as in the country. If such is the fact, it may be ascribed, first, to the greater facilities afforded at such places for palming on the public, as is notoriously the practice, the whisky which is prepared and sold for wine, and under the disguise of every other kind of liquor in demand; and second, to the liberal patronage of the milk dairies; for without a market for the refuse, the work of distillation must greatly diminish, and in many cases entirely cease.

When whisky sold high because of the demand, the business of distillation was considered very lucrative, a vast amount of capital was employed, and great numbers of persons in all parts of the country were engaged in it. But as the light of temperance has been gaining ground, the demand for the article, and also the price, has gradually decreased, until the profits of the manufacture with many, would not compensate for the wear and tear of conscience consequent upon the business. Thus, according to the official report of the Secretary of State, there were in operation in the State of New-York alone in 1829, 1,129 distilleries. As the work of reduction has been going on with undiminished activity ever since, the number at present in operation, as appears from recent official statistics, is less than 200. And this statement will appear more striking in connection with the fact, that notwithstanding our augmented population, and the greatly increased consumption of spirit in the arts and manufactures, the importations of the article into the United States within the same period, has diminished more than two thirds.

Many distillers of grain, who were supposed to be doing a thriving business, have suddenly failed; and those who continue, in spite of the odium and immorality attached to

it, to make and sell whisky as a beverage, are driven to various expedients to sustain what under any management is rapidly becoming a sinking concern. In order that the expenses may not exceed the profits, the slop must be turned to good account; hence a milk dairy or a "piggery," are indispensable adjuncts to every distillery.

But slop alone, as food for fattening cattle, is of little value. On such unatural aliment they become diseased and emaciated. Cows plentifully supplied with it, may yield abundance of milk; but it is notorious that the article thus produced is so defective in the properties essential to good milk, that it cannot be converted into butter or cheese, of course is good for nothing—except to sell. But in country places milk cannot be turned to account in this way, for there are no buyers, and as slop, for the reasons named, is not in request for stock or dairies, if the distiller would find the most advantageous market for it, he must conduct his operations in the vicinity of populous places. This, we repeat, is one among other reasons why such localities are desired. He finds it less profitable to fatten swine upon slop, on account of the risk of killing them to his own detriment, than to have it fed to human beings through the agency of the dairyman.

It may also be remarked, that very many persons have banished intoxicating drinks from their dwellings; and with the knowledge of the fact, would no more be accessory to the manufacture than their use. But so ramified and involved are the various agencies of intemperance, that in the supply of their families with a necessary article, they have hitherto unconsciously perpetuated its evils by supporting the distilleries.

But without enlarging here on particulars of this kind, the business of producing milk from slop, as briefly de-

scribed, will be seen to be merely a branch of a very extensive concern. The entire system, is the result of a quadruple alliance, consisting first, of distillers; second, of slop dairymen; third, the venders and consumers, of intoxicating liquors; and fourth, the consumers of the milk thus produced. Such appear to be the facts. The distillers are supported by the slop milkmen; and the milkmen by their customers. Let the customers withdraw ther patronage, and the business of these milkmen will be broken up, and a check given to the business of distillation. Here then are several active and interested partners. By their united enterprise and industry, the system is kept in vigorous operation, each and all the parts being found mutually dependent and necessary to each other. But more definitely the great business of the league, as ascertained by its effects, is threefold, viz.:

First. To convert, by the process of distillation, nutritious grain, created for the purpose of sustenance, into a poison for man, and reserve a residuum of the nutritious part as food for brutes.

Second. To sell whisky dregs, when strained through the udders of diseased cows, and duly diluted, colored, and drugged, for milk.

Third. To supply the market with scrofulous and measly pork, and also with the bloated and diseased carcases of cows, as a substitute for beef.

These statements may appear exaggerations, but they are sober facts. The proof of these, is best shown by the success of this combination in securing its objects, and by the extent of its operations and actual results, which will be duly considered in their proper place. Let it suffice here in passing to remark:

First. It is ascertained that the distilleries in the city

of New-York and vicinity, destroy as much grain created for purposes of sustenance, as would nearly suffice for the supply of the entire population. To this sinful waste and perversion of the bounties of Providence, add the millions of dollars the public is annually taxed for the liquors thus produced, and in addition thereto the incalculable amount of disease and wretchedness and ruin occasioned by the polluted and polluting streams which flow from these pestilential fountains; and we still have an inadequate idea of the evils inflicted upon the population by the distilleries. What friend of humanity, with these facts before him, will, by the use of slop milk, aid and encourage so wretched a business?

Second. It has been estimated, after careful inquiry, that about ten thousand cows in the city of New-York and neighborhood, are most inhumanly condemned to subsist on the residuum or slush of this grain, after it has undergone a chemical change, and reeking hot from the distilleries. This slush, moreover, after the ceremony of straining through the organs of sickly cows, as before stated, and duly colored and diluted and medicated, is sold to the citizens at an annual expense of more than a million dollars. The amount of disease and death consequent upon the sale and use of this milk, is doubtless recorded in the books of final judgment, and will hereafter be revealed. But the fact which chiefly concerns the public is, that this milk has been, and, as will be shown it is believed by incontrovertible testimony, is now, extensively injurious and fatal to health and life.

Third. If other facts were necessary to prove the success of the combination and the iniquity of the system, we might proceed to show to what extent it supplies the market with diseased pork and beef, but especially the

latter; for thousands of slop-fed cows having in a single year become so diseased as to be of little use for the dairy, they are slaughtered and eaten by our citizens. But it is not here designed to go into detail. It is sufficient that the entire system, when first assailed, was not only rife with evil in all its tendencies and effects, but was of great extent, and had become firmly established by its connections, and the various interests which it had drawn to its support.

CHAPTER XIII.

EVILS OF UNNATURAL FEEDING DEMONSTRATED FROM THE PHYSICAL STRUCTURE OF THE COW.

Digestive organs of ruminant animals.—Teeth.—Salivary glands.—Œsophagus.—Rumen.—Reticulum.—Omasum.—Abomasum.—Process of rumination.—Liquids pass into the fourth stomach.—Digestive process.—In the different stomachs.—Gastric juice.—General deductions.

Having in the preceding chapter presented some general views, we now proceed to a more particular examination of the subject. In order to place it in its true light, let it be remarked, first, that the cow is an herbivorous and a ruminating animal; pasturage, of course, or gramineous matter, is its natural and appropriate aliment.

Reasoning *a priori* from the physical formation of the cow, as it is a ruminating animal, it were easy to demonstrate that its digestive organs are peculiarly adapted, and were designed by nature, for solid food; and consequently that distillery slop and food of that description is the most unnatural aliment which it can receive into its stomach.

The digestive organs of the ruminant class, such as the cow and sheep, are more complicated than those of any other animals. In the first place, they have cutting or incisor teeth which are admirably adapted for cropping grass or pasturage. The upper external portion of these teeth, is convex, rising straight from the gum, while inwards they have a concave surface, gradually diminishing in thickness, and terminating in a sharp edge which is covered with enamel, so as to produce and retain the sharpness necessary for separating herbaceous substances. They have also large *mo-*

lares, or grinding teeth, fitted for comminuting grassy fibres, or food which requires long and difficult mastication, in order that the nourishment may be extracted from it; and for this purpose we find the enamel, or harder portions of the teeth, distributed over and throughout their texture. Besides this, they have large *salivary glands*, for the purpose of moistening and lubricating the food preparatory to swallowing, and to aid in the second process of mastication, during which the food is reduced to a pultaceous state; while in carnivorous animals, these glands are either wanting, or of a much smaller size.

But the considerations drawn from the stomach of the cow, are still more striking and conclusive, and will be better understood by referring to the following plate. The *œsophagus* is marked (*a*), which gradually enlarges as it descends, and apparently runs into the rumen or paunch, but in fact terminates in a canal; (*b*) represents the œsophagus slit open at the commencement of the œsophagean canal, to show its communication with the first and second stomachs.

The *first stomach* (*c*) is usually called the paunch or rumen; it is placed immediately under the termination of the gullet, and is much the largest of the four. Externally, it has two sacs or appendices, and internally it presents four divisions separated from each other by deeply projecting duplicatures of the coats of the stomach. The rumen of animals fed on herbaceous food, is seldom or never empty; it is in constant motion, and by its macerating process prepares its contents for future digestion.

The *second stomach*, marked (*d*), is called the reticulum, and is a globular appendage of the paunch, only it possesses a thicker muscular coat. Its inner surface is arranged in irregular pentagonal cells, shallower and wider than those of the honey-comb, but nearly resembling them; hence this stomach is sometimes called the *honey-comb*.

Each of these divisions, especially the sides and base, is covered with minute prominences or fine papillæ, which are secreting glands.

The *third stomach* (*e*) is the smallest, and is called *omasum*, or *manyplus*. It has a globular shape, and has a thinner muscular coat than the former. The internal structure of this stomach is very singular. It consists of numerous broad laminæ, sent off from the internal coat in a longitudinal direction, alternately varying in breadth, and covered with small granular papillæ.

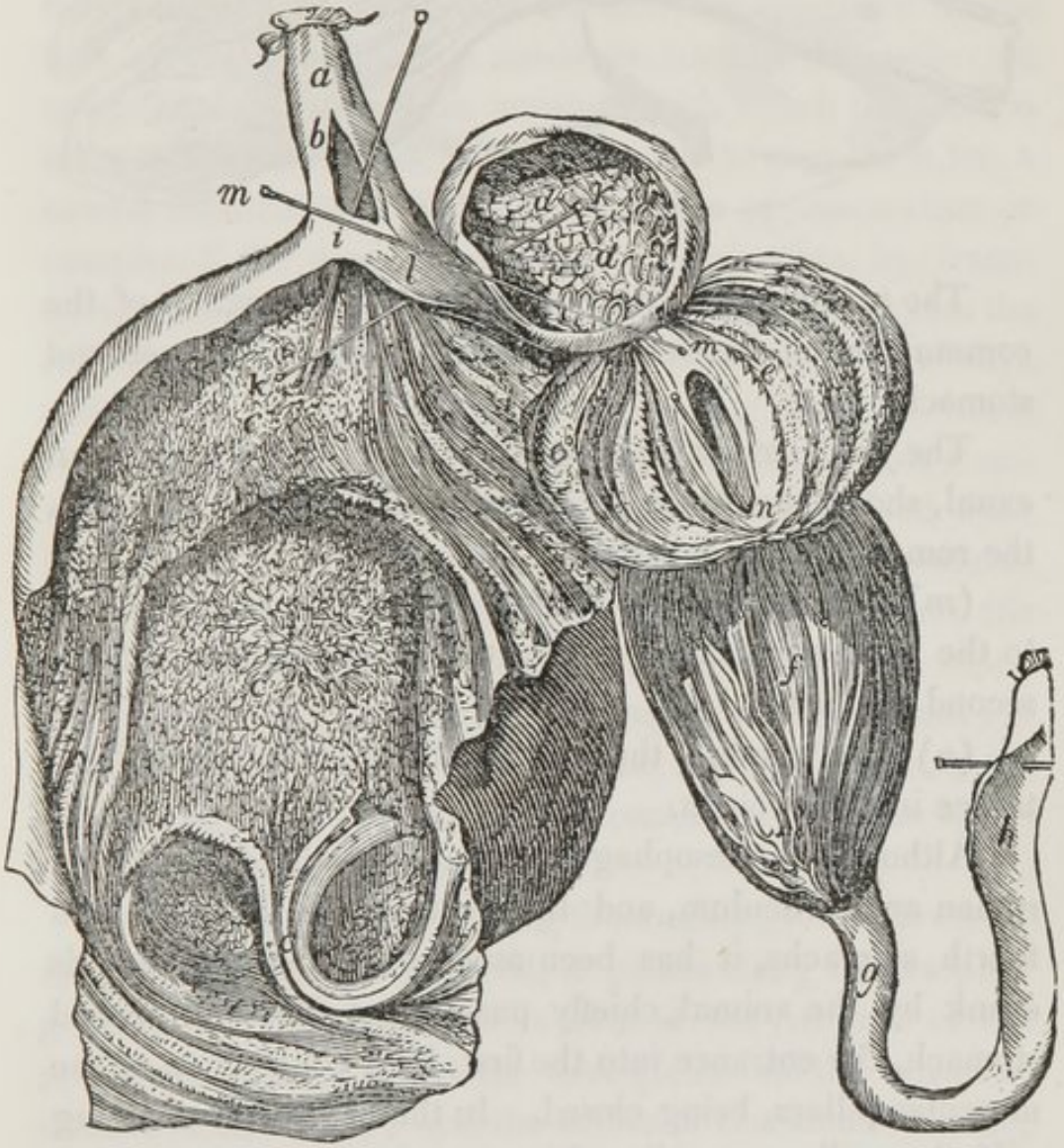
The *fourth* stomach (*f*) is the *abomasum*. It is of pyriform shape, and is next in size to the rumen. It has large longitudinal folds covered with villi, like the digestive portion of the stomach of the horse. The muscular coat of this stomach is still thinner than that of the former. The inner surface of the three first stomachs, is covered with a cuticle, whilst that of the fourth is lined by a true mucous or secreting membrane.

(*g*) Denotes the *duodenum* or first intestine.

(*h*) Marks the place where the *biliary* and *pancreatic ducts* enter the duodenum.

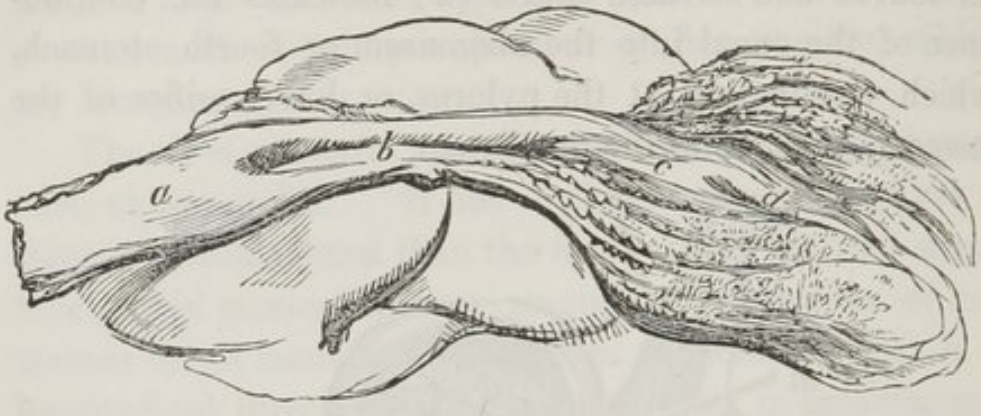
It may be well in this place to remark, that by an examination of the first plate, but more particularly of the second, a singular provision will be noticed by which the food can be received into the first and second stomachs, or be carried on to the third or fourth, as is the case, after herbaceous substances and aliments of that description are thoroughly ground down by the process of rumination. (*a*) Is a continuation of the œsophagus through the stomachs. (*b*) Marks the progress of the œsophagean canal, which is slit from the base of the gullet to the third stomach, in order to show the continuous roof of the canal. (*c*) Is the prolongation of the same canal, into and through the third stomach or manyplus, which may be known by

its leaves and serrated edges. (*d*) Indicates the continuance of the canal into the abomasum or fourth stomach, which terminating at the pylorus, or lower orifice of the stomach, opens into the duodenum.



(*a*) The œsophagus. (*b*) The commencement of the œsophagean canal. (*cc*) The rumen. (*dd*) The reticulum. (*e*) The omasum. (*f*) The abomasum. (*g*) The duodenum.

The curious arrangement last referred to, is farther illustrated in the first plate. The arrow (*i*) points out that section of the œsophagean canal, through which the gullet communicates with the rumen.



The arrow (*k*) indicates the place and direction of the communication between the same gullet and the second stomach.

The third arrow (*l*), passing under the œsophagean canal, shows the place of direct communication between the rumen and the reticulum.

(*m*) The supposed direction of the œsophagean canal to the third stomach, over the roof of the rumen and the second stomach.

(*n*) The passage through the third stomach, and entrance into the fourth.

Although the œsophagean canal leads directly into the rumen and reticulum, and thence through the third and fourth stomachs, it has been ascertained that the liquids drank by the animal, chiefly pass direct into the second stomach, the entrance into the first, by a contraction of the muscular pillars, being closed. In the case of the sucking calf, the milk passes directly on to the fourth, or true digesting stomach; and the other stomachs, but particularly the rumen, appear in a measure to be useless. Hence the small size of the rumen compared with the abomasum in the calf that is fed entirely upon milk.

Now let us see what happens during the digestive process. The food, after having undergone slight mastica-

tions in the mouth, is swallowed and received into the capacious reservoir called the rumen, and marked (*c*), which is situated directly under the base of the gullet, as represented in the plate. Here it remains for some time, and by the muscular action of the stomach, and the impulsive direction of the papillæ, it is made to traverse its follicular compartments, whilst the moisture with which the food is surrounded contributes to soften it, and to prepare it for a second mastication. When the process of maceration is completed, the food is returned for rumination, by transferring small portions of it at a time from the rumen into the reticulum or second stomach (*d*), in which there is always sufficient water and mucus for moistening the food that is introduced into it. By the contractile action of this stomach, the portion of macerated food just received from the rumen, is rolled up into a ball or pellet of suitable form to be thrown up the œsophagean canal into the mouth, where it is subjected to a second mastication, which is leisurely performed during the repose of the animal; a process which is well known by the name of *chewing the cud*, or rumination, and which is continued until the appetite of the animal is appeased.

When the mass, after being thoroughly ground down by the teeth, is again swallowed, it passes along the œsophagean canal, which changes its form at the entrance of the reticulum, through which the food glides into the omasum, or third stomach (*e*); and the orifice of this stomach being brought forward by means of the muscular bands, which form the ridges of the walls of the canal, when they contract every portion of food is effectually prevented from dropping into either of the preceding cavities. Sir Everard Home describes this third stomach as being of the form of a crescent, and containing twenty-four *septa* or folds in its inner membrane. These folds are placed paral-

lel to each other like the leaves of a book, excepting they are of unequal breadths, and that a narrower fold is placed between each of the broader ones. Whatever food is introduced into this cavity, must pass between these folds and describe three-fourths of a circle before it can arrive at the orifice leading to the abomasum, or fourth stomach (*f*), which is so near the third, that the distance between them does not exceed three inches. And as a farther demonstration of the design and adaptation of this organ for the perfect comminution of herbaceous substances, as Youatt remarks, the articular covering of these leaves is peculiarly dense and strong, and thickly studded with little prominences; so that when the leaf is examined, it exhibits a file-like hardness, that would be scarcely thought possible; and it is evidently capable of acting like a file, or a little grindstone. These prominences are harder and larger towards the lower part of the leaf; and in the central leaves assume the form and office of little crotchets, or hooks, some of which have the hardness of horn, so that nothing fibrous or solid can escape them, until it is reduced to a pulpy mass. Clearer evidences of design for the performance of specific functions, than is exhibited in the construction of the omasum, cannot be imagined.

It is, then, in the abomasum, or fourth stomach (*f*), that the proper digestion of the food is performed; and for this purpose it is lined with a soft villous membrane, and is traversed somewhat irregularly, yet longitudinally, with numerous folds. But the principal agent in digestion is the liquid called the *gastric juice*, which is secreted from the cellular glands with which this organ abounds. The solvent powers of this liquid having broken down the pulpy mass into a semi-homogeneous fluid called chyme, it passes through the lower opening of the pyloric into the duodenum (*g*) or first intestine, where its separation into the nutritive

and innutritive portions is effected, and the former begins to be taken up, and is carried into the system.*

Such, then, as we have concisely described, and endeavored to illustrate, is the admirable provision of nature for the perfect comminution and digestion of the food of an animal whose flesh and milk are destined to supply so important a part of human sustenance. Can it be that the complicated apparatus of the cow was designed for the digestion of distillery-slop, or food of that description? From the teeth alone we are enabled to decide on the proper kind of aliment. Let then the common sense of the most illiterate man answer, whether slush or liquid diet would require such an array of cutting and grinding teeth, of salivary glands and stomachs for its digestion? Reason answers no; facts, observation, and experience, demonstrate that the proper functions of the animal cannot be subserved, or its health maintained, by such an artificial and unnatural kind of food. It is evidently impossible to pervert the order and manifest designs of nature to such an extent with impunity.

* The different length of the intestines in carnivorous and herbivorous animals is worthy of notice. The shortest, we believe, is that of some birds of prey, in which the intestinal canal is little more than a straight passage from the mouth to the vent. The longest is in the deer kind. The intestine of a Canadian stag, four feet high, measured ninety-six feet. (*Mem. Acad. Paris*, 1701, p. 170.) The intestine of a sheep unravelled, measures thirty times the length of the body. The intestine of the wild-cat, is only three times the length of the body. Universally, when the substance upon which the animal feeds, is of slow concoction, or yields its chyle with more difficulty, then the passage is circuitous and dilatory, that time and space may be allowed for the change and the absorption which are necessary. When the food is soon dissolved, or already half assimilated, an unnecessary, or, perhaps, hurtful detention is avoided, by giving to it a shorter and a readier route.—*Paley*.

CHAPTER XIV.

APPROPRIATE FOOD, PURE AIR, AND EXERCISE, NECESSARY TO THE HEALTHY CONDITION OF DAIRY CATTLE.

Temperature of food.—Liquid aliment improper.—Forming milk out of solid food.—Herbaceous matter adapted to the wants of the animal.—Healthy chyle.—Pure air necessary to health.—Injurious effects of foul air.—Exercise important to health.—Illustrated by experiments.—Exercise an instinct.

THAT the *natural temperature* of food for ruminant animals is the most appropriate, appears too plain a proposition to be disputed; but in the general management of cows in the vicinity of populous places, this important fact is entirely disregarded.

Man, it is true, is omnivorous. His stomach is nearly equally well adapted to the digestion of animal or vegetable food, of solids or fluids. He is also a cooking animal, and can receive his food at varying temperatures. But it is different with ruminant animals. They are essentially herbivorous, and should receive this kind of aliment, at a natural temperature, before it has undergone certain chemical changes, and not, as is the case in the form of slop, reeking hot from the distillery. Their immense complex concocting organs must have something else to employ them besides receiving some thirty or forty gallons of slush per day, which contains but a small quantity of vegetable matter in the form of *bran* disseminated through it. To fulfil the obvious design of nature, they must have food which requires mastication. Without the power of rumi-

nation, or in familiar phrase, without a *cud*, they will languish and die. Hence a little grass or hay cannot be dispensed with. But a little is not enough. They must have solid food in sufficient quantity to fill their stomachs. The cow that is fed on distillery-slop, so far as we know, uses but one of its four stomachs; all the rest are idle; of course, there must follow great functional derangement. And when this kind of diet is received into the system, it i rapidly sucked up by the thousand absorbent vessels, and thrown into the blood; and before it becomes animalized, probably in the course of ten minutes, it begins to be strained through the organs of the udder, in the form of a blue, watery, insipid secretion, called milk.

How very different is the process of forming milk out of solid food! By the complicated apparatus already described, the food undergoes various modifications and changes. First, it is partially chewed and mixed with the saliva; it then descends into the rumen, where it gradually traverses its various compartments, and is probably reretained several hours, until it is thoroughly macerated; next it is passed into the reticulum in small portions, and there being softened and covered with mucus, by a kind of anti-peristaltic action it is t' rown into the mouth. Here, "by a compound motion of the lower jaw, half lateral and half vertical," leisurely repeated from thirty to forty times, on each cud or pellet, the second process of mastication is completed;* and being reduced to a proper consistence, it is again swallowed, and glides directly into the omasum

* Dr. Paley remarks, that the gratification also of the animal is very probably renewed and prolonged by this faculty of rumination. Sheep, deer, and oxen, appear to be in a state of enjoyment whilst they are chewing the cud. It is then, perhaps, that they best relish their food.

where it sustains some changes not well understood. It next passes into the abomasum, or last stomach, where it is mixed with certain fluids equivalent to the gastric juice in the human stomach, and thus is converted into a soft pulpy mass called *chyme*, from which the small vessels of a portion of the digestive tube, still lower down, called *lacteals*, by a peculiar power which may be denominated vital chemistry, manufacture that bland fluid, chyle, which contains in itself all the ultimate elements of animal bodies. This, then, is an *elaborated animalized* product, containing an abundance of oxygen and carbon, with some nitrogen, and fitted for conversion into albumen, gelatin, fibrin, or any of the proximate elements of animal bodies. The blood formed from it is consequently rich in all the elements which are required to supply the wastes, and build up the various tissues of the system. Of course, the milk secreted from it is highly animalized, and essentially a vital product; and its separation from the blood is not a mere mechanical straining off, from vessels distended with an unnatural quantity of watery fluid, as when the animal is gorged with distillery-slop.

In cows thus fed, it is highly probable there is very little if any chyle formed; in fact, there is very little if any appropriate matter to make it out of. It is known that the food of animals must necessarily consist of one of the three great *staminal principles*, a *saccharine*, an *oily*, or an *albuminous* principle. Thus gramineous and herbaceous matters, on which ruminants feed, contain two of these, viz. the *saccharine* and the *glutinous*, which is a modification of the albuminous, while every part of an animal contains albumen and oil. But how much saccharine matter can it be supposed is left in the slop of the distillery or in brewers' grains, after, by the process of fer-

mentation, all the alcohol that can be obtained is extracted from it? Spirit or alcohol is the direct product of the saccharine portion of the grains; and as it is rapidly developed by fermentation, it is hardly probable that any remains behind undecomposed. As gluten is insoluble in water, and does not so readily ferment as the saccharine principle, it is probable that brewers' grains contain a considerable quantity of it. Indeed, it may be said to contain the only nutritious principle that can be obtained from them. It is fully established by the experiments of Majendie and other physiologists, that a diet, to be complete, must contain more or less of these three staminal principles. Such at least must be the diet of man. Although animals may form a chyle, and even live a while on one of these classes of aliments, yet it is impossible that they can do so for a great length of time. No proper chyle can be obtained from the digestion of such food; consequently no healthy blood can be formed, and none of the secretions be healthy. This, then, is another important reason why the health of cows cannot be maintained on distillery-slop and similar kinds of food.

Healthy chyle is so similar in its properties to blood, that it has been called *liquid blood;* and Vauquelin, a celebrated chemist, even regards it as *fibrin* in an imperfect state. But when the food, as is the case with distillery slop, is of such a nature that proper chyle cannot be formed from it, we would naturally expect, when used and taken up by the absorbents, that the entire system would be filled with the watery and innutritious fluid, and such, as will subsequently appear, is the actual condition of animals so fed. Such food contains no *carbon*, which constitutes the greater proportion of fibrin, or muscular fibre; of course no fibre or flesh could be formed, for the very good reason that there

is nothing present to furnish the materials essential to its formation. In view of these facts, though uninstructed by experience, as to the actual results, we might confidently anticipate the deleterious effects which are known to take place, and must ever be consequent upon the use of unwholesome and insufficient food.

But there are other conditions which are essential to the health of these animals, which may be concisely noticed.

First, *Pure air* is indispensably necessary. Any other conclusion than this, would be as contrary to the known laws of life and health, as to the common sense of mankind. But while it will be admitted without argument, as it relates to the physical wants of man, the unfortunate animals under consideration are treated as if they were an exception to the general laws of organic life. Yet what is true of man, regarded merely as an animal, is also true of the higher species of irrational creatures. There exists in each, allowing for the difference of their destinations, the same necessity for pure air, suitable exercise, and nutrient food, "simply modified according to the wants of the individual species."

Some of the lower classes of animated existence, are fitted by nature to live in stagnant pools, and even in putrefacted substances; but as we ascend in the scale of being to the higher orders of animals, it is well known that they can only be sustained in health and vigor by the inspiration of pure air. A certain definite proportion of three aeriform substances is found absolutely necessary to vitality; and as the balance of these proportions is disturbed by the introduction of noxious substances, the atmosphere becomes impure and deadly. The effects of living in foul air, are manifested by the debility which en-

sues—impaired digestion—depression of the vital functions, and oftentimes the generation of diseases of the most malignant and fatal character. Now as air is rendered impure by every thing which impedes its circulation, but especially by the breath and perspiration of animals crowded together in small and close apartments—the presence of excrements, and stench, and putrifying animal and vegetable matter, which, even with the strictest regard to cleanliness, unavoidably accumulates by immuring them in confined stables, such a condition, in the absence of all other prejudicial causes, cannot fail to prove destructive to health and life.

Second, *Exercise.* It is as evidently the design of nature that cattle should enjoy that bodily activity which is produced by the natural action of their own limbs, in moving from place to place for the means of subsistence, as it is that vegetables be left undisturbed in the soil from which they imbibe their nourishment. "The kind of food," says Dr. Roget, "which nature has assigned to each particular race of animals, as well as their structure, has an important influence, not merely on its internal organization, but also on its active powers and disposition; for the faculties of animals, as well as their structure, have a close relation to the circumstances connected with their subsistence." In relation to this subject the same writer farther remarks: "The activity of the digestive functions, and the structure of the organs, will also be regulated by a great variety of other circumstances in the condition of the animal, independent of the mechanical or chemical nature of the food. The greater the energy with which the peculiarly animal functions of sensation and *muscular action are exercised*, the greater must be the demand for nourishment, in order to supply the expenditure of vital force cre-

ated by these exertions."* Cattle were necessarily endured with powers of locomotion in order to seek their own subsistence; and it is self evident that they cannot be condemned to a torpid vegetable condition with impunity.

Jenner, and very recently Dr. Baron, have made some curious experiments on animals, which indicate that a loss of their open range and natural nourishment, has with them a tendency to disorganize and destroy. Dr. Baron placed a family of young rabbits in a confined situation, and fed them with coarse green food, such as cabbage and grass. They were perfectly healthy when put up; in about a month one of them died: the primary stop of disorganization was evinced in a number of transparent vesicles studded over the external surface of the liver.

In another, which died nine days after, the disease had advanced to the formation of tubercles on the liver. The liver of a third, which died four days later still, had nearly lost its true structure, so universally was it pervaded with tubercles. Two days subsequently a fourth died; a considerable number of hydatids were attached to the lower surface of the liver. At this time Dr. Baron removed three young rabbits from the place where their companions had died to another situation, dry and clean, and to their proper and accustomed food. The lives of these remaining three were obviously saved by this change. He obtained similar results from experiments of the same nature performed on other animals.

Nature, ever unerring in her instincts, prompts the bounding frolics of young animals, as well as the more clumsy gambols of the old. "There must," remarks Addison, "be frequent motions, agitations, to mix, digest, and

* Roget's Bridgewater Treatise, Vol. II. p. 65.

separate the juices contained in the body, as well to clear and cleanse that infinitude of pipes and strainers of which it is composed, as to give their solid part a more firm and lasting tone.—Exercise ferments the humors, casts them into their proper channels, throws off redundances, and helps nature in those secret distributions, without which the body cannot subsist in vigor." And in order to this healthy action of the vital functions, it is not sufficient that exercise be taken occasionally and at long intervals, but, when the season permits, it should be taken daily. Common sense and observation, independent of physiological knowledge, might lead us to the conclusion, that any other management of cattle than that here suggested, must lead to the derangement of health, and fatal diseases.

CHAPTER XV.

ACTUAL CONDITION OF THE DAIRIES.

Food of dairy cows.—Their number.—Management.—Effects.—Condition and temperature of the food.—Distillery-slop dairies.—Average quantity of slop consumed.

HAVING in the foregoing chapter considered some of the conditions which are essential to the health of milch cows, and to the secretion of nutritious and wholesome milk, it is important next to inquire how these conditions are fulfilled in regard to the dairies which furnish our cities with this indispensable article; for all departures from these conditions must, in proportion to their degree, have an injurious effect on the animals themselves, and also on the quality of their milk.

First, *Food.* When public attention was first called to this subject, as near as the writer was able to ascertain, there were in the vicinity of the cities of New-York and Brooklyn *five hundred* dairies, averaging about twenty cows each; and the whole number, excepting some five or six that were supplied with *brewers' grains*, were fed on distillery-slop.

One of the most notorious of these overgrown metropolitan milk-establishments, or rather the largest collection of slop-dairies, for there are many proprietors, is that connected with Johnson's grain-distilleries, which are situated in the western suburbs of the city, near the termination, and between Fifteenth and Sixteenth streets, in New-York. The area occupied by the concern, includes the greater

part of two squares, extending from below the Ninth Avenue to the Hudson River, probably a distance of one thousand feet. During the winter season, about two thousand cows are said to be kept on the premises, but in summer the number is considerably reduced. The food of the cows, of course, is *slop*, which being drawn off into large tanks, elevated some ten or fifteen feet, is thence conducted in close square wooden gutters, and distributed to the different cow-pens, where it is received into triangular troughs, rudely constructed by the junction of two boards. The range of the pens being interrupted by the intersection of the Tenth Avenue, the slop is conveyed by means of a gutter underground to the opposite side of the road, where it is received into a capacious reservoir, and thence conducted to the pens, which extend to the margin of the river. In the vicinity of Brooklyn there is a similar establishment, which contains about *seven hundred* cows; and in the neighborhood of that city and of New-York there are numerous smaller concerns, where the cattle are fed in like manner, by receiving the slop smoking hot directly from the distilleries. In the far greater number of cases, however, the dairies are too far from the distilleries to be supplied in this way. The slop is therefore carted in vast quantities from the distilleries in hogsheads, to the smaller milk establishments, which are numerously scattered in the suburbs and neighborhoods of the cities to the distance of several miles.*

* Since the above was written, the author, accompanied by L. Jackson, Esq , re-visited some of the whisky and slop-milk manufactories in New-York, Brooklyn, Williamsburg, Bushwick, the Wallabout, and vicinities, for the purpose of information. He learned that at some of the establishments in these places, an unusual mortality had recently occurred amongst the milch cows. The fact itself was indisputable, but owing to the unwillingness, not to say

The daily average quantity of slop for a cow, is about a barrel of *thirty-two gallons*. At first we were incredulous as to the amount they learn to consume; but after many

incivility, of the persons who supposed it was their interest to conceal the truth, nothing very definite in relation to the nature and extent of the disease was obtained. Some of the distilleries, we observed, had been enlarged, and others were undergoing repairs, which occasioning a temporary failure of slop, the dairymen were carting it across the East River from New-York, for the supply of their cattle. The slop concerns and distilleries, though somewhat improved in *appearance* since public attention had been directed to them, were still spoken of by the inhabitants in the neighborhoods as nuisances of so offensive a character as to prevent the improvement of property in their vicinity; whilst their present vile condition, too truly indicated the nature of the evils they were continuing to inflict on more distant portions of the community. The most careful inquiries, however, failed to elicit any new information of interest; but we everywhere received the fullest confirmation of the facts and principles which are spread throughout this work.

In the course of the tour, we visited the large rum-distillery of Messrs. Scneder, Schenck and Rutherford, near the South Ferry, Brooklyn. We were not disappointed in failing of admittance into the concern, for it is common to all these establishments which are battening on the spoils of an injured community, to conceal as far as possible their operations from the public eye. It was, however, of little consequence, for there were other means of information at hand, and much that was open to observation. We were informed that from *seven hundred* to *one thousand* bushels of grain are daily converted into whisky at this distillery, the refuse of which would suffice to slop *two thousand cows*; and that about *fifty head* of *cattle*, and from *five* to *seven hundred swine*, were fattening on the premises. No milch cows are there kept; but we counted *eighty-seven carts* and *wagons*, containing an aggregate of *one hundred and twenty-nine hogsheads*, apparently waiting for slush, exclusive of numerous others which were going and returning from the premises. The hour of our visit (3 o'clock P. M.) was inopportune to witness the daily delivery of the slop. The greatest activity in the business is from 4 to 8 o'clock morning and evening, during which time an incessant stream of carts is seen issuing from the distillery, laden with slop for the supply of the neighboring dairies.

careful inquiries at many dairies, the fact is rendered certain. Now it is evident that no cow in *health* would eat such an enormous quantity of slop. By feeding on this unnatural and stimulating food, they are thrown into a state of disease, and for a short time will feed monstrously, and yield large quantities of bad milk.

The dairyman, judging indeed correctly, from the condition and mechanical texture of this fluid kind of food, that its second mastication is as unnecessary as it is in fact impracticable, and apprehending that his cattle will speedily die by an entire cessation of rumination, known by the familiar term the *loss of cud*, is urged by his fears to give them some hay or other herbaceous food. A cow will eat eighteen or twenty pounds of hay per day. The estimated allowance for those that are fed on slop, is *three* pounds per head; but we are assured that very few get even half that quantity, and probably, as will subsequently appear, for the best reason in the world,—the diseased condition of their teeth renders the mastication of solid food impossible. The greater proportion of these milkmen, it is said, feed no gramineous food at all; certain it is, that those who feed slop, give no more hay than they deem necessary to keep their cattle alive. Numerous men, of good character for veracity, who have relinquished the slop-milk business for conscience sake, testify that such is the practice. But in the absence of names, which cannot with propriety be here introduced, there is presumptive proof that such is the fact. Why is slop fed at all? We answer, because it yields more milk at a cheaper rate, than any other kind of food. The dairyman will at once concede that his object is gain, and that the more slop, the greater his profits. So long, therefore, as he can sell slop-milk, it is his interest to gorge his cattle with the food which pro-

duces it in the greatest abundance. And leaving the inhumanity of thus prematurely destroying the health and lives of his cattle out of the question, he does not by this course of feeding pecuniarily suffer. For when they become so diseased as to be no longer profitable for the dairy, they are sent to the cattle market, and their place is supplied by fresh stock. So far, therefore, as the *kind* of *food* is concerned, such, concisely, is the condition of the New-York milk dairies. With very few exceptions, all the cows are most inhumanly condemned to subsist on this most unnatural aliment; and the milk thus produced, is not only inconsiderately regarded as of indispensable necessity in our households, but is the pernicious sustenance on which we depend as the staple diet for children.

Second. *The condition and temperature of the food.* We have anticipated in another place, some things which belong to this head, but a few more facts may be appropriately stated under it. The *kind* of food, we have seen, is the most unnatural; it is now proposed to show that it is eaten in an improper and unnatural state. At the distilleries, the slop is drawn off *hot* into tanks, at short intervals through the day, and in this state is distributed and eaten by the cows on the premises, and also by those in the adjacent parts, as before it cools it may be transported to a considerable distance. It is considered more drastic at a high temperature, and is preferred in that state, because it then forces itself more rapidly through the system into the milk pail, although when hot it most seriously injures the teeth and general health of the animals fed upon it. As this kind of food, however, is instrinsically deleterious in any condition, whether hot or cold, it is not important to determine which is worst.—When drawn from the still, moreover, the slop is so powerfully acid as rapidly to cor-

rode iron ; and yet it is often suffered to run into a second state of fermentation before it is eaten. But without enlarging on particulars, we think it must appear as obvious to every intelligent mind, as it is demonstrable by facts and physiological principles, that this unnatural food in the condition in which it is consumed, cannot fail to destroy the health of the animals that subsist upon it, and so deteriorate the quality of their milk, as to render it unfit for human sustenance.

CHAPTER XVI.

CONDITION OF THE DAIRIES, CONTINUED.

Personal testimony on the subject.—Description of a dairy.—Arrangement of the cattle pens.—Interior of the stables.—Confinement of the milch-cows.—Consequences of this treatment.

In the preceding remarks, the writer has avoided theoretical deductions, because they are less conclusive than those derived from ascertained facts. And while it would have been comparatively easy in prosecuting his inquiries to have received second-hand testimony, he has preferred to be guided by his own researches when he could rely upon them, rather than upon the vague observations of others, which, having been made without a specific object, are often too uncertain to lead to determinate results. It is obvious, that, in pursuing this course, nothing but the fullest confidence in his own statements, could have induced him to make them public. For if he has misapprehended facts, or wilfully perverted them, or arrived at conclusions which the premises do not justify, in either case it is in the power of every one in this community to obtain correct information on the subject, expose the fallacy of his reasonings, and correct his mistakes. But though such is his position in relation to the inquiry, he fearlessly challenges for it the most rigid investigation. This, he believes, will remove all uncertainty, and lay every inquirer under the necessity of acquiescing in the statements so confidently made.

Is any one, for illustration, still skeptical as to the pernicious quality of the milk with which he is supplied, or as to the patronage he is indirectly giving the distiller, though he uses not a drop of alcohol in any form as a beverage, let him accompany his milkman to his dairy, and, nineteen chances out of twenty, his doubts will be removed by a full demonstration of the facts insisted upon. If the wind is in the right quarter, he will smell the dairy a mile off; and on reaching it, his visual and nasal organs will, without any affectation of squeamishness, be so offended at the filth and effluvia which abounds, that still-slop milk will probably become the object of his unutterable loathing the remainder of his life. His attention will probably be first drawn to a huge distillery, sending out its tartarian fumes, and, blackened with age and smoke, casting a sombre air all around. Contiguous thereto, he will see numerous low, flat pens, in which many hundreds of cows, owned by different persons, are closely huddled together, amid confined air, and the stench of their own excrements. He will also see the various appendages and troughs to conduct and receive the hot slush from the still with which to gorge the stomachs of these unfortunate animals, and all within an area of a few hundred yards. He will discern, moreover, numerous slush-carts in waiting and in motion, for the supply of distant dairies; empty milk-wagons returning, and others with replenished cans, as constantly departing. Moored off in the distance, he will, perhaps, discover a schooner discharging her freight of golden grain into huge carts, each drawn by four oxen, employed to convey it to the distillery mill, which, grinding at the rate of one hundred bushels per hour, rapidly converts the nutritious substance into slop and whisky, to "scatter fire-brands, arrows and death," through the community.

This sketch, though drawn from actual observation, very inadequately represents one of the still-slop milk and whisky manufactories, in the vicinity of New-York. Description, to be effective, must be more minute. Many persons, it is true, may, by a few minutes' ride from the city, witness the original for themselves; and any doubts as to the evils of the system, and the support they give it while they continue to use the products of the concern, will be no longer possible. But as there are many other persons, equally interested, who cannot as eye-witnesses inform themselves on the subject, it may be useful to state some additional particulars relative to the large concern before mentioned, as a specimen of other similar establishments.

The situation of Johnson's distilleries, and the manner of feeding the cattle with hot slop by means of gutters, etc., has already been given. The dairies have been formed around the distilleries, for the purpose of consuming on the spot the slop refuse of this extensive concern, which, as we were informed, distils about *one thousand* bushels of grain daily. The cow-pens are rude, unsightly wooden buildings, varying from fifty to two hundred feet in length, and about thirty feet in breadth. They are very irregularly arranged, so as to cover the entire ground, excepting narrow avenues between; and appear to have been temporarily constructed, as the arrival of new dairies required enlargements for their accommodation. It is said they will contain about two thousand head of cattle, but this estimate, we would judge, is an exaggeration. The stalls are rented by the proprietor of the distilleries to the different cow owners, at from four to five dollars a year per each head of cattle, while the slop is furnished at nine cents a barrel.* Slop constituting both food and drink, water

* The price of slop is not uniform, but is varied by the value of grain. It has been as low as 6¼ cents per barrel.

and hay or other solid or gramineous fodder, supply no part of the wants of these abused animals. The fluid element, indeed, appears not to be in request for purifying purposes. Fountains of pure water, extensive hay-ricks, capacious out-houses, and similar conveniences, which are ordinarily deemed so important for the feeding and watering so large a stock, are here dispensed with as unnecessary appendages to a city dairy.

The interior of the pens corresponds with the general bad arrangement and repulsive appearance of the exterior. Most of the cattle stand in rows of from seven to ten across the building, head to head and tail to tail alternately. There is a passage in the rear for cleaning, and another in front which gives access to the heads of the cattle. The floor is gently inclined, but no litter is allowed. The stalls are three feet wide, with a partition between each, and a ceiling about seven feet high overhead. But the chief and most inexcusable defects are the want of ventilation and cleanliness, though in the latter respect, since public attention has been called to their vile condition, they are somewhat improved. There appears, however, no contrivance for washing the pens, or by which a circulation of air can be produced. We have before adverted to the tainted air and intolerable stench in the vicinity of these regions of filth. To scent the effluvia as it is diluted and diffused in the surrounding atmosphere, it is true, is sufficiently offensive, and the visitor will instinctively retire in dread of closer proximity. But to survey the premises round about, and merely to look into the pens, will but inadequately convey an idea of the disgusting reality. Neither is it sufficient to enter into them while empty with the impression that the worst can be imagined. This is a delusion. If we would have the evidence of our senses,

without the possibility of a mistake, we must try them. Let the visitor go into the midst of the pens, when crowded with cattle, in summer, as the writer has done, and inhale but one breath of the polluted air, and an inexpressible impression of heart-sickening disgust will be produced, which time will never efface. Exaggerated description here is out of the question; there can scarcely be an exaggeration of the facts; and let no one make this charge until he has himself made the experiment, under the like circumstances. The astonishment is, that animal life, with all its wonderful recuperative energies, and power of accommodation to circumstances, can exist in so fetid an atmosphere. Nor will the overpowering disgust produced be in any degree relieved by the spectacle of sick, dying, and dead cattle, as was the case during a recent visit of the writer, and which, under this wretched management, cannot fail to be of frequent occurrence.

Such, then, as described, is the barbarous and unnatural treatment of this docile, inoffensive and unfortunate animal, that is destined to supply us with nutriment, both when living and dead, and which is one of the most valuable gifts of Providence to ungrateful men. Here, in a stagnant and empoisoned atmosphere that is saturated with the hot steam of whisky slop, and loaded with carbonic acid gas, and other impurities arising from the breath, the perspiration, and excrements of hundreds of sickly cattle, they are condemned to live, or rather to die on rum-slush. For the space of *nine months*, they are usually tied to the same spot, from which, if they live so long, they are not permitted to stir, excepting, indeed, they become so diseased as to be utterly useless for the dairy. They are, in a word, *never unloosed while they are retained as milkers.* In some few cases the cattle have stood in the same stalls for fifteen

or eighteen months; but so rapid is the progress of disease under this barbarous treatment, that such instances are exceptions to the general rule, and of very rare occurrence. Facts show that all the conditions necessary to the maintenance of health and life, are recklessly violated to an extent which, if not well authenticated, might appear incredible in a Christian community. Of course, by a law of physical nature, the digestion of the animals becomes impaired, the secretions vitiated, loathsome and fatal diseases are engendered, and if not seasonably slaughtered, and eaten by our citizens, the abused creatures die, and their flayed carcases are thrown into the river.

CHAPTER XVII.

THE CAUSE INFERRED FROM THE EFFECTS.

Injurious consequences of slop on the health of cattle.—Its stimulating effects on the stomach and intestines.—Foul air.—Deprivation of exercise.—Diseased cattle slaughtered for the markets.

HAVING in the preceding chapters considered some of the conditions which are essential to the health of herbivorous animals, and to the healthy character of their lactescent secretions, and having shown that these conditions are flagrantly outraged in the management of city dairies, we now proceed, *a posteriori*, to infer the cause from the effects. In other words, as the object is to exhibit facts, rather than to defend a position, it is proposed to prove by the results, that the unnatural treatment described, actually destroys the health of the cow, and deteriorates the healthy and nutrient properties of the milk.

First, *the effects on the health of cattle.* It may be premised that, "nature has endowed brutes with an acuteness of the various senses, and with a degree of instinct, which so far as their life and enjoyment and usefulness are concerned, fully compensate for the lack of human intelligence. The quadruped is scarcely born ere it is mysteriously guided, and without any lessons of experience, to the kind of food which affords the most suitable nourishment, and it is warned from that which would be deleterious."* Guided by this mysterious instinct, the cow at

* Youatt on Cattle, p, 445.

first will no more drink distillery slop, than the child whose appetite is undepraved will drink ardent spirit. It is said that some cows cannot be induced to eat this kind of food. But as the hotter the slop, the greater the aversion, in order to overcome this repugnance, it is at first given cold; and by depriving the cattle of water, keeping them on short allowance of food, giving them only such as is dry with abundance of salt to excite thirst, they, in time, generally learn to love the nauseous slush, as men acquire a relish for intoxicating drinks. Eventually, indeed, they become voraciously fond of this kind of food; and if they fail of their usual supply, they will paw and rave and indicate all the uneasiness of the drunkard who is deprived of his accustomed drams.

This aliment, from its stimulating power upon the stomach and intestines, produces an artificial thirst, which induces the cattle to swallow three times the quantity that is necessary of suitable food, for their proper nourishment. It, of course, unduly excites the absorbent and secretory organs; the blood becomes serous and innutritious; the fluids bearing an undue proportion to the solids, are voided in preternatural quantities;—hence the quantity of slush milk they yield. The flesh becomes flaccid, with a peculiar tendency to putrescence; the teeth decay and drop out; scabs and cutaneous eruptions sometimes appear; and not unfrequently the hair falls off, which gives the hide the appearance of having been scalded.

But the want of *pure air*, and *exercise*, not less than improper food, operates deleteriously on the health of the animals. They sometimes lose their feet at the navicular bones, or articulation of the first joint; their hoofs often become elongated several inches and curved upwards, and withal so tender as to produce lameness, and nearly deprive

them of the power of locomotion. The muscles being deprived of the action necessary to send into them the supply of blood which is essential to their increase of size and strength, become at length attenuated and relaxed, and incapable of performing their functions. Glandular swellings in consequence of the torpor of the arterial circulation, are not infrequent; and cases have occurred where, owing to lameness from debility or disease, and sometimes by a paralysis of the limbs, the cattle, unable to stand, have been supported by straps passed under the body, and yet have been retained as milkers. It is not meant, however, that the general description given, is the precise condition of every cow that is kept on slop diet, or that any individual animal is afflicted with the complication of maladies referred to; for the treatment of the cattle may vary in important respects, and the constitutional vigor of some, favored by circumstances, may longer resist the combined effects of bad food, foul air, and deficient exercise, than others. But the conclusion of which we are certain, and upon which we insist, is this, that distillery slop, in proportion to the quantity consumed and the management usually consequent thereupon, produces the effects above described, and of course, is unhealthy and improper; and it is self-evident, that the lactic secretions, and also the flesh of such animals, are only fit to be thrown into our rivers.

But thousands of these cattle, after having become so diseased as to possess no value for the dairy, are every year slaughtered in our markets and eaten by our citizens. As is common in scrofula, consumption, and some other diseases which are most fatal in the spring, so is it in the mortality of these still-fed cows, especially in the months of March, April and May, when they are crowded into the cattle market, where they may be seen in droves of several hun-

dreds every week. It is the policy and interest of the dairymen, to part with those first which they are in the greatest danger of losing; and also that they be removed from the stalls to the shambles in the shortest possible time. For as the vessels of the animals which have been distended with serum, become depleted, they not only rapidly lose weight, but also their good appearance; and as they refuse to eat, and indeed, from the condition of their teeth, are unable to masticate solid food, if not killed, they must speedily die of starvation or disease. When slaughtered, the effluvium of the carcase is intolerably offensive, which subsequent exposure to the air does not entirely remove; and the flesh must be sold as quickly as possible, or it will putrify on the dealer's hands. A butcher with his eyes bandaged, by the peculiar smell of slop-fed beef, will select out every piece in the market. The flesh being distended with serum, or a thin bloody fluid, when cooked, either by roasting or boiling, will shrivel up to the bone, or be reduced, perhaps, to one half its original dimensions, a fact which is familiar to every cook or kitchen maid, although they are unable to account for. The business of slaughtering these cattle is disreputable; and no butcher who values his reputation would willingly be known as a "slop-beef dealer." They say, however, the flesh though a little darker is very juicy, and sometimes well flavored, and they generally appear not to be aware that it is unwholesome; yet all agree, that either from its loose, pulpy fibre, or some other undefined cause, it will not retain salt like other meat, and very soon becomes putrid—which facts, according to settled physiological principles, beyond all others demonstrate its unhealthy properties.

CHAPTER XVIII.

OTHER DEMONSTRATIONS OF THE EFFECTS OF PERNICIOUS DIET.

The teeth.—Testimony, with illustrations.—Some exceptions thereto.—Consequences not peculiar to cattle.—Swine affected by it.—How kept in Philadelphia.—Testimony of distillers.—Feeding swine on slop unprofitable.—Mortality among cows.—Report of a committee.—Diseased meat unfit for food.—On whom the correction of the evil depends.

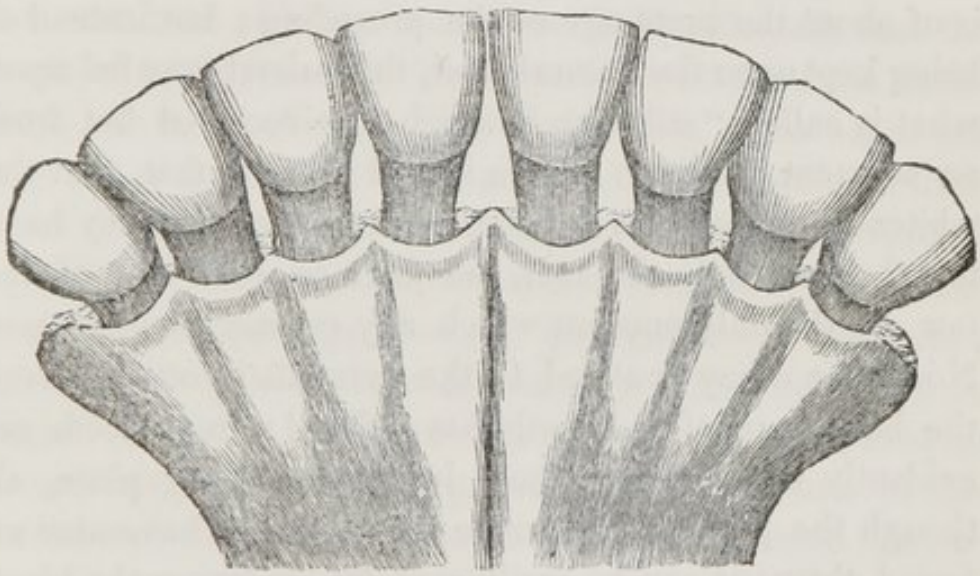
As the teeth constitute an essential part of the animal structure, it may be useful to refer to them more particularly than we have yet done, for proof of the deleterious effects of improper diet on the general health of cattle.

Like the other organs of the body, the teeth are supplied with nerves, blood-vessels and absorbents; they, of course, possess a principle of vitality, and are governed by the same physical laws. It is evident, therefore, that whilst a violation of these laws diseases the system, the healthy condition of the teeth and gums must suffer in the general derangement. On this point, the deductions of reason, common observation, and the investigations of scientific physiologists, not only harmonize, but the truth is a general one, which as legitimately applies to many of the lower orders of animals, as to the human species. In demonstration of this position, we need only examine the teeth of cows that are fed on distillery slop, or other unnatural aliment. The teeth of such cattle speedily become affected with dental gangrene or decay, and also blackened and encrusted with a substance called *salivary calculus*, or tartar,

which is deposited from the saliva. In some cases that we have seen, the teeth were corroded down to the gums; and according to the descriptions of other cases that have been furnished, ulcerations were found at the roots of the fangs, occasioned, doubtless, by the acrid humors generated in the blood by pernicious food, and the teeth thus becoming loosened in their sockets actually drop out. But the subject cannot, probably, be more forcibly illustrated, than has already been done by Burdell, whose attention was particularly directed to its consideration, in his work on dentistry. Having stated as his opinion that whatever is injurious to the general welfare of the system affects the teeth as a part of that system, he proceeds to remark:

"But perhaps one of the most striking proofs of the position I take, is to be drawn from the effects which a deviation from the natural food has upon the lower orders of animals."

No. I.

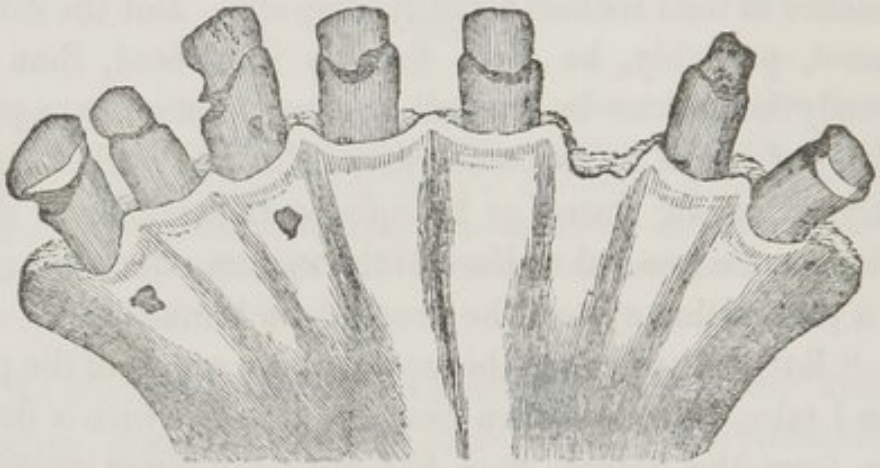


(Teeth of a Cow fed on natural diet.)

"The above drawing exhibits a portion of the jaw of a cow which has fed upon natural food. It will be observed

that the teeth are perfectly healthy, and the enamel sound; the alveolar processes are not diseased; there is no accumulation of tartar between these teeth, but they are firm and white. I next present a specimen from my cabinet of a different character.

No. II.



Teeth of a Cow fed on artificial diet.

"The animal from which this latter drawing is taken, is of about the same age as the preceding; but instead of being kept upon the natural food, the animal was fed upon what is called "still-slop," which was received hot from an adjacent distillery. Here it will be seen, first, that the whiteness of the teeth is gone,—in other words, they have lost their enamel. In fact, the teeth on each side of the jaw are the only ones on which any enamel can be seen. Nor is the decay confined to the enamelled portion; even the bony part of the teeth has suffered; these teeth are evidently smaller than those in the preceding plate, although the jaw is of the same size. Caries have also affected them, as can be easily seen by observing the black spots in the teeth. The alveolar processes have likewise taken part in the disease; ulcers have formed at the roots of the teeth, the portion of the bone opposite these roots

has become affected and has broken off, and one of the teeth is also gone.

"In the specimen last presented, many of the interstices were filled with tartar, which was removed before the drawing was made, to show the natural state of the teeth themselves. It may be said this is only a single specimen; but such is not the fact. I have examined several large milk-farms around New-York, from which the city is supplied with milk. In most of these, "still-slops" are used as food for cows; each cow consumes about thirty gallons daily, and wherever these slops are used, the teeth of these animals are more or less affected.

"Those kept near a distillery, and where the food is furnished to them hot, exhibit more marks of decay than those kept at a greater distance, where the still-slops are cooler before the animal is fed upon them.*"

The foregoing statements, with one exception, have been fully confirmed by the observations of the writer. He has not been able to discover, with Mr. Burdell, that the teeth of cattle fed with slop hot and direct from the distillery, are more affected with caries than those which are kept at a greater distance, provided slop constituted their chief or only food. At the distilleries they usually receive the slop at an equal temperature, having been somewhat cooled in its passage through the gutters to the pens; while to those at a distance, the slop being conveyed in hogsheads from which the air is excluded, the heat is longer retained; and being fed in that condition to the cattle, and likewise when perfectly cold, the teeth are exposed to greater variations of temperature in the latter than in the former case. Now so far as temperature is con-

* Burdell on Diseases of the Teeth, p. 65.

cerned, as has been ascertained by microscopic observations, it is the sudden transition from hot to cold, and *vice versa*, which produces the greatest injury to the teeth; for the enamel, by the unequal expansion and contraction, is fractured, and the consequent exposure of the bony substance of the teeth to the action of acrid fluids, subjects them to rapid decay.

Slop, as before remarked, is preferred hot, because in that state it is said to excite a greater flow of milk. But from all that has been ascertained by careful and protracted observation, and from the experience of those engaged in the business, it appears that this kind of food, in whatever condition received, destroys the teeth; and according to the admitted principles before stated, the aliment which uniformly produces such effects upon these organs, must also affect the general health of the animals that feed upon it.

But the unhealthiness of distillery-slop is not peculiar to cattle. Horses and swine are likewise affected by it. A few pails' full given to a horse, or even the moistening of his feed with it, has been known seriously to injure the teeth, and, through ignorance of the consequences, some valuable animals have been ruined by it.

Where this refuse cannot be used to better advantage, as is the case in some of our cities and country places, swine are extensively fed with it. The method of penning swine for this purpose, in the city of Philadelphia, is sufficiently singular to deserve notice. A brick building, four stories high, is fitted up for this purpose, and filled with swine from the cellar upwards. The whole is divided into apartments ten feet square, and six feet high. Each apartment contains from ten to fifteen swine. And it is said, that two brick buildings are now erecting for the accom-

modation of about two thousand more. Swine at these establishments are kept on slop for seventy-five cents per month. The arrangements, so far as cleanliness and ventillation are concerned, appear to be extremely defective. The darkness, steam, and odor, are intolerable. It is stated that a large number of the swine die within the first two months after admission, and that only swine of first rate constitution can stand the treatment.*

Additional testimony to the injurious effects of this food on the health of swine, has been incidentally furnished by an association in Tennessee, whose inquiries were addressed to practical distillers, in order to obtain from them opinions and calculations on the comparative lucrativeness of feeding stock with grain, or converting it into whisky. The report on the subject says: "We have succeeded in obtaining the testimony of a number whose veracity cannot be doubted, and whose experience and management must have weight with an enlightened public." One distiller says: "At the beginning I had *forty head* of hogs; but during the spring and autumn, about *ten* of them died from fits, brought on by the poison of the copper mixed with the slop."

Another distiller says: "With regard to the opinion that a grain distillery is a good place to raise swine, I can only say that I have never been able to raise them without a considerable quantity of corn. Swine taken to a distillery in the fall or winter poor, will remain so until the spring of the year, unless you feed with corn as well as slop. Soon as the weather becomes warm, young hogs will take a cough and die, and if there be any cure for it, corn is the medicine. Old hogs, if they have the slop after the grass

* Vide Temperance Journal, Vol. I. p. 9.

rises in the spring, and have the privilege of both, will grow and fatten fast, although, without great care, many will die during the spring and summer with fits, occasioned by the slop cankering in the still, and with all care you will lose some, for fat swine will sometimes die."* A private correspondent who has had much experience in this business remarks, "that slop is certain death to young pigs when fed to the mother." But it is not necessary to multiply extracts of this kind.

From the information obtained on this subject, it is evident that the fattening of swine on this kind of food, on account of the mortality thereby produced among the porkers, is now extensively regarded as an undesirable, because it is an unprofitable business. Whether this mortality is occasioned by the acid and acrid properties of the slop, or as some suppose by the copper, and by the poison of the alcohol being mixed with it, it is not important to determine. The fact that many die, is indisputable ; and the loss from this cause, as estimated by numerous other practical men who have been consulted, is stated to be twenty-five per cent. The livers of some become enlarged, and diseased, and filled with tubercles like the livers of drunkards ; some die with fits outright ; but the greater number, especially of young swine, as the weather becomes warm, take a cough and die. And better far that they all die, than that such pork be eaten. Swine, under the most favorable management, are particularly subject to scrofulous diseases ; and it cannot be that diseased pork, or the flesh of animals partaking of the bad properties of such food is wholesome. But on these analogous effects we will not enlarge.

* Vide Temperance Journal, p. 101.

The main fact insisted upon, viz., that cattle fed upon still slop diet become diseased, is undeniable. The most healthy animals, put upon this unhealthy aliment, soon indicate an accumulation of diseases; and their very appearance, compared with the sleek and healthy condition of those kept on natural food, is *prima facie* evidence of the fact. In a little time they become so thoroughly distempered as to be of no use; and the dairyman, in order to prevent the loss of their dying upon his hands, is obliged to change his stock, at least every *nine months*, by sending his diseased and worn-out cattle to the butchers. Yet with this frequent change of stock, and the exercise of every possible precaution, during the few months the cattle are kept on this food, the loss by disease is very considerable. In the absence of every other manifested cause, except the diet and management, one dairyman lost *eleven* out of *twenty* cows in the space of five months; another, lost *thirteen* out of *seventeen* in seven months. This was an unusual fatality; but numerous other reports have been made to the writer, which were nearly as great. Being determined to obtain as accurate statistics as possible, a committee of dairymen, now engaged in the milk business, was induced to enter upon a thorough investigation of the subject, and it subsequently reported, that out of *eighteen hundred and forty-one* cows which were fed on slop, in the vicinity of Brooklyn, *two hundred and thirty* in the course of a *few months* had died of disease; and from the difficulties thrown in the way of full information by the proprietors of the dairies, there is reason to believe that the actual mortality was far greater than reported. This, it will be seen, is equivalent to thirteen per cent.; and by collating the various estimates and reports of those in the business, the loss from this cause may be set down

at from twelve to twenty per cent. The cows being bloated with slush, though apparently in good condition, will die as suddenly as unexpectedly. After yielding the usual quantity of milk, they have been known to die the same day. How extremely disgusting the idea of partaking of the milk, not merely of a distempered animal, but of one that is *already dead* of *disease!* Yet such are the legitimate fruits of this iniquitous and unnatural system.

But it is unnecessary to enlarge on statements of this kind, as, from what has been stated, every reflecting mind will perceive that the whole subject has various important bearings on the health and morals of the people. Diseased meat, when eaten, every one knows, produces malignant fevers. But against impositions of this kind, the law benevolently protects the community, by appointing inspectors with authority to throw into the rivers such flesh, and all that appears in the least degree unsound, and justly subjects those selling it clandestinely to fine and imprisonment. Yet here is a cause incomparably more prolific of disease than any against which the law provides, that entirely escapes its cognizance. There cannot, however, be a rational doubt but that the juices or secretions of diseased animals, which is the milk, especially when produced from unwholesome aliment, are as unfit for food, as is their flesh. Any other conclusion would be as contrary to the known laws of life and health, as to the common sense of mankind.

The subject is, indeed, one on which every man is competent to decide. No better reason can be given that we should eat diseased meat for the benefit of the unprincipled butcher, than that we use diseased milk to satisfy the rapacity of the dairyman or distiller. In the former case we are protected to some extent by legal statute, and we should

endeavor to effect such a modification of the laws as will entirely remove the grievance. In the latter case we are called upon to protect ourselves. The remedy is in our own hands. Upon our vigilance and fidelity to our own interests, depend the correction of this intolerable evil.

CHAPTER XIX.

DISEASES CONSEQUENT UPON THIS UNNATURAL SYSTEM.

Dry-murrain.—Bloody-murrain —Consumption.—Effects of it on the milk.—Wolf-in-the-tail.—Diarrhœa, Pleurisy, etc.

THE occasion of the death of slop-fed animals, and likewise the prevention and cure of the entire evil, are so manifest, that no valuable end can be gained by dwelling upon the maladies that are thereby induced, unless it be to arouse the indignation of every humane heart against the system which subjects these useful and unoffending creatures to this barbarous treatment. Any thing, therefore, like a full enumeration, or a nosological classification of diseases, will not here be attempted. It will be sufficient for our purpose to name a few maladies with a diagnosis of the cases, which may serve both as a proof and as an illustration of the iniquity and inhumanity of the whole system.

Dry-murrain, is one of the distempers with which slop-fed cattle are sometimes seized. In this case, the animals suddenly show symptoms of disease. The milk disappears, the muzzle becomes dry, the tongue furred and parched, and the flanks heave with evident signs of distress. The progress of the malady is extremely rapid. In the morning, the animal is apparently well; at night it may be dead, and usually falls, it is said, stiff over backwards as if knocked upon the head.

Bloody-murrain, is of more frequent occurrence. It is probably a species of the plague, with which a righteous

God destroyed the cattle of Egypt because of Pharaoh's obstinacy. "If thou refuse to let them go, behold, the hand of the Lord is upon thy cattle: there shall be a very grievous murrain. To-morrow the Lord shall do this thing in the land. And the Lord did that thing on the morrow, and all the cattle of Egypt died."* When slop-fed cattle are taken with this distemper, it appears scarcely less malignant or fatal than that mentioned in the sacred record. It is probably endemical, and evidently differs, in some respects, from the malignant epidemic murrain which occasionally, through successive ages, has swept away nearly all the horned cattle in many countries,† although its general characte-

* Exod. 9: 2, &c.

† Virgil, who flourished about fifty years before the Christian era, so graphically describes the ravages of this pestilence among the Roman herds, that a brief extract therefrom, though it divert the attention of the reader from the main subject, will not require an apology.

Hinc lætis vituli vulgo moriuntur in herbis,
Et dulces animas plena ad præsepia reddunt.
Hinc canibus blandis rabies venit, et quatit ægros
Tussis anhela sues, ac faucibus angit obesis.
Labitur infelix studiorum, atque immemor herbae
Victor equus, fontesque avertiter, et pede terram
Crebro ferit: demissæ aures; incertus ibidem
Sudor, et ille quidem morituris frigidus: aret
Pellis, et ad tactum tractanti dura resistit.
Hæc ante exitium primis dant signa diebus.
Sin in processu cœpit crudescere morbus,
Tum vero ardentes oculi, atque attractus ab alto
Spiritus interdum gemitu gravis: imaque longo
Ilia singultu tendunt: it naribus ater
Sanguis, et obsessas fauces premit aspera lingua.
Ecce autem duro fumans sub vomere taurus
Concidet, et mixtum spumis vomit ore cruorem,
Extremosque ciet gemitus.

Georg. lib. III. ver. 494, &c.

ristics, as they have been observed by the writer and described to him, essentially agree with the following symptoms.

The cough is frequent, painful, and convulsive. The mouth is hot; the root of the horn is cold; and there is extreme tenderness observed along the spine. As the disease progresses, bloody matter runs from the mouth and nostrils, and likewise mingles with the fæces; the stench is intolerable; suddenly the patient sinks and dies.

However individual cases may vary from the foregoing symptoms, such is the virulence of the disease, it is not understood that cows once attacked with it ever recover. We before adverted to the pestilential murrain of former times among cattle; and it appears to have extended from them to the human species.

The thriven calves in meads their food forsake,
And render their sweet souls before the plenteous rack.
The fawning dog runs mad; the wheezing swine
With cough is chok'd, and labors from the chine;
The victor horse, forgetful of his food,
The palm renounces, and abhors the flood;
He paws the ground, and on his hanging ears
A doubtful sweat in clammy drops appears.
Parch'd is his hide, and rugged are his hairs.
Such are the symptoms of this young disease;
But in time's process, when his pains increase,
He rolls his mournful eyes; he deeply groans
With patient sobbing, and with manly moans.
He heaves for breath; which from his lungs supplied
And fetched from far, distends his lab'ring side.
To his rough palate his dry tongue succeeds,
And ropy gore he from his nostril bleeds.
The steer who to the yoke was bred to bow,
(Studious of tillage and the crooked plough,)
Falls down and dies; and, dying, voids a flood
Of foaming madness, mix'd with clotted blood.—DRYDEN.

Οὐρῆας μὲν πρωτον ἐπωχετο καὶ κύνας αργους
Αὐταρ ἔπειτ' αὐτοισι βέλος ἐχεπευκὲς ἀφιεις

Βάλλ.—Iliad. lib. I.

On mules and dogs th' infection first began,
At last the vengeful arrows fixed in man.—Pope.

Vast numbers of the cattle belonging to the Greeks, and of the Greeks themselves, perished at the siege of Troy by this pestilence. In the reign of Romulus, Plutarch says, this pest destroyed not only great numbers of cattle, but also many of the inhabitants; and the historian Livy, referring to another visitation of the scourge, declares that "the consuls had greater difficulty in raising their recruits because the plague, which the year before had raged among the horned cattle, had broken out among the men."*

Persons in our own day, are frequently attacked with *malignant pustules*, from being accidentally inoculated with the virus of cattle that have died of bloody-murrain. The first manifestation of the disease, is a gangrenous affection of the skin, which is followed by constitutional symptoms of a character so dangerous, that, if not arrested, death speedily ensues. The slightest contact with the body of the animal so as to absorb the virus, is sufficient to produce this fatal disease. Four cases of this malady came under the treatment of Dr. Pennock of Philadelphia in 1836; the poison being communicated, by skinning cows that had died of murrain. To one of the persons it proved fatal; but Moses Hagerty, J. Hagerty, and Adam Hill, milkmen, recovered. In the city of New-York, a case recently came under our observation, which nearly proved fatal.†

* Liv. lib. XLI.

† For a detailed account of these cases, vide Am. Med. Jour. Vol. XIX. p. 14.

Though interesting to the general reader, it would be irrelevant to our object, to attempt an account of this disease as it has prevailed among cattle from the earliest periods of authentic history, down to the close of the eighteenth century. It is indeed unnecessary, as it has already been done by an able writer, to whose investigations veterinary science is not more indebted than is humanity for the benevolence of his sentiments. Referring to the virulence and the extent of this malady, he says: "With occasional remissions, and often very short ones, this malignant epidemic had prevailed, and now had reached the very extremity of Europe. The attention of every government had been anxiously directed to it. Prompted by benevolence, or urged by the hope of honor or reward, the most eminent physicians of the day had devoted their time and medical skill to the elucidation of its nature, cause, and mode of treatment; and all not only without success, but, it would almost seem, with an unfortunate result; for the malady continued to spread, although it was not so intractable or murderous."* But in the enlightened nineteenth century, through the culpable remissness of the municipal and state governments, the ignorance or inattention of the people, and the recklessness or cupidity of a few individuals, whose interest it is to perpetuate the evil, a system of treatment is not only tolerated but encouraged, which inflicts upon these domesticated animals diseases as distressing and fatal as those which have invariably been deprecated by foreign governments as great national calamities;†

* Youatt on Cattle, p. 393.

† The appearance of murrain among cattle in Great Britain in 1745, became a matter of legislative inquiry and enactment; and by order of council, boards of health were established in various parts of the kingdom. The deep concern felt by the government in the

and which, as will be seen, through the voluntary agency of inconsiderate men, is made to extend its direful consequences to the health and lives of human beings.

subject, is exhibited by the tenor of the royal documents, from one of which, as matter of interest and curiosity, we subjoin an extract.

First Commission, March 12th, 1745.

His majesty being desirous of doing all in his power to put a stop to the spreading of the said distemper, has thought fit, by and with the advice of his privy council, etc., to make the rules and regulations following, etc.:

First. That all cow-keepers, farmers, and owners of any of the said several sorts of cattle, in any place where the said distemper has appeared, or shall hereafter appear, do, as soon as any of the said cattle shall appear to have any signs or marks of the said distemper, immediately remove such cattle to some distant place from the rest, and cause the same to be shot, or otherwise killed, with as little effusion of blood as may be, and the bodies to be immediately buried, with the skin and horns on, at least four feet in depth above the body of the beast so buried, having first cut and slashed the hides thereof from head to tail, and quite round the body, so as to render them of no use.

Secondly. That they do cause all the hay which such infected cattle have breathed upon, and all the hay, straw, or litter, that they have touched or been near, to be forthwith removed and burned; and that no person who shall attend any infected cattle, shall go near the sound ones in the same clothes.

Thirdly. That they do cause the houses or buildings where such infected cattle have stood, to be cleared from all dung and filth, and wet gunpowder, pitch, tar, or brimstone, to be burnt or fired in several parts of such buildings, at the same time keeping in the smoke as much as possible; and that the same be afterwards washed with vinegar and warm water; and that no sound cattle be put therein for at least two months.

Fourthly. That no person whatever do buy, sell, or expose for sale, the milk or any part of the flesh or entrails of any such infected cattle; or feed, or cause to be fed, any hog, calf, lamb, or any other animal, therewith; or drive, or cause to be drove, any such infected cattle to any market or fair, either in or out of the country where the

Consumption, as might be expected, when there are so many causes operating to impair the vigor of the constitution, and bring on this fatal malady, is one of the most frequent with which slop-fed cattle are attacked. To say nothing of the effects of improper diet, it would be strange, indeed, if cattle removed from the pure native air to which their constitutions have become adapted, and pent up in hot and filthy stables, should not suffer from diseases of the respiratory organs. "There is one striking fact, showing the injurious effect of heated and empoisoned air on the pulmonary system. There are some cow-houses in which the heat is intense, and the inmates are often in a state of profuse perspiration. The doors and windows must sometimes be opened, and then the wind blows in cold enough upon those that are close to them, and, one would naturally think, could not fail of being injurious. No such thing. These are the animals who escape; but the others at the farther end, on whom no wind blows, and where no perspiration is checked, are the first to have hoove, inflammation, and consumption." This fact speaks volumes in regard to the importance of pure air, and the right management of cattle.

A cough of peculiar character, is the earliest symptom of this disease. The lungs soon become tuberculated, and these tubercles or ulcers, suppurating and running into each other, form abscesses which destroy so much of the lungs, that there is not enough left to support life, and the

said cattle now are, or to or from any place whatsoever, out of their own respective grounds, while they are so distempered.

For the encouragement of the owners of cattle to comply with the above decree, they were entitled to receive from the commissioners of the treasury "one moiety, or half the value of such cattle" as were destroyed.—*Youatt*, p. 390.

animal languishes away and dies. The progress of the disease is marked by the loss of appetite and diminished strength; often there are purulent, and sometimes bloody and fetid discharges from the mouth and nostrils; the cough becomes more frequent and urgent, but painful, altered, and sometimes spasmodic; a violent and unmanageable diarrhœa sets in, and the animal sinks and expires. The fatal termination is of course accelerated, or otherwise, in the degree that vitality is exhausted by the violence of the inflammatory action.

The effects of consumption on the milk of the cow under ordinary circumstances, is thus described by the writer before quoted. "The milk gradually diminishes, and had it been examined before its diminution in quantity, an evident deterioration in quality would have been observed; it has acquired an unpleasant flavor, it quickly becomes sour, it spoils, or gives a peculiar taste to that with which it is mixed. The butter that is made from it is ill-flavored, and the cheese will not acquire a proper consistence. Some have said that the milk is of a blue color, and that it has more serum in its composition, than ordinary and healthy milk." With a knowledge of these facts, which are abundantly verified by ordinary observation, common delicacy, and all our irrepressible feelings of aversion to diseased milk, would cry out against its use for human food; yet it is certain that such milk is daily used by the great majority of our citizens.

Wolf-in-the-tail, as it is usually denominated among dairymen, is another frequent and fatal disease among these cattle. It is so called, from the ridiculous notion that the disease originates in the tail. The cattle being continually under the stimulating and forcing nature of their food, without exercise or pure air to abate in any de-

gree its injurious effects, are extremely subject to sudden determinations of the blood to the head which results in apoplexy. The first premonitory symptom usually noticed, is the coldness of the tail, from which when cut there is no effusion of blood. If, however, the animal had been closely observed, the eyes would have appeared blood-shot and protruded, the breathing laborious, with numerous other indications of general indisposition. The animal *appears* suddenly struck, and expires, sometimes in a few minutes, but more frequently after an agonized struggle of several hours. On examining the carcase of such animals after death the coats of the stomach are found excoriated, the intestines decayed, and the wind-pipe and brain filled with extravasated blood.

Diarrhœa and *pleurisy* are also very common and very fatal among these injured creatures, likewise diseases of the *liver*, *spleen* and *pancreas*. But it would be foreign to our design, useless in itself, and uninteresting to the reader to give an enumeration, much less a description of the multifarious distempers which this vile system of treatment induces. If enough has been said to exhibit another feature in this wretched business, which in all its aspects is most revolting, the object here proposed is gained. The results described are as certain, as the connection of cause and effect. Exemption from disease is impossible when every law of health is grossly violated, as is the case in the management of these cattle. And yet—we reiterate the fact that it may be ever in mind—the milk of these diseased creatures, whose existence is but a lingering death, constitutes the staple diet for infants and children, and is regarded of indispensable use in every family. The whole system, so far as surveyed, will be seen to be characterized by ignorance and brutality. It was, probably, at first re-

sorted to rather as a matter of convenience or of experiment, than from an actual want of humane feeling ; but it is now a mercenary expedient, unnecessarily yet determinately pursued as an object of deliberative choice from motives of interest, alike regardless of its inhumanity to brutes, and of the incalculable evils which it inflicts upon human beings.

CHAPTER XX.

THE POISONOUS EFFECTS OF DISEASE ON THE MILK OF COWS.

Chaptal's opinion.—Facts illustrating the poisonous effects of milk.—Milk sickness.—Dr. Graff's testimony.—Christison's ditto.—Familiar facts on the subject.—A letter from a physician.—Also from a correspondent.

THE argument is cumulative. We have shown that the natural conditions of amimal life, as it respects air, exercise, and food, are grossly violated by the slop-milk system, and that deranged health, and loathsome and fatal diseases are the necessary consequences. We now propose to show, that when the animals are diseased, their secretions must also be diseased, and are therefore unfit for human sustenance.

Chaptal says, "milk preserves the character and quality of the aliments; and for this reason we are induced to place it at the head of the humors of the body." But this is not all. Milk also partakes of the morbid condition of the animal which produces it, so as to transmit to those who feed upon it, dangerous and fatal diseases.

That milk is affected by the food both in our own species and that of brute animals, is so generally admitted as to need little in the way of proof. But that the milk of diseased animals is capable of communicating disease to man, is a proposition which has never been agitated amongst us as one that nearly concerned the people. How it should be overlooked in this community may well excite astonishment, when thousands are daily eating both the milk

and flesh of diseased animals, and experiencing in themselves and families the appalling effects, without, of course, indulging a suspicion of the real cause of their sufferings. In defence of the position we will state a few facts, as these will more forcibly illustrate the principle on which we insist, than any pathological argument our limits will admit. A case in point, occurred not long since in Portsmouth, New Hampshire. Several persons were taken violently ill, with vomiting and purging, attended by cramps and spasms. After a careful examination of the cause, the physicians were irresistibly led to the conclusion that the sickness was occasioned by the milk of a cow that had fed on some poisonous vegetable. All who used any of the milk sickened, and some being given to a dog, he was affected in like manner.

The milk sickness, or trembles, as it is sometimes denominated, that has extensively prevailed among cattle in several of the southwestern states, would of itself furnish a volume of illustrations. We subjoin a few extracts from the communications which have appeared on the subject. Says a correspondent of an Indiana paper: "At Logansport, on the banks of the Wabash, I was cautioned against using either milk, butter, or beef, on my way to Vincennes. As a reason for the caution, I was informed that the milk sickness was common in this state. I had heard of it before, but knew little of it. I was informed that many deaths occurred annually from this dreadful malady. There is a difference of opinion as to the cause that produces it; but the general conclusion is that it is occasioned by the yellow oxyd or arsenic in the low ground or woodland, and particularly near the Wabash river, and that some weed (yet unknown) imbibes the poison, and when eaten by the cattle causes them to quiver,

and stagger, and die, within a few hours. If cows eat it, the milk is poisoned, or butter that is made from the milk; and it is also as sure death to those who use the milk or butter, as it is to the animal that eats the weed. Great care is taken to bury such cattle as die with it; for if dogs, &c., eat their flesh, they share the same fate, and it operates as violently upon them, as upon the creature that was first affected with it." Dr. McCall of Tennessee says, "if the calf suck this milk it trembles and dies. Horses as well as cattle die by the poison, and dogs, cats, buzzards, turkies, chickens, and crows, die by eating the flesh of animals that have perished under this disease." He also relates many cases of sickness in the human subject, which proved fatal under his own treatment.* Dr. Graff, of Edgar county, Illinois, on this subject says: "The cattle may be affected to such a degree as that their flesh and milk will produce the disease in man, and yet they themselves manifest no unhealthy symptoms whatever." Again he remarks: "Hundreds of persons throughout the west and southwest are annually perishing from its attacks. Butter and cheese, manufactured from the milk drawn from infected cows, are supposed to be the most concentrated forms of this poison. They possess no distinguishing appearance, odor, or taste, from the healthy article. A very minute quantity of either will suffice to develope the disease in man. The cream, ordinarily sufficient to be added to the coffee drank at a single meal, is said to have induced an attack. The butter or cheese eaten at one repast, has frequently been known to prove effective. The property is not contained in any of the elements of the milk exclusively, but distributed throughout the whole of them, being possessed by the buttermilk as well as the whey."

* Medical Recorder, Vol. VI. p. 257.

Dr. Graff also records the testimony of Dr. John W. Davis of Indiana, who says: "My own experience enables me to state, that I have seen a peculiar affection, which I feel assured could have been no other than the milk sickness, in a city remote from its local causes, attacking every individual who partook of a certain cheese which had been purchased from a wagon arriving from an infected district." The instance just cited, occurred in Chillicothe, Ohio, "in which place," says Dr. Graff, "I met with a medical friend who had charge of a number of the cases. He expressed to me his belief that the disease was milk sickness, from what he had learned in relation to it, in addition to the fact that it was exclusively confined to a single house, sparing those inmates who did not eat of the cheese in question." We are also informed by this writer that "a murderous practice is now carried on in certain districts, in which the inhabitants will not themselves consume the butter and cheese manufactured; but, with little solicitude for the lives or health of others, they send it in large quantities to be sold in the cities of the west, particularly Louisville, Ky., and St. Louis, Missouri. Of the truth of this I am well apprised by actual observation; and I am certain it has often caused death in those cities, when the medical attendants viewed it as some anomalous form of disease, not suspecting the means by which the poison had been conveyed among them."* How like this is the practice of numerous venders in New-York, who will not risk in their own families the use of drugged, diluted, and diseased milk, but, utterly reckless of human health and life, furnish it for the consumption of others!

If other facts are necessary to sustain our position, they

* Am. Journ. Med. Science, April, 1841.

abound in medical writings. Christison, in his work on poisons, states that "it has several times been remarked on the continent, that the milk of the cow may act like a violent poison, although no mineral or other deleterious impregnation could be detected in it; and these effects have been variously and vaguely ascribed to the animal having been diseased, or to its having fed on acrid vegetables, which pass into the milk. At Aurillae, a village in France, fifteen or sixteen customers of a particular dealer in goat's milk, were at one and the same time attacked with all the symptoms of a violent cholera; and about twenty-four hours afterwards, the goat too was taken ill of the same affection, and died in three days. Another instance lately occurred in Westphalia. Six people of a family, after partaking of goat's butter-milk, were simultaneously attacked with violent vomiting, and tension of the epigastrium, and several of them suffered so severely as even to have been thought by their physician to be in danger." He also quotes a French writer, who states that the shepherds in the neighborhood of Embrin, in France, were obliged to abandon certain fields, because the milk of their cows was rendered useless by the abundance of a certain plant among the herbage.

It has before been remarked that the bad quality of milk will sometimes operate deleteriously on those that partake of it, whilst the animal itself appears unaffected. This is the case in the human species, but in a far greater degree among the lower animals. The fact is well attested that calves have been poisoned by receiving the milk of a cow, whilst the effects on the cow were too slight to be observed. —But it is unnecessary to spread out additional proofs and testimonies in support of a position which, if not self-evident, is demonstrated by facts and results that are otherwise

wholly inexplicable on sound pathological principles. Every physician and every man of common sense will concur in the opinion that the milk of diseased animals cannot be used for food, without risk to health and life; and every humane mind will agree in the verdict, that those persons who continue to furnish it to be so used, with a knowledge of its morbific qualities and effects, should suffer a punishment proportioned to the enormity of their offence.

We here subjoin a very summary view of the subject, by a gentleman whose opportunities for observation have been rather limited and incidental; but being an eminent physician in New England, his opinions are entitled to respect.

"Dear Sir,—I am glad to observe that your citizens are waking up to some of the influences which are in operation to enfeeble or destroy human health. Among those, the milk that is extensively distributed through the city, from the dairies supported by the distilling establishments, is by no means inconsiderable.

"I live in the country, but occasionally go to the city; and while there, I make a practice of securing, if possible, my accustomed glass of milk morning and evening, instead of coffee and tea, which for some years I have laid aside altogether. Three years ago last winter, I took lodgings at a respectable house near Broadway, and bespoke, as usual, my glass of milk. I observed that the taste of this milk was unnatural, unsavory, and I had no relish for it; in fact, it soon became loathsome, and at the end of one week I found myself greatly enfeebled, with loss of appetite, a feverish heat of the hands, and a slightly furred tongue, with other indications of disorder. The milk, I was informed, came from a dairy supplied with swill from a distillery. I left the boarding-house, and took lodgings at the Clinton Hotel, where I found a well-flavored glass of milk morning

and evening, and in three days I was well. Mr. H., the landlord, assured me that he was supplied with milk from Harlaem, by a farmer who fed his cows on wholesome food.

"Let the parent who feeds his children with milk from the dairies at Brooklyn, visit those places, and look for once into the buildings where the cows are crowded together with scarcely space enough between them to allow a milkman to pass; let him take two long breaths of that filthy atmosphere, from which the poor animals are not permitted to stir for weeks and months; let him smell of the heart-sickening rum-broth upon which these abused creatures are compelled almost exclusively to feed—each drinking from fifteen to thirty gallons a day; let him examine the stumps of the teeth corroded down to the gums by the acrid fluids generated from the unwholesome food; let him learn that some of these animals, becoming in a single season unfit for the dairy, are fattened partly upon the same poisonous composition, and killed and carried into market to be eaten by himself and family; and then let him say whether he will patronize such nefarious establishments.

"Nothing can be more certain, than that the quality of the milk is greatly influenced by the state of the health of the animal producing it; and where such immense quantities of a mischievous material as fifteen or thirty gallons are made to pass through the organs of a single animal in twenty-four hours, it is impossible that the functions of the organs should be performed in a perfect manner. The milk thus produced might almost as well be taken directly from the distillery, without the ceremony of straining it through the blood-vessels of a sickly cow."

Mr. James Seawell authorizes the publication of the following statement, dated New-York, August 4th, 1841.

"Sir,—As others may be benefitted by a knowledge of my experience in the use of distillery milk, I am induced to send you a brief account of it, with the permission to make such use of the statement as you judge best.

"It is usual for my family to visit the country in the months of July and August, and during that time our domestic arrangements in the city are broken up. But the present season, as business engagements would not permit me to leave the city, my plans were a little different. I accompanied my family to the country, and returned, and the same evening having eaten my customary supper of bread and milk, of which my nephew and servant (the only persons besides myself in the family) partook, in the course of the night we all were suddenly seized with diarrhœa, of so violent a nature that we did not recover under two or three days. During that time we abstained from milk food, not however because we suspected that to be the origin of the disease, for no apprehension of the kind was indulged until about a week afterwards, when, after a meal of milk, my nephew and myself were again simultaneously taken with the same disease; accompanied with every symptom and effect of our previous illness. So extraordinary an occurrence led me to investigate, if possible, the cause. I soon learned that the servant who had not eaten of the milk escaped, which first excited the suspicion that bad milk might have occasioned the attacks. But as I had taken the precaution to be supplied with a pure article, and had long been accustomed to its use without injurious effects, this cause appeared to be insufficient. On inquiry, however, I learned to my surprise, that my old dairyman on the temporary absence of my family had discontinued his supply of milk, and that the milk which we had eaten was the pernicious slush of the distillery.

"I cannot, sir, doubt that this poisonous milk was the sole cause of the disease, and if its use had been freely persisted in, its effects would have been fatal. Others may not have observed the same consequences from the same kind of milk, because used sparingly, perhaps only for tea and coffee; and by such a use at my own table, or by feeding it to an infant, its diseased properties might not for a long time, or probably never, have been discovered. But no man can disprove the experience of another. I am fully convinced of the effects in my own case, and there is this additional evidence:—having obtained milk which I know to be pure, I have ever since, as was my custom long before, made it a daily article of food, with only beneficial effects."

CHAPTER XXI.

FOREIGN INVESTIGATIONS AND EXPERIMENTS.

Preliminary statements.—Continued prevalence of the evil.—Report addressed to the Medical Society of Paris.—Impure milk acid.—Test of acidity.—Result of experiments.—Conditions essential to good milk.—How acidity may be corrected.—Case in M. D'Arcet's family.—A caution.—Importance of this testimony.—All slop milk acid.—Beer grains.—Milk in our cities worse than in Paris.

As we now design to present some other views of the subject, a few preliminary remarks may be in place.

The investigations and experiments made in this country, led, it is believed, to the discovery and public disclosure of the fact, that milk produced from the dregs of distillation, was innutritious, impure, and unhealthy. The announcement of this opinion, for a time, produced a deep sensation. Many among the most intelligent of the people, having by careful inquiry satisfied themselves that the statements were well founded, at once banished the impure milk from their tables, and no consideration could now induce them to resume its use. But the reform of long established evils, especially when it is the real or supposed interest of many persons to perpetuate them by deluding the people, is oftentimes slow and difficult. However important may be a discovery, there are those who are contented to be no wiser than were their fathers, and who are so averse to change that, except the subject

be pressed upon their attention with a pertinacity from which they cannot escape, they are reluctant to believe and avail themselves of the proffered advantages. But it is proper to state that the great mass of the community are yet unacquainted with the subject. And as reform was not likely to progress faster than light was diffused, it is not surprising that it has not been more rapid and extensive, or that its influence should be greatest amongst that class who have had access to the publications in which the subject has been presented.

But whilst the evil still exists, to a lamentable extent in this country, it is an interesting fact, that the investigations and disclosures in relation to it, appear not to have been wholly lost upon the philanthropists and philosophers in Europe. The grievance, it is true, is not there always manifested in the same form as in this country, for grain distilleries in the southern parts of Europe are comparatively rare. But it still exists, and from the reports addressed to the Medical Society of Paris, it appears that Messrs. Petit and M. D'Arcet, distinguished chemists of that city, and also the very celebrated Gay-Lussac, have made extensive journies for the purpose of experiments and information on the subject; and having submitted different specimens of milk to analysis from observing their different effects upon children, fully confirm what was before demonstrated in this city, to wit: that pure air, adequate exercise, and natural food for cows, are absolutely necessary to the secretion of rich and healthy milk; and to the extent that these conditions are disregarded, the milk becomes impure, unhealthy and innutritious. As these investigations have an important bearing upon the subject, it would be great injustice to the inquiry, wholly to omit a notice of them; we therefore subjoin a summa-

ry statement as given by a foreign correspondent of one of our public journals. He says:

"I have recently met with a report addressed to the Medical Society of Paris, on the subject of milk, which shows the importance of procuring this food of the children from the purest source in a new light; and proves that 'distillery slops' are not the only thing injurious to its quality.* Messrs. Petit and D'Arcet, distinguished chemists of Paris, were led to examine minutely the quality of different specimens of milk, from observing their very different effects upon children. Some which they examined, and which they found to be speedily thrown up by the children in coagulated masses, was proved by chemical tests to have a predominance of acidity, though it was not perceptible to the taste. Other portions, which were well digested, were proved to have a predominance of alkali, which is considered the natural condition of the milk. On inquiry, it was found that the cows from which the first milk was obtained, were fed *in the stables* with remnants of vegetables as well as hay, and almost without movement; that the alkaline and healthy milk was from cows allowed *to range and feed in the pastures.*

* A recent foreign medical work, remarks on this subject: "The changes produced in the quality of the milk by diseased conditions of the cows, have recently attracted considerable attention in Paris, owing to the prevalence of a malady called the *cocote*, among the cows in that capital."—*Journ. de Pharm.* Vol. XXV. pp. 301, 318.

The following are the morbid changes which have been recognized in milk:—want of homogeneousness, imperfect mobility or liquidity, capability of becoming thick or viscid on the addition of ammonia, and presenting when examined by the microscope, certain globules (agglutinated, tuberculated, or mulberry-like mucus or pus globules) not found in healthy milk.—*Percira's Mat. Med.* Part II. p. 1407. Lond. 1840.

"These observations led them to examine the varying qualities of milk on a more extensive scale, as to the simple fact of the predominance of acid or alkali; and for this purpose they availed themselves of a test which may be procured without difficulty from the chemists. It is paper dipped into a solution of litimus. If it be of good quality, the blue color will be changed to red by a fluid which is acid. A tincture of blue cabbage will detect acidity also, if it is sufficiently fresh, in the same way.

"During a voyage through Flanders, M. D'Arcet, in company with the celebrated chemist, Gay-Lussac, visited some of the best dairies, in which the cows are fed upon the meadows, and found the milk, *without exception*, to contain a predominance of alkali. They examined the milk of cows fed in the stall on turnips, the leaves of vegetables, etc., which were allowed to pass two hours a day in the pastures, and found it uniformly acid.

"The same experiments were repeated in the grazing regions in the north of France, and uniformly with the same results.

"It would then seem to be fully ascertained, that pure and perfect milk can only be given by cows that pass the greater part of the day in the pastures during the mild season; and that it cannot be furnished by cows which are fed upon the parings and tops of vegetables, or of other food than the grasses, and are deprived of exercise—to say nothing of the pernicious effects of the distillery slop or the sour and putrid remnants of the kitchen. And yet this milk must be the staff of life in childhood—the staff of which its bones and sinews are formed; and its quality will do much in determining the vigor or feebleness of the next generation in your city. It is too true that the impure and often infected air, and the limited exercise of chil-

dren in a city, added to the intense excitement of its movement and bustle, while they often render childhood precocious, and youth premature, lead to decay equally premature in a generation taken together. But, surely, this is an additional reason for seeking the purest and best possible nourishment, in order to counteract these inevitable causes of decline.

"I am sure, that many a mother will thank me for adding that these chemists, on observing variations equally great in the digestion of children fed by different nurses, found the same difference in the quality of the milk; and that which was thrown up frequently coagulated, was uniformly sour when received, not to the taste always, but as tested by litimus paper. They observed that the child is not only deprived in this manner of suitable food, but he is obliged to call for it forty or fifty times a day instead of four or five times, and thus fatigues and injures his own stomach without being nourished, and wearies and exhausts his nurse so as to render the quality of the milk still worse.—Such a state of things, they say, ought to be immediately remedied, and that it can be done by giving the mother or nurse a more simple diet, or by means of medicine, which a judicious physician can best prescribe, among which they consider minute doses of supercarbonate of soda the best.

"But can nothing be done to palliate the evil until we can obtain pure milk? M. D'Arcet made the experiment in his own family of adding one half a grain of supercarbonate of soda to a pint of new milk from a city-fed cow, and succeeded in rendering it harmless at least, and far more nutritious. One of his children, so feeble that he despaired of being able to save him, was thus suitably nourished, and grew up to vigorous health, by observing daily the quality of the mother's and finally of the cow's

milk, and taking the proper measures to correct its defects. Now it will be incomparably better to procure the pure milk of the grass-fed cows on the banks of the Hudson, and on the hills of Connecticut, than thus to feed the poor children with a drugged mixture; but it will be at least a temporary palliative until the northern rail-road can be completed, and pure milk can be obtained as easily as the pure water of the Croton river."

This correspondent concludes his letter with a very proper caution to housekeepers to beware of converting food into medicine, by increasing the quantity of super-carbonate of soda. "I have known," he remarks, "this simple, *harmless* thing, as it called, even in the form of excessive drafts of soda water, produce sores in the mouth and lips, which indicate corresponding sores in the stomach; and this was followed by all the miseries of dyspepsia and decline. An able physician assures me, that he could ascribe the death of a patient, from a similar state of mouth and stomach, to nothing but the far-famed morning cordial of Connecticut lay-physicians, '*pearlash and cider*.' It is time the world had learned that medicine cannot be safely used as daily food or drink, without leading to disease."

The interest of the facts in the foregoing communication, has induced us to introduce it nearly entire. It will have been observed that the alkalescency of milk as an unvarying test of its goodness, is insisted upon, and also that the leading principles we are endeavoring to establish are recognized and endorsed by some of the most sagacious and expert analysts in Europe. Truth is truth, and cannot be invalidated by discrepancies of opinions. But this striking coincidence, being the result of independent observation and scientific inquiry, it evidently presents a

broader basis for public confidence, than was before possessed; and as the general positions are of great practical importance to the physiologists and philanthropists of our own country, it may be hoped that, in view of the authorities by which they are sustained, none will be induced to reject them without careful experimental examination.

But to return. If alkalescency is an unvarying attribute of healthy milk, then it follows that slop-milk and other kinds similarly produced are unhealthy; for all such milk, as demonstrated by our own experiments, is uniformly acid. We have never known an exception; and nothing less than a miracle in vital chemistry could make it otherwise. Other causes doubtless contribute to this result; but it may suffice to remark, that the slop is usually eaten in the acetous state, and is so powerfully acid, as rapidly to decompose iron. We have observed an inch iron pump-stave, by being exposed to its action, destroyed in a short time. The milk is not only proved to be acid by appropriate tests, but when fresh is often sour to the taste. In summer it will spoil in four or five hours, while grass-milk, with no greater care, will keep from twelve to twenty-four hours.

It may be in place here to state, that "*beer-grains*," or the refuse of the breweries, which are in so great demand for the use of city milk-dairies in England, and also to some extent in this country, uniformly produce, it is believed, acid milk; such at least has been the character of every sample which has come under our observation. It is conceded that beer-grains, when used with other proper food, are more nutritious and healthy for cattle than slop; they keep the cows in better condition, and make richer milk. But this is all that can be said in their favor, for the milk by experiment is invariably found to be acid. It is,

of course, *unhealthy, and should be rejected.* Why should it be used, when pure alkaline milk can be obtained? If the choice was between slop-milk and that produced from beer-grains, the latter should be preferred. But as we are not obliged to use either, both should be unhesitatingly discarded. Let there be no compromise with these evils. When complete reform is practicable no half-way measures should be attempted. Besides, there is no more necessity nor consistency in supporting the brewery, than in patronizing the distillery.

From the accounts published in foreign journals, it appears, that the condition of our population in regard to milk, is incomparably worse than any thing which came under the observation of the French chemists. The slop-milk with which this community is deluged, is not only acid, the chief thing of which they complain, but is innutritious, and diseased, and drugged, and diluted besides. There appears, therefore, no remedy or alternative in our case, but utterly to reject it. So thoroughly convinced are we of its deleterious properties, that we would not give it to a dog whose life we valued; and in these conclusions, every impartial mind, on careful examination, will doubtless concur. Essential as milk is deemed in domestic economy, it were certainly better to forego its use altogether, than by its consumption risk the health of our families, and countenance an imposition which is insidiously destroying the lives of thousands.

CHAPTER XXII.

NUTRITIOUS PROPERTIES OF MILK.

Specific gravity of milk.—By what affected.—The lactometer.—Methods of ascertaining the specific gravity of milk.—The proportions of cream and curd by measure.—Husted and Mead's dairy.—Lee and Wolcott's.—Morris's.—Fisher's.—Townsend's.—Milk from a city-fed cow.—Samples of slop-milk.—Underhill's dairy.—Tables showing the results of various examinations of milk.—The superiority of pure milk for culinary purposes.—Slop-milk deficient in oil and albumen.—Letter from a physician.—Adulteration of milk with drugs.—Also with water.—Iniquity of these practices.

We advance another step in the investigation. It has been shown that in slop-milk an acid quality predominates. But does this fluid in other respects possess the usual properties of good milk? Whatever may have been predicated concerning it, the qualities of the article itself, so far as these can be ascertained by appropriate tests and analysis, must determine its character. Is such milk nutritious? This is an essential quality. As milk is deficient in nutritive properties, in the same ratio it is of little value.

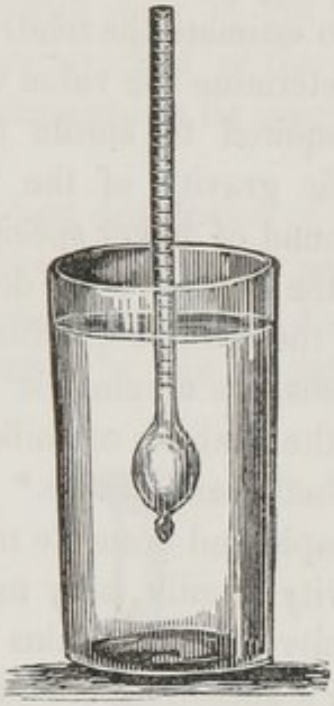
In the former part of this work, milk was described as consisting of three staminal prinnciples, viz. sugar, oil, albumen, and certain saline matters, more or less perfectly combined, and suspended in an aqueous medium. These elementary principles constitute the nutrient properties of

the fluid, and impart to it a greater specific gravity than water. Its average specific gravity, according to some authors, is 1030, whilst others make it 1032, and even 1035, water being 1000. But as we are unacquainted with the milk, the specific gravity of which has been furnished us, and as almost every specimen, owing to the influence of temperature, food, age, health, etc., upon animals, has a specific gravity peculiar to itself, it is proposed to adopt as a standard of comparison, that which nature supplies in our own country, the milk of cows kept in a proper manner upon natural aliment. For this purpose we have not selected the milk of any one cow, as individuals are known greatly to differ in the richness of their milk; but have taken from the aggregate product of a dairy, where the milk of each animal has been promiscuously mingled with the others, a small quantity as a sample of the average quality; and this rule has been strictly observed in every specimen submitted to examination.

As the density of milk is often increased by adulterations, it is not always possible to determine the comparative goodness of specimens, merely by the weight. But as new milk has a specific gravity of 1030, and water 1000, when water is the only adulterant, a small quantity mixed with the milk, may thus be readily detected.

Instruments denominated *lactometers*, have been contrived to ascertain the comparative qualities of milk by its specific gravity. The principle of one of these instruments is similar to the hydrometer. It consists of a glass tube with a graduated scale rising from a hollow bulb, to which is attached a smaller ball with weights that serve to sink and balance the instrument in the fluid, as represented by the cut. When plunged into milk, it will take a higher or

lower position according to the density of the fluid ; but the indications of this instrument, are found to be less accurate than is desirable.



Another lactometer "for ascertaining the richness of milk from its specific gravity, by its degree of warmth taken by a thermometer, on comparing its specific gravity with its warmth," was invented by Dicas of Liverpool, but never came into use. Another invention for the same purpose, was made by Mrs. Lovi, of Edinburgh, in 1816. It consists of aerometric beads, by which the specific gravity of the milk is tried when first new-milked, and next when the cream is removed. When milk is tried as soon as it cools, say to sixty degrees, and again after it has been thoroughly skimmed, it will be found that the skimmed milk is of considerably greater gravity ; and as this increase depends upon the separation of the lighter cream, the amount of the increase, or the difference between the specific gravity of the fresh and skimmed milk, will bear pro-

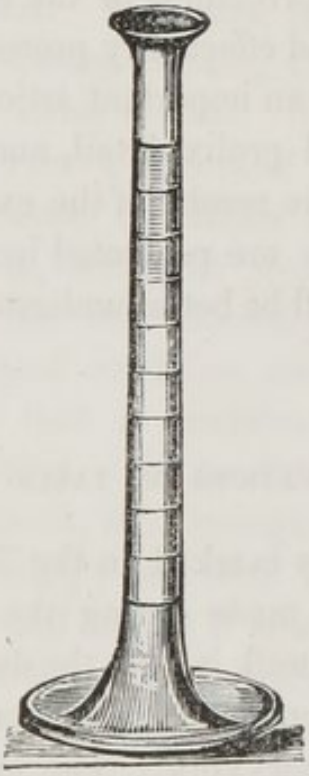
portion to, and may be employed as a measure of the relative quantities of the oily matter or butter contained in different milks. The specific gravity of skimmed milk depends both on the quantity of the saccharo-saline matters, and of the curd. To estimate the relative quantities of the curd, and by that determine the value of milk for yielding cheese, it is only required to curdle the skim-milk, and ascertain the specific gravity of the whey. The whey will, of course, be found of lower specific gravity than the skimmed milk, and the number of the degrees of difference, affords a measure of the relative qualities of curd. According to this hypothesis, the aerometric beads may be employed to ascertain the qualities of milk, relatively both to the manufacture of butter and cheese.*

But the most simple and accurate method of ascertaining the specific gravity of milk, is by means of a graduated bottle, of the capacity of 1000 grains of water, which is adopted as a unit or standard of comparison. The writer caused a small glass bottle, with a long and slender neck, to be made in form like that represented below, and hav-

* Trans. High. Soc., Sec. V. Part I.

ing weighed it accurately, introduced into it exactly 1000 grains of pure water, and marked the level of the water with a file on the neck of the bottle. The bottle thus graduated and filled with milk to the level of the water mark, of course, when weighed at the same temperature, indicated with great correctness its specific gravity in relation to this standard.

The simplest and best description of lactometer for ascertaining the relative *richness* of milk by the cream it yields, is a glass tube one inch in diameter and twelve inches long, supported by a foot, as exhibited by the following cut.



Ten inches of the tube are graduated into as many equal parts, and the three upper divisions of the instrument are each subdivided into ten others, which being numbered from the top downwards, form a scale of hundredths. Being filled up to ten inches high with milk, and kept at a suit-

able temperature for twelve hours, the cream it contains will rise to the surface, and the scale denote at a glance the *per centage* of cream compared with the milk. To ascertain the quantity of curd in the milk, first take off the cream, and having coagulated the milk, separate the curd from the whey, and the residue of whey, as indicated by the gradations of the instrument, will show the relative per cent. of curd. These particulars have been presented, because it is believed that they can scarcely fail to be both interesting and useful. With these instructions, any person in ordinary life who is not a practical chemist, and is without the convenience of a laboratory, may yet by simple and easy experiments test the correctness of the statements offered to his consideration, and effectually protect himself from fraudulent imposition in an important article of diet.

In order to avoid prolix detail, and also for more convenient reference, the results of the examinations of different samples of milk are presented in tabular form. The Tables, however, will be better understood by a few explanatory observations.

OBSERVATIONS ON TABLE NO. I.

Sample No. 1, as marked in the Table, is the average of ten experiments, made during the months of July and August, 1841. The milk is from the dairies of Messrs. Husted and Mead, Greenwich, Connecticut, about thirty miles from the city of New-York. The cattle drink from the running brook, and, whilst the season permits, are allowed to range and feed on the herbage of the fields, without restraint. The milk is conveyed to the city by wagons and steamboat, in tin canisters, nicely fitted to a square box. In hot weather, the interstices are filled with ice, and a

similar precaution is always found sufficient to protect it from the greatest heat. The milk is distributed to the customers in excellent condition from wagons once a day in winter and twice a day in summer, six days in the week. On Saturday the enterprising proprietors, by an arrangement with the neighboring farmers, are enabled to furnish a duplicate supply of milk, so as to rest on the Sabbath. The author, having visited these dairies, and his family having been supplied with milk therefrom for nearly three years, he is from personal knowledge enabled to state these particulars.

No. 2 is the result of five examinations, made during the month of August. The milk is from Messrs. Lee and Wolcott's New-Jersey Grazing Company, near New-Brunswick, fourteen miles distant. The cattle enjoy an unrestrained range over a thousand acres of uninclosed pasture; and the general conditions essential to the production of good milk, are most probably fulfilled. The concern appears to be very honestly conducted. The milk is brought in good condition, and with the most satisfactory assurances that it contains not a particle of adulteration of any kind As no distribution of the milk is made on the Sabbath, it is brought from the country late on Saturday evening; and with the usual precaution of scalding the milk and setting it in a cool place, no difficulty in preserving it sweet is experienced.

No. 3 is also the result of five specimens, from Morris's dairy, Morrisania, Westchester county, eight miles from the city. The establishment numbers at present about one hundred and thirty cows; they are stabled only at night for the convenience of milking, and during the day, while the season permits, are allowed to graze in the pastures. The food of the cattle consists of herbaceous and

granular substances, such as grass, hay, Indian meal, ship-stuff, and occasionally small portions of ground oil cake; and, as we are assured, the treatment necessary to the healthy condition of the cattle and the production of pure milk, is carefully observed. The milk is conveyed to the city in carriages fitted for the purpose, and distributed to customers in good style, and, as is affirmed, without dilution or adulteration of any kind.

No. 4 is the average of three samples. The milk is understood to be brought to the city by a Mr. Fisher, who is chiefly supplied by the farmers at White Plains, twenty-eight miles distant. It is doubtless produced from natural food, by healthy cattle, and is presumed to be unadulterated.

No. 5 is the average result of five examinations. The milk is brought from Townsend's dairy, Astoria, Long Island. We have no other particulars except the declaration of the distributer of the milk, that the dairy is properly managed; and the fair quality of the article would lead to this conclusion.

No. 6 is a sample of milk from a city-fed cow, which was stabled at night, and during the day usually allowed the range of a small yard. Her food was chiefly the refuse of kitchens, some hay, leaves of vegetables, and every day a mess of Indian meal or shorts. The milk, as will be seen, was not deficient in nutrient properties; but it was invariably acid, even when fresh drawn, as shown by tests, though not perceptible to the taste. And this peculiarity we have found an unfailing characteristic of milk similarly produced by city-fed cows, which proves that it is less healthy than pure country milk.

Those dairies only are mentioned, whose milk was subjected to examination; but besides the foregoing, there

are numerous others which produce pure and healthy milk.

OBSERVATIONS ON TABLE NO. II.

Samples No. 7, 8, 9, 10, and 11, in the second Table, are the average of numerous examinations of milk from slop dairies, located in Brooklyn, Williamsburgh, Greenwich village, and near Johnson's distillery, New-York. A difference will be observed in the proportions of cream and curd in some of the specimens; but this may be readily explained without supposing that there was any radical difference of quality. Each sample, as shown by appropriate tests, was acid; and each being produced by cows fed on slop and confined in stables, they were all essentially alike, of course undeserving of a distinct or more particular notice.

No. 12 is the average of four specimens of milk from Underhill's dairy, at the Wallabout, two or three miles distant from the city. We were induced to visit this overgrown slop-milk concern, in order to obtain by personal investigation and inquiry a correct knowledge of its condition and management. The whole arrangement appears to have been made for the purpose of consuming on the spot, the slop of Wilson's extensive whisky distillery, to which it doubtless forms an important and profitable appendage. The number of cows, we were informed, was about 200. They are shut up in a long range of low, filthy pens, adjoining the distillery, for the greater convenience of receiving the slush hot from the tanks without the expense and trouble of cartage. We should not omit to mention that about twenty cows belonging to the dairy were kept, it was said, on dry feed without slop; but whether the milk of these cows was sold separately, or in what

other way it was made available to the credit of the concern, we did not learn. The samples of milk examined contained, as will be seen, more cream and curd than some other slop specimens, which may be explained by the supposition that the milk contained less water; the difference affords no proof that it is either more pure or healthy than other slop-milk.—But as it respects the dairy, after a careful inspection we are compelled to admit, that we discovered nothing worthy of notice in which it differed from the repulsive and disgusting condition of other slop establishments that we have elsewhere described. We also learned that the proprietor of the distillery himself kept ninety cows, the milk of which he sold to the small retail dealers.

The samples of milk referred to in the tables, are of new or uncreamed milk. This is important to be known, because the specific gravity of milk is materially affected by the cream, which is specifically lighter than the other constituents.

TABLES

Showing the Specific Gravity, Characteristics, and rate per cent. of Cream and Curd by Measure, contained in different Samples of milk.

TABLE I.

MILK OF COUNTRY DAIRIES.				
Samples of Milk.	Specific gravity.	Characteristics.	Per cent. of Cream.	Per cent. of Curd.
Number 1	1.030	Alkaline	10	12
" 2	1.029	Alkaline	10	11
" 3	1.028	Alkaline	9	9
" 4	1.026	Alkaline	8	9
" 5	1.027	Alkaline	8	10
" 6	1.026	Acid	7	9

TABLE II.

MILK OF DISTILLERY-SLOP DAIRIES.				
Samples of Milk.	Specific gravity.	Characteristics.	Per cent. of Cream.	Per cent. of Curd.
Number 7	1013	Acid	$3\frac{1}{2}$	4
" 8	1013	Acid	$3\frac{1}{2}$	5
" 9	1015	Acid	4	4
" 10	1016	Acid	5	5
" 11	1016	Acid	$4\frac{1}{2}$	5
" 12	1024	Acid	6	8

These examinations demonstrate, that slop-milk contains less than half the nourishment of the milk which is produced from grasses and other natural food; of course, one quart of pure milk is worth as much for dietetic or culinary purposes, as two quarts of the vapid distillery slush; and such is the unvarying testimony of those persons who have tried both kinds. The proprietor of an extensive refectory states, that for several months in the year the ordinary consumption at his establishment was about eighty quarts of distillery milk daily; but since the introduction of the pure article, although the business of the concern has increased, a little more than half the quantity of milk formerly used, suffices for prepared dishes, whilst the demand for unprepared milk as food, has considerably augmented. The keeper of a large hotel remarked, that a few drops of good milk will color and flavor a dish of tea or coffee, whilst of slop-milk so much must be introduced, as to spoil the taste, and cool the beverage below an agreeable temperature; and in preparing and cooking various dishes, pure milk not only greatly improves their savor and quality, but so diminishes the proportion of more costly ingredients as to make it an economical saving in that article, of at least 50 per cent. The conductors also of many other similar establishments, of boarding-houses, etc., besides numerous private families who have had opportunities of comparing and judging correctly, concur substantially in the foregoing statements.

But there is another fact ascertained by experiment, which should go far towards settling the question of the innutritiousness of slop-milk. The nutrient properties of milk, we have shown, consist chiefly of *oil* and *albumen;* but so deficient is slop-milk of these essential attributes, that it is incapable of producing butter or cheese. A coagulum of

sufficient consistence and cohesiveness for cheese-making cannot be obtained from it; and whilst the milk of one good cow properly managed will afford one pound of butter daily, the milk of the largest dairy that is fed on slop alone, will not by the ordinary process of churning yield one ounce. It is true, that when the milk is set to cream, a thin white pellicle or scum rises to the surface, but when churned it does not collect and coalesce so as to compose butter, but, by the agitation, is diffused through the liquid in the form of froth. If then it were pure, and possessed no deleterious properties, it does not afford the nourishment that is requisite for the growth and sustenance of a child. On this point, any necessary amount of professional testimony might be adduced, but in this place a single extract may be sufficient. Says a physician: "A greater blessing cannot be conferred upon the community than by producing a thorough reformation in the milk department. It is a subject in which the health of thousands is involved. I have given some attention to it from the circumstance of having the constitution of a fine boy, the delicacy of whose mother compelled her to nurse from the bottle, entirely undermined, and scarred with blotches to this day; while my other children, nursed at the breast, enjoy perfect health. Uncertain of the cause of my boy's pining and drooping, it at length occurred to me to analyze the milk, which I found to be the mere dregs of a distillery; scarcely *one particle* of *nutriment* to a *pint*. I found a pint of warm water, a teaspoonful of flour, and two grains of magnesia to contain more nutriment than a pint of swill, called milk.

"It has often occurred to me as surprising, that while we have municipal laws to regulate the quality of bread stuffs, and other articles of food, the corporation should be

perfectly reckless of what we are compelled to administer to the stomachs of our children. There is not a more certain poison in the form of food, than this swill-milk. Besides its deleterious properties, it does not contain sufficient nutriment to support a child. I am convinced that there is no other cause so baneful to the health of a community of children. The *price* of good milk, should never be an objection to its use. For myself, I would sooner pay two shillings a quart for milk from grass-fed cows, than take the swill at any rate." As analysis, facts, and experience speak one language on this subject, we will not despair of success in this much needed reform.

But deficient in nutriment as slop-milk is, and must be, inasmuch as it partakes of the weak and diluent properties of the slush from which it is produced, yet, as we firmly believe, it is never sold to the consumer as it is drawn from the cow, but is frequently *drugged*, and *always diluted*.

Slop-milk is naturally very thin, and of a pale bluish color. In order to disguise its bad qualities and render it saleable, it is necessary to give it color and consistence. That it is often adulterated, is proved by analysis, and the confessions of those who from principle have relinquished the practice. Starch, sugar, flour, plaster of Paris, chalk, eggs, anatto, etc., are used for this purpose; such substances being preferred, of course, which have the strongest affinity for the fluid, and will not readily precipitate.*

* The presence of flour, starch, etc., in milk, may be detected by adding to the milk a solution of iodine in alcohol, or by adding a little nitric acid to the milk, and then a few drops of a solution of iodine of potassium. Either of these tests communicates a blue color to milk or cream which contains arrow-root, rice-powder, flour, or any other substance of which starch is the constituent.—*Domestic Chemist*, p. 148.

These adulterations enable the vender to give the milk a proper consistence and a beautiful white color, so as to dilute the wretched slush with about an equal quantity of water, without detection. We have frequently observed insoluble residuums at the bottom of milk vessels, but have never submitted them to analysis.

The custom of watering this kind of milk is notorious, and we believe, is universal. We have never known an instance where the practice has been charged upon the venders, under circumstances in which truth might be expected, that they have dared to deny it. In a visit for information on the objects of this work to one of the larger slop-dairy establishments, where many of the proprietors were present, one of them remarked that he sold three qualities of milk at three different prices, viz. four, five, and six cents a quart. We inquired the difference. He said he sold the *real* milk at six cents a quart. "What," we exclaimed, "is there no water in it?" He was inclined to deny that there was; but others had confessed that they diluted their best milk, and a denial in his case would have been contradicted by every other man present. "And sure, sir," said he, "you would not have me cheat my customers. I put in just water enough to give good measure without wronging myself, which pleases them and makes the tale of the milk hold out." "And how is it," we inquired, "with the five cent milk?" "In that," said he, "I put more water." "And how with the four cent milk?" He replied: "In it I put as much water as I please." These statements, as no man impugned them, were probably near the truth. Another dealer remarked, that whether the milk was sold at four, five, or six cents a quart, his rule was to make it average six cents a quart for the undiluted milk. Of course, that which he sold at four

cents, was one third water. But the others disputed this statement, and said he put in far more water than that proportion, which was, at least, a virtual admission that such was their own custom.

Mixing water with milk is by many esteemed a venial offence, because they regard it merely in a pecuniary point of view. But it should be considered as involving interests of far greater magnitude. It is the deterioration of an indispensable article of food, which in its best condition as furnished by the slop establishments is insufficient to support life; and by relying upon it in this depraved and diluted state, as is done in thousands of instances, as the staple diet of young children who are incapable of understanding or of expressing their wants, the most serious consequences ensue; for without adequate nourishment they must inevitably perish of exhaustion. Besides, we see not why the vending of such a drugged mixture, or merely diluted with water, is not as fraudulent and more iniquitous, than to pass pewter for silver. A man is sent to prison for uttering a spurious piece of coin, which cannot damage the receiver beyond its pretended value. But here, by basely counterfeiting an indispensable article of food, and imposing it upon the unsuspecting for that which is not what its name imports, health is deranged, lingering and distressing diseases are induced, and life itself is destroyed with impunity.

CHAPTER XXIII.

DELUSIONS ON THE SUBJECT OF MILK.

Instructions of experience.—Prevalence of popular mistakes.—A knowledge of our ignorance important.—Diseased food always unhealthy.—Illustrated in the case of the human infant—Influence of drugs on the child when taken by the mother.—Sensibility of the infant system.—Analogous inferences.—Practical importance thereof.—Water, as a diluent.—Milk the natural food of the infant.

As this subject, in its relations to health, addresses itself chiefly to observation and experience, a labored exposition of the principles of dietetics would be irrelevant to our object. No fact in physiological science is more clearly ascertained, than that health and life are affected by the quality and condition of the food received into the system. The instructions of experience on this subject are so uniform, that the multitude, though unaccustomed to investigate the intricate relations of cause and effect, and uninstructed in the principles and phenomena of life, are yet in many cases not necessarily betrayed into very serious or dangerous mistakes.

But the origin of some popular errors which have proved extensively mischievous, has been more involved in mystery, or so far removed from casual observation, that men intelligent on other subjects, have regarded the evils resulting therefrom as the inevitable condition of humanity; when, in fact, they were the penalty of ignorance, which a knowledge of organic and physical laws would have enabled them to remove.

Witness the delusion which until recently prevailed, in the use of alcoholic beverages, to an extent that threatened to desolate the nation. Many saw and deplored the evil; all in some way were sufferers by it; and some few were intent upon the discovery and application of a remedy. But the great mass of mankind, both learned and unlearned, were so effectually entrenched behind their ignorance or their prejudices, that the ravages of the destroyer continued unchecked; and the annual sacrifice of hundreds of thousands of victims failed for successive generations to secure the practical appreciation of a few plain physiological truths, which were of sufficient efficacy to have arrested the evil.

A knowledge of our ignorance, therefore, is the first step to its removal. Every reform that has ever been projected, whether physical, moral, or political, has progressed *pari passu* with the conviction that some new truths were to be learned, or some new principles were to be developed, which while they deeply concerned the individual, would on their adoption confer important benefits upon society.

That the public, at present, is beguiled into the support of a system which is replete with injurious consequences, cannot, we think, be doubted. So far as the subject relates to health, how many are there who seem to act on the principle, that it is of little consequence what they eat, or what they drink, provided they do not indulge to excess—than which a more irrational and destructive doctrine was never propagated. Improper or diseased food is always inimical to health. The positive injunction of the Mosaic law, which prohibited the eating of diseased flesh, or of cattle that died of themselves, was founded on this principle, and was as much a humane dietetical regulation, as a

matter of civil polity in regard to the Hebrew nation. There is no danger of overrating the importance of this subject. And as it is essential to the desired reform, that correct opinions prevail on this point, it will be useful briefly to illustrate the principle; for all, on reflection, will be convinced, that the milk of diseased animals, kept on unnatural food, when used as an article of diet, must be inconsistent with the principles of organic life, and is contrary to all our knowledge of the connection which subsists between living bodies and the appropriate forms of matter by which they are sustained.

Who does not know, for illustration, that the health of the infant is affected by the condition of the sustenance it receives from its mother? We speak not now of hereditary disease, by which the iniquities of the parent are visited upon the children, or of infectious diseases by which a healthy body becomes diseased by contact or otherwise; but of those induced by the noxious qualities of the infant's aliment consequent upon the deranged health of the mother. Is the mother diseased? The virus generated in the vitiated secretions, taints the nourishment, and is communicated to the child.

The influence which many medicines have over the sucking infant when taken by the nurse, is well known. "Children," says Pereira, "may be salivated by sucking nurses under the influence of mercury, or purged by the exhibition of drastics, or narcotized by the administration of opiates to the nurse. These are facts," he remarks, "of the greatest moment in reference to the frequency of *disease in cows*, and to the possible morbific character of their milk."*

* Mat. Med., Part II. p. 1407.

So sensible, indeed, are the delicate organs of the babe, as to be injuriously affected even by the strong mental emotions of the mother, (see page 97,) and in a greater degree by almost the slightest changes or irregularity in her diet. Acidulated draughts, as every nursing mother knows, when taken by herself will produce pain and irritation in the system of the infant; while tepid herb beverages, which are slightly anodyne, will produce their appropriate effects by assuaging pain and inducing sleep. If wine, beer, or toddy is used by the nurse, the narcotic properties of these liquors on the child are manifested by the drunken lethargy that ensues, which is as pernicious, unnatural, and unrefreshing as is the stupor of opium.*

If these facts cannot be disproved in the relations of the child to its mother, neither can they be when its food is derived from any other source. Unwholesome aliment,

* Indulgence in the use of stimulating beverages by mothers has probably been more destructive to their own health, and to the health and lives of their offspring, than any other cause that can be mentioned. Whilst any desirable amount of medical evidence might be adduced in support of this position, it must here suffice to quote the testimony of Dr. Courtenay, of London, who in a period of about eight years attended 1127 mothers, as their professional adviser; and he invariably found, other circumstances being equal, that those who never tasted malt liquors, wine, or spirits, enjoyed the best health. "Mothers," he affirms, "who could never nurse their children under the ale and porter system, without greatly suffering in health, after relinquishing the use of these baneful stimulants, have experienced perfect freedom from disorder during lactation. Nor was this all: the offspring of such mothers have enjoyed an unprecedented immunity from disease also." He carefully informs us that he refers to "the ill effects of the *moderate*, not the immoderate use of these falsely denominated strengthening beverages." He adds: "thousands of children are annually cut off by convulsions, etc., *from the effect of these beverages acting through the mother.*"—*London Lancet*, Feb. 1840.

by whatever cause produced, can never sustain the body in health and vigor; but on the contrary, will induce much physical suffering, and, in proportion to its use, make direful inroads on human life.

But whilst the principle in the abstract may appear too obvious to be disputed, its bearings upon health in the subject before us, having never been an object of inquiry, are, of course, not understood; and yet the happiness, health, and lives of multitudes, depend upon its correct, practical appreciation.

Next to water, which is nature's own beverage and the proper diluent for man, milk, even in our artificial modes of living, is an article of indispensable necessity, and universal use. Every man and every woman, therefore, but especially every child in the community, has an important stake in this matter, which it becomes parents and those on whom the responsibilities of life rest, seriously to consider.

Milk is the natural food of the infant. It is the first, and during the feebleness of early life, the only aliment. All are born with an appetency for this natural fluid, which neither cooking nor chemistry can imitate; and the relish for its use is seldom lost, except as the taste becomes vitiated by luxurious and unnatural indulgences. Holding a medium place between animal and vegetable diet, when pure it is at once the most palatable, healthy, and nutritive aliment with which our nurseries and tables can be supplied. It is not surprising, therefore, that immense quantities are used, or that so much importance should be attached to it as an article of diet for children.

We possess no certain data by which to estimate the proportion of the infants in our populous cities that are reared by hand; but the average, for obvious reasons, is

far greater than in rural districts. Many mothers in our large towns, from constitutional feebleness, and others from infirm health, are incapable of nursing their offspring; but far more from unnatural and justly reprehensible habits of life, completely disqualify themselves for discharging this important and endearing duty. Hence, in the judgment of several distinguished medical practitioners, whose ample opportunities for observation entitle their opinions to respect, more than *three-fourths* of the infants born in our cities, are sustained in whole or in part on artificial diet. In some instances semi-fluid farinaceous substances, etc., are prepared as substitutes for the natural food of the infant; but as a general rule, cow's milk, being cheaper and most readily procured, is regarded as the grand *succedaneum*. This, certainly, is a correct conclusion, provided the milk is pure; for such milk is more analogous to the infant's natural food, and is better adapted to its digestive organs and sustenance than is any artificial preparation. But, unfortunately, it is not pure milk, but the diseased and innutritious slush we have described, which is substituted for the nourishment of the maternal breast, at a period, too, when the powers of life are most feeble, and when the demands for healthy and appropriate aliment to supply both the consumption and growth of the system, are most imperative. Sickness, and an extensive waste of life might be expected as the inevitable consequences of so flagrant an outrage of the laws of organic existence; and such we believe is the result, as is indicated by the excessive infant mortality in our cities. Yet among the many excellent treatises published on the hygienic treatment of children, not one has referred to the pernicious influence of bad milk, although, as it respects them, this holds the most important place of all aliments. Such, indeed, is the ab-

solute want of information on the subject by the great mass of the people, that its noxious properties are not even suspected, although there is strong probability that it is annually destroying thousands. With the earnest desire, therefore, of inciting physicians to observe and record facts as a basis of future deductions on the subject, and of arousing those interested to its immediate consideration, we next propose to show, more fully than we have yet attempted, that the evils attributed to this pernicious article of food, appear to be sustained by experience, facts, and probable arguments.

CHAPTER XXIV.

INFANT MORTALITY IN FOREIGN CITIES.

Infant physiology.—Analogies of nature.—Physical and moral debasement in Paris.—Also in London.—In Liverpool.—Birmingham.—Glasgow, etc.—Consequences therefrom.—Infant mortality in England.—Foundling hospitals.—In Paris.—London.—Amsterdam.—Glasgow.—Improvement in the duration of adult life.—Also of infant life.—Table of infant mortality in London.—General diminution of infant mortality.—Deductions.

A POPULAR writer on infant physiology remarks, "that the successful rearing of every living being depends chiefly on the proper adaptation of its treatment to the laws of its constitution. When these are in harmony, the failures will be few and unimportant, and arise chiefly from those unavoidable accidents and exposures, to which all created beings are, and will continue to be, more or less subjected. But where the treatment and laws are not in harmony, failure, disease, and untimely death, may be expected as the most frequent and certain results."*

That these principles are correct, is shown by the analogies of nature. In the young of the lower orders of animals which in physical structure most nearly resemble man, though guided merely by brute instinct, the cases of mortality amongst them are few, compared with what occur in the human family. Whence this difference, if not attributable to different modes of treatment? In the former case the unerring dictates of nature are implicitly obeyed, which secures the safety and welfare of the animal;

* Combe on Infancy, p. 21.

whilst in the latter case, boasted human reason either disdains to consult, or misinterprets and perverts, the laws of its own being; and suffering, disease, and excessive mortality are the necessary consequences. "If it were only," says Dr. Combe, "in wild and barbarous regions that this extraordinary mortality occurred, it might seem quite in accordance with the hardships with which even infancy is there surrounded; but the startling circumstance is, that it happens in the midst of comfort and civilization, precisely where the knowledge and means of protection are supposed most to abound."

We cannot glance at the destitution, vice, and suffering, which, as described by their own writers, extensively prevail in European cities, without the conviction that the conjunction of numerous unfavorable circumstances must make fearful havoc, especially of infant life, and thus greatly augment the bills of mortality. "In France," a late writer remarks, "out of a population of thirty-two millions, twenty-two millions have but six cents a-day to defray all expenses—food, clothing, and education."* It is easy to conceive that a population in such poverty must be extremely ignorant and degraded, and life be one ceaseless conflict with physical want. And what is true of the destitution and suffering in rural districts, is also true, under circumstances of peculiar aggravation, in populous towns. In 1833, according to the published tables, the pauper population of Paris, described as indigent poor, amounted to 77,200; but the Office of Charity relieved 90,000. In the hospitals there were 13,700 sick and infirm persons; it is also stated that there were 19,886 foundlings. Dalure says that 7,850 children in one year were abandoned by their parents; and in 1827 they amounted to 8,084.†

* A. Brisbane. † Annuaire pour l'An. 1829. Paris.

In the city of London, there is probably more vice, degradation, and wretchedness, than in any other city in the world. In that city it is estimated there are always 12,000 children undergoing a system of vicious training, to fill the ranks of those who are removed by transportation, imprisonment, violent or natural death; 30,000 persons live by theft and fraud; 3,000 are regular receivers of stolen goods; 10,000 are addicted to gambling; and 20,000 are beggars about the streets; 15,000 are set down as habitual gin drinkers; 23,000 are annually found drunk in the streets. There are 150,000 who have abandoned themselves to systematic debauchery and profligacy; of these, 80,000 are females, one tenth of whom die annually under circumstances of wretchedness and suffering of which the mind can hardly form a conception.* It is evident where so many paupers, drunkards, gamblers, thieves, beggars, vagrants, and prostitutes, are congregated within the area of so small a spot of earth, no extensive social providence favorable to the nurture and protection of infant life, can be supposed to exist. On the contrary, profound ignorance and utter recklessness of those fixed laws which regulate life and health, and upon the observance of which existence depends, must inevitably inflict upon the population the consequences of their violation; and infant life, from its very feebleness and helplessness, will first and most extensively suffer.

The Journal of the Statistical Society for January, 1840, states, that in Liverpool there are 7,862 inhabited cellars, damp, dark, filthy, ill-ventilated and loathsome; and in these lodge 39,300 persons of the laboring class. In Manchester, of 132,230 working people, 14,960 live in cellars.

* See Statistics of Crime in London.

'So great," says Gaskell, "is the moral and social degradation in the female sex among this class of the population, as to reduce them below the level of the savage state. Upwards of two-thirds of all the children born to this class in Manchester, are brought into the world by the aid of public charity. The mother pursues her toil almost till the hour of delivery—to abandon her tender and delicate infant, after the interval of a few days, to other and hireling hands;—again to pursue her usual routine of work."* In Bury, one third of the working classes are so badly off, that in 773 houses, one bed serves for four persons; in 207, one for five; and in 78, one for six human beings. In Bristol, 46 out of every 100 of the working people, have but one room for a family.

A member of the British Parliament recently read in his place, several letters from his constituents in Birmingham, which state, that in all the manufacturing districts, the number of insolvent debtors has been so great, that the prisons cannot contain them, and many of them are therefore discharged for want of room—only to find a place in the workhouses. The workmen with large families, it is affirmed, receive only from six to eleven shillings per week, and the poor creatures are obliged to crowd together in dwellings, "that are even unfit for brutes."†

In Glasgow, thirty thousand Irish and Highlanders, according to the description of Dr. Cowan, "wallow in filth, crime and wretchedness, in the cellars and wynds of this great commercial city." From ten to twenty persons of both sexes, lie huddled together in their rags and filth on the floor each night. From other sources we learn, that the scenes of wretchedness are indescribable. In that city alone in 1837, there were 21,800 cases of fever.

* Gaskell on Infant Labor, p. 168. † English paper.

The registrar-general states, that he has seen in one small garret, the husband sick of a typhus; a sick child laid across the sick man's bed; two others sleeping under the bed; the two window recesses let to two Irish lodgers at sixpence a week, as resting places for the night; the wife, a young healthy woman, lying in the same bed with her husband for the night, and supporting the family by taking in washing, which was hung across the room to dry—the parish authorities having forbidden the exposition of linen out of the windows!*

It were easy to multiply similar descriptions, if these were not sufficient for our purpose. But the social, civil, and moral evils which afflict large masses of the population in foreign cities have been so often depicted by others, it is unnecessary to enlarge upon them.

With these appalling pictures of wretchedness, destitution, and demoralization before us, we need no statistics to prove that there is a prodigal waste of infant life. No argument is required to show, that those who cannot provide for themselves, are not likely to provide for their offspring; and a little neglect at a period when most care is needed, is sufficient to induce disease and early death. Under such circumstances, how few are the probabilities in favor of infant life! When such ignorance of the laws of life, and destitution of domestic comfort exist, it is more surprising that any survive among these classes, than that multitudes perish.

Children in such conditions of society, are regarded as burthens and not as blessings; and as self-preservation is even stronger than natural affection, they are cast off, as we have seen, to perish by thousands, or peradventure to

* London Quarterly Review, July, 1841.]

be rescued to die in the hands of public charity; for, deprived of maternal care, the chances of life are essentially diminished, as is shown by the proportion of deaths in Foundling Hospitals, which must greatly swell the annual returns of infant mortality in these places.

According to the report of the registrar general, the average proportion of mortality under the age of one year in England and Wales, is 214.54 per 1000, or about 21 per cent.; whilst that of the foundlings in Madrid was 67 per cent.; in Brussels, from 1812 to 1817, 79 per cent.; and in 1811 at Vienna, 92 per cent. Here is exhibited an excess of mortality induced by secondary causes, *three* and even *fourfold* above what occurs in private life. Dr. Combe, referring to these statistics, remarks: "Facts like these speak with an authority which no one can venture to reject, and show how entirely infant health and life are made to depend on our fulfilment or neglect of the laws which the Creator has assigned for the regulation of the infant constitution."*

But to return. For a full confirmation of these views, as to the extensive destruction of infant life, it is only necessary to examine the records of mortality in the cities referred to. In Paris, in 1818, the total number of deaths was 22,421, of which 3,942, or 17.58 per cent. were under the age of one year; and 24.86 per cent. died before the expiration of the second. In London, in 1829, the whole number of deaths was 23,526; of these 9,057, or 38.40 per cent., died under the age of five years. The total deaths registered in Liverpool in 1838, were 6,553, of which 3,162, or 48.23 per cent., were under the age of five years. In Amsterdam, from 1819 to 1829, the deaths

* Combe on Infancy, p. 31.

within twelve months after birth, amounted to 22.73 per cent. In Carlisle, the average mortality under five years, for a period of eight years, was 40 per cent. In Glasgow, in 1830, out of 4,694 deaths, 2,000 were under five years, or 42.58 per cent. Similar returns from other populous towns might be introduced, but as the foregoing may be supposed to represent the average infant mortality of European cities, they are sufficient for our purpose. The average of the whole, makes the annual deaths under the age of five years, 42.24 per cent. Here is a waste of human life which humanity shudders to contemplate. But there is one circumstance which appears to relieve the darkness of the picture. This decrement of vitality is now less than in former periods, and is progressively diminishing.

Populous cities have justly been denominated the graves of mankind. It has been remarked in relation to several European cities, so great was the infant mortality, that the population was only sustained by immigration. But as the means of subsistence, general intelligence, and a knowledge of the conditions which are essential to animal existence have increased, many destructive influences have been removed, and others have been rendered comparatively innoxious. There is but little doubt, that where insuperable natural causes unfriendly to life do not exist, cities may be so adapted to the necessities of the animal organization, as scarcely to diminish the probability of health and life in any degree. It is certain that the healthiness of European cities has greatly increased within a century, and the mean average duration of life prolonged. Dr. Hawkins says,* that the decline in the mortality

* Vide Hawkins' Medical Statistics, *passim*.

is even more remarkable in large cities than in rural districts. In London, for example, in the year 1647, the total deaths were about 21,000; whereas, a hundred years afterwards, in 1797, the amount was only 17,000. In the middle of the last century, the annual mortality in that city was about 1 in 20; and by the census of 1821, it was abou 1, in 40. So that in the space of about seventy years, the chances of existence are exactly doubled in London. On the continent of Europe, we find that the duration of life has also increased, but in an inferior degree. In Paris, about the middle of the last century the mortality was about 1 in 25; at present it is about 1 in 32. In Sweden, the annual deaths from 1755 to 1795 were 1 in 37; and in 1823 they had diminished to 1 in 48. The annual mortality in Berlin was 1 in 28 from 1747 to 1755; but less than 1 in 34 from 1816 to 1822.

But whilst all statistical records show, that the average duration of human life has steadily augmented with the progress of civilization,* still the improvement is most striking

* One of the most interesting statistic views of the mortality of different countries, is that in which the influence of the progress of civilization is exhibited, by comparing the deaths to the population of the same country at intervals sufficiently long to admit of a decided social amelioration. The following summary exhibits the subject in a very striking manner.

In Sweden, the mortality compared with the population has diminished nearly 1-3d in 61 years; in Denmark 2-5ths in 66 years; in Germany 2-5ths in 37 years; in Prussia 1-3d in 106 years; in Wurtemberg 2-5ths in 73 years; in Austria 1-13th in 7 years; in Holland 1-2 in 24 years; in England 4-5ths in 131 years; in Great Britain 1-11th in 16 years; in France 1-2 in 50 years; in the canton of Vaud 1-3d in 64 years; in Lombardy 1-7th in 56 years; Roman States, 1-3d in 62 years.

The principal towns in Europe present the same gradual diminution, as might be shown by the proportions estimated for different epochs—but our limits will not permit. Vide *Am. Journ. Med. Science*, Vol. XIV. p. 515.

in regard to infancy. "In Geneva, tables of mortality have been kept since 1590, which show that a child born there has, at present, five times greater expectation of life than one born three centuries ago."* In other countries of Europe we have no returns extending through so long a series of years, and those furnished chiefly refer to adolescent and adult life; still the evidence is conclusive that the mortality has decreased in a far greater ratio amongst young children than adults. This might be shown at large of Paris, Manchester, Carlisle, Glasgow, and other populous towns, where the attention both of physiologists and political economists has been attracted to the subject. But as correct conclusions are best attained by computations on an extensive scale, it may be sufficient here to submit a tabular statement, which exhibits the ratio of the diminution in the mortality of infants in London during the last century. Figures do not always represent facts; but the following table, compiled by T. R. Edmonds, Esq. is entitled, we are assured, to the fullest confidence.

TABLE

"Showing the births and deaths under five years of age, according to the London Bills of Mortality, for 100 years, in five periods of five years each; also showing the number dying under five years out of 100 born."

	1730–49	1750–69	1770–89	1790–1809	1810–29
Total births,	315,156	307,395	349,477	386,393	477,910
Total deaths under 5 years,	235,087	195,094	180,058	159,571	151,794
Dying per cent. under 5 years,	74.5	63.0	51.5	41.5	31.0

Here then is indisputable proof that the diminution of infant mortality in London, during 100 years preceding

* Hawkins' Medical Statistics.

1829, was from 74.5 per cent. to 31.8 per cent.; and the same general result with some modifications, is true, as we have seen, of the cities on the continent. M'Culloch says of the above table, the "results were obtained by an unexceptionable method;" and referring to Carlisle statistical observations which relate to the decrease of infant deaths, he remarks: "If they approximately represent the mortality of England, the waste of life in the five years of infancy has almost diminished one half during the last hundred years;" and adds, "other observations support this probability."* But not to enlarge on a position so clearly demonstrated, we learn from this brief review of foreign cities,

First, that in them the average annual mortality of children under the age of five years, is about 42.24 per cent. of the total deaths.

Second, that notwithstanding the poverty, wretchedness and suffering of large masses of the population, there are still effective moral and physical causes in operation, which are gradually ameliorating their condition, protracting the duration of life, and greatly diminishing the aggregate of infantile diseases and mortality. We next recur to American cities.

* M'Culloch's Statistics of the British Empire, Vol. II. p. 524.

CHAPTER XXV.

INFANT MORTALITY IN AMERICAN CITIES.

Design of the preceding chapter.—Infant mortality in Boston.—Tabular view of infant deaths in Philadelphia.—Mortality of infants in New-York.—A principle established.—Inferences therefrom. —Infant mortality, not chiefly owing to atmospherical influences. —Atmospherical salubrity in New-York, etc.—What is the cause of the excessive brevity of infant life in American cities?

The primary object in the cursory survey of some of the chief European towns presented in the preceding chapter, is too obvious to require much explication. It was to obtain materials of comparison with our American cities. Having these now at command, we propose to arrange by the side of each other the facts already adduced, and the statistics of a similar nature, derived from official records in our own cities. This condensed view will indicate at a glance the difference of infant mortality, if any exists, in the two countries.

We begin with the city of Boston. The registration of interments in the burial grounds of that city, is intrusted to a superintendent, who keeps a faithful record of all the deaths in the city, specifying the ages, distinguishing the males from the females, etc., and a "General Abstract of the Bill of Mortality," is annually published. "Heavy penalties being imposed for burying without permission, it is presumed," says Mr. Shattuck, in his Vital Statistics of the city recently published, "that all, or very nearly all the deaths that have taken place in the city are recorded. And the bills, as far as they go, contain a faithful abstract of

the records, and may be generally relied upon as correct."*

The following Table which is compiled from the printed documents, exhibits in an average of three different periods of time, including a series of 29 years, the amount of infant mortality in Boston, and the per centage as compared with the total deaths.

Years.	Total deaths per annum.	Deaths under one year.	Between one and two years.	Between two and five years.	Total deaths under five years.	Per cent of deaths under five years.
From 1811 to 1820	8020	1375	832	491	2698	33.64
From 1821 to 1830	10731	1962	1220	793	3975	37.04
From 1831 to 1839	14483	2861	1781	1598	6240	43.09

Having ample materials, we exhibit a little more full the statistics of Philadelphia and New-York. The detail is important to our purpose, and can scarcely fail to be interesting.

"The authenticity of the Philadelphia bills of mortality," Dr. Emerson remarks, "may be regarded as resting upon very solid grounds. From authority vested in the Board of Health, this municipal power makes it obligatory upon physicians to give certificates designating the name, age, and sex of all who died under their care, and sextons are bound, by still heavier penalties, not to permit the interment of any dead body, until such certificate is obtained, which he returns on the last day of every week, for publication.† The following Table might have been extended farther back a few years, with some variation of result; but it appeared desirable to embrace a period corresponding in extent with the returns in New-York.

* Am. Med. Journ. April, 1840, p. 274. † Med. Journ., Vol. I. p. 117.

A TABLE,

Exhibiting the total deaths in Philadelphia, and of children under the age of five years, including a period of twenty-five years, viz., from January 1st, 1814, to January 1st, 1840. The still-born are excluded.

Years.	Total deaths per annum.	Deaths under one year.	Between one and two years.	Between two and five years.	Total deaths under five years.	Per cent. of d'ths under five years.
1814	2041	390	122	104	516	25.28
1815	1943	358	116	97	571	29.38
1816	2225	338	168	171	677	30.42
1817	2107	438	138	134	710	33 60
1818	2609	472	214	118	804	30.81
1819	2979	706	334	269	1309	43.98
1820	3189	650	307	241	1198	37.56
1821	2161	633	215	193	1041	48.19
1822	3334	696	243	193	1132	33.95
1823	4372	854	401	299	1554	35.52
1824	4284	936	384	364	1680	39.72
1825	3539	836	250	232	1318	37.21
1826	3845	844	380	285	1509	39.27
1827	3659	850	293	215	1358	38.75
1828	3971	933	395	329	1657	41.83
1829	4001	965	364	303	1632	40.78
1830	3948	1003	325	260	1588	40.22
1831	*					
1832	6699	1521	643	689	2853	42.58
1833	4440	1337	375	321	2023	45.56
1834	5073	1578	442	385	2405	47.40
1835	5666	1679	655	777	3111	54.72
1836	5373	1496	412	308	2416	44.94
1837	*					
1838	5168	1384			2552	48.10
1839	4765	1361			2461	51.83

* The returns for these years could not readily be obtained; but the general result is not thereby affected.

The subjoined table of deaths in New-York is entitled, it is believed, to greater confidence, than most European tables of this nature, where the report of deaths is not required to be made by medical practitioners. The existing regulation in that city requiring the sextons of the different public burying-grounds and cemeteries to furnish the city inspector with certificates from the attending physician, stating the age, sex, place of nativity, disease, etc., of each case of interment, under a heavy penalty for neglect, the returns, of course, are minute and accurate.

A TABULAR STATEMENT

Of the total deaths in the city of New-York, and of children under five years of age, including a series of 27 years, viz., from January 1st, 1814, to January 1st, 1841, excluding the still-born, which average about 5.24 per cent. of the whole number of deaths.

Years.	Total deaths per annum, still-born excluded.	Still-born and premature.	Deaths under one year.	Between one and two years.	Between two and five years.	Total d'ths under five years.	Per cent. of deaths under five years.
1814	1881	93	407	160	132	699	32.14
1815	2405	102	468	216	194	878	32.22
1816	2651	88	522	178	218	918	31.03
1817	2409	118	599	208	142	949	34.49
1818	3106	159	683	234	198	1115	37.02
1819	3008	168	847	306	188	1341	38.09
1820	3226	189	867	361	254	1482	38.87
1821	3368	174	825	369	261	1455	38.05
1822	3026	205	793	264	219	1276	35.42
1823	3221	223	899	315	230	1444	37.26
1824	4091	250	1072	397	389	1858	39.03
1825	4774	244	1109	386	300	1795	32.48
1826	4671	302	1232	476	350	2058	37.59
1827	4890	291	1336	546	389	2271	40.49
1828	4843	338	1427	460	339	2276	39.02
1829	4734	360	1390	496	465	2351	42.05
1830	5198	339	1547	575	517	2639	44.24
1831	5991	372	1757	663	592	3012	44.06
1832	9975	384	1922	830	965	3717	33.41
1833	5334	392	1724	552	468	2744	43.92
1834	8590	492	2603	900	861	4364	45.07
1835	6608	474	2176	707	732	3615	47.51
1836	7503	506	2332	1014	841	4187	49.06
1837	8182	550	1946	1001	961	3908	48 82
1838	7533		2051	983	802	3826	50.90
1839	7361		1968	976	752	3696	50.21
1840	7868		1959	1006	1011	3976	50.02

The foregoing tables, it will be observed, though varying a little in results, essentially agree in establishing a principle. Two particulars stand out with startling prominence. First, the enormous extent of infantile mortality. Second, the no less alarming fact, its steady increase. Here is a destruction of infant life, probably without a parallel in any civilized or barbarous community on earth. In two cities, New-York and Philadelphia, MORE THAN ONE HALF THE TOTAL DEATHS OCCUR UNDER THE AGE OF FIVE YEARS; and in the third city, Boston, where the mortality is least, it is *still greater* than the average in Europe.

It is both an appalling and an anomalous fact, that excessive as is the mortality, it is continually *augmenting*. We have shown that during the last hundred years, the diminution of infant deaths in London, has been from 74.5 per cent., to 31.8 per cent., and that the same principle is true of other cities in Europe. But in our American cities, as far back as satisfactory data can be obtained, there has been an increase of infant mortality in nearly the inverse ratio of its diminution in Europe. Results so opposite cannot proceed from homogeneous causes. In Europe the favorable change is with great probability ascribed to a more rational treatment of disease, and to the increased intelligence and improved condition of the people. But is the reverse true in this country? No informed mind will venture to affirm that it is. Our cities, in these respects, have not retrograded. On the contrary, in all that pertains to viability and economical influences they have progressed; and in several particular and general causes, which operate favorably on public health, they must be admitted to be in advance, not only of London, but of most other populous cities in the world. Such being the facts, by a parity of reasoning, a higher standard

of infant health, and a proportional diminution of deaths amongst them, might be confidently expected. But the tables demonstrate the fallacy of such inductions. Infantile mortality is greater amongst us than in Paris, where so many causes which are unknown here combine to destroy early life; it is *eight* per cent. above Glasgow; *ten* per cent. above Carlisle, and nearly *thirteen* per cent. greater than in London. It is, in short, so far as we are able to ascertain, greater than in any of the populous towns in Europe. Whether, therefore, we understand it or not, a cause for this extraordinary disparity exists, which operating in harmony with certain and unalterable laws, has for a series of years been geometrically progressing. What, then, is the cause of this excessive and increasing mortality?

Were we competent to the investigation *ex professo*, it would be inconsistent with the limited plan and design of this work, to enter upon a minute inquiry into the various causes which influence health and diminish or increase mortality. We, therefore, remark generally, that it cannot be justly ascribed solely to atmospherical influences, or to any peculiar insalubrity of climate; for the mean duration of human life, as shown by statistical computations, is greater in our American cities, than in the cities of Europe. The annual proportion of deaths to the population in

London,* are	1 in 35	Philadelphia†	1 in 47.86
Glasgow	1 in 44	Boston	1 in 41.26
Manchester	1 in 44	New-York	1 in 37.83
Paris	1 in 32		
	4)155		3)126.95
	38.75		42.31

* T. R. Edmonds, Lancet, Sept. 1836.

† Average of 14 years. American Medical Journ. Vol. I. p. 154.

Here is a demonstration that the American cities have an advantage on the scale of longevity of 3.56 per cent.

Is it objected that these results refer to the total deaths, and therefore afford no just criterion of the effects of climate on the infant constitution? In answer, we quote Prof. C. A. Lee, of New-York. "In proof of the general healthiness of this city (New-York), we would refer to the statistics of that most excellent institution, the House of Refuge for the Reformation of Juvenile Delinquents. This was founded in 1824; since which time there have been received into the institution 1670 children, of whom eighteen only have died, being a fraction over one per cent. Out of 919 children who have been received at the New-York Orphan Asylum since its establishment in 1806, there have been seventy-five deaths, of which eighteen occurred in the year 1834, making a total of 8.16 per cent., and deducting the deaths by cholera, 6 per cent. of the whole number. From 1814 to 1820 it is a singular fact that there was not a single death in the institution, though there were generally over a hundred inmates; and in 1832, during my attendance, there was but a single death among 120 children, of whom there were not more than ten that escaped an attack of cholera, thus proving that the most malignant diseases lose much of their fatality when met with prompt treatment and good nursing."* It is, therefore, leaping at a conclusion which is contradicted by facts, to refer the excess of infant mortality amongst us above what occurs in European cities to climate; for independent of the above considerations, if climate was the cause, then must its salubrity have been deteriorating for the last

* Lee's Medical Statistics, Am. Med. Jour. Vol. XIX. p. 27.

quarter of a century in the ratio of the increase of infant deaths—a position no one, we suppose, will undertake to defend.

Neither can it be ascribed to the physical or moral condition of the population. In regard to healthiness of situation, construction, etc., as well as atmospherical salubrity, the cities of New-York, Philadelphia and Boston, will not suffer by comparison with those referred to, nor perhaps with any of equal size on earth. In some particulars affecting the general health, such as the drainage of marshes, the widening of streets, better regulations for the removal of impurities, etc., these cities have not only been greatly improved, but as is shown by the official returns, and contrary to what the increasing infant mortality would indicate, the standard of health is higher than formerly, and the total annual deaths, according to the population, have ratably diminished. The waste of infant life in European cities, where so many causes conspire to produce it, is not a strange, but a natural result. The agents in the work of destruction, are too palpable to be mistaken. The extreme poverty which there exists, must give rise to numerous fatal diseases, and make direful havoc of infant life. But in this country the same causes do not exist, at least not in the same form, or to a very limited degree. Not only do the necessaries but also the comforts of life here abound, and are within the reach of all. Besides, the provident intelligence of the people, the social, civil, and economical advantages enjoyed, are decidedly greater than in the densely crowded manufacturing towns of the old world, where large masses of the people are condemned to wear out their lives in fruitless struggles to ameliorate their wretchedness. In addition to this, intemperance in the consumption of intoxicating drinks has greatly di-

minished amongst us, and, as the criminal statistics prove, with a proportionate decrease of the pauperism and vice, which are so generally the proximate causes of improvidence, disease, and premature death.

The question again returns: What is the cause of this excessive infant mortality, and of the difference which in this respect exists between American and European cities? The alarming fact that *more than half* the total deaths occur among children who perish in their infancy, is one which not only concerns the medical profession, but also every parent and philanthropist, and political economist; for if this frightful mortality is allowed to go on unchecked and increasing as for a few years past, the time is not distant when it will be a rare occurrence for a child born in our cities to survive the period of infant life. If the evil be unavoidable where large masses of people are crowded together, exertions to diminish it must prove unsuccessful, and it were a folly either to attempt impossibilities, or to complain of that which cannot be removed. But such is not the fact. Our records prove, that the present was not always the condition of our cities in this respect; while foreign statistics show, that the increase of this mortality, and the extent to which it now prevails amongst us is *peculiar* to our own country, and therefore not inseparable from the conditions of city life. No exertions therefore should be spared to discover, if possible, the cause or causes of this fatality, and the means which are competent to their removal.

CHAPTER XXVI.

INFLUENCE OF IMPURE MILK ON THE HEALTH OF CHILDREN IN CITIES.

Effects of immigration on the bills of mortality.—Immigrants in foreign cities.—Objections anticipated.—Excessive infant mortality chiefly owing to improper aliment.—Impure milk such aliment.—Objection considered.—Origin and progress of the evil.—Influence of other causes.—Extent of the evil.—Early extinction of infant life in cities not a design of Providence.—Certificate of physicians.—Duty in reference to the subject.

The extreme brevity of infant life has not escaped the observation of medical men, who have expressed various opinions upon the subject. Several concur in attributing it chiefly to the immense immigration of poor foreigners, who land in our cities destitute even of the necessaries of life, and being crowded together in narrow streets and imperfectly ventilated houses, engender diseases which prove fatal to infant existence. That the accumulation of foreigners (hitherto chiefly Irish) in our cities under these unfavorable circumstances, has greatly contributed to augment the aggregate of the annual deaths, none will dispute. Owing to the destitution, but more to the intemperate and consequently improvident and reckless habits of this class of population, it has been estimated that the average duration of life among *adults* after their arrival in this country, has not exceeded five years. But for this fatality among adults, it is evident, that the proportion of infant deaths, as compared with the total mortality, would be still greater than it now appears. Conceding, however,

all that can be fairly claimed on the score of immigration, it presents, we apprehend, an insufficient reason for the extent and increase of infant deaths amongst us; for the condition of the British cities to which we have referred, in regard to this class of population is as bad, if not more deplorable than our own, whilst the proportion of infant mortality is greatly against us.

The three principal ports through which immigrants enter Britian, are Bristol, Liverpool, and Glasgow. Liverpool, with a population of 185,000, is computed to contain 30,000 Irish; the population of Glasgow is 202,426, of whom 35,554 are Irish. In Manchester, Leeds, and many other manufacturing towns, the Irish, it is said, are proportionally numerous. Dr. Symonds, speaking of their circumstances on immigration, says, "we frequently found in Bristol a family of five or six adventurers, with one threadbare blanket between them. It is a common circumstance for a house to be tenanted by five or six families. We have found thirteen men, women, and children, living promiscuously in one garret of no very large dimensions. On one occasion, it happened to us to discover that thirty individuals had, on one night, slept in a room, the measurement of which did not exceed twenty-five by sixteen feet. The people thus congregated were Irish."* Dr. Walker, physician to the Huddersfield Infirmary observes: "The most irksome part of our duty is the visiting the vast number of Irish domiciled in the numerous lodging-houses; where we are never without some, and usually a large number of typhus cases. Last year it was very fatal. Two Catholic priests have fallen victims to it from attending these lodging-houses. We have now about forty or fifty

* Trans. of the Prov. Med. and Surg. Assoc., Vol. II. pp. 167, 168.

cases of typhus among the Irish, most of whom require visiting. I have now been in the constant habit of giving gratuitous attendance to the out-patients of our charity for nearly a quarter of a century, and though it has fallen to my lot to see as many disgusting spectacles among the abodes of disease and poverty as any other man can have done, yet the present loathsome condition of our Irish lodging-houses, surpasses any thing I have seen or read of in England."* Similar descriptions might be quoted of the Irish immigrants in London,† Glasgow,‡ and other places; but enough has been given to show that, wretched and pitiable as is their condition sometimes in our country, it is incomparably worse in Britain; of course, there must be other agencies in operation amongst us besides the influence of immigrants, to produce the evils under consideration.

But it would be as inconsistent with our limits as irrelevant to our object, to dwell upon or even to enumerate the diversity and contrariety of opinions which have been expressed by some physicians upon this subject; it is only necessary to refer to a few of the most prevalent, to show their unphilosophical and inconclusive character.

Says one, "more luxury and effeminacy in both sexes prevail now than formerly; and may have had some influence in producing constitutional debility, and the consequent feeble health of children." If this were true, and it is not important to question it, the first effects of "luxury" would be felt on the immediate subjects of it, and eventually be manifested in the decreased average duration of adult life; but official records show that this has improved,

* Medical Annual 1838, p. 85.

† Vide Fourth Rep. of the Poor Law Commissioners, p. 78.

‡ Vital Statistics of Glasgow, by Dr. Cowan.

while the reverse is true of infant life. Besides, we cannot suppose that these deteriorating influences are greater here than among a corresponding class in Europe, which is the only circumstance in a comparative view that gives it a bearing on the subject. A second informs us, "that it must be ascribed chiefly if not solely to vitiated air, consequent upon filthy and badly located dwellings." But is the condition of our cities, in these respects, either worse than formerly, or worse than European cities? Both these positions are contradicted by facts, and the conclusion must be rejected. A third says, that "scarlet fever, inflammatory diseases, convulsions, etc., have increased in prevalence and fatality amongst children, which will account for the increased mortality." It is a lamentable truth that these diseases have become more numerous and fatal than formerly, as is shown on the face of the bills of mortality. But as diseases are merely consequences of something anterior to themselves, it is manifest, that the bare announcement of their existence, which neither explains their origin nor the reasons of their growing prevalence and fatality, must leave us as ignorant as before of antecedent causes, and of the means that may be employed for their removal.

But we cannot dwell on particulars. It may be summarily remarked, that the causes referred to, and numerous others, doubtless tend to destroy infant life both in this country and in Europe; but as they are common to both sides of the Atlantic in probably corresponding degrees, it is evident that they are inadequate either singly or combined to produce the results and the circumstances connected with them, as manifested in the growing and excessive waste of infant life in our American cities. The cause which is adequate to these results must be endemic. In other words,

it must be peculiar to our cities, if not in its nature, yet in the modifications or degrees of its influence. What cause then is there which possesses these peculiar properties and characteristics? We answer, IMPROPER ALIMENT! This is all-sufficient of itself, and the only cause that can be named which is alone fitted for this baleful work. Other morbid causes are local, partial, and limited in their influence; but food need only be improper and unhealthy, to destroy all the infants in any community. Now such an aliment is the *impure milk* with which our cities are deluged, whose destructive effects on health and life are indisputable.

But are not European cities afflicted with bad milk and its consequences? We have proof that such is the fact, but no evidence that it prevails to the same fatal extent as in this country;* and the difference, other things being equal, will account not only for the disparity we have seen in the death of infants, but will also solve the otherwise unexplained, and perhaps inexplicable phenomena, the gradual *increase* of infant mortality amongst us for the last quarter of a century, whilst there has been a *decrease* in Europe.

Previous to the late war with England, impure milk, or at least, milk produced from the dregs of the distilleries, appears to have been almost unknown in our cities. But

* Gaskell says: "The staple diet of the manufacturing population in England, is potatoes and wheaten bread washed down with tea or coffee. *Milk is but little used.*" (*Gaskell on the Man. Pop. of Eng.* p. 109.) The same writer elsewhere estimates (p. 142.) that a family of five persons of the same class, expend 3d. per week for milk,—that is, allowing but one quart of milk in seven days. But this probably is a vague opinion, and much less than is generally used. Be that as it may, it falls far below the average consumption of milk, for example, in New-York, where probably there are few families, however humble their condition, who do not use at least one quart daily, whilst those in easier circumstances, consume twice and thrice that quantity.

that event cutting off the supply of spirituous liquors from the British West Indies, a demand was created for the products of domestic distillation. Hence grain distilleries, as is well known, sprang up in our cities as well as in the country, about the year 1814, which led to the use of the refuse for milch cows, as a substitute for natural food, and consequently to the confinement of cows in pens. With the rapid growth of population in our cities, there was a proportionate demand for milk, whilst the pasturage for cattle decreased with the progress of improvements. What was at first a matter of experiment or convenience, became with some an object, if not of imagined necessity, of choice; for it was found, as elsewhere shown, that this kind of sustenance would produce more milk at less cost than any other. But with these inducements for the use of slops, there were numbers of dairymen who at first rejected them, and others who used them sparingly with other food; so it was not until late years that the use became general and exclusive, and the evils of the system, in their full extent and enormity, were inflicted upon the people. Here then we are enabled to follow the destroyer by the print of his footsteps. From small and almost imperceptible beginnings, we trace the gradual developments of this iniquitous system; sometimes accelerated, and again checked and modified and influenced by adverse or favorable circumstances, as indicated by the bills of mortality; yet, on the whole, steadily gaining strength and extension, until it has become the enormous curse and scourge we now behold it.

Let it again be distinctly understood that, in allowing to the noxious milk system the pre-eminence it claims as the only manifested cause that is by its own peculiar agency competent to the results developed, we do not

thereby detract from, or in any degree underrate the injurious effects of the other co-operating morbid influences, which, even in the best regulated cities, are in ceaseless activity to depress vitality and destroy life. All we affirm of impure milk is, that it is one of the grand sources and predisposing causes of disease in our cities, especially among young children, and is competent, we judge, to produce the evils ascribed to it. To say less than this, would be to misrepresent our own convictions, reject the testimony of facts, and withhold assent to some of the plainest physiological principles.

No one, on surveying the magnitude of this evil, will conclude that its influence is exaggerated. In the cities of New-York and Brooklyn, nearly *five millions of gallons* of this milk is annually consumed, and probably in Boston* and Philadelphia, in nearly the same relative proportion. In the two former cities there are more than *twenty-five thousand* children under five years of age; and this pernicious milk, which is only fit for the kennels, constitutes their principal, and in numerous cases their only food. When the support of infant life is converted into a source of disease and death, is it surprising that they perish by thousands?

There are many well-disposed persons, who are accustomed to ascribe this terrific waste of infant life to inevi-

* Though this statement in regard to Boston may require some qualification, it is not of a kind that affects the general conclusion. Brewers' grains and other improper food, and not slop, are there used for dairy cows; and the milk thus produced, as we have elsewhere shown, having the acid property which is common to distillery-slop milk, is unhealthy and should be rejected. The most that can be said in favor of brewer's grains as food for milch cows is, that it is comparatively less pernicious than slop. And strikingly coincident with this fact, is the relative infant mortality in Boston compared with the other American cities mentioned, as will be seen by referring to the tables.

table and fatal necessity, irrespective of the observance or neglect of those secondary causes, through which Providence invariably fulfils its designs. But can such be the purpose of the benevolent Creator? Is so large a number of His rational offspring born with such feeble powers of vitality that life necessarily becomes extinct on the threshold of existence? Such conclusions, being inconsistent with the teachings of his Word and Providence, must be rejected as impious and absurd. If this mortality was the appointment of a Divine decree independent of any agencies under human control, then might we become indifferent and fold our arms in inactivity, for any exertions of ours to prevent it would prove as unavailing as our regrets. But how are these views reconciled with the increase of infant deaths amongst us from 32 per cent. to 50 per cent. in the course of a few years, whilst in foreign cities, for the same period, the results are reversed? Of the secret sources of life we are necessarily ignorant, but not of the external circumstances connected with it. It is not more certain that the Deity acts in accordance with His own established and unvarying laws, than that their fulfilment or neglect by his creatures, will be followed by corresponding results. Hence the duty of endeavoring to understand our own relations to the world around us in order to adapt our conduct to the principles of organic existence. We may not in every instance be able to trace with precision the connection of cause and effect; but we may not doubt that the sweeping mortality of infants amongst us is, to a great extent, the consequence of our ignorance or recklessness of the laws of life. Being still in pupilage as it respects physiological science, we are incompetent to trace out with distinctness and specify all the causes that are inimical to existence, or to determine how largely the deteriorated qua-

lity of milk of which children so generally and freely partake may contribute to this melancholy result. But as this is one of the most frequent, though least suspected of the perversions of the laws of health amongst us, analogy, experience and observation, the testimony of facts, and also the testimony of our most eminent medical men, fully justify the conclusion that its influences are not exaggerated, and that it should be classed among the most fruitful causes of suffering, disease, and death.

Some persons may conclude that the foregoing arguments and illustrations, have already been extended to greater length than the establishment of the main positions required. Such individuals decide correctly for themselves; but there are others who may demand an obvious, yet very different description of evidence from any that has been advanced. For however indisputable and conclusive may be the language of facts, common observation and experience on the subject, yet, from its nature, the demonstration might appear incomplete to some minds without the testimony of medical men. This testimony is accordingly given by intelligent and experienced physicians, who, enjoying opportunities beyond any other class of men for an accurate knowledge of the facts whereof they affirm, have fearlessly staked their reputation as men of truth and science on the correctness of their conclusions, and published them to the world.

In relation to the subjoined certificate, it may be proper to remark, that it was given at the solicitation of the author, without a view to its present use, and appeared in the New-York papers about three years ago. Every physician called upon for the purpose, excepting one who declined on the ground of his ignorance of the subject, promptly gave it the sanction of his mame. Aft r present-

ing testimony of this kind to the good sense and philanthropic feelings of humane and intelligent men, it must be left to them to say whether they will continue to patronize a system so inimical to their dearest interests, and which the guardians of the public health so unsparingly condemn.

CERTIFICATE OF PHYSICIANS ON THE PERNICIOUS PROPERTIES OF SLOP-MILK.

The undersigned, Physicians of the city of New-York, being requested to express our opinion in relation to the milk of cows fed chiefly on distillery slop, have no hesitation in stating that they believe such milk to be extremely detrimental to the health, especially of young children, as it not only contains too little nutriment for the purposes of food, but appears to possess unhealthy and injurious properties, owing in part, probably, to the confinement of the cows and the bad air which they consequently have to breathe, as well as the unnatural and pernicious nature of the slop on which they are fed.

John Stearns, Sen., M. D.	John W. Francis, M. D.
James C. Bliss, M. D.	Thomas D. Boyd, M. D.
John Torrey, M. D.	Charles A. Lee, M. D.
C. Ticknor, M. D.	James Stewart, M. D.
Jno. Neilson, M. D.	Ja's A. Washington, M. D.
J. Vanderbergh, M. D.	D. Atkins, M. D.
A. D. Clement, M. D.	Ab'm. L. Cox, M. D.
Albert Smith, M. D.	Wm. P. Buel, M. D.
E. R. Belcher, M. D.	John Davis, M. D.
George Leo Wolf, M. D.	David M. Reese, M. D.
G. Forrester Barstow, M. D.	A. Sidney Doane, M. D.
Thomas Cock,* M. D.	E. Mead, M. D.

* Believing also that the air of stables should be particularly attended to.

Henry G. Dunnel, M. D.	Alvan G. Smith, M. D.
J. Van Rensselaer, M. D.	C. R. Bogert, M. D.
Benjamin Drake, M. D.	Alonzo S. Ball, M. D.
John S. Conger, M. D.	M. W. Williams, M. D.
Wm. Channing, M. D.	P. Van Arsdale, M. D.
N. W. Condict, M. D.	Alex. Clinton, M. D.
Alex. J. Watson, M. D. Surg.	Richard Pennell, M. D.
J. L. Milledoler, M. D.	Nicholl H. Dering, M. D.
J. S. Oatman, M. D.	A. C. Churchhill, M. D.
James R. Wood, M. D.	F. A. Cadwell, M. D.
G. S. Janeway, M. D.	Henry E. Bartlett, M. D.
Ebenezer Storer, M. D.	William Power, M. D.
James L. Phelps, M. D.	Wm. N. Blakeman, M. D.
J. Miller, M. D.	David Seaman, M. D.
A. Gerald Hull, M. D.	J. H. Borrowe, M. D.
Wm. A. Walters, M. D.	S. R. Kirby, M. D.
Gilbert A. Smith, M. D.	John B. Beck, M. D.

Has not the time fully come, in which milk that is produced from distillery slop and all other improper food, should share the fate of diseased flesh, putrid fish, and other unwholesome aliments, and be thrown into our rivers? Let every householder, and especially every parent who would not sport with the health and lives of his children, see to it that the deleterious slush is banished from his table. So miserable an apology for a healthy and nutritious article of diet might be tolerated in a barbarous nation where infanticide is permitted, but here, it should not be endured. Let each individual feel his share of responsibility in removing so great an evil; and all unitedly endeavor to turn away the severe but justly merited reproach, which this awful mortality of children so justly casts upon the habits of a Christian community.

This chapter cannot perhaps be better concluded, than in the words of an English medical author, who is conversant with the subject and well acquainted in this country. Referring, in a letter to the writer, to the London milk dairymen, he says: "They force the milch cows with swill so that they literally become drunkards, and send the milk to rear our children, as you do in New-York,—thus sowing the seed of disease in the cradle, and poisoning the fountain of life at its source."

CHAPTER XXVII.

INCIDENTAL TESTIMONY.

Letter from a friend.—Case of sickness occasioned by slop-milk, and recovery.—A similar case in the author's family.—Effects of impure milk on a cat.—Fatal effects of slop milk in a family of children.—Cutaneous eruptions occasioned by its use.—Reasons for introducing certain descriptions.—A disgusting incident.—Filthiness of slop-men.—Death of cattle.

But for the fear of exceeding the limits assigned to this work, we would proceed to state some of the numerous cases that have come under our own observation, in which the health of children has been irrecoverably destroyed by the use of impure milk. But their place will be better supplied by the narrations of others, which we cannot well omit, who from humane and philanthropic considerations have addressed the writer upon the subject. The following is an extract of a letter from a personal friend of the author of great respectability, whom name is suppressed, because his sanction for its use, in consequence of his absence from the country, could not be seasonably obtained.

Dear Sir:

Having carefully read your communications on "Milk Dairies and Distilleries," I have felt both surprise and regret that the attention of our citizens had not been called before to so important a subject. Whatever concerns health and morals, should deeply interest us all; and I think that you have clearly shown that both, to the extent

the system is patronized, will suffer by it. But my object is to state very briefly a few facts on the use of impure milk, corroborative of the views you have expressed, as they occurred in my own family, with the hope that others may be benefitted by my experience.

"A fine healthy child, aged about ten months, was, on account of his mother's health, taken from her; and his diet, prepared by the direction of a physician, was cow's milk, and the precaution observed, to use the milk of one dairy. But the health of the child presently began to fail, and in defiance of the most tender and assiduous care, continued to do so for many months. Medical skill did not avail to restore his health, or even to alleviate his sufferings; at length, his wasted and diseased condition destroyed all hope of saving his life. At this time, your first articles on impure milk appeared, and fearing that the milk on which my child was fed might have some influence on his health, I was determined to ascertain its quality, and was grieved to learn that it was produced from *distillery slush*. On acquainting a physician with the circumstance, the milk diet was continued, but by his advice was obtained from a dairy kept on natural food. The advantages of the change were almost immediately perceptible. But though life was saved, and health mended apace, disease was probably too firmly seated in the constitution to be ever removed. He still lives, and may be spared many years; but his health, compared with my other children, is feeble. He is often sick, and through life will doubtless suffer the consequences of early pernicious diet.

"I would not attach undue importance to a single fact, unsustained by other evidence. But subsequent observation has convinced me that I did not misjudge in the case of my child. Other cases very similar have come to my

knowledge; and I cannot doubt that the same cause is now destroying the lives of great numbers of children in this city."

A case strikingly coincident with the foregoing, having occurred in the author's family, its introduction may serve as another instructive illustration of the permanent injury done to the infant constitution by improper aliment, when the effects are not immediately fatal. With allowance for unimportant circumstances, the case will doubtless be recognized as a prototype of a multitude of others, which are constantly occurring in families who are as ignorant of the sources of suffering and premature decay, as of the means for their alleviation.

The child, at the age of nine months, appeared well-constitutioned, plump and healthy. But the delicacy of the mother's health rendered it improper, and, indeed, perilous both to herself and infant, to discharge the duties of a nurse; and as no suitable person was found to whom the maternal office could be safely intrusted, she would not resign the management to another, but with her own hands supplied the best substitute for her milk that could be obtained. Cow's milk was chosen as most nearly resembling the nourishment designed by nature, and preferable to arrow-root, panada, weak broths, or any artificial preparation of farinaceous or animal substances. The choice of fluid diet, moreover, was indicated by the condition of the system. The *incisor* or *cutting* teeth having just made their appearance, the jaws were unprovided with the means of masticating more solid aliment. In order to make the milk more like that to which it had been accustomed, it was used in a tepid state, and at first slightly diluted with water, and sweetened. These particulars are stated to show that all was done for the child which de-

voted affection could bestow, or professional skill suggest.

But the effect of the new regimen was presently visible in the altered condition of the child. The first outward indication of illness was a remarkable change in the temper. He had before appeared gentle, contented, and happy; now he was irritable, restless, and unmanageable—sleep disturbed and fitful, and seldom tranquil when out of the arms. The eyes were sunken, and his appearance unnaturally pale and haggard; he lost strength and vivacity; gradually fell away in flesh; so that at the age of fifteen months, his weak and emaciated body would scarcely sustain itself without bolstering. Medical aid was in constant requisition, but without avail. He continued to sink day by day; and it appeared certain that his death would soon be included among the hundreds of cases of "*Marasmus* or *Emaciation*," among children, which so frightfully augment the annual bills of mortality.

It now first occurred to the writer that there might be something peculiar in the milk which occasioned the disease, or at least, unfavorably affected the child's health; and on inquiry, he was neither surprised nor alarmed to learn that the milk was produced from the refuse of a whisky distillery at Williamsburg; for, up to that period, it is believed that the deadly properties of slop-milk were not even suspected. The discovery, however, of this fact, determined him, if possible, to procure milk which was produced from natural food, and this with considerable difficulty was obtained. The effect of this diet was most manifest on the infant's health. Without any change of external circumstances or condition, excepting the substitution of one kind of milk for another, there was a sudden and most remarkable improvement in his general health.

This case is not narrated because it is more extraordinary than others, but merely as an exemplification of a numerous class that have subsequently come under the writer's observation, and continue to be of frequent occurrence, whilst, with regard to most of them, there is unfortunately too little knowledge of the cause of disease to prevent a fatal result. But for the use of healthy instead of unhealthy food, to human appearance the child would have inevitably perished—not the victim of a Divine decree, but of human ignorance; not because there were no conditions on which life could be saved, but because those very conditions which a benevolent Providence has immutably established for the preservation of the species, and on the observance of which life to its utmost limits ordinarily depends, were violated. Surely, in a very important and responsible sense, the lives of infants are placed in the hands of their natural protectors!

His life was spared and he still lives; but is more frail and sickly than any other member of the family. His constitution, originally good, is so enfeebled that the growth of the body is stinted; and although the oldest of four brothers, his weight and stature is less than either; and to the close of existence will probably suffer the consequences of early mismanagement.

The pernicious properties of slop-milk are farther illustrated by the following experiment made by Mr. Joseph Depew, of New-York, who has authorized its publication in connection with his name.

"The young of the domestic cat, being of a class of quadrupeds which, like the human infant, is nourished with milk, and hearing that the milk of cows fed on distillery slop was unhealthy, I determined to witness for myself its effects on one of these animals. With this view, I fed a

young cat slop-milk for five successive weeks; in which time it sickened, lost its playfulness, the hair fell off, and it became extremely weak and emaciated; I believe, if this food had been longer continued, the cat would have died. I then changed the slop-milk for pure country milk, and fed the animal five weeks as before; when it gradually gained strength, activity, and sprightliness; the hair came on anew; and in that short time nearly doubled its previous weight.

"Permit me to state another case which came under my observation. A friend and neighbor lost two fine children, who after being weaned sickened and died at about the same age. No suspicions were entertained of the cause of their sickness and ultimate death. His third child, after being weaned also began to droop and sicken in like manner. It was now, on the inquiry of a friend, brought to the recollection of the bereaved parents, that their deceased child had been fed on the milk of a distillery dairy; and as the same kind of milk was the principal food of the sick surviving child, it was suggested that this might have occasioned the death of their children, and that pure country milk, be immediately obtained. This was done; the child recovered, and is now alive and healthy."

Mr. John Golder, another citizen of New York, attests from personal knowledge to the following facts:—The privilege of occupying a certain corner as a milk stand, was granted to a slop-dairyman, on the condition that he should supply the family of the owner with milk. After using the milk for some time, the gentleman and his family were most unaccountably afflicted with eruptions of the skin, sores, and general indisposition. Various conjectures were indulged as to the origin of the strange disease, when at length it was referred to the quality of the milk. And

such, on careful investigation, appeared to be the fact; for on abstaining from the milk, the family speedily recovered, and the obnoxious milk concern was driven from the premises.

In the progress of the work, it has often occurred to the author that he should apologize for the introduction of certain facts and descriptions which have already been given, and may occasionally appear in subsequent chapters. He would willingly have passed them in silence, if compatible with a faithful exhibition of the flagrant evils it is his object to portray and remove. But this being impossible, he has not hitherto, neither does he now feel at liberty to omit, any particulars that are essential to a correct knowledge of the subject under consideration. The train of miseries arising out of the existing mismanagement of the dairies, may be expected to continue so long as the present ignorance of the cause prevails; we, consequently, cannot hope for their removal, except as public sentiment in regard to their origin shall be informed and corrected. To suppress any facts, therefore, that are necessary to this important result, would be to sacrifice the well-being of multitudes to false notions of delicacy, a course which our own sense of duty unqualifiedly disapproves, and which, we have no doubt, every humane and well-regulated mind would at once condemn. These remarks should, perhaps, have appeared in another place, but they here happen to be made, as suggested by the subjoined letter, from a very respectable gentleman of New-York, which they may serve to introduce.

"Dear Sir:—

"I do not pretend to be familiar with all the enormities of the slop milk business; but were our citizens as

well acquainted with it as myself, I think it would be impossible for them to extend to it their support. It is not my design to give a *detail* of the facts connected with the system which have come under my observation; but if a few particulars will subserve the reform you have so much at heart, they are at your disposal.

"To gratify the curiosity of a friend from the country who some time since visited me, I accompanied him to one of the large slop-dairies in the vicinity of the city. As we approached a range of cow stables, an open window induced us to draw near to it, when, unobserved ourselves, we saw a man inside milking one of the cows, whose bag was evidently diseased and extremely sore. After attentively noticing it, for a few minutes, we discovered that one side of the bag and one teat were very much swollen, and that the bag on the swollen side had recently been lanced and was in a most offensive state of suppuration. But the dairyman, unwilling to lose the milk, was carefully stripping three of the teats, whilst at every pressure of the fingers, bloody and yellow corrupt matter was forced from the wound, ran trickling down over the back of his hands, and mingled with the mess of milk in the pail, which was doubtless afterwards sold and eaten by his customers. All this, I affirm, I saw for myself in the presence of my friend. And think you, sir, was not this enough to spoil my relish for slop-milk? From that time I was done with it, and the whole concern where such abominations could be practised, for ever. I may be told that this is a rare and strong case. This I admit, and am induced to mention it on that account, because the attention of others may thereby be drawn to consider a system which under the very best regulations is too bad to be tolerated. I was careful, however, not to mention what I had seen in my

family, lest the bare recollection of it should ever after create an unconquerable aversion to all milk. I confess my own disgust was so deeply fixed, I was afraid to trust any dairy; and I only became reconciled to the use of milk by keeping a cow for the supply of my family.

"The cow stables, you know, are indescribably filthy, and so is every thing pertaining to the milk management. The milk room is in the midst of the steam and effluvium of the pens, and scarcely a whit purer, which is sufficient of itself to taint and spoil the best milk. What better could be expected when the whole is intrusted to the care of men whose services can be cheapest obtained, and who being ignorant of thrift of that kind, have not an idea of what is meant by cleanliness? They will use their milk-strainer for a dish-cloth, and then slap it up against the stable-door to dry. At other times, they will gather a handful of straw from the stable-floor, and whisk it around a pail or other vessel, and set it aside for use. These are literal facts.

"Not long since, I saw in a lot two cows which had been dragged out of the stables, and a number of men around them, as if endeavoring to do something for their relief. Observing the men trying to raise one of the animals up, I inquired what ailed her, and was informed that she had the 'foot sore;' and sore enough they appeared to be. The hoofs were curved upwards several inches like a sleigh-runner; and they have a method of cutting them, so as to help the animal to maintain a standing posture. But this animal was too far gone to be relieved in any way; for when raised on her feet, she could not stand with the aid of four men. There was an involuntary tremor of the muscles of the legs, and every indication of severe pain. The other cow was, if possible, in a still

worse condition. There was the frame of what had been a noble animal; nearly emaciated to skin and bones, and though covered with flies, too weak to shake her ears. The animal, by its moans, appearing to be in great agony, I begged they would have the humanity at once to end her sufferings. Whether this was done, I cannot tell. But returning at night, I saw that the carcass had been devoured by swine, on the spot where the cow probably had died.

"You know these slop-men are careful to dispose of their cows after the confinement of a few months in the pens, lest they die on their hands. But so insidious sometimes are the ravages of fatal diseases, that in spite of their precaution, the loss in this way must be very considerable. I have observed in passing a certain slop-dairy, *six cows* cast out to die in the space of one week; and the number of those I did not see, might have been far greater. But facts of this kind are so well known, it probably is not important to dwell upon them.

"In conclusion, I only remark, there is nothing else tolerated by public sentiment, that is more execrable in itself, and mischievous in its effects, than the distillery slop-milk business."

Facts of the foregoing description, from persons of unimpeachable veracity, could be almost indefinitely multiplied; but interesting and useful as they might prove, our limits require that they yield a place for professional testimony. The reader's particular attention is requested to the communications addressed to the author in the next chapter, by a much esteemed personal friend, whose standing as an experienced and intelligent physician, entitles his opinion on the subject to the highest respect; also to the views exhibited in the third letter, which are the result of much patient thought and careful investigation.

CHAPTER XXVIII.

LETTERS FROM CHARLES A. LEE, M. D. LATE PROFESSOR OF MATERIA MEDICA IN THE UNIVERSITY OF NEW-YORK, ETC.

Opportunities for observation.—Appearance of children fed on slop-milk.—Profits of slop feeding.—Value of the slop dairy to the distiller.—Description of slop-milk.—Difficulty of obtaining pure milk for children.—Health of children destroyed by impure milk.—Influence of food on the quality of milk.—Letter II.—Prefatory remarks.—Effects of slop on the health of cattle.—Influence of slop-milk on health.—Fatal effects of it, with diagnosis of case.—Marasmus arising from innutritious diet.—Duty of municipal authorities in relation to the evil.—Letter III, from Mr. John Burdell, Dentist.—A drawing of a child's jaw with explanations.—Teeth, the indexes of the constitution.—How affected by impure milk.—Early injury to the teeth never repaired.—Teeth of the present generation inferior to those of the preceding.—Effects of slop-milk not limited to infants.—Incidental considerations.—Process of nutrition.—Phosphate of lime in pure milk.—Teeth and bones formed therefrom.—Beauty of this arrangement.

LETTER I.

DEAR SIR:—

I embrace the earliest opportunity to give you, according to request, the results of my experience in relation to the influence of "still-slop-milk" upon children, and also as to its general effects as an article of diet.

I have now been a practitioner of medicine in this city upwards of fifteen years, and my opportunities of observing the agency of different causes upon the public health, have been rather extensive. For several years I was employed as a dispensary physician among the poor, and annually

treated more than two thousand patients with different diseases. The result of my experience and observation is, that the chief cause of the excessive mortality among children in cities, above that in the country, is owing to the nature of their diet. There are many parts of the country, where the water is much worse than in this city, and yet the health of the inhabitants does not seem to suffer. Good air is doubtless essential to rugged health, but the children of our wealthy citizens, who are supplied with suitable and nourishing diet, are not so often afflicted or carried off by those diseases, so prevalent and fatal among the poor.

Children who are fed with "still-slop milk," have a pale cachectic appearance, are extremely subject to scrofula, and are sure to take every epidemic disease prevalent. To scarlet fever, measles, hooping-cough, they are particularly subject, and will take them upon the slightest exposure. Such children are also very apt to sink under any serious disease, with which they may be attacked. There is a laxity of the solids and a vitiated condition of the fluids, which predispose them to disease in its most malignant form. If, for example, they are seized with scarlet fever, it will either be in the highly congestive form, which is almost certain to prove fatal; or it will be attended with that gangrenous or phagedenic ulceration about the throat, which is perhaps equally dangerous. And so of other diseases. There can be no doubt that this arises chiefly from a vitiated condition of the whole system occasioned by improper diet; and of this diet, "still slop milk," forms an important part.

You may have noticed that at all times of the year, on certain corners of our streets there are boys who take their stand every morning for the sale of milk. They generally furnish it at four cents a quart, and sometimes at three cents,

and this is a great inducement for the poor to buy; instead of paying six cents for pure milk. This milk is mostly supplied by distillers, who keep cows on their premises, and to save the trouble of peddling it round dispose of it in this way. Now as it costs but about nine cents a day to keep a cow upon swill, and as cows in general give about ten quarts of milk a day, you can readily see that they can afford to sell it at that low price. Those who feed nothing but meal, grain, and hay to their cows, tell me that it costs from two shillings to two and sixpence a day to keep a cow. Of course their profits are smaller even when they sell at eight cents, than to sell the still-slop at four cents. Now I believe that our board of health could not do a better act than to prohibit the sale of slop-milk. They certainly have the power; and by exercising it, they would do far more good, than by stopping the sale of tainted meat.

Another thing. Were it not for the use of still-slop milk, our distilleries would most of them have to stop. As it is, they have to suspend operations when the price of grain is high; and at times they are in the habit of diluting their slops by adding more than half water, in order to save themselves from loss by the low price of whisky. I have been often told by milkmen, that occasionally slops are so thin and meager, that a peck of Indian meal disseminated in a hogshead of water, would contain more nutriment than the same quantity of swill. Indeed, it was this very imposition which induced several milkmen to stop feeding it to their cows.

There is another circumstance worthy of notice. Still-slop-milk is of a pale bluish color, and when cows are fed with it almost exclusively, as they are at the distilleries, it is necessary to *color* the milk in order to make it marketa-

ble. This is actually practised by all such milk dealers. Starch-flour, plaster of Paris, etc., are used for this purpose. This enables them to give it a rich and beautiful white color, and to dilute it with about an equal quantity of water. This may be called one of the "tricks of the trade," and of course it is thought nothing of by men whose consciences are not troubled by turning the "staff of life" into poison.

But to return. When called to visit a sick child, my first inquiry always is, what is the usual diet? Do you give milk to your children? Who is your milkman? These are usually my first questions; for the answers always furnish more or less clue to the proper treatment. It is a rare thing, I believe, in this city, for a judicious physician to allow a child to be brought up by the bottle, without particularly directing the *kind of milk* to be used, and how it is to be prepared. I have for a long time been convinced that it is far better and safer to use barley or rice and water, or arrow-root, and other farinaceous substances, than to allow any milk at all,—for such has been the difficulty of getting good milk, that there was always more or less danger of imposition. From late inquiries, however, I believe these difficulties are in a fair way to be removed.

I could give you any number of cases where the health of children has been utterly destroyed by the use of still-slop milk; and I could convince you that the *cholera infantum* itself, the great scourge of our city, is in fact caused chiefly by the use of this milk, either by the mother or child; for it is a singular fact, that in the large cities of Europe, where other causes of disease, with the exception of this, are as prevalent as in New-York, this disease is absolutely unknown. Hence the efficacy of a removal to

the country; as a change of diet is the necessary consequence.

The importance of good milk, will appear from a few considerations. Pure milk contains in it the basis of all nutriment, i. e. it is composed of an albuminous, a saccharine, and an oily principle, and no substance is nutritious that does not contain one of these. These are combined in milk in different proportions, according to the nature of the food on which the animal subsists. This was known even to the ancients; for Galen states that he endeavored to make milk more astringent, by placing the animal which was to furnish it in pasturage enriched for the purpose, with *agrostis*, *lotus*, and other astringent vegetables; and as the patient became convalescent, and could bear a richer nutriment, he was allowed to sail down the Tiber and use the milk of Stubiæ, which was celebrated for its excellence. I was much struck lately by a fact related by Dr. Dunglison in his Elements of Hygiene, which has a bearing on this subject. He states that "in a certain part of Virginia, where he resided, the hogs are fattened chiefly from the refuse of the stills after the distillation of whisky; or to use the expression of the farmers, they are 'still-fed.' The inferiority of the meat when thus forced, compared with the result of feeding them upon corn, and allowing them to roam abroad and obtain their food from acorns and chesnuts, in the woods, he says, is universally admitted."

But I deem it unnecessary to multiply facts on the subject; enough I trust has been said to convince any reasonable mind of the truth in relation to the matter. It only remains for those who are convinced to act accordingly.

With much respect, your friend,

CHARLES A. LEE.

LETTER II.

DEAR SIR :

When I addressed you my last letter on the subject of milk, I supposed that your able and praiseworthy efforts, had nearly satisfied the reading public of the innutritious and unhealthy properties of this article when obtained from cows fed on distillery slop, and confined in filthy and ill-ventilated stables. If, in addition to what you have urged, the testimony of sixty of the most respectable physicians of this city is not sufficient to settle the question, it is not at all likely that any thing I can write, will have the least effect. As the subject, however, is attracting a good deal of attention both in this and other cities, at your request I proceed to add some further considerations, which, it seems to me, should lead people to pause before they use this poisoned article of diet, and I am the more inclined to this, as, in my last, I alluded to several points which want of time compelled me to pass over with a single remark.

On inquiry I find that cows fed on distillery slop, become so much diseased in consequence, that they are always killed off in the fall and winter, to furnish our citizens with *healthy beef*, and a new set obtained every spring from the country. However improbable this may seem, on inquiry it can very easily be ascertained that it is a fact. Their teeth, you are aware, also become so much diseased, that it is impossible to feed them on any thing but fluids; and hence probably the reason why some of our milkmen, who have lately become convinced of the unhealthy quality of slop-milk, do not resort to feeding grain; for they will tell you in justification of their conduct, that "their cows cannot eat grain." This, you see, is a direct acknowledgment of the truth you are endeavoring to establish, viz. the unhealthiness of still slop-milk; for it is self-evident, if

the cow is diseased, her secretions must also be. Our citizens will do well to bear in mind this fact, that cows become so diseased in one season, by the use of still-slop diet, as to be ever after of no use for the dairy; but have to be slaughtered to furnish us with meat for the winter. In this way, several thousand cows are annually slaughtered for our market.

The principal point of inquiry, however, is: What effect does the milk of cows fed on distillery slop actually have on the health? This I endeavored to answer in part, in my last, though I am aware, but very imperfectly. Since then, however, I have seen and conversed with many of our oldest and most respectable physicians on the subject, and I find they agree with me entirely in opinion. They consider, as I do, that it is owing to unhealthy diet chiefly, that so many die during the first few years of life; and that it is owing to the same cause, that the prevalent diseases of the season, whether they be bowel complaints, scarlet fever, hooping-cough, measles, or any thing else, derive their chief mortality. They believe that still-slop milk is *poisonous* in its effects, undermining gradually the constitution, and laying the foundation for a large majority of all cases of *marasmus*, decay, atrophy, convulsions, and bowel complaints generally. In this way do they account for the great excess of deaths by these diseases in the city over those in the country; and they also argue with me that it is a legitimate subject of investigation for the Board of Health of our city, and then, if the facts warrant, to take measures accordingly. They believe that all the damaged flour, meat, vegetables and fish sold in our market, do not occasion *one-tenth* part of the injury to the community, that diseased milk does. And they therefore think that a *milk inspector* would be quite as useful an officer,

and far more necessary to guard the citizens from imposition, than a flour inspector, a pork and beef inspector, or even a *tobacco* inspector. In all these cases a man's own senses tell him whether the article be good and genuine; in the other case, he can rarely judge correctly whether the milk be pure or adulterated, healthy or diseased. It is true, we sometimes do see still-slop milk strained through the sick, "cribb'd, cabin'd and confined" animal's glands with such rapidity, that we can smell and taste the identical slop still reeking and fermenting from the infernal distillery; but in general, it is so colored, mixed, medicated and prepared, that it is well calculated to deceive the unsuspecting observer.

Not long since I attended a poor boy about six years of age, who had literally been brought up on still-slop milk. His parents, who are poor, kept a few cows in the upper part of the city, which they fed upon slop, and by selling their milk, thus gained their support. The boy was always pale and sickly, had a rickety, bloated appearance, and, with sunken eyes and haggard expression of countenance, reminded one always of a little premature old man. About a year before his death he began to fall away in flesh; grew weak and irritable; had little appetite, and so languished along till he died. As his case was in some respects interesting, I asked and obtained leave for a *post mortem* examination. The first thing that struck my attention as remarkable, was, the almost entire absence of blood from the system. The muscles were pale, flabby, and almost dwindled away to nothing; the blood-vessels about the heart, which are generally loaded with blood, were collapsed and empty; and the heart itself was soft and hypertrophied. The principal marks of disease, however, were in the *mesenteric glands*. These, you know, are near the

origin and in the track of the chyliferous vessels, through which all the nutriment that is absorbed has to pass, in its passage to the thoracic duct, which empties it into the blood. These glands were most extensively diseased, more than ten times their usual size, and many of them in a high state of inflammation. Of course, I was immediately led to impute their morbid condition to the nature of the food on which the child had chiefly subsisted from the time almost of his birth; for in fact, there was no other manifested cause to which it could be attributed. This accounted for his gradual emaciation, want of strength, the impoverished state of the fluids, and for death itself.

But this is not an isolated case. During the last year our city inspector reported *two hundred and ninety-two deaths* of *marasmus* and *emaciation*,—the same disease as above, 202 of which were under two years of age. Our best medical writers consider this disease as generally arising from innutritious diet. "The blood," Dr. Mason Good observes, "becomes innutritious from scarcity or pravity of food, or an insufficient supply of nutriment is introduced into the blood by the chylific organs, or not sufficiently separated from it by the assimilating. In infants it is often advisable to change the nurse's milk. It is not easy to detect all the peculiarities of milk that may render it incapable of affording full nutrition. I have often advised a change of milk, and found a wonderful improvement on its being followed."

Our sympathies have often been appealed to in behalf of Hindoo children, who have been exposed upon the waters of the Ganges, or left suspended in baskets to the limbs of trees, to perish of hunger, or be devoured by the birds. But here is occasion enough for sympathy for our own offspring. Here we may, on a more stupendous scale,

behold "the death of the innocents;" hecatombs of whom are yearly sacrificed to appease the remorseless god Mammon—actually immolated on the altar of Plutus, that their expiring breath may fan the Tartarean flames of the distillery. Let these flames be quenched, as they long ago should have been, by the strong arm of the law, and a small portion of the 2,000,000 bushels of grain now annually converted by them into poison in this city, be fed to those animals that furnish food for our little ones, while the remaining part will supply our population with bread-stuff. Let our legislators bring about this reform, and they will deserve a higher reward than the oaken coronal, which was placed on the brows of him who had saved the life of a single Roman citizen. They will deserve and receive the heartfelt gratitude of a rejoicing people, and their names shall be handed down to the latest posterity, emblazoned on the list of illustrious public benefactors.

It is indeed high time for the guardians of the public health to rouse from their lethargy, and imitate the vigilant foresight of the Roman consuls, "*viderunt ne quid detrimenti respublica caperet.*" Let them assiduously watch those causes of disease which it is in their power to remove, and then remove them with the same zeal and energy they would resist a fire or a flood, or a band of hostile savages; and then they will have earned for themselves the proud title of *watchful conservators of the public weal.*

With respect, yours,

CHARLES A. LEE.

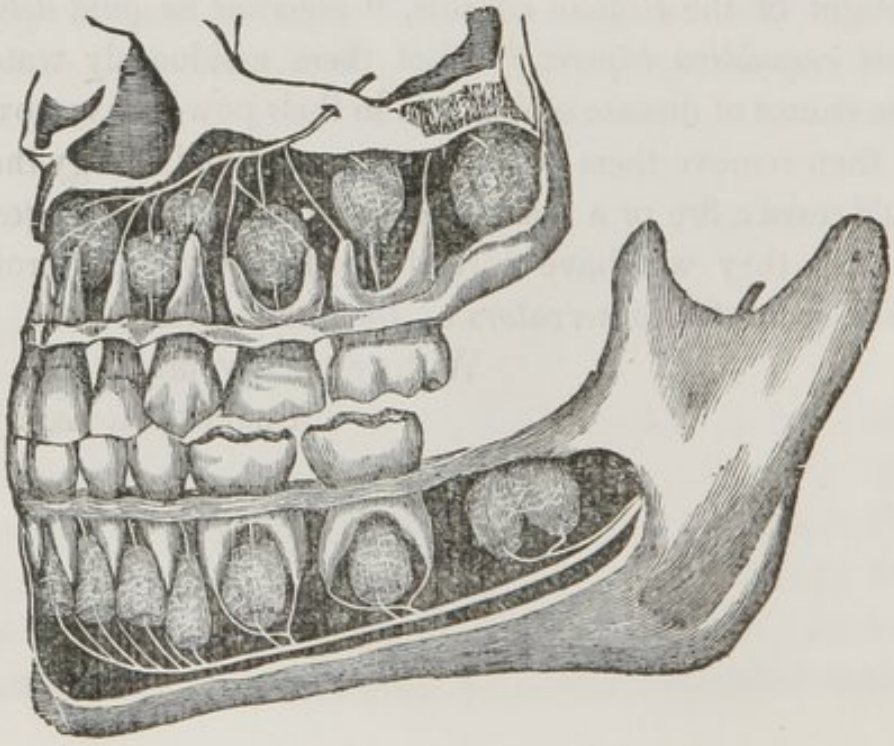
Letter III.

The following letter is from Mr. John Burdell, Dentist, New-York, Author of a "Treatise on the Structure, Physiology and Anatomy of the Teeth," etc.

Dear Sir:

You are aware, that my views on the use of distillery slop-milk are already before the public; but if I can state any additional particulars which may tend to throw light on this important subject, I will rejoice in the opportunity of placing them at your disposal.

Any knowledge I may possess in relation to the inquiry, has been incidentally derived from a careful observation of the effects of different kinds of diet on the animal system generally; but more especially the influence of diet on the nervous tissues in connection with the formation of the teeth, —to which study my attention has been directed, by my professional pursuits. In order to convey a clear idea of what I mean by the formation of the teeth, I send you a drawing prepared by myself to illustrate the subject.



(This plate exhibits the jaws of a child at the age of four years.)

The drawing shows the number and the arrangement of the infant or first teeth, and their nervous connection with the brain and spinal marrow or nervous system. There are twenty teeth in the first set, but in the plate, half only are visible as we have a side view, five above and five below, and a part of the two front teeth on the other side.

The pulps or rudiments of the second or permanent teeth, can be seen directly under the roots of the first set. These rudiments have nerves, blood-vessels and absorbents, which are readily traced by dissection. When these pulps commence ossifying or hardening, they crowd against the absorbents of the first teeth, and stimulate those vessels to such a degree that the roots of the infant teeth are taken up by the absorbing vessels, and disappear as fast as the permanent or adult teeth advance. This makes the shedding teeth, as they are commonly called, when they fall out, to have the appearance of being broken at the root.

The white thread-like filaments attached to the roots of the teeth, are intended to represent the nerves which supply them with the vital or life-giving principle. There is one to each root.

The teeth being thus a part of the system, they necessarily partake of the nourishment received into it; and being formed at the time when the child's diet is principally milk, the importance of having it pure and nourishing, will at once be admitted. If it is either deficient in nutriment or possesses deleterious properties, the teeth in common with the other organs of the body must suffer. Hence the teeth may be regarded as the indexes of the constitution. We find, indeed, that children who have been fed upon this or other insufficient or improper food, if they survive the period of infancy, have enfeebled constitutions, their teeth prematurely decay, and are so soft they may

be cut with a dentist's instrument ; whereas the teeth of children who have been properly nourished, and whose constitutions are sound and firm, possess almost a diamond-like hardness. In view of these facts, can any one conclude that impure and innutritious slop-milk is a proper diet for children ?

It is evidently owing to the want of information on the subject, that this great evil has been so long endured. This milk is produced from the most unhealthy and disgusting materials; and no parent, I should judge, with a knowledge of its nature, would risk the health and life of his children on such aliment. The diseased condition of the animals, and the unnatural and filthy manner in which they are kept, are alone sufficient to convince the reflecting mind, that their secretions must be unhealthy.

It is an important consideration, that so far as the teeth are concerned, the injury done them, by feeding children on bad milk, is one which can never be repaired. The teeth having received their organization during infancy, unlike any other part of the osseous system, later years have no effect in producing a favorable change. It is well known, that a broken bone, if properly replaced, will again unite ; but the parts of a fractured tooth will never adhere. The bones of children enlarge and grow firmer and harder until the period of adult life, which shows that a constant change is going forward in the system. But the teeth, retaining their original texture and form, are in these respects unaffected by the lapse of years.

There are rational grounds for the opinion, that the teeth of the former generation in cities, in regard to firmness, hardness and durability, were better than those of the present and of the rising generation. The increase of dentists would appear to sustain this conclusion. Now it

is known that the production and consequent consumption of slop-milk, has from small beginnings increased until it has become a great and grievous evil. I do not say that the present condition of these necessary organs, the teeth, are to be attributed solely to the effects of this kind of aliment. But it doubtless has had great influence, and having discovered one cause which is competent to this result, let us not rest until it is banished from the community. Considerations of philanthropy, but especially the we e of those most dear to us, who are the greatest sufferers, and whose tender years exclude the possibility of their rescuing themselves, should enlist all our sympathies, and employ all our energies in their behalf.

In conclusion, I remark, that the mischief is not confined to infants, but injures the health of all who partake of it. This is proved by its effects on the milkmen themselves, for whilst the majority of them are too wise to eat it, there are others who use it freely. The latter, often suffer from biles, eruptions and running sores, which may be considered as the outlets to the impurities of the blood occasioned by the pernicious qualities of the milk. This is probably an effort of nature to expel the morbid humors from the system; and fortunate it is for these slop-milk drinkers that it is generally successful; as without these discharges, distressing and even dangerous and fatal maladies might be expected. I am acquainted with one of these men, who has a tumor of the size of a tea-cup, which discharges from a spoonful to half a gill at regular intervals. I would recommend to such persons who persist in the use of this impure milk, to have an issue kept open on some convenient part of the body as a vent for the impurities generated in the system, and as a preventive to the fatal results which otherwise may ensue. With great respect, your friend,

JOHN BURDELL.

The preceding letter suggests a few incidental considerations, with which we close the chapter.

In nothing, perhaps, is the design of Providence more remarkable, than in the adaptation of milk to the wants of the infant system. It contains, as has before been shown, albumen, oil, and sugar, which are the primary staminal principles of all alimentary substances. These substances are found to be identical with the elements of which the texture of the body is composed. Milk, of course, is capable of assuming a great variety of modifications, in order to form fibrin or flesh, and build up the various tissues of the system. When it is received into its proper receptacle, it is first changed into chyme, and then into chyle; and is next taken up by the absorbent vessels and thrown into the blood, which conducts the nourishment it has received through an infinitude of minute tubes and channels to all parts of the body, each of which takes from the blood that kind and quantity of nourishment it needs for its own support, and also for the support of that part of the body which is committed to its care. Dr. Edwards familiarly illustrates the process of nutrition as follows. "The organs placed at the ends of the fingers, take out what is needed to make finger nails; while they will cautiously abstain from, or repel that which will only go to make hair, and let it go to the head. And the organs on the head, carefully take out that which they need for their support, and also that which will make hair, or, in common language, cause the hair to grow; while they will cautiously abstain from that which is good for nothing, except to make eye-balls, and let it go to the eyes, and will even help it on. And the organs about the eye, will take that and work it up into eyes, or cause them to grow. And so throughout the whole. And there is among all the millions and millions of these workers, the most delicate

and wonderful sympathy. If one member suffers, all the members instinctively suffer with it; and if one member rejoices, all the members rejoice with it."

But this is not all. Besides the muscular, the fleshy and the fibrous parts referred to, the growth and nourishment of other parts not less important are to be provided for, namely, the *teeth*, but especially the *bones*, which constitute the basis of the system. In order, therefore, to supply the osseous matter so essential to young animals, pure milk contains a great quantity of the *phosphate* of *lime*; and that the organs may be saved the labor of forming this proximate principle from its elements, the identical material of which the teeth and bones are formed exists ready prepared in a fluid state as a component part of the milk; and nothing more is requisite than for the appropriate organs to arrange it, as the exigencies of the system may require.

This admirable provision of nature for promoting the growth and repairing the waste of young animals, enables us to form some conception why children who are fed on impure or bad milk have feeble constitutions, and why their "teeth are so soft as to be cut with a dentist's instrument." Such food is depraved and innutritious. The elementary principle, namely, phosphate of lime, which is essential to the perfect organization of the teeth and bones, if it exists at all in such milk, it is most probably in such defective proportion, as to be incompatible with a different result. The foregoing facts, however, are merely referred to as a farther illustration of general principles; and without dwelling upon them, we see how, by a beautiful arrangement of Providence, *natural milk* possesses all those peculiar alimentary properties in perfection, which exactly adapt it to the wants of the infant system, and is essential to its proper

and healthy development. Antecedent to experience, therefore, we might safely infer that not one of its constituents could be subtracted, without depriving it of a principle which is necessary to the well being of the young it was primarily intended to nourish. But when we discover that the inference is fully sustained by observation and experience, as well as by induction, the principle appears no longer a questionable or speculative matter which we are at liberty to reject, but an important practical truth, that deeply concerns us individually to understand, and reduce to practice. In short, with whatever change of aspect the subject is viewed, it assumes new interest; and whatever new facts are elicited, augment its importance; whilst every application of rational principles to the inquiry appears to give force and substantiality to the positions it is our object to establish.

CHAPTER XXIX.

MILK SICKNESS.

Preliminary observations.—First mention of milk-sickness.—Regions to which it is peculiar.—Confined to no season.—What animals subject to it.—Symptoms of the disease in brutes.—Symptoms of the disease in men.—Its virulence and fatality.—Cause of the disease.—Its locality circumscribed.—Investigations of its origin.—Different theories concerning it.—Nature of the poison.—Effects the flesh and vitiates all the secretions.—Experiments thereon.—Its fatality illustrated.—Some points of resemblance in the appearances and effects, common to diseased slop-fed cattle.—Probable cause of milk sickness.

We have before mentioned the milk sickness, but in too concise a manner to convey any satisfactory information of the nature of this singular disease. As the topic comes legitimately within the design of this work, we would scarcely be excused in omitting to give a more particular account of it; and this inference is strengthened by the consideration that what has been written on the subject, having chiefly appeared in medical journals to which few besides professional readers have access, a farther notice of it will be regarded, not only as in place, but highly desirable. The gratification, however, of a laudable curiosity, is not the only object in recurring to it. The subject will be observed to have a practical bearing on a leading position which we before have endeavored to establish, viz., that the milk and flesh of animals may be so deteriorated, either by the pernicious nature of their food, or by the specific action of disease on the animal organization, as, when eaten by man, to induce disease and destroy life. So

obvious a common sense principle might appear to require neither argument nor illustration, were it not for the habits of thousands around us, who, by daily partaking both of diseased milk and flesh, show they have yet to be convinced that there is danger in such practices.

As the subject lies without the range of our personal research and inquiry, we designed to have condensed from various sources into a general view, what appeared most worthy of notice. But we are diverted from this purpose, by a recent and very able essay by Dr. Graff of Illinois, which, as it appears to contain all that is yet authentically known of this almost anomalous disease, we take pleasure in introducing it to the reader, with little modification, excepting what is requisite to adapt it to the limits of this work.*

Occurring as the milk sickness universally does in our frontier settlements, where medicine as a science is in its infancy, and its practice too much in the hands of the ignorant, we have had very imperfect accounts of the affection, either as it regards its history, symptoms, or means of cure.

A few imperfect essays recorded in our medical journals, constitute every thing that I have seen offered to the public on this subject. The earliest history of it that I have noticed, is mention made of a singular disease affecting cattle, by Bishop Kennipin, a French Missionary, who ascended the western rivers early in the last century. He knew of it only as causing the death of cattle with singular and often very fatal symptoms.

The only name by which it is known, is that which I have used, which is quite objectionable, as it may serve to

* See Am. Jour. Med. Science, April, 1841.

convey an erroneous impression by the supposition that milk only could produce it; whereas the flesh of an infected animal acts with an equal degree of violence and rapidity.

It is a disease peculiar to the United States, occurring seldom, if ever, to the eastward of the Alleghany mountains. It is in a greater or less degree met with in all the western states, as far south as the Mississippi, and extends north to the boundary. The states of Indiana and Illinois, are most subject to its occurrence, whilst its existence in the bordering states is comparatively rare. In the first formation of our western settlements, its prevalence often served as a cause to disband a community, and compel the inhabitants to seek a location which enjoyed immunity from its occurrence. Many of the otherwise most desirable portions of the country, remained long exempted from settlement, and even now the inhabitants of these localities have, as a condition of their residence, entirely to abstain from the use of milk, its preparations, and the flesh of their cattle.

Its occurrence or prevalence is confined to no season, or description of weather, existing in a like degree in the heat of summer or cold of winter, and with like virulence and frequency during a dry or wet season.

The animals in which it has been observed, are cattle, horses, sheep, and goats, which seem to acquire it with their food or drink.

We will first speak of the *symptoms* manifested in cattle affected with it, as it is only through them that we have yet found the disease communicated to man. This may be affected to such a degree as that their flesh and milk will produce the disease, and yet they themselves manifest no unhealthy symptoms whatever. This latent condition of the

disease may be discovered by subjecting the suspected animal to a violent degree of exercise, when, according to the intensity of the existing cause, it will be seized with tremors, spasms, convulsions, or even death. This is a precaution practised by butchers in these countries, always before slaughtering an animal in any wise suspected of the poisonous contamination. An ordinary degree of exertion will not develop these phenomena unless it produce the symptoms usually preceding a fatal termination. When for instance a cow is sufficiently deeply affected, nothing peculiar is observed until immediately preceding the outbreak of the fatal symptoms. She is then observed to walk about, without any apparent object in view; all food is refused, and there is evidence of impaired vision. The eye is first of a fiery appearance, increasing to a deep red color, until the animal is observed to stagger and fall, when, if she rises, the trembling of the whole muscular system will prevent the maintenance of the standing position. The animal usually dies after repeated convulsions, never lingering beyond a few hours. Often it falls suddenly, as if it received a blow from a heavy body on the head, and death is produced in a few minutes.

In man the symptoms differ from these, and are varied. The length of time found to elapse from the reception of the cause to the appearance of the disease, is dependent on a multiplicity of circumstances, as the age, sex, or condition of the patient and violence of the poison. It may be developed as early as the third, or deferred until the tenth day. As a premonitory symptom, a peculiar and indescribable fœtor from the lungs is the most prominent, and so universally have I found it present and to precede the disease, that in almost every instance when I have been brought in proximity with a person predisposed or attacked,

have I been able to foretell its approach, and pronounce on the character of the disease. This fœtor can no more be mistaken by a person accustomed to it, than that which is so universally attendant on variola; and it may in fact be safely stated to be pathognomonic of the forming and early stage of milk sickness. This halitus from the lungs, which I have never found entirely wanting even some days previous to an attack, increases in intensity until the disease is fully developed, when it gradually disappears with the specific symptoms, and at the termination of four or five days cannot be detected. A person laboring under the peculiar effluvia from the air passages, in many cases complains of no illness, and appears entirely unconscious of his situation, unless advised of it by his friends or attendants.

Often the symptoms are observed to differ widely from these. Besides the peculiar smell emitted, there is a premonition of the attack; for some days previous to its development, the patient experiences a restlessness and uneasiness which he cannot describe; there is a frequent moving about without any definite object in view, and he finds it impossible to confine his attention to any subject or employment. He feels, and often expresses a dread of some impending calamity; starts at the slightest noise; his temper is always irritable; his lip is seen to quiver when he attempts to speak, and all his motions are characterized by nervousness and are quickly performed. This state gradually increases in severity; his ideas are much confused; he suffers greatly from a want of words to express his meaning, with every evidence of a deep and somewhat peculiar state of cerebral irritation. Added to these there is a severe pain in the head, attended with tinnitus aurium, suffusion of the eyes, and intolerance of light. Vomiting announces the onset of the attack. Some days frequently elapse before

pain in the stomach is complained of, but during the time the suffering is intolerable, consisting of a sensation of deep distress, which, though referred to the præcordia, or abdomen, the sufferer cannot locate in any particular spot. Pain in the limbs is complained of, and is severally referred to each of the extremities, but is more constantly located in the spine, particularly at the nape of the neck. The pulse, during the forming stage, possesses great force and volume, with slightly increased action. Upon the commencement of vomiting, it becomes greatly accelerated, is quick and frequent, and varies in different cases with the degree of inflammatory action existing, and the means of treatment employed. The bowels will remain obstinately constipated, the powers of nature being incompetent to relieve the condition, so that unless it be done by appropriate remedies, at the end of six or eight days an offensive discharge takes place, quickly followed by dissolution, the symptoms being those which would indicate disorganization of the structure of the intestines.

When recovery ensues from severe cases of milk sickness, it is tedious, and years are often required to restore the patient to his wonted health and vigor. Indeed it has often been a question with many, whether those once severely attacked ever regain a perfect integrity of constitution. In cases which terminate fatally (of which description is a large majority), a length of time from one to four weeks is required, proportionate to the intensity of the primary effects, the propriety of the treatment, and the natural powers of the resistance of the constitution, as they often seem to die from a wearing out, a gradual destruction of cerebral and nervous energy.

Cause.—The cause of this disease of animals is as yet shrouded in mystery and uncertainty. No satisfactory ac-

count of its nature has yet been given, and it has in turn been supposed to be of vegetable, mineral, and even aerial origin. The limits of its prevalence is not often over a large and continuous tract of country, but rather circumscribed, and surrounded by localities never known to produce it. No example is known in which the property of producing the disease has been acquired by any locality which did not previously possess it. The boundaries which were at the first discovery of the country found to separate the infected from the healthy districts, remain unchanged. The locality which serves to produce the disease, most commonly extends as a vein of variable breadth, traversing the country for a considerable distance. It can be traced in one instance for nearly a hundred miles, running parallel to the course of the Wabash river, in the state of Indiana.

Again, it will be found to occupy an isolated spot, comprised in an area of one hundred acres whilst, for a considerable distance around it is not produced. Thus having the locality perfectly circumscribed, much labor has been expended in order to discover some production peculiar to the locality. The search has been uniformly unsuccessful in the attainment of its object. The general appearance of these infected districts is somewhat peculiar. I have always observed that the situation of the ground is elevated above that of the surrounding country, occupying what is denominated a ridge, and that the quality of the soil is in general of an inferior description. The growth of timber is not observed to be so luxuriant as in situations otherwise similar, but is scrubby, and stunted in its perfect development. Throughout the entire district in which these localities are interspersed, there is observed an absence of the occurrence of stones scattered over the surface, whilst in

the infected districts, they are almost universally present. They are of small size and darkened aspect externally, breaking with a regular and shining fracture, and, upon analysis, imperfectly made, were found to contain a considerable portion of iron, with slight traces of copper. Another more decided and peculiar appearance, which serves to distinguish them from other spots, is the breaking forth of numerous feeble springs, furnishing a trifling supply of water, but not varying in quantity with the change of seasons. In its apperance, it presents the general evidences of a sulphurous and ferruginous contamination.

Experiments made upon the water collected from these springs, or more properly called oozes from the soil, with the greatest care, by the employment of the most delicate chemical re-agents, failed to indicate the presence of any mineral except iron, sulphur, traces of magnesia, and a quantity of copper barely capable of being demonstrated. A belief being entertained by many that the disease is occasioned by arsenic, or some of its salts, I, with much care and patience, subjected not only the water, but likewise the earth, from these districts to a most rigid examination, and by no test was I furnished with the slightest evidence of its presence.

An intelligent medical friend expressed to me his belief, that it was produced by the inhalation of some noxious gases generated during the night; in proof, he stated that he had observed cattle, which were regularly housed each evening, escaped its attacks, and that when suffered to remain at large, they were frequently seized with the disease. It is difficult to form this belief of the nature of the cause, as we can hardly conceive the particular action of any combination of circumstances, capabable of giving rise to such an emanation only at night, ceasing to operate during

the day. The most popular belief is in favor of a vegetable origin. But this appears irreconcilable with the fact, that the disease has frequently appeared with its greatest virulence when the ground has been for weeks previously covered with snow.

For my own part, I would most willingly subscribe to the opinion that some mineral, or mineral combination possesses the agency of its production. Yet I confess that I cannot even imagine what must be the nature of that substance producing such violent and anomalous effects, and in its operations so unlike any thing with which we are acquainted. The cause, whatever it may be, when it enters into the organization of the animal, either by inducing a specific action in the tissues of the economy, or by a combination with some of the elements of the body, forms a poison not more violent in its operation, than singular in the effects it can produce. If this cause should prove to be a mineral, it must be one of great subtlety, from its difficulty of detection, and from its virulence it must possess qualities and activity not equalled nor resembled by any metal or metallic combination yet discovered. No substance of which we have any knowledge, will produce like phenomena.

Hoping, that if I could succeed in developing the same symptoms and effects by some active or poisonous article, it might, by the probable analogy of the agents, lead to the discovery of the nature of this poison, I patiently tried many. The action of none of the mineral poisons were found at all similar. My experiments were chiefly made on dogs, and in them I found the symptoms immediately preceding their death, occasioned by a fatal dose of strychnia, greatly to resemble those produced by the continued administration of the flesh of an animal which had perished from milk sickness. The appearances on dissection differ in a greater

degree, and particularly in cases of poisoning by the vegetable proximate principle, exhibit the blood in a state more nearly resembling a healthy condition. With the view of an extensive series of experiments, I procured the body of a full grown cow, which had perished suddenly from the affection with violent symptoms. The brain was immersed in a copious effusion of blood, and in no part of the body was it found coagulated. The flesh in external appearances did not differ from that of healthy beef, unless that it was slightly darker, and a thin bloody fluid continually dropped from it. By exposing it by the side of a healthy portion, I found that the influence of the sun rendered the specimen from the diseased animal offensive, and turned it to a greenish hue, whilst the other remained comparatively sound and unaffected. It can possess nothing peculiar in its taste, for persons who have partaken of it have not remarked any thing unusual, and animals will exercise no preference, if the two descriptions be simultaneously presented to them. The beef which I procured was subjected to the ordinary process of salting, which did not in the least effect its poisonous properties.

Butter and cheese, manufactured from the milk drawn from an infected cow, are supposed to be the most concentrated forms of this poison. They possess no distinguishing appearance, odor, or taste, from the healthy article. A very minute quantity of either will suffice to develop the disease in man. The cream, ordinarily sufficient to be added to the coffee drunk at a single meal, is said to have induced an attack. The butter or cheese eaten at one repast, has frequently been known to prove effective. The property is not contained in any of the elements of the milk exclusively, but distributed throughout the whole of them, being possessed by the butter-milk as well as the whey.

Beef, in the quantity of a few ounces, will produce the disease, and it is believed in a more violent and fatal form, than when it is produced by milk, or any of its preparations.

The effect of the poison is manifested throughout the entire system, and vitiates all the secretions. An experiment, which went far to prove how deeply the milk of other animals is imbued with its poison, was made by administering the infected meat to a bitch suckling five puppies. The effect produced in them was very sudden, and the entire litter died in four days, which was two days before the occurrence of the death of the mother.

The subtle, poisonous principle, of whatever it may be proved to consist, seems to possess the power of infinite reproduction, by some vital or chemico-vital action of the system of those animals poisoned by its influence. Thus supposing one pound of flesh to prove sufficient to produce the death of another animal, it will be found that each pound of flesh of that animal so destroyed, will possess as active powers of destruction, and will, in its turn, serve to contaminate the whole body of another animal in the same degree.

Hundreds of persons throughout the west and southwest are annually perishing from attacks of this disease. Owing to the want of success which has so uniformly attended the practice of their physicians, many of the inhabitants depend entirely upon their domestic remedies. It is in that country emphatically one of the *approbria medicorum*.

The mortality of the disease is illustrated by the following cases which occurred in Dr. Graff's own practice. The circumstances are thus stated: "The entire family of a Mr. Frazier, moving westward, purchased a quantity of fresh beef in Indiana, of which every member of the com-

pany partook heartily, daily, until it was exhausted, which was the day on which they arrived in my neighborhood, being the evening of the fourth day. In the evening they retired, apparently in their usual health; but during the night I was summoned to attend a female of the company who was seized with violent illness, when I found the unequivocal symptoms, and the peculiar odor of milk sickness. Upon a careful examination, I discovered the smell present with every member of the family, and on inquiry ascertained about the beef and the locality in which they purchased it, which at once satisfied me they were doomed. Before the next morning every member of that company of six was attacked in a violent manner, and *only one* of the number recovered."

Thus far our author: we subjoin very few words of our own. Whilst an evident difference is admitted to exist in the virulence of the effects produced by the milk and flesh of animals affected with milk sickness, and the milk and flesh of those diseased by slop and other improper food, yet there are some points of resemblance which deserve notice.

First. We are informed, "that cows may be affected with milk sickness to such a degree, as that their milk and flesh will produce disease, and yet they themselves manifest no unhealthy symptoms whatever." We remark, that this is often the case with diseased slop-fed cattle, whose milk is so noxious as to impair health and destroy life, whilst their good appetite and plump appearance indicate no cognizable symptoms of disease, until they die as suddenly as unexpectedly.

Second. Dr. Graff states that he gave the infected flesh of a cow which had died of milk sickness, to a bitch suckling five puppies, which proved how deeply the milk

of another animal was imbued with the poison. "The effect," he says, "produced in them was very sudden, and the entire litter died in four days, which was two days before the occurrence of the death of the mother." This is precisely analogous to the effects of slop on the milk of the sow, which is thereby rendered so poisonous as suddenl y to destroy sucking pigs, with this difference: the constitution of grown swine longer resists the agency of this destructive diet.

Third. Our author remarks of the flesh of the cow which had perished of milk sickness, "in external appearances it did not differ from that of healthy beef, unless it was slightly darker, and a thin bloody fluid continually dropped from it." He also informs us that it possessed nothing remarkable in taste, but was peculiarly prone to putridity. The nature and also the characteristic appearances of slop-fed beef were described in a previous chapter (p. 147) long before Dr. Graff's essay was published; yet so nearly do they correspond in every essential particular with the above account that the substances designated might be supposed identical. If is, therefore, less remarkable that slop-fed beef is imbued with unhealthy properties, than that a coincidence in external appearances so striking, should result from causes so different.

We only add, that though the cause of milk sickness is still enveloped in mystery, on farther investigation it will probably be found to proceed from some poisonous mineral combination; for it is already known that arsenical iron pyrites are scattered in great abundance, throughout every section where this malignant disease prevails.

CHAPTER XXX.

FOREIGN MILK DAIRIES.

Impure milk not peculiar to American cities.—Flemish and Dutch dairies.—Food for cattle.—Dairy management in Holland, Switzerland, etc.—How managed for the supply of large towns with milk in England.—Brewers' grains, the chief food of milch cows.—How preserved.—Distillery slop.—Other food.—Stabling cows.—Rhodes's dairy, description of.—Laycock's dairy.—Metropolitan dairy.—Frauds in milk.—Effects of stabling.—Cows in London.—Adulterations and impositions in milk.—Harley's dairy at Glasgow.—Professed advantages of his system.—Its defects.

It has been remarked, that impure milk is not, in a peculiar sense, the scourge of American cities. For the sake of humanity, we devoutly wish such were its narrow limits, and that other countries were exempted from so grievous a curse. But, unhappily, this is very far from being the fact. In Europe the evil is not merely confined to a few populous towns or rural districts, but in some instances is spread through entire kingdoms. In Sweden, for illustration, every farm-house has a distillery, the refuse of which is fed to cattle; and the same management appears to prevail throughout the northern countries of Europe. Even in Germany, a brewery and distillery are regarded as the indispensable accompaniments of every large farming establishment.

Among the Flemish and Dutch, a more rational system prevails, but owing to the inferiority of their pastures, the dairies are more remarkable for the abundance, than the excellence of their products. In Flanders, the principal

article of food for cows in summer is clover, cut and carried to the stalls. On a small scale, where pasturage is to be had, the cattle are left at liberty; where this is not the case each cow is led by a rope, and permitted to feed round the cornfields, the grassy borders of which are left about ten feet wide for this purpose.

The food of one cow in winter, for twenty-four hours, is straw eighteen pounds; and turnips sixty pounds. Some farmers boil the turnips for the cattle; others give them raw, chopping them with a spade: one or the other operations is necessary to obviate the risk of choking the animal where the turnips, which is usually the case in Flanders, are of a small size. Instead of turnips, potatoes, carrots and grains are occasionally used. Bean straw is likewise given, and uniformly a white drink prepared both for cows and horses, consisting of water in which some oil cake has been dissolved, whitened with rye-meal, oat-meal, or the flour of buckwheat.

In Holland, the summer feed for dairies is pasturage day and night; in winter, hay, turnips, grains from the breweries, cakes of linseed, and of rapeseed, also bean and other meals, and the white drink before mentioned. For the sake of cleanliness, the tails of the cows are tied to the roof of the stable with a cord during the time of milking. The cow-houses, both in Flanders and Holland, are kept remarkably clean and warm; so much so, that a gentleman (Rev. Thomas Radcliff) spoke of having drank coffee with a cow-keeper, in the general cow stable in winter, without the least annoyance from cold, filth, or any offensive smell.

Among the Swiss, cows, goats, and sheep constitute the wealth of the farmers, and their principal means of support; or, to discriminate more accurately, the goats, in

a great measure, support the poorer class, and the cows supply the cheese from which the richer derive their little wealth. The extent of pasture is estimated by the number of cows it will maintain. The mountain pastures are rented at so much for each cow's feed, from the 15th of May to the 18th of October; and the cows are hired from the peasants for the same period; and at the end of that time are restored to the owners. In other parts, the proprietors of the pastures hire the cows, or the owners of the cows rent the land.

The Grinderwald Alps feed three thousand cows, and about the same number of sheep and goats. The cattle are attended on the mountains by herdsmen, who, when the weather is tempestuous are up all night calling to their cows, otherwise they would take fright and run into danger. Chalets are built for the use of the herdsmen. These are log houses of the rudest construction, without a chimney, having a pit or trench dug for the fire, and the earth thrown up forming a mound around the interior area, which serves for a seat. To these chalets, the persons whose employment it is to milk the cows, and to make cheese and butter, ascend in the summer season. When they go out to milk the cows, a portable seat with a single leg is strapped to their backs; and at milking time, the cows are attracted home from the most distant pastures by a handful of salt, which the herdsman takes from a leathern pouch hanging over his shoulder. During the milking, the *Rans des Vaches* is frequently sung.

In some parts of Switzerland, the cows yield on an average twelve English quarts of milk a day; and with forty cows, a cheese of forty-five pounds can be made daily. In the vicinity of Altdorf, they make in the course of a hundred days, from the 20th of June, two cheeses daily, of

the weight of twenty-five pounds each, from the milk of eighteen cows. On the elevated pastures of Scarla, a cow, during the best season, produces nearly sixty pounds of skim-milk cheese, and forty pounds of butter. Reckoning twenty-eight pounds of milk equivalent to one of butter, the produce will be eight hundred pounds for ninety days, or less than nine pounds a day. This small return is ascribed to the great height of the pastures, and to the insufficient food of the cows in winter.*

The best French dairies are in Normandy; but in this department of agriculture, France does not excel. In the southern districts, olive, almond, and poppy oil supply the place of butter; and goat's milk is generally used for food.

In Germany, the best pastures and meadows are at Holstein, and along the margin of the German ocean; and for the same reasons that prevail in Holland and Britain, the mildness and moisture of the winters. There are also good pastures and meadows on the Danube, in Hungary; but the great heats of summer are generally unfavorable to dairy husbandry.

But our concern is chiefly with cities, and that the notice may not be unduly extended, we will confine it to some of the principal towns in England. A few particulars may be mentioned in order.

First, food. The dairymen who produce milk for sale in an unmanufactured state, are, of course, limited to populous neighborhoods. They never grow their cow provender, but feed their cattle chiefly on brewers' grains; that is, malt after it has been used by the brewer. This appears to be the invariable practice throughout the kingdom, as well in the largest and best regulated establishments, as in the smaller and inferior dairies.

* For. Quart. Rev. and Cont. Misc.

As the brewing seasons are chiefly in autumn and spring, a stock of grains is generally laid in at those seasons for the rest of the year; the following is the method of preserving them at the large dairies in London. The grains are laid in pits, lined with brickwork set in cement, from ten to twenty feet deep, and of any convenient dimensions. They are firmly trodden down, and covered with a layer of moist earth, eight or nine inches thick, to keep out the rain and frost in winter, and the heat in summer. A cow consumes about a bushel of these grains daily, the cost of which is from fourpence to fivepence, exclusive of the carriage and preservation. The grains are, if possible, thrown into the pit while warm and in a state of fermentation, and they soon turn sour, but it is said, they are not liked the worse by cattle on that account; and the air being perfectly excluded, the fermentation cannot run on to putrefaction. The dairymen say that the slow and slight degree of fermentation which goes on, tends to the greater development of the saccharine and nutritive principle, and they will have as large a stock on hand as they can afford, and not open the pits until they are compelled. It is not uncommon for two years to pass before a pit of grains is touched; and it is said that some have lain nine years and been perfectly good at the expiration of that period. The dairyman, however must know his brewer, and be able to depend upon him. The grains from a large ale brewery are considered the most nourishing. Those from a porter brewery are not so good; and those from the little brewers, who first draw off their ale, and afterwards extract every particle of nutriment in the formation of table beer, are scarcely worth having.

Distillery slop, also, or as it is called in England, "wash," to the extent produced, appears there to be in

as great demand for milch cows as in this country; and the distillers in the neighborhood of London and other populous places, manage much as do the same class of persons in the vicinity of New-York. Large dairy establishments are got up expressly for the purpose of consuming on the premises the slop of the distilleries. At Brentford, near London, one of these concerns was constructed at a cost of £8000, and calculated to contain 600 head of cattle. The price of brewers' grains is fourpence halfpenny per bushel; of distillers' grains, on account of the meal they contain, ninepence a bushel; of slop, 36 gallons for sixpence.

The management of the cows, however, in the larger establishments, is far superior to what obtains in our dairies. Grains and slops appear to be used always in connection with large supplies of more natural and substantial food. One of the most singular facts connected with their mode of cow-keeping is, that the process of fattening goes on at the same time with the milking; and when they become dry, they are usually fit for sale in the Smithfield beef-market. At Laycock's "lactary," at Islington, which is one of the best, their food is composed of brewers' grains, mangel wurtzel, ruta baga, and hay; the turnips for fattening. The daily average for each head, is one bushel of grains, fifty-six pounds of mangel wurtzel, or turnip, and twelve pounds of hay. It is proved there, as in New-York, that brewers' or distillers' grains alone, to say nothing of slop, are miserable food for cows, producing milk of very inferior quality, and requiring hay and roots to prevent serious detriment to the health of the cattle.

Second. The confinement of dairy cows appears to be general. As the dairies of London are objects of much interest to the stranger and the agriculturist, and happily illustrate the effects resulting from a combined and well-ar-

ranged system, we will subjoin a sketch of some of them. The most eminent, are two at Islington, belonging to Mr. Laycock, and Mr. Rhodes, and the metropolitan dairy on the Edgeware road.

Rhodes's dairy has been established more than thirty years. The surface on which the buildings are placed is a gentle slope of two or three acres, facing the east. The sheds run in the direction of the slope, as well for the drainage of the gutters as for the supply of water for drinking, which will thus run from trough to trough the whole length of the shed. The sheds are twenty-four feet wide; the side walls being about eight feet high, with rising shutters for ventilation, and panes of glass let into iron frames for light. The floor is nearly flat, with a gutter along the centre, and a row of stalls, each seven feet and a half wide, along the sides, and adapted for two cows, which are attached by chains to a ring that runs upon an upright rod in the corner of the stalls. A trough or manger, of the ordinary size of those used for horses, is placed at the top of the stall. Four of these sheds are placed parallel and close to each other, and in the party-walls are openings a foot wide, and four feet high, opposite to each cow. The bottom of these openings is about nine inches higher than the upper surface of the troughs, and receives a one foot square cast iron cistern, which contains the water for drinking; each cistern serves for two cows that are placed opposite to each other, but in different sheds: all these cisterns are supplied from one large tank. These cisterns have a wooden cover, which is put on while the cows are ea g their grains, to prevent their drinking at that time and tainting the water by dropping any of the grains into it. At the upper end, and at one corner of this quadruple range of sheds, is the dairy, consisting of three rooms, each about twelve feet

square; the outer or measuring room, the middle or scalding-room, with a fire-place and a boiler, and the inner, or milk and butter room.

At the lower end of the range is a square yard surrounded by sheds, some for fattening the cows when they have ceased to give milk, and the others for store and breeding pigs. The pigs are kept to consume the casual stock of skim-milk which remains on hand, owing to the fluctuation of the demand. The milk is kept in a well, walled with brick laid in cement, about six feet in diameter, and twelve deep. The milk soon becomes sour there, but is then thought to be most nourishing. Breeding swine are said to be most profitable, and the sucking pigs are sold for roasting.

Beyond this yard is a deep pit or pond into which the excrement is emptied. There is a stack-yard, sheds, and pits for roots straw, and hay; a place for cutting chaff, cart-sheds, stables, and every building which such an establishment can require. The number of cows varies from four to five hundred.

Salt is given to the cows, at the rate of two ounces each cow a day. Their principal food consists of brewers' grains; but portions of green food or roots are supplied alternately with the grains. In winter, when tares or green fodder cannot be produced, after the turnips, potatoes or mangel wurtzel have been eaten, they are supplied with hay.

Laycock's dairy establishment is also situated at Islington, and covers several acres. The number of cows varies from four to seven hundred. We will only notice a few particulars, in which this concern differs from Mr. Rhodes's dairy. The cows in Rhodes's are never untied while they are retained as milkers. Some of them have stood in the stall more than two years. Mr. Laycock, on the contrary, turns out his cows once every day to drink from

troughs in the yard, and they remain out from half an hour to three hours, depending on the weather and the season of the year. From the end of June until Michaelmas, they are turned into the fields from six o'clock in the morning until twelve or one; and from two o'clock in the afternoon until about three o'clock on the following morning. Mr. Rhodes's cows have always water standing in the cistern before them.

The metropolitan dairy establishment stands on less than an acre of ground, and is calculated for 360 cows. The cow-houses are in parallel ranges, twenty-four feet wide, the side walls eight feet high, the space allowed for each cow about three feet nine inches, and the greater number of cow-houses without stalls. There is one gutter in the centre, and no raised foot-path there; it being found that the latter is apt to make the cows stumble when turned out upon any occasion. But these occasions are extremely rare, for the cows here, as in Mr. Rhodes's establishment, are never untied from the day they are put into the milking shed, until they are removed for fattening or for slaughter. The food consists of grains chiefly; grass and roots constitute the rest of their food; dry hay is seldom given, and the chaff of clover hay, when used, is always mixed with grains or wash. The cows are never turned out to water; but from a large cistern, pipes conduct it to every cow-house; and the water being turned into a manger, as it runs slowly by, each cow drinks at pleasure.

Such is a sketch of some of the principal milk dairies about London. They have been constructed and are maintained at considerable expense, and being objects of curiosity to those who take an interest in such matters, attract many visitors; the proprietors, of course, keep them in the

best condition for public inspection. They are regarded as complete concerns of the kind; but it must be admitted that as it respects the conditions which are absolutely essential to the health of the cows and the production of nutritious and healthy milk, namely, adequate exercise, pure air, and natural food, they are most lamentably defective. Inferior, however, as must be the quality of the milk, it is said to be rarely vended pure in the state it comes from the dairies. The method of distribution would, indeed, appear to favor a system of imposition. The milk is chiefly sold by small itinerant dealers, who have "milk walks," or a certain number of customers whom they supply twice a day, and contract for as many cows, which they milk themselves, as will supply their demand; of course whatever frauds the dealers may practise, there is no oversight or responsibility on the part of the wholesaler. Says a London writer on this subject: "Though the cow-keepers do not themselves adulterate the milk, yet they are not to be wholly acquitted of the guilt; for in many of the milk-rooms, where the milk is measured for the retailer, pumps are erected for the express purpose of furnishing water for the adulteration, which is openly performed on the spot, in the presence of any who happen to be present." Youatt remarks: "The name of new milk has something very pleasant about it, but it is an article which very rarely makes its appearance at the breakfast or tea-table of the citizen. That which is got from the cow at night, is put by until the morning, and the *cream skimmed off*, and then a little water being added, it is sold to the public as the morning's milk. The real morning's milk is also put by and skimmed, and being warmed a little, is sold as the evening's milk."

The same writer elsewhere observes in relation to the confinement of cows: "We can readily conceive that, from

want of exercise, and consequent cutaneous perspiration, Rhodes's cows may give a somewhat greater quantity of milk than Laycock's; but on the other hand, when we think of an animal tied in the corner of a stall for twelve, or eighteen, or twenty-four months together, we cannot help associating the idea of disease, or tendency to disease at least, with such an unnatural state of things; the feet and digestive system would particularly suffer, and we should suspect a little vitiation of all the secretions, and some deterioration in the quality of the milk."

It is estimated that 12000 cows* are kept in the environs of London for supplying the inhabitants with milk. It is therefore evident that *nine tenths* of the milk consumed is furnished by the small dealers, who each keeping their half dozen cows, etc., in places retired from the public eye, and in a manner that will best subserve their own interests, it is not likely under these circumstances that better milk will be produced, than in the larger establishments. The accounts of the London dairies, in some particulars, appear to be conflicting; but from all we can

* The quantity of milk yielded by all these cows, at nine quarts each per day, amounts to 39,420,000 quarts, or 27 quarts of genuine milk for each individual. The retail dealers usually sell the milk for fourpence per quart, after the cream is separated from it, and then about three shillings per quart for the cream; besides this, a great deal of water is mixed with this skimmed milk: so that we far underrate the price when we calculate that the genuine milk sells at sixpence per quart, which makes the money expended in milk in the British metropolis amount to £985,000, or nearly a million of pounds per annum.

If we again divide the £985,000, by 12,000 (the number of cows), we have the almost incredible sum of more than eighty-two pounds as the money produced by the milk of each cow. This is divided among a variety of persons, and after all affords but a scanty subsistence to many of them; but it unequivocally proves the rascality that pervades some of the departments of the concern.—*Youatt.*

learn, it may be safely inferred that the condition of the greater part is little superior to those in New-York. Loudon says: "The defects of the London dairy establishments, appear to be, chiefly, want of cleanliness, and imperfect ventilation." And again: "The idea is by no means pleasing, of consuming milk chiefly manufactured from *grains*, and *distillery wash*, and produced by cows deprived of *all exercise* in the open air." Another writer remarks: "We cannot omit to animadvert on the culpable filthiness of cows, both in the metropolis and vicinity, where these animals are literally *crammed*, not with wholesome food, but with such matters as are calculated to produce an abundance of milk. This unnatural practice, however, would be in some degree venial, if the milk was vended in a *pure* state. It is indeed a notorious fact, which we think it our duty to state, that vessels both of hot and cold water are always kept in the milk-houses for the accommodation of mercenary retailers. Those persons purchase a certain quantity of unadulterated milk at a low price; but as each must make his or her profit, they mix it with such proportions of water as they think necessary to make their milk of *sufficient standard*; when it is hawked about at exorbitant prices. Circumstances of this fraudulent kind ought to be more generally known; and we trust the vigilance of the police will be extended to the suppression of other practices in the trade, equally bold and pernicious."*

For the foregoing facts, where other reference is not given, we are chiefly indebted to Loudon and Youatt, who are standard authorities on these subjects, and whose accuracy, so far as they go, may not be questioned. Their attention, however, was not directed to the infringement

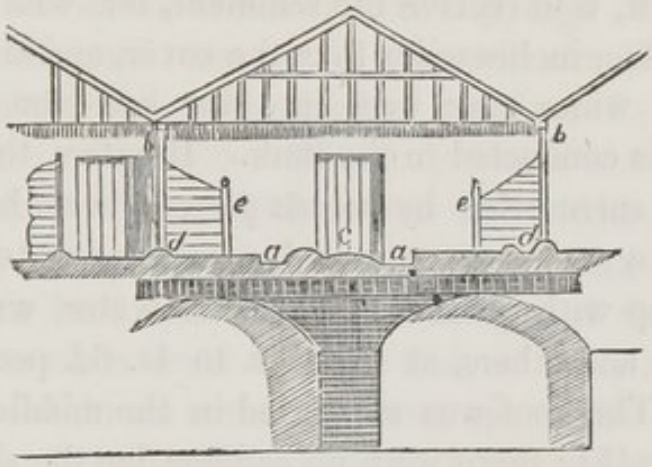
* Domestic Enc., Vol. IV. p. 78.

of natural laws and the consequent effects on the health and lives of human beings, but solely to the management of cattle with a view to economical results. Detailed accounts, therefore, of the specific forms of evil under consideration, would have been inconsistent with their object; yet enough has been incidentally disclosed to show that the whole system is characterized by ignorance of physiological principles, and a mercenary recklessness of consequences; whilst the people, unconscious of the evils inflicted upon them, are making no exertions for their correction. That they may be corrected and a more rational mode of treatment be introduced, is, we believe, everywhere practicable to well-directed efforts. Loudon says: "Already country dairies have sprung up at the distance of from five to twenty miles from London, and milk and cream are sent to town in close vessels in spring-carts which go at a rapid trot. When, instead of spring-carts rail-roads are established, on which carriages may go at the rate of thirty miles an hour, the milk and butter used by the commonest people of London, will be of as good quality, as that now used almost exclusively by gentlemen who have country-seats." If this may be affirmed of the British metropolis, the complete reform of this enormous evil in other cities, should not be regarded as visionary or impracticable.

We subjoin an account of Harley's dairy establishment at Glasgow, which being esteemed very complete of its kind, has been celebrated since 1813. The professed object of the proprietor is, to supply the public with new milk free from adulteration, and to have the stables, cows, and milk kept in a more cleanly condition than by the usual mode.

The cow-house contained one hundred cows. It stood

upon a vaulted cellar, which was divided into three apartments; the middle one for the manure, that at one end for potatoes and other roots to be used as food; and in the other, cows not giving milk were kept.



The excrement was dropped into the centre division through apertures in the gutters (see the cut, *a a*,) eighteen inches in diameter, covered with cast-iron plates. Sometimes a cart was brought into the cellar, and the excrementitious matter at once dropped into it, and carted away. The covers had finger-holds for lifting them, and the refuse was drawn along the grooves into them by a broad hoe or scraper fitted to the groove. It was often found necessary to mix ashes with it, to render it of a fit consistence to be carted away. The second division of the vaults was fitted for the process of fattening; darkness and quiet being considered favorable circumstances. In the third, roots were effectually preserved from frost. At one end of the cow-house a tank was formed fifty feet long, sixteen feet wide, and six deep, with its surface on a level with the bottom of the cellar; it was arched over, and had a man-hole for cleaning out the sediment, four feet in diameter; into this tank the whole of the urine was conducted, after being filtered through the urine gutters into spouts

beneath it, reaching the whole length of the house. Each filter consisted of a vessel covered with a plate of cast-iron, pierced with small holes, the surface of the plate being on a level with the surface of the gutter; the use of the vessel under it, is to receive the sediment, for which purpose it is made four inches wider than the cover, and in this extra width the water runs over into the cast-iron spout, by which it is conducted to the tank. It enters the tank by a division surrounded by boards pierced with holes, so as to filter it a second time, in order that the water may be pumped up with greater ease. This water was sold to gardeners, and others, at from 1*s.* to 1*s.* 6*d.* per hundred gallons. The roof was supported in the middle by cast-iron pillars (*b*); there were no ceilings, but the slates were hung to the quarterings of the rafters on pins, with a good lap; this being found warm enough in the coldest weather, and favorable for ventilation in the hottest: there were also windows in the roof, both for light and ventilation. The heat was generally kept from 60 to 64 degrees. The passages (*c*) were paved and five feet wide, and two inches and a half higher in the middle than at the side.

The floor on which the cows stood in Harley's cow-house, was raised six inches above the passages; this not only *showed the cows to better advantage*, but kept them dry and clean: and two and a half feet of the floor next to the trough, was made of composition, similar to what is commonly used in making barn floors; because the principal weight of the cows being upon their fore-feet, and as in lying down the whole weight is upon their knees, it was obviously desirable to have that part of the stall as smooth and soft as possible. It is conceived, indeed, that joists and flooring would be the best for that purpose, were it not for the expense. The back part of the stall was of hewn

stone, and for about eighteen inches towards the groove there was an inclination of about half an inch to let the water run off; and these eighteen inches were of striped ashler transversed, the strips being about an inch separate; this prevented the feet of the cows from slipping. In all cow-houses, perhaps, the front part of the stalls should be rather lower than the back part, since it would enable the cattle to lie easier; and, besides this, they would not be apt to slip their calf. Cows which put out their calf-bed, or have a tendency to slip their calf, should have a straw mat laid below their hind quarters. The bottom of the feeding troughs was on a level with the floor of the stalls; both edges were of hewn stone, the outer one next the passage was three inches above the bottom of the trough, and the other six inches higher; they were four inches and a half thick, and rounded to a semi-circle; the trough was one foot three inches wide, and six feet four inches long.

The standing room for the cows in the dairy, that is, the space between the feeding trough (*d*) and gutter (*a*) was from six to seven feet; the latter dimensions being for the larger cows. The breadth allowed for a cow was from three feet to three feet six inches; two cows standing together between wooden partitions as in stables (*e*). Each cow is fixed to a stake nine inches from the partitions, and six inches from the feeding trough; the stakes are two and a half inches in diameter, and the cows are fixed to them by chains and swivels fixed to rings. "The chains were three feet seven inches long, consisting of twenty-one links, viz. three on one side of the swivel, and eighteen on the other; the short end of the chain had a hook for joining the chain, with a broad point of an oval shape, which was more easily hooked or unhooked, and answered the purpose better than the common mode used in dogs'

chains. The hecks, or racks for the hay, are three feet two inches long, by one foot ten inches deep, framed with deal, and filled up with one horizontal and ten perpendicular iron rods a quarter of an inch in diameter. These hecks are hung with window-cord which passes over pulleys, so that they can be raised by a wheel and pinion at pleasure above the heads of the cows, when they are eating green food from the feeding-gutter. Mr. Harley considers it of importance not only that each cow should be kept clean by combing and brushing, but by the chain system of fastening, should have the liberty of licking its own skin, and that of its fellow.*

The cattle stand in rows, twelve in a row, across the house, head and head, tail and tail alternately; there is a passage behind for cleaning, and one in front for feeding. In front of each cow is a wire grating, hung like a window-sash, which lifts up when giving the soft food and cleaning the cribs, and is put down when they get hay, etc. The contrivances for washing the cribs, collecting the urine, and ventilating the house, give peculiar advantages to the establishment, which may be summed up in the following items:—the health of the cattle; the preservation of the timbers; the diminished danger from fire, there being no hay-loft above the cattle; the preservation of the provender; and the flavor of the milk. The heat is regulated by thermometers. A circulation of air can be produced, so as to keep the cattle comfortable in the hottest weather, by which their health is promoted. Ventilation also prevents the timber from rotting; makes the cows eat their fodder better, as their breath is allowed to escape, instead of being thrown back upon the food, as is the case when

* Harlean Dairy System, p. 28.

their heads are placed opposite a wall. It is well known that milk takes a taste from any other substance; of course, if the cow-house is filled with bad air, the milk while passing from the teat to the pail, and during the time it may stand in the house, will be impregnated with foul atmosphere.

In feeding and preparing the food, Harley has made many experiments; and by the mode he now follows, the cattle fatten and milk better, than by the ordinary process; and the milk has no taste from turnips, or other vegetables.

The arrangement for milking, insures the cow to be clean milked, and also prevents fraud; and the mode of locking up the milk, and at the same time of admitting air, prevents adulteration by the retailer. The cows are not farmed out to milkmen, as in London.

The stock of cows for some time back, has been 120, averaging eleven English quarts each per day; but both quality and quantity depend much upon the kind of food. Harley gives a decided preference to the Ayrshire breed of cows. They are bought chiefly at country fairs, either newly calved, or a few weeks before calving, and are *never turned out* until they go to the butcher.

The food of the cows during summer consists of cut grass and green barley mixed with old hay; and during winter, Harley uses a good many turnips and potatoes, all of which are steamed and mixed with cut hay and straw; also *grains* and *distillery wash*, *when these can be got.*

When there is more milk than supplies the demand, part is put in the milk-house until next day, when the skimmed milk is sold at half price, and the cream sold at 1*s.* 6*d.* per quart. When any cream is left, it is put in a churn and made into butter once a week or fortnight.

A table of regulations has been adopted for the times of feeding, milking, currying the cattle, cleaning the houses, etc. Each person has a currycomb, and a hair-cloth for cleaning the cows twice a day, and a mop and pail for the house, which is washed and sanded twice a day.

The cleanly state of the cattle and house, makes it a treat for visitors to see the establishment; and the way the vessels and milk house are kept, has made some persons fond of milk, who were formerly disgusted with it, from the manner in which many town dairies are conducted.

The advantage of this system to the owner of the cattle, is shown from the following abstract, in Harley's own words: but the benefit of a liberal supply of genuine milk to the community at large, particularly to children, he says, it is not easy to estimate :—

To the general *health of cattle* by ventilation, 15 per cent.

To the *prevention of disease* called grain sickness,—when fed on grains, 15 per cent.

To the *prevention of swelling*, by eating young and wet grass, 15 per cent.

To the *prevention of choking*, when feeding on turnip or potatoes, 15 per cent.

To *saving in the expense* of feeding by improved modes of cooking, 20 per cent.

To *saving of labor* in feeding, cleaning, etc., 50 per cent., as one person will do as much as two on the old plan; but allow 25 per cent. of this for draining, etc., leaves 25 per cent. profit on servants' wages.

To *saving of timber* in building, as they will last more than double the time, 50 per cent.

Harley has a steam engine for driving the following machinery:

A small thrashing-mill.

A straw-cutter.

A turnip and potato slicer.

The churning apparatus.

Pumping water, etc.

The same boiler that drives the engine, steams the food, and warms the water, etc.

After much study, labor and expense, the establishment is now brought to such a state of perfection, that it receives the cordial approbation of all who have seen it; furnishing the community with genuine milk at comparatively a low price. It is admitted that the greater part of the system is original, and is not to be met with in any part of the kingdom.*

Loudon remarks, "that the merits of Harley's system are considered to be greatly exaggerated in the above account. Taking the system altogether, it may be described as essentially that employed by the dairy farmers in Holland and the Netherlands, given at length by Radcliff and Sinclair."

From the foregoing representations of Harley's dairy, we are prepared to commend all the real improvements introduced into it, and these strike us as being considerable. By this system important pecuniary advantages accrue to the proprietor, whilst the health of the cattle, and the purity of the milk are both promoted by the superior attention which is paid to cleanliness and ventilation. But granting all that can be claimed for these particulars, the system has two radical defects. First, the cows are fe

* Farmer's Mag.. Vol. XV. p. 189.

all the *brewers' grains*, and *distillery slop that can be obtained.* Second, being confined in stables, they are *totally deprived of exercise.* Whatever, therefore, may be the merits of the establishment in other respects, these alone are sufficient to condemn it. Proper food and exercise are essential to the health of cattle; and these being disregarded, all the animal secretions become vitiated, and the milk impure and unhealthy.

CHAPTER XXXI.

OBJECTIONS ANSWERED, AND THE DIFFICULTIES OF REFORM CONSIDERED.

Slop healthy food for cattle, because the refuse of grain.—Slop said to be eaten in the state of vinous fermentation.—Cattle said to thrive on small portions of slop.—Gradual correction of the evil.—Difficulties in the way of reform.—The evil stands not alone.—Why distillers are opposed to reform.—A letter from distillers.—The distillation of liquor encouraged by the patronage of the moral and temperate.—Cow-stables the nightly resort of thieves and vagabonds.—Responsibility of distillers.—Distilleries in New-York, etc.—Production of whisky.—Destruction of grain.—Whisky from the west and south.—Dilution and sale of slop essential to the support of the distilleries.—The number of rectifying houses.—The advantages of these establishments to the city distiller.—Distillation of spirit from molasses.—A grain distillery in Philadelphia.—Opposition of slop-men.—Diseased condition of the cattle.—The stock and their management must be changed.—The evil, not necessary.—Reform practicable.—Desecration of the Sabbath by the traffic in milk and slop.

Some few minds that appear soberly intent on truth, are not quite clear in relation to certain points involved in the general inquiry. It is, therefore, proposed to throw the difficulties which have been suggested into a tangible form, for the purpose of connecting therewith such elucidatory remarks as our information may enable us to make.

I. It is asserted, "that *still-slop* is healthy and proper for cattle, because it is composed of corn and rye."

This is most obviously leaping at an inference. We may say that *whisky* is healthy and proper because it is produced from corn and rye; but who does not in this

case see the fallacy of the conclusion? Every novice in chemistry knows, that in chemical combinations a slight change in the component parts will form an entire new substance. Thus the air we breathe, by a slight change in the constituent elements, becomes a deadly gas, and kills as soon as it is inhaled. Vinegar, though so different in its properties from sugar, is precisely analogous in its composition. But it is unnecessary to multiply examples to show the utter fallacy of the conclusions deduced from such premises. And if, for the sake of argument, we admit that there has been no change in the nature of the corn and rye, it by no means follows that when administered, as they are, in so dilute a form—a hogshead of slop, perhaps, containing no more nutriment than exists in a peck of Indian meal—that they constitute healthy food. It is like supporting a man daily on two spoonfuls of flour mixed with two gallons of water. The extreme dilution of the preparation, unfitted as it is for the gastric apparatus of ruminating animals, is probably one cause why their health suffers from its use.

II. It is said "that cattle get the slop in the state of vinous fermentation, the same state in which bread is eaten, and therefore it must be healthy."

How this assertion can be reconciled with the facts in the case, we are unable to determine. Bread is not eaten in a state of fermentation at all. Dough, by the process of *panary fermentation*, acquires porosity, and by the action of heat is baked or converted into bread, as every housewife knows, before it has passed into the acetous state, which spoils it. Slop is eaten by cows, indifferently, either in the vinous or the acetous state. In the vinous state, it probably contains alcohol, after the process of distillation; and from the large quantities received into the system, and

the debilitated condition of the digestive organs, there is at least probable evidence that the process of vinous fermentation is carried on in the stomach of the animal, by which alcohol is developed and separated from the water and extractive matter with which it is combined. This opinion is strengthened by the fact that swine and cattle become intoxicated by eating large quantities of apple pomice, though in a saccharine state; and is further confirmed by the testimony of Denham and Clapperton, the intrepid African travellers. Speaking of the camels of Africa, they say, that they so frequently become intoxicated in consequence of eating freely of dates after drinking water, as seriously to diminish their health and strength. They make the statement as one of common occurrence in that country, and it it doubtless entitled to the fullest credence. Now, we know not how such results can be accounted for, except on the hypothesis named. If this is admitted, the stimulating properties of the slush, by the appetite which itself creates, will explain why cattle, that have acquired a relish for it, devour so voraciously this kind of food; and its narcotic properties account in part, for its deleterious effects on the health of the animals that freely partake of it. But not to anticipate what more properly falls under another head,—

III. It is frequently urged, by interested witnesses, that "cattle fed upon slop, with a proper quantity of hay and meal, will thrive better, and are more healthy than on other food."

This, it will be observed, is a very indefinite statement. It would be a gratifying item of information to learn what quantity of still-slop with other food is "proper" for a cow. For while it might not be worth while to proscribe infinitesimal portions, we are homœopathists in this partic-

ular at least, believing that so far as the health of the animal is concerned, the smaller the dose, the better the effect. But while there might be great diversity of opinion among milkmen as to the proper quantity, it is not ascertained that there is any difference in their practice. Any amount of testimony can be produced to prove that about a barrel per day is the usual allowance, or as much as the animal will swallow. But whatever may be the effects of small portions of slop on the animal's health, there is one objection to its use for dairy-cows, which is decisive and final; any appreciable quantity acidifies the milk, which renders it of course unhealthy, and unfit for human nourishment.

Some other particulars may here be considered, which though specially referring to the city of New-York, will be found to apply with little modification wherever the work of reform has commenced.

The entire removal of the evil cannot, perhaps, be immediate, but must be gradual and progressive. When public attention was first called to this subject, nearly all the dairies from which our city was supplied with milk, were fed on distillery-slop. The investigations and disclosures which were then made of the impure, unhealthy, and innutritious quality of the milk thus produced, occasioned an immediate and extensive demand for a pure article, the product of natural food. To meet this demand at once, was certainly desirable, but, for reasons which will appear, it was impracticable to furnish the necessary supplies, and correct the evil as soon as it was discovered.

In looking attentively at the subject, it will be seen, there were difficulties in the way, which lay a little behind the interests of those who were prosecuting the business. From the isolated situation of this city there is, unfortunately, but very little good pasturage in its vicinity;

and the little there was, of late years, has been chiefly put in requisition for other purposes. Hence the means of producing pure milk, instead of meeting the wants of our rapidly augumenting population, have actually decreased in the inverse ratio of the demand. There has been no period, within the last thirty years, in which the country in the immediate vicinage of New-York has been adequate to the supply of the inhabitants with wholesome food and pure milk. Such being the facts, the inducements to furnish inferior supplies, and to fraudulent practices, have been very great; yet no effective measures have been adopted either to remove the temptations to abuse, or to protect the public against them. There are some evils consequent upon the condition of populous cities, such as bad air, and bad water, which must often be endured. But the evil under consideration is not inseparable from the location of the city; and yet, for the reasons named, it is not surprising that it exists. The dairyman, failing in a cheap and ready supply of pasturage and fodder for his cattle, found that still-slop would answer his purpose. And what was at first a matter of convenience or experiment, soon became an object of choice; for he discovered that slop would produce more milk, and at a cheaper rate than any other food. The quality of the milk, it is true, was greatly deteriorated; but this neither diminished the price nor the demand. The gains of whisky-milk, and not "the milk of human kindness," influenced his decision; and, as the more slop the greater the profits, every selfish consideration urged him to secure a supply by patronizing the iniquitous business of distillation, regardless of the incalculable evils he would thereby inflict upon his fellow men. Slop! slop! slop! was the only cry. Pure air, natural food, and suitable exercise for his cattle were no longer

desired, because slop, pens, and bad air were found more profitable. The natural and healthy condition of the cows was thus reversed, for one most inhuman and unnatural. Herd after herd was driven from the fields, until all were "cribb'd, cabin'd, and confined," a reproach and a curse to the community.

Such, as we have described, was the state of our milk dairies when first made a subject of public discussion. Their natural and healthy condition had, by gradual and unperceived degrees, given place to one most unnatural and pernicious. And the evil, as we have shown, stands not alone. It is a part of a formidable combination which, by the tacit acquiescence of the community, has for many years been sending far and deep its roots, until it has acquired fearful dimensions and strength. And now, to assail any part of this combination, is to rally a host in its defence.

Distillers were opposed to reform, because, if successful, it would subtract one of the most essential elements of their prosperity. The following estimate of their profits derived from the patronage of the slop-dairies, was made by a person long familiar with the business, and will place the distiller's interest in the subject in a clear light. The concern which furnishes the basis of this calculation, converts 600 bushels of grain into whisky per day. Each bushel of grain will yield three barrels of slop at nine cents per barrel—or a daily aggregate of one thousand eight hundred barrels, which will suffice for one thousand eight hundred cows. In the neighborhood of the distillery, there are about one thousand eight hundred cow-stalls; those supplied with troughs and gutters to convey the slop directly to the pens, each rent for five dollars per annum; and the stalls a little more distant, where the slop has to be carted,

at four dollars and fifty cents each—making the average, therefore, about four dollars and seventy-five cents.

Annual rent of 1800 stalls, at $4 75 each, is	$8,625
1800 barrels of slop daily, at nine cents per barrel, amounts per year to	58,130
	$66,755

Although we cannot question the fairness of the above estimates, we are not responsible for their accuracy. No exertions were spared to obtain correct data from proper sources; but owing to the unwillingness, not to say incivility, of some persons at the head of these establishments to give information, we were compelled to apply elsewhere; on them, therefore, must rest the mistakes, if any such there be, whilst we, though innocent in the matter, when they are pointed out, will promptly acknowledge and correct them. As, however, we have no reason to doubt their fairness, they most clearly disclose the grounds of the distiller's hostility. The slop-milkman's patronage is indispensable to his operations. Let the establishment referred to be annually taxed sixty-six thousand seven hundred and fifty-five dollars, and other distilleries according to their extent in the like ratio, and soon the whisky and the whisky-milk manufactories would die together.

Since the foregoing was written, we have been unexpectedly favored with a communication, from a source which we believe entitles the statements it contains to the fullest confidence. It was prepared by gentlemen who for a long series of years were practical distillers in this city; and although no longer directly engaged in the business, in their present occupations possess, in an eminent degree, all the necessary facilities for obtaining correct information on the subject. The letter, besides furnishing new

facts which have an important bearing on the matter under consideration, confirms, as will be observed, the views we have elsewhere presented. We subjoin an extract, to which the reader's attention is invited.

RESPECTED SIR :

In compliance with your request, we herewith submit a concise account of the liquor distilleries in the city of New-York and vicinity. The particulars stated, were in part derived from authentic sources of information to which we have access, but chiefly from our own long practical connection with the business of distillation, and may therefore be relied upon as critically correct. One fact, we have observed, stands out with startling prominence, namely ; the grain distilleries now in operation amongst us, are chiefly sustained by the moral and temperate portion of the community, through the patronage which they extend to the slop-milk dairies. This conclusion is undeniable ; as, without their support, the business of distillation, in the present state of the markets, must be broken up. Corroborative of this statement our investigations enable us to say, that *six sevenths* of all the milk consumed in this city, is produced from the unhealthy slush of the distilleries.

You are aware of the filthy condition of the cow stables, and of the unnatural and injurious confinement to which the animals are subjected. But there are some circumstances important to be known in regard to their management, with which you are probably unacquainted. At some of the large slop dairies, the labor of feeding and milking the cattle, cleaning the milk vessels, etc., is chiefly performed by drunken thieves and vagabonds, who, after prowling through the city for plunder during the day, resort to the lofts of the cow-stables at night to lodge, and in return for this privilege, the dairymen exact from them

the most menial services. The disgusting filthiness of these wretches in their persons and habits to whom is intrusted the care of the milk, is so well known to the dairymen, that for this and other considerations, they will not allow the use of this milk in their own families. These facts, sir, are too notorious to be disputed.

We are in possession of an immense mass of information, which goes to prove that the use of slop-milk in families is little less than murderous; but as time will not permit us now properly to arrange these materials, they must be the subject of another communication.

Our present design is to state a few particulars in relation to the destruction of grain, and the production of whisky and slop by the different distilleries in the city of New-York and neighborhood. The tremendous calamities which they inflict upon the community, without any countervailing benefit, might well make angels weep. The ill-gotten gains of the distiller, who now proudly rolls in his carriage, is the price of blood. When will these destroyers of human life and human peace—of all, indeed that is excellent and lovely and of good report—abandon their baleful work? Its invariable tendencies are to pervert the bounties of Providence into a means of increasing human wickedness, and to spread vice, degradation and death, wherever its influence extends. "It violates all those principles which require men to honor God, and do good to mankind; it is manifestly hostile to both, as could be proved by millions of facts; and no principle of religion, morality, or humanity, with a knowledge of the consequences, to which all now have access, will justify its continuance."

But to return. The following is an accurate state-

ment of the distilleries now ready for full operation, and the quantity of grain each can daily consume.

Johnson & Son's distillery, Sixteenth-street,	1400	bushels.
Spencer's two distilleries, at Greenwich Lane and Broome-street, ...	1000	do.
Minturn's, Williamsburg, ...	500	do.
Schenck, Sneder & Co.'s, Brooklyn ,. .	600	do.
Cunningham & Harris's, Brooklyn, . .	600	do.
Robert Bach's, Williamsburg, . . .	500	do.
Manly & Clark's, Brooklyn, ...	500	do.
Charles Wilson's, Wallabout, . . .	200	do.
Cole & Berry's, Williamsburg, . . .	250	do.
Daily consumption,	5,550.	

The above, you will observe, exhibits the quantity of grain each distillery is capable of mashing per day; and for the past seven years each has mashed the utmost its works would admit. The profit on whisky sales in previous years, has been estimated to average from thirty to forty per cent. But at present, owing to the fall of price, the net profit has diminished to about the net amount of slop sales; so that without turning the slop to good account, the failure of the distilleries would be inevitable. A bushel of grain, weighing fifty-six pounds, will yield sixteen quarts of spirit; the whole mashing as above stated being five thousand five hundred and fifty bushels, would, therefore, daily produce twenty-two thousand two hundred gallons of first proof whisky. As but few distilleries omit mashing more than twenty days in the year, the number of working days may be fairly put down at two hundred and ninety-two, which would give an aggregate of SIX MILLIONS, FOUR HUNDRED and EIGHTY-TWO THOUSAND, FOUR HUNDRED GALLONS of *first proof whisky* annually manufactured from grain

in the city of New-York and vicinity. We may remark, that with the exception of Minturn's and Bach's distilleries, recently built, the capacity of which have not, we understand, been increased, all the others commenced with mashing from one hundred to two hundred bushels a day. Johnson's distillery was a one hundred bushel house up to 1832; at that time it was increased to four hundred bushels; in 1834 to one thousand bushels; in 1840 to twelve hundred bushels; and during the past summer (1841) to one thousand four hundred bushels. And the other distilleries were enlarged, at nearly corresponding periods.

The quantity of whisky introduced into the city by the Hudson river and from the west, cannot be accurately ascertained; but some idea of the vast amount may be inferred from the transactions of different houses in the article, and the examination of the bills of lading as the vessels arrive. It may, for example, suffice to state that Messrs. W. E. & J. Craft have, the present season, received from Hubb's distillery, Lawrenceberg, Indiana, rising of eleven thousand barrels of whisky; and the tow-boats, which are constantly floating in, not unfrequently bring from two hundred to eight hundred barrels each. The immense influx of whisky from the the south and west, has so diminished the price of the article in this market, that the proprietors of the city distilleries, in order to save their business from ruin, have resorted to a new expedient to turn the slop to advantage. For this purpose, some have connected a hot water pipe with the gutter which discharges the slop from the still, by which means the slop, when it reaches the cistern from which it is delivered to the milkmen, is diluted more than half, and sometimes more than two thirds, by the addition of the hot water. The pecuniary benefit resulting to the distiller by this process, is ob-

vious. Whisky at present prices affords no profit, and is indeed a sinking concern; the profit must therefore be made on the swill. The undiluted slop of one thousand bushels of grain, at nine cents a barrel, would yield but ninety dollars, which would not defray the expense of the manufacture; but when diluted with water so as to produce one hundred and eighty dollars, it becomes a saving operation; and in this way the distilling business in this city is at present supported. The logic of the milkmen on this subject is worthy of notice. They say, as they have to pay for water in the slop, it is right for them to exact pay, in the same proportion, for water in their milk. And after all, they insist that they have the worst of the bargain; for their cows on this meager diet become emaciated and diseased, and many die. Besides, the smell and taste of the milk is so unpalatable, and even offensive, they are obliged to drug it, and thicken it with a preparation of chalk, white sugar, etc., which they carry with them in a junk bottle, to make it marketable.

All the grain distilleries mentioned, are either directly or indirectly *rectifying* concerns, namely:—

Schenck, Sneder & Co.'s rectifying house at the distillery.

Mark Spencer's rectifying house at the distillery.

Johnson & Son's, with Lazarus, corner of Washington and Robinson streets.

Cunningham & Harris's rectifying house at the distillery.

Robert Bach's, Brooklyn, near the ferry.

Minturn, Wilson, Messrs. Manly & Clark, and Messrs. Cole & Berry, are each indirectly concerned with rectifying establishments. The plan of rectifying liquor, is one of the great advantages possessed by the city over the

country distiller; for by this process the whisky is made to assume any appearance, name or character which the vender or purchaser may desire; and the distillers are thus, through their various agents, drummers, or salesmen, enabled to carry on, with impunity, the most fraudulent operations.

Besides the distilleries mentioned, there are eight or ten others which distil spirit from molasses. Some of these, as Jacob Cram's, Messrs. Havens, Suydam & Co.'s, and others, are immense concerns. Their operations being irregular, we are unable to state the precise amount of liquor produced by them; but it probably exceeds *three thousand gallons* of *first proof spirit daily*. As there is less of this kind of liquor used among us than of whisky, it is not important here to enter upon particulars. These establishments, it is true, furnish no slop for cattle; but, it should not be forgotten, that they are contributing to swell the river of death, which spreads desolation wherever it flows, and is daily ingulfing the hopes and happiness of thousands.

In Philadelphia, there was a large grain distillery in Race-street, owned by the Messrs. Smiths, which mashed one thousand bushels of grain per day. The slop of the establishment was at first fed to cows, but the inhabitants refused to buy the milk produced in this way. It was therefore next fed to swine; but after a thorough experiment, this also proved a losing operation, and the concern failed altogether,—evidently through the inability, chiefly, of the proprietors to turn the refuse to profitable account. But what appeared a private misfortune, was a manifest public benefit. The buildings are now removed, and the vicinity, which was notorious for intemperance, vice, and wretchedness, is now as remarkable for its improved appearance, and the sober and reputable character of the population.

We conclude, sir, with the expectation of again recurring to other branches of the subject. Should the statements herewith submitted be called in question, in confirmation of their general accuracy we are prepared to give our own, and any desirable amount of personal testimony. Wishing you every success in your philanthropic labors, with sentiments of respect we subscribe ourselves your friends and fellow citizens.

As the facts and statistics presented in the foregoing communication require no comment, we will next briefly consider some of the difficulties in the way of the slop-milkmen which have not before been referred to.

They were generally opposed to reform, because it would break up their establishments, subject them to inconveniences, and greatly diminish their profits. But besides the influence of adverse interests, there were embarrassing circumstances in the way, which required time and effort to remove. The people, hitherto, had indulged no misgivings on the subject. Mere want of information had made them a party to the vile imposition which was practised upon them, and which they would continue to suffer unless its atrocities were forced upon their attention, and their energies were aroused to adopt prompt and decided measures for their own relief. To enlighten the public mind on the subject was, therefore, the first step; and this was no sooner attempted, than loud and reiterated demands were made for an *immediate* correction of the evil. But this was impracticable. The mischief was deep-rooted and wide-spread. The error, which for years had grown with our growth and strengthened with our strength, could not be retraced in a single day. We have before adverted to the unfortunate condition of this city, in regard to pasturage; but other difficulties were in the way, which deserve notice.

To make thorough work, the dairymen must begin *de novo*. The old stock of cattle must be disposed of, for they were generally so diseased, and their teeth so broken off and affected with caries, that they were incapable of masticating such food as would produce good milk. Fresh stock, therefore, must supply the place of the old; and in order thereto, the diseased cows must be knocked on the head, and their flesh thrown to the dogs, for which it was most fit, or be put in a condition for the butchers. And it should be remembered, that the latter is a bloating process, which can only be effected by the most unnatural means; for it is impossible to fatten them on any thing but fluids.

With the change of stock, it was required, moreover, that there be a corresponding change in their condition and sustenance. Instead of impure air, and hot, unnatural, stimulating slush, they must have pure air, pasturage and fodder, or such other food as is adapted to the complex digestive apparatus of herbivorous ruminating animals; for all these conditions are essential to their health, and to the nutritive and wholesome quality of the secreted fluid. We glance at these particulars to show that many things which require time and exertion, are indispensable to a radical change in the system, even after the public mind is prepared for it. These facts may also aid us to appreciate the importance of what has already been accomplished.

In their own vindication, many milkmen strenuously urged, as they will doubtless in other places, that the use of slop being unavoidable, we must quietly endure the evil as one inseparable from our peculiarly hampered situation. But this position and its corollary has been disproved by numerous facts. As near as can be ascertained, about fifty dairies in the city and vicinity have already re-

linquished the use of slop and other improper food, and many others are making arrangements to follow their example. It cannot, therefore, with any show of truth, be longer insisted that intrinsic difficulties exist in the way, aside from the apathy of the people on the subject, and the cupidity of the slop milkmen. What has been done to mitigate the evil, shows that more can be effected, and, indeed, demonstrates the practicability of complete reform. Many persons who had been deterred hitherto by conscientious scruples, have been encouraged to embark in the business by the prospects now afforded of conducting it on right principles. The means of bringing milk to the city from a distance have been projected, and carried, after full experiment, into thorough effect. And as the facilities of our communication with the country increase, an abundant supply will flow in from various quarters, and no deficiency need be apprehended.

But without enlarging on particulars of this kind, it will be conceded, enough has been done to establish two essential points, viz., the existence of the evil, and the practicability of reform, not only in this city, but wherever it prevails. The evil here, as facts show, has evidently been arrested. Many have been induced to think and act in relation to it. What had long been endured, unnoticed and unquestioned, has now to conflict with antagonist principles, which, if thoroughly aroused into action, will be found incomparably more formidable than anything which can be brought against them. Nor is the subject now regarded in a physical point of view merely; conscience, which had long lain dormant, has been awakened. And we may be allowed to notice in this connection, which we do with peculiar pleasure, that several of the pure dairies,

in the distribution of milk, for three years past, have avoided the desecration of the Sabbath.* The custom of

* As the traffick in milk, on the Sabbath, is one of the most frequent, annoying and unnecessary public profanations of sacred time amongst us, we cannot dismiss the subject without an additional remark.

The custom of carrying, buying and selling milk on Sunday, is, as is well known, the reproach of this community. On Sabbath morning, instead of the stillness which indicates a cessation from secular employments, the sacred day is ushered in with the rattling of several hundred milk wagons, driven at the top of their speed over the rough pavements, accompanied with the shouts of as many hundred milkmen; and from that early hour the din and disturbance are kept up until ten or eleven o'clock in the forenoon, and are again repeated, from three or four o'clock in the afternoon until evening. No street, lane, or alley escapes the annoyance; for nearly every family is visited, and suffers not only the discordant clamor of its own milkman, but probably also that of twenty others who successively supply the different households in the same neighborhood, besides the incessant clatter of those passing and repassing to various parts of the city. Other desecrations and disturbances of the day by business or pleasure, by rail-roads, steam-boats, etc., are comparatively infrequent and local; so that the great mass of the people, if they choose, may avoid them; but this occurs every Sabbath in the year, and necessarily annoys every family.

This traffick has been, and by many is still, defended as a work of *necessity*, and therefore not a violation of the Sabbath. We remark, that until within a few years the city was supplied with a *quality* of milk which could not at certain seasons be preserved fit for use over four or five hours;—if the article, therefore, was indispensable on the Sabbath, there was a valid reason for its purchase on that day. But circumstances have changed. More than three years ago, many pure dairymen, from a sense of duty, abandoned the use of slop for their cattle, and also the traffick in milk on the Sabbath; and to meet the wants of their patrons, they furnish a double supply of milk on Saturday, the article being of a quality which can be preserved perfectly sweet until Monday. The *necessity*, therefore, of trafficking in milk on the Sabbath, having long since ceased to exist, the profanation of the day by this custom should have ceased with it.

The case of infants, who are fed on milk diet, may, perhaps, be

trafficking in milk on the Lord's day, is now proved to be as unnecessary as it is sinful. Thousands can now testify from their own experience that it can be dispensed with throughout the year without injury or inconvenience either to the purchasers or venders. Thus developing a new and beautiful feature in the cause of reform, which alone should strongly commend it to the patronage of a Christian community.

considered peculiar, and require that milk for their use, should be obtained fresh on Sunday. This is a mistake. No such case exists, nor can any be imagined in which pure milk at any season, cannot be preserved sweet through the Sabbath, and in a condition perfectly healthy for the most delicate infant. If inconvenience has here been experienced, it is solely owing to the neglect of servants, or other culpable mismanagement. We speak from personal knowledge on the subject, after a trial of more than three years. And within the same period, the fact has been settled by the experience of hundreds of families in all conceivable cases. Whatever, therefore, may have been the exigency in former years, it is now fully demonstrated that the traffick in milk on the Sabbath is a desecration of sacred time for which there exists not the shadow of an apology.

We only add, that the dairymen who have, for conscience sake, at pecuniary sacrifices and through many discouragements, carried out their plans so as to furnish pure milk, and at the same time avoid the profanation of the day, have not, we regret to state, recieved from the moral and reputable, the support they had a right to expect. We know reputed Christian households, and even clergymen's families, who have discarded these dairymen, because they refused to sell milk on the Sabbath; and others, who now withhold their patronage for the same reason. We may charitably attribute their conduct to mistaken views of the supposed necessity in their case; but this will neither atone for the evil, nor undo the mischief of their example on those who have no regard for the Sabbath, as a Divine Institution. The traffick in slop, and also its cartage on the Sabbath, is another of the evils of this system,—but we cannot here enlarge upon it.

CHAPTER XXXII.

FRAUDS AND IMPOSITIONS IN THE SLOP-MILK SYSTEM.

Deceptive practices of dairymen, illustrated by facts.—False labels on milk-carts.—Intrigue with servants.—Professors of religion engaged in the slop-milk business.—Facilities for deception.—Influence of half-slop-men.—Their management.—Price of pure milk.—Price of slop-milk.—The poor, willing to pay a fair price for good milk.—Price no difficulty with the wealthy.—Feeding cattle with slop, the result of choice, not of necessity.—Appeal to those in the business.—Inexcusableness of apathy on the subject.—Appeal to mothers.—Also to the farmers of Long Island and New Jersey, and of the counties of Westchester, Putnam, Dutchess, Orange, etc.

Some men in the milk business, very reluctantly forego the profits of slop-feeding, and rather than lose their customers, resort to various subterfuges and evasions. It is an unpleasant duty to advert to the impositions which are practised; but as they are wrong in themselves, and of frequent occurrence, it appears right to notice them, in order to guard the public against their repetition. Many have been reported, but a notice of a few of the most common must suffice.

A gentleman says his milkman assured him that *he fed no slop;* and as no evidence appeared to the contrary, he felt bound to believe him. But passing a distillery some months afterwards, curiosity induced him to stop, and, to his surprise, he saw his milkman busy among his cows. As the truth flashed across his mind, he charged the milkman with deceiving him, who promptly replied: "Every word I said was true, sir; I told you *I fed* no slop; and

by the help of the gutter, you see, which leads from the still-house to the stables, my *cows feed themselves!*"

Another person states, that on questioning his milkman, he admitted that he fed slop, but said he had one cow, his best cow, which refused to eat them, the milk of which he would bring him, at the additional charge of two cents a quart. To this proposition the gentleman assented, and a half-gallon can was daily filled and duly brought. But the quality of the milk seemed not to be improved, and the family were inclined to believe, either that there was no difference in the milk or that they were imposed upon. The matter thus passed on for several weeks, when the gentleman happening to be in his kitchen one day when the milk was brought in, its rank and nauseating smell created a suspicion that all was not fair, which accident soon after fully confirmed; for he eventually learned, that some half dozen families besides his own were regularly supplied with the reputed pure milk out of the same half-gallon measure at the advanced price—all the dupes of their own good-natured credulity, and the milkman's dishonesty.

Another mode of deception, which has been carried to great extent, is the practice of putting false and equivocal labels upon the milk-carts and wagons. It is ever one of the elements of knavery to conceal, if possible, its deformity by a fair exterior. Why do not these men tell the truth, and put on their carts, "Whisky milk from Johnson's distillery, Sixteenth-street;" or from "Spencer's distillery, Greenwich-village," or "Minturn's distillery, Williamsburg," or "Wilson's distillery, Wallabout," or "Sneder and Schenck's distillery, Brooklyn;" or any other of the numerous whisky establishments in operation round about the city? The question carries with it its own answer. The literal facts in the case would spoil their milk market; and in order to

retain their customers and beguile others, they resort to the grossest misrepresentations, and very many are thereby deceived. Some of the labels on these slop-milk concerns, are, "Pure country milk from Bloomingdale," or "Newtown," or "Long Island," or "New Jersey," etc.; others are marked, "Pure milk Dairy," "Washington Dairy," "Columbian Dairy," etc., when if followed to their homes, instead of conducting you to the pure air, and green pastures of some rural district, would introduce you to the filth and stench of cow-pens and whisky-distilleries.

The following is another specimen of this kind of imposition. A slop-milkman whose cows were the unwilling patrons of a large liquor distillery in the neighborhood of the city, procured a wagon of the same fashion, and painted and lettered, excepting the number, precisely like those belonging to the Jamaica Milk Dairy, which at that time was in repute for the excellence of its milk, so that the label read, "Jamaica Milk Dairy, No. ——," the figures being omitted. The whole thing was most artfully calculated to deceive into the belief that the wagon distributed milk from the Jamaica, Long Island, Milk Dairy. The milkman, on being reproved for this constructive fraud, said: "You don't read right. Jamaica Milk Dairy? No! That is the way to read it." And laughing at the success of his imposition, remarked: "If people are deceived, it is their own fault."

Another of these milk dealers whose cows were penned and fed at a city distillery, caused "Astoria, L. I.," the letters being the initials of Long Island, to be conspicuously painted on his wagon. Being charged with the deception, he replied that the inscription was correct, meaning "Astoria, L. I." (lie). What other proof need we of the iniquity of the slop-milk business, even in the estimation of

those who, being engaged therein, are best acquainted with it? If such tricks are necessary to sustain it, were there no other evidences, here is demonstration that it is impossible for an honest man to continue in so vile an occupation. But the public having become acquainted with this kind of imposition, it is now much less practised than formerly; for there was no motive to continue it longer than the people were deceived.

We may mention still another dishonorable expedient, which is the more deserving of notice, because less liable to suspicion or detection. We refer to the intrigue of slop-men with the servants in those families from which they have been discarded, in order to recover their lost milk customers. It is well known that most of the family servants are foreigners, and very many of them Irish; and that many of the slop dairymen, and still greater numbers who distribute that kind of milk, are also Irish. We are assured, that on account of the superior influence which natives of that country can exert over their countrywomen, who are extensively retained as domestics, their services as milk distributors are peculiarly valuable. The management is to induce the servants to favor their interests, to the prejudice of the pure milkman. And this is not so difficult, even in respectable and intelligent families, where household matters are chiefly intrusted to servants, as might at first be imagined. If the slop-milk has been discarded for the product of a pure dairy, then their object is to produce the impression that no advantage has been gained by the exchange, and having the entire management in their hands, nothing is more easy, when they are so disposed, than to create dissatisfaction, in the first instance, which being strengthened by their reiterated complaints, at length results in the dismissal of the new, and perhaps the re-

instatement of the old milkman. Among the tricks resorted to for this purpose, is the dilution of the pure milk with water below the standard of slop-milk; by neglect or exposure to cause it to become prematurely sour, so that it is unfit for use; by complaints of deficient measure, irregular delivery, or incivility on the part of the dairyman; also of impurities in the milk, etc. A pure milkman, in whose veracity we have entire confidence, states that he lost several of his best customers, by the discovery of some animal ordure as a sediment at the bottom of a milk vessel, and which he could not doubt was put there by an Irish servant girl, who, after various other unsuccessful attempts, succeeded in procuring his discharge by this filthy expedient, the knowledge of which being spread to other families, entirely ruined his milk market in a most respectable neighborhood. Strange as these discoveries may appear, they will only be regarded as improbable by those who are unacquainted with the power of national predilections and prejudices, especially when strengthened by the unity of a common faith.

But there is one other particular, which, as we would "nothing extenuate nor set down aught in malice," cannot be omitted, although we recur to it with deeper regret than to any other it has appeared our duty to notice. We allude to the fact, that there are some men of professed Christian principles, who are extensively engaged in producing slop-milk, and who resort to many of the deceptive measures, and underhand schemes, to impose upon the public, which are too generally characteristic of the business. A single incident may show how difficult it is for a man of integrity and sound conscience to be engaged in this occupation. Some gentlemen, being informed of the disgusting filthiness consequent upon stabling cows and feeding

them upon slop, called upon the proprietor of one of these concerns, in order to judge for themselves of the truth of these allegations. The premises in question were contiguous to a distillery, and in the rear of them, and round about, were other stables which presented most repulsive exhibitions of filth and offensive accumulations of excrementitious matter. The slopman, apprised of the intended visit, had subjected his own cattle and pens to a thorough lustration; and having in this condition been inspected by his friends, he adroitly induced them to retire, without extending their survey to other establishments, filled with admiration at the good order and degree of neatness which prevailed. The dairyman afterwards justified his management on the ground, that his interest required him to sustain the general credit of the slop-milk system.

Fort he purpose of meeting the wants of their numerous customers, some in the slop business pretend to supply both kinds of milk, on a large scale. In some instances both kinds are distributed from the same wagons, a nd in others, different wagons are employed. But the facilities and temptations to the abuse of confidence are so strong, and frauds are so often practised without detection, that the confidence of the public, with few exceptions, should be withdrawn from them. It is to be feared there are those in every business who, for the love of gain, will not be very scrupulous about the means of obtaining it. And if men in the business in question, with the evidence of its iniquity before their eyes, will still persist in it, and are determined to do so in spite of their convictions, they show they have no principle in the matter, and ought not to be trusted.

The influence of the half-slopmen, is even more obnoxious to reform, than avowed hostility. They put on a

friendly garb for dishonorable and selfish purposes. Knowing what is right, they choose the wrong, and endeavor to exculpate themselves on the plea that the public will not pay a fair price for *pure* milk, so that they are compelled to adapt the quality of the article to the price paid for it. In other words, they will cheat a customer, rather than diminish their enormous profits, or lose him. With what system of ethics such habits of business may be reconciled, it is not important here to inquire. It is sufficient to know, if a man's occupation honestly pursued will not afford him a competence, it is his duty to engage in some other. But how do these men know that the public will not pay a fair price for good milk? Have they made the trial? No: but others have, and in every instance have been liberally patronized, which proves that their statement is unfounded. Milk produced from natural food, as hundreds in this city are prepared to testify, is actually cheaper for all culinary and other uses, at eight cents per quart, than is slop-milk, setting aside its deleterious properties, at three cents per quart. In every instance that we have known, such has been the decision, when both qualities have been subjected to a fair experiment; and yet about the same price is paid for both kinds.

But it may be useful to show how many of these half-slopmen manage. If pure milk is demanded, they promise a supply at an advance of twenty-five per cent., which being agreed to, so vile and miserable an article is furnished, that their customers have good reason to believe they have gained nothing by the change. This opinion the slopmen are willing to strengthen; for to the extent the people are deceived into the belief that one kind of milk is as good as another, they become indifferent to the whole matter; and the work of reform, so far as they are con-

cerned, not only ceases, but their influence is thrown on the wrong side, and goes to support and perpetuate the evils of which they at once become the patrons, the dupes, and the victims. It is as painful to mention these facts, as it is pleasing to notice others of an opposite character. By the sudden revolution of public opinion, consequent upon the disclosures in relation to this subject, some good men have been surprised in an occupation, to which their principles are opposed. But as they manifest a determination to lose no time in the arrangements necessary to a change in their dairies, and in effecting it may be subjected to inconveniences and pecuniary sacrifices, they are entitled to the confidence of our citizens, and should receive from them suitable encouragement and support.

We have before alluded to the advantages which, in an economical view, are consequent upon the use of pure milk; and we recur to the subject for the purpose of submitting a few considerations which have not been elsewhere presented.

The price of milk, like that of many other articles of sustenance, is affected by the same causes. At the present time, a pure article produced from natural food, rich and healthy, cannot be brought to our doors for less than six cents per quart. This is, of course, the minimum price, from which the venders, if they supply an honest article, cannot deviate. But it may be inquired, What assurances are given that the pure dairymen do not dilute their milk? We may not attempt to impart to other minds the confidence which we from personal acquaintance are enabled to repose in the integrity of those now engaged in the business; but independent ofthese considerations it is not the *interest* of these dealers to dilute their milk, and it is their *interest* to avoid the lowering system altogether, by fur-

nishing a perfectly pure article.* Their patronage and success depend upon the superiority of their milk. To dilute it, therefore, or to deteriorate the quality in any way, will most assuredly defeat their own object. Setting principle aside, honesty, with these men, is not only the *best*, but the *only* policy that will succeed. As men of common sense, who understand their own interests, they know if they fail to furnish *pure* milk, nothing can save them; they must fail altogether. They are virtually pledged to the public in the penalty of a total failure in their business, to supply rich, unadulterated milk, in distinction from the weak, vapid, unwholesome and unpalatable slush of the slopmen. And thus far they have nobly redeemed their pledge. We have, therefore, the strongest guaranty the case at present admits, that these men will furnish pure milk, for it is their pecuniary interest to do so; whilst a failure to do this, or deliberate deception, will be the signal for their rejection and complete defeat.

But it is very different, as will at once be seen, with the slopmen. The author was informed by a dealer who had relinquished the business, that he knew one man who at his different stands sold twenty-five gallons of water for milk per day. This milk and water system enables these men to sell milk at three, four, five, or six cents per quart, as may happen best to suit their own pockets, or the desires of their customers; a circumstance which they do not fail to turn to their advantage; and in order to do this, they have only to reduce the quantity of milk in a quart, and make up the measure with water and any thing else which will give

* With some of these dealers it is a matter of principle to exclude *every drop* of water from the milk, even to the rinsing of the pails after milking, so that they may be enabled to affirm that the milk is perfectly pure.

it the appearance and consistence of milk. Hitherto these impositions have been encouraged by the ignorance which has prevailed on the subject. But who does not see, setting aside all other considerations, that to buy such milk is the worst imaginable economy? If we prefer watered milk, let us water it ourselves, and then we will know what we pay for. We would not patronize the butcher, the baker, or the grocer who, professing to sell his articles a cent or two less, gave us but eight or ten, instead of sixteen ounces in the pound; for we know that false weights and measures are indictable offences, and we would feel indignant at such knavery. And is there any more profit, or principle, or wisdom in countenancing these impositions in the milkman, than in the butcher or baker? Are we not sinning without motive—against motive—in buying this diluted and deleterious slush, when pure undiluted milk can be obtained for about the same price? Let none say, the little milk we use will make no difference. The ocean is made up of drops. The still-slop business is composed of half pints, pints and quarts; and so long as the moral and respectable tolerate it, this vile system, with all its evils, will continue to be inflicted upon us.

It is not surprising that persons who have no opportunity of deciding for themselves, or have had no evidence on which they could rely as to the relative qualities of milk, should demur at an advanced price. But let the difference of quality be distinctly understood, and even the poorer classes, who are usually good economists, and among whom the saving of a cent is a consideration, will be found the fast friends of the desired reform. It is truly their interest pecuniarily, which they are not slow to perceive, to buy a rich, healthy and nutritious article, though it cost a little more, rather than diluted, unwholesome milk at any

price. Several cases among them have come to our knowledge, in which families have done without milk, and certainly very wisely, rather than use diseased whisky dregs. A poor mechanic in Greenwich village, having lost a child in August last, as the physician decided, by the use of slop-milk obtained from the distilleries in the neighborhood, and finding it inconvenient to procure such as he desired, his family have dispensed with the use of any ever since. The desire to obtain, and the willingness to pay for a good article, is illustrated in the case of a laboring man, who on his return from his daily toil, brings his milk more than a mile at the usual price of good milk, rather than pay half the price for distillery milk next door to his dwelling.

In regard to the wealthier part of the population, it cannot be necessary to enlarge. With them the quality of the milk, not the price, is generally the chief consideration. We dare not here venture to repeat the extravagant price which some have declared they would be willing to give, rather than return to the use of slop-milk. It is sufficient to know that with them, when they fully understand the subject, there is no difficulty. Some of them now manifest deep interest in the reform, and are exerting themselves to give it success.

From all therefore which has yet appeared, we cannot avoid the conclusion, that feeding cattle with slop, is invariably, and in every instance, the result of deliberate choice, and not of necessity; and the plea that the public will not pay for pure milk, is insincere. Those who persist in the use of slop, do so, not because other food for their cattle cannot be obtained, or that such is indispensable to their business and the support of their families; but because the love of money in them is stronger than humanity and conscience. Not that we believe they indulge unkind and

malicious feelings, or that they would not rejoice in gaining their object without inhumanity to brutes and injury to their fellow men. But habits of evil, though they may not always deaden the sympathies, generally pervert the judgment and benumb the conscience; it is not surprising, therefore, that many attempt to justify themselves in the whole matter. There must, however, be no compromise of principle. Truth is truth, and will not bend to our wishes. That business cannot be innocent whose entire tendencies are to evil. No plea can justify its pursuit. It must be abandoned.

And is there a reflecting man engaged in the business, who can persuade himself that it is right? Nay, after all the light which has been poured upon the subject, is there one who can doubt that it is wrong? The moral sense of mankind has long since decided, that to take the bread from the hungry, and to convert it into still-slop and whisky, is a grievous offence against God, and high treason against humanity. And until the nature of things shall change, this decision will never be reversed. The burning tide, like the desolating lava, destroys all it touches. Property, character, happiness and intellect, fall before it. Pauperism, crimes, wretchedness and disease follow in its train; whilst despair and death, temporal and eternal, prove that upon it rests the malediction of heaven. Oh! it is a horrible business, which now admits of no palliation. And can the man who is an accessory, who gains his livelihood by supporting it, be innocent? Yet this is the business of the slop-milkmen. They pay from *three* to *fifteen dollars* a day to sustain this process of death, which in many cases must entirely cease but for their patronage. Through their agency, the work of destruction, otherwise imperfect, is made complete. It is not sufficient that the nutritious grain

is converted into poison for men, but the residuum having diseased the meat for our tables, also diseases the milk for our children, by which the health and lives of multitudes are annually destroyed.

If these facts are undeniable, and we fearlessly challenge their disproval, will any person who has an interest in them, longer remain indifferent? Can you continue so, and feel that you have discharged your duty to God, to your families, and to the community? Are you not bound by the most powerful obligations to wash your hands from all participation in so great an evil? Be persuaded to ascertain the facts in your own case without delay; for while your every day patronage supports the business, you are participants therein, and though you suffer, it were folly to complain. By whom is the abomination sustained, if not by yourselves? and it will sink but for your support. See to it, therefore, that your conscience is clear in the matter—that your support is not relied upon, and this fountain of iniquity will be sealed up. It is a self-evident proposition, that the power of correcting the evil is in the hands of the consumer. And until you exert that power, you will suffer, and may hope, but in vain, for deliverance.

To Mothers, the subject appeals in tones which can scarcely fail to reach their hearts. It belongs to a department which is exclusively domestic, and over which they have undisputed control. As without their concurrence nothing can be effectually done, so by their united action, this great evil will be speedily and entirely removed. Mothers! the proposed reform is practicable; and the power of correcting it, is by Divine Providence intrusted to your hands. Is not this alone sufficient to arouse your energies, and enlist all your influence in so important a work? The subject involves considerations of immense

interest to your own offspring; and after a review of the facts which have been presented in this volume, can other motives be necessary to induce you at once to discharge your duty in relation to it? If you were required to step out of your appropriate spheres of usefulness, or to subject yourselves to severe privations and exhausting toils for months and years together, in order to rid the community of so great and grievous an evil, would not the consummation be an ample reward? But nothing of this kind is required. That which demands your attention is a home concern; it is under your own roof—under your eye—within reach of your hand, perhaps on the table before you. Cause that filthy, diseased and diluted milk, of which yourself and family are about to partake, to be put into the place for which it is most fit—the gutter; and determine that so long as you are mistress of your dwelling, no more of the vile stuff shall enter it. Having done this, demand pure milk;—be certain that it is pure, be satisfied with nothing else, and you will be supplied. It will flow in abundantly, healthful, and pure, and nourishing as nature herself has prepared it; and to your instrumentality will belong the honor of preserving the health and lives of thousands of innocent children, and of terminating an evil which has so long been the reproach of the community.

To regard the subject merely as one of pecuniary calculation or of physical interest, is to degrade it. Every intelligent mind will discover that it takes a vastly wider range. In its relations and consequences it is one of humanity, morality and religion. But it is not our design to dwell on these topics. It is sufficient here to show that there is that in it, which peculiarly commends it to a mother's heart. Maternal affection, and all those beautiful and benevolent instincts which are woman's characteristics,

should incite her to consider this subject as her own. Where is the mother, even if uneducated and barbarian, that would permit her helpless and dependent infant to draw its sustenance from the breast of a filthy, squalid and diseased nurse, whose own nourishment and habits of life were most unnatural and revolting? And shall the refined and intellectual mother suffer, as it regards her offspring, practices still more unnatural and pernicious? Do the relations of cause and effect cease, when the infant is nourished on the milk of an animal whose condition, in every particular which can affect the health of the child, is more distempered and disgusting than any thing we can conceive of in human form? But we are persuaded that it is unnecessary to press farther these considerations to interest her in this work. Woman must put off the most lovely attributes of her nature, extinguish every spark of maternal feeling, prove recreant to her domestic trusts, and forget her obligations to the observance of those laws which the Author of nature has indelibly impressed on her own being for the benefit of her offspring, ere, with a knowledge of the evils which flow from this vile system, she will feel released from doing all in her power for their removal.

As a few local references cannot impair the general interest, and may increase the usefulness of the work, we will conclude this chapter by calling the attention of farmers in the vicinity of New-York, to a brief statement in relation to the *producing of milk for market.* This is a business in which, it is believed, many of them may engage with great profit to themselves, and advantage to their fellow citizens.

It is known to you, and as we have elsewhere remarked, the city of New-York is unfortunate in having very little good pasturage in its vicinity. This scarcity, doubt-

less, led to the use of distillery slop and other improper articles as substitutes for the natural food of milch-cows, and consequently to their confinement in pens. But what was at first a matter of convenience or experiment, eventually became an object of choice; for it was found that this kind of sustenance for cattle would produce more milk, at less cost to the dairyman, than any other. Gain being the object of those in the business, and the more of this kind of food the greater the profits, it is not surprising that endeavors should be made to secure a constant supply, or that the use of slop became general. And such at present are the facts. The natural condition of the animals is reversed. Deprived of proper food, pure air and exercise, they have become diseased. The milk, of course, is diseased; and, as proved by facts, and the testimony of our most respectable physicians, is impure, unhealthy and innutritious. The public, having to some extent been informed on the subject, there is now a growing demand for pure milk produced from natural food. Such, briefly, being the attitude of this community in relation to the business, a fine opening is presented to men of enterprise who live in grass regions, within a convenient distance of the city, to embark in it.

The quantity of milk required for the *daily* supply of the cities of New-York and Brooklyn, as near as can be ascertained, is about *fifteen thousand gallons.* This, at the average price of six cents per quart, amounts to *three thousand seven hundred and fifty dollars* per day, or in round numbers to *fifteen hundred thousand* dollars a year, in the profits of which you may share, by enterprise and industry. Why should you not engage in this branch of business? Many of you are the proprietors of some of the finest grazing farms in the world, which are already stock-

ed with cows. These you can turn to immediate and profitable account. The conversion of your milk into butter or cheese, with the loss of the labor of making it, will not pay more than two cents a quart, for which you may realize six cents in these cities. Is not this sufficient pecuniary inducement for you to engage in the business, aside from the humane consideration that such an enterprise will probably be the means of saving the lives of thousands of innocent children, and of warding off numerous evils which now afflict and oppress the population?

But the question here may arise, How is milk to be conveyed from a distance to New-York? Those who are most familiar with the geography of your respective localities, and the ordinary facilities for transportation, can best answer the inquiry. And yet a remark or two on this point may be useful. Places remote from rail-road and steam navigation, may not be able to engage in the business. But many things which appear difficult, if not impracticable at first, will yield to enterprise and perseverance. Most of the milk which now supplies this city, is daily brought in wagons across rivers from three to ten miles. Similar exertions would place most of the milk produced in a wide range of circumjacent country, within reach of rail-roads and steam-boats. Long Island and the border counties of New Jersey, already possess superior advantages in both these respects, which could be immediately improved to a much greater extent than at present. The construction of the New-York and Albany rail-road, will soon confer the like facilities on the counties of Westchester, Putnam, Dutchess, and the adjoining portions of Connecticut; whilst the counties west of the Hudson river, Orange, Sullivan and Rockland, are already intersected by a rail-road which, in connection with steam navigation,

has brought these exuberantly rich grazing regions so near the city, that we may soon expect milk from the far famed dairies of Goshen.* If the operations are too extensive and complex for individual management, companies can be formed, which may employ persons to collect the milk from the dairies in season for the rail-cars and steam-boats; and when it arrives at the depot in the city, wagons should be ready for its distribution. Milk, in this way, could be conveyed any distance, with less agitation, than is common with that now brought to the city.

The supply of this city with milk, you perceive, is at present an immense concern. And yet on account of its extremely bad quality, the inhabitants use no more than they can help. Witha plentiful supply of a pure, healthy and nutritious article, the consumption would probably soon double. Connect with this, the rapidly augmenting population of the city, and no fears need be entertained for en-

* Since the above was written, the Author's anticipations have been fully realized. He has just been favored with a sample of milk from Goshen, Orange county, seventy miles from the city. It was brought fifty miles by the Erie rail-road to Piermont, and thence twenty miles to New-York; the whole distance, at present, is accomplished in five or six hours. What an exhaustless source of health and comfort is here brought to the doors of our citizens! We are gratified to learn, that a company is already formed, and arrangements on an extensive scale are in actual progress, for the purpose of bringing milk to the city from the counties above mentioned, and that the specimen received, is the first fruit of the enterprise. During the warm weather, it is designed to convey the milk in ice, and also to furnish the patrons of the concern with refrigerators, constructed on an improved plan, for the convenience of families. We are not prepared, by analysis, to say what will be the average quality of the milk, as but one sample has been submitted to examination; but we risk little in the opinion, that it will partake of the excellence for which the butter and cheese of that region have been long remarkable.

tering into the business. The counties on the Hudson might soon give employment to more than one steam-boat in conveying it to market; and the advantages of such an arrangement would amply repay the expense. This plan, indeed, is already seriously contemplated in Connecticut, and will probably be carried into effect.

The idea of bringing milk from a distance, is not an untried experiment. Many pioneers in the work have tested its practicability, and prepared the way for future success. For more than three years past it has been brought by Messrs. Husted and Mead from Connecticut in excellent condition, alternately by wagons and steam-boat, without a failure. The milk is placed in large canisters, nicely fitted to a square box. In hot weather, the interstices are packed with ice, and a similar precaution would be sufficient to protect it against the greatest heat. The city of Boston is also largely supplied from Worcester, forty miles distant. The system having been in operation several years, has been subjected to a fair trial; and though but five cents a quart is paid for the milk, the result is highly satisfactory to all engaged in the business. Many, we learn, are there making arrangements for very extensive operations.

Addressing practical men, who are accustomed to the management of dairies, it is not necessary to enter more fully into particulars. The present design, is merely to exhibit such an outline, as will afford a general view of the subject. No prudent man will embark in the business, without minute and accurate information. To such an examination of the subject you are now invited; and it is confidently believed, that the more attentively it is considered, the more attractive it will appear. The present slop-milk system must sink. It is too iniquitous and de-

structive to be endured. The vicinity of the city of New-York, for thirty years past, has not been adequate to supply the inhabitants with pure milk, and the means of doing it, are constantly diminishing. Natural food, pure air, and exercise for cows might be furnished, it is believed, to a much greater extent than is now attempted; but nothing that is here possessed can successfully compete with your superior natural advantages. Bring then the produce of your luxuriant pastures to this market. Patronage is certain. By proper exertions any desirable number of customers can be obtained. Conduct your operations on upright and honorable principles, and you cannot fail to secure rich returns for yourselves, and confer inestimable benefits upon a population of more than three hundred thousand souls.

CHAPTER XXXIII.

FACTS AND ESTIMATES.

Preliminary remarks —Basis of an estimate.—Consumption of grain by distillation.—A perversion of the bounties of Providence.—Effects of distillation on the price of bread-stuffs.—Annual product of spirit, and cost to the consumer.—Cost of intemperance.—Tax on real estate.—Demoralizing effects of intemperance.—The triple league.—Responsibility of magistrates, and of the people.—Concluding observations.

The remarks in the preceding chapter chiefly tended to prove the responsibilities of the *consumer* of slop-milk, in supporting a system which is destructrive to health and life. And though a volume would scarcely suffice to present all that might be written on that topic alone, enough has probably been said to settle all doubt on that question for ever; and also to convince the most incredulous, that the evil deplored is too deep-seated and wide-spread ever to effect its own cure. Such being the facts, the work of reform must be the result of united, vigorous, and decided action. This, and this only, will remove the burden, the disgrace, and the curse, which this monstrous combination of ignorance, imposture and cupidity, has so long inflicted upon us.

In the foregoing remarks, however, allusion has only been incidentally made to the *demoralizing* influences of the system, and the *pecuniary tax* it imposes upon the community. And as this is not the least important branch of the inquiry, it deserves a more thorough investigation and exposure than it has yet received, in order that those who sustain the business of *distillation* by encouraging the production of impure milk, may clearly perceive the ex-

tent of their responsibilities in relation to the entire system. The whole subject is fraught with the deepest interest, and should receive the most candid and careful consideration. No earthly objects can engage the attention, of greater importance, than health, life, property and morals. And if we look carefully at the agencies employed to give destruction its perfect work, it will appear that the people are first famished by the distiller, and then tortured to death by the venders of strong drink and impure milk.

By repeated experiments it is ascertained that a family of ten persons, containing an equal number of children and adults, do not require for their support more than twelve and a half pounds of bread per day. This will give an average of twenty-six ounces to each adult, and fourteen ounces to each child,—the United States' army ration for each man a day, is eighteen ounces of bread, and either twenty ounces of beef or three fourths of a pound of pork, but no vegetables. The above calculation therefore for a family, with other substantial articles of food, is a liberal one, and may be safely assumed as the basis of our estimates. It is also known that flour in the process of baking gains from twenty to twenty-five per cent., so that ten pounds of flour are equal to about twelve and a half pounds of bread.

The cities of New-York and Brooklyn, and the village of Williamsburgh, according to the last census, contain a population of three hundred thousand souls.* This number of persons, on the foregoing estimates, would daily consume *one thousand five hundred and thirty barrels* of flour, or *seven thousand six hundred and fifty bushels* of grain;

* It may be proper to state that such was the fact when the above was written. Since that period the population has increased and another census has been taken; but as the results educed are not thereby materially affected, it was not considered important to change the basis of the estimates.

and in one year, FIVE HUNDRED AND FIFTY-EIGHT THOUSAND, FOUR HUNDRED AND FIFTY BARRELS of flour, or in grain TWO MILLIONS SEVEN HUNDRED AND NINETY-TWO THOUSAND TWO HUNDRED AND FIFTY BUSHELS. Now it is estimated, by persons whose business gives them the best means of judging, that the distilleries and breweries in the places above mentioned, yearly consume at least TWO MILLIONS FOUR HUNDRED THOUSAND BUSHELS of corn and rye. But admit that TWO MILLIONS of bushels are thus consumed, and, astounding as is the fact, it appears that the distilleries and breweries of this city and vicinity destroy nearly as much grain created for purposes of sustenance, as would suffice for the support of the entire population.

If so much grain was thrown into the sea by the authority of law, and the people were taxed *two millions* of dollars to pay the loss, where is the man who would not resist such high-handed oppression? But such a burden would be light, and such a waste a blessing, compared with the evils we now suffer by this sinful perversion of the bounties of Providence. Better, infinitely better, that this grain be sunk in the ocean, than converted into a liquid poison to paralyze the energies, waste the resources, and destroy the health and morals of the community.

There are doubtless other general causes which in some degree influence exorbitant prices; but how is it possible, when the supply is limited, that this enormous demand will not specially affect them? Who can doubt that if the millions of bushels of grain which have been destroyed during the year could now be thrown into the market, flour would be greatly reduced in price, and other kinds of grain in equal ratio? In England, when bread-stuffs, either by the failure of the crops or other causes, rise to a certain valuation, the distillation of grain is forbidden

under severe penalties. Every dealer in the article knows that the price of flour is modified by the state of the market with regard to corn and rye. But in this country where there is no law against this merciless waste, the fires of the distillery must be kept up, though they consume the bread of widows and orphans, though the staff of life is converted into a stream of death, and pauperism, and crime, and wretchedness, and despair are spread through all the laboring classes of the community. Yes, let who will suffer, the distilleries must be kept in operation; and the demand thus created beyond the consumption of the people, and the produce of our own country, actually regulates in the market the price of bread-stuffs. Attracted by high prices, a few years since, there were large importations of grain into the country from England, from the shores of the Black Sea, from the banks of the Dnieper, and other parts of Europe. But the abundance these supplies were calculated to produce, was prevented by the rapacity of the distiller. A baker in extensive business informed the author, that in negotiating for a quantity of foreign rye, it was placed out of his reach by a distiller, who paid the extraordinary price of one dollar and seventy-five cents a bushel, though the original cost, besides the charges of importation, was not probably more than thirty cents a bushel. And a merchant, who imported one hundred thousand bushels of rye, sold it to the distillers at a profit of sixty thousand dollars! Thus is the last hope of the mechanic and laboring man, in times of scarcity, extinguished by the distiller. The rich are not, perhaps, much affected by it. The pauper, being fed by the hand of charity, is not affected by this state of things. It is the working men, the industrious, producing classes, who are the greatest sufferers. And where, under such circum-

stances, is there any rational prospect of relief, so long as men prosecute the iniquitous business of *distillation without restriction*, and thus fatten on the spoils of an injured community?

But there is another view of the subject. Two millions of bushels of grain, at the usual average product of four gallons of spirits to the bushel, would be eight millions of gallons.* This quantity, with the addition of water, by the venders, would at the lowest estimate raise it to ten millions of gallons. And being prepared and sold, as is the practice, under the disguise and name of every other kind of liquor in the market, must cost the consumers at least *ten millions* of dollars, exclusive of malt liquors. And for this horrible waste of human subsistence and treasure, there is no reciprocity or interchange of commodities by which both parties are benefitted and the community enriched. On the contrary, it is a total loss to the world; and so far as this loss can be retrieved, the laboring men, who are the real producers, must be taxed to pay for it. The farmer, it is true, may receive a high price for his grain; and the distiller, the rectifier, the vender of the liquor, and the slopmen, realize their profits. But the *consumer loses the whole.* He receives in no imaginable way an equivalent for his money. The liquor neither feeds nor clothes him; it neither ministers to the present necessities of his nature, nor provides for his future wants. Besides, therefore, the entire loss of so much treasure to the world, in order to complete the estimate, there should be superadded the impaired industry and ability of the consumer to labor, and the poverty, and crimes, and wretched-

* The amount has diminished since the above computation was made. The actual quantity of spirits and beer annually produced, according to the returns of 1840, is 7,524,678 gallons.

ness, and final ruin of which intoxicating liquors are at once the element and incentive; but the sum of these is absolutely overwhelming, and beyond the powers of arithmetic to compute.

It is not our design to attempt a delineation of the woes of intemperance, for this would be foreign to our object, and are already known by every intelligent man to be great beyond description; nor yet to obtrude individual views and speculations upon the attention of the reader, as these, however honest, might still be incorrect and inconclusive. But in order to exhibit one aspect of the evil under consideration, and the expense incurred by it, we will state, from the Annual Report of the Comptroller of the city of New-York, the cost of pauperism and crime in this city with the year ending the 31st of December, 1837. It is an established fact, that at least *three fourths* of the cases of pauperism and *three fourths* of the offences against the laws, are directly or indirectly owing to strong drink.

Value of city property in the Alms-house, Halls of Justice, and Bridewell, in 1837, $1,500,000, which at 7 per cent. interest per annum, would yield	$105,000 00
Expenses of the city during the year, under the following heads of account:	
Alms-house,	279,999 12
Courts,	34,831 78
Charities,	6,100 00
Hall of Justice,	47,817 20
House of Detention, Harlem,	1,119 76
House of Refuge,	15,600 00
Justices' Courts,	15,200 00
Lunatic Asylum,	47,209 50
Police,	33,724 23
Salaries,	57,427 25
	644,028 84

Three fourths of this enormous expenditure being chargeable to intoxicating drinks, is four hundred and eighty-three thousand twenty-one dollars and sixty-three cents. Add one hundred and twenty thousand one hundred and ninety-one dollars and ninety-three cents, half the yearly expense of the city watch, and the grand total is SIX HUNDRED AND THREE THOUSAND TWO HUNDRED AND TWENTY-THREE DOLLARS AND FIFTY-FIVE CENTS.

The city tax the preceding year, was eight hundred and ninety-six thousand dollars. Of course nearly two thirds of this sum, or more than *sixty-three* per cent. paid as tax, was expended to undo, as far as money could avail, the mischiefs inflicted on the community, by those who make and sell intoxicating liquors for their own exclusive benefit.

Taxes on real estate in this city, have nearly doubled within the last eight years. Rents, until the recent depression, have risen at the same rate. But where falls the burden? Every foot of land, and every tenement, are virtually mortgaged to the Corporation for the security of taxes. But who pays them? Certainly not the drunkards, the paupers, and felons; for themselves and families, to a great extent, are supported by private or public charity. Not the landlords, who make the increase of taxes one of the standing pretexts for advancing rents every year. But the tenants—the tenants pay them; and the weight falls most oppressively on those least able to sustain it. And this is one of the indirect ways in which the toil and sweat of mechanics and laboring men are taxed, to support the crimes and wretchedness caused by distilleries and liquor stores.

These are some of the burdens imposed on us by the conversion of bread stuffs into intoxicating liquors, and

the licensing of so many thousand shops to diffuse the insidious and fatal poison through the community. When there is a failure of the crops through drought or other causes, could the grain which is destroyed by distillation be thrown into the market, the price of flour would never rise above a fair valuation. But the pecuniary loss forms the least important part of the evil. The official reports of the police and pauper establishments show, that twenty-five thousand persons every year are plunged into vice and wretchedness by intemperance. And these, it should be borne in mind, refer only to the extreme cases in the scale of drunkenness—to the vagrants, the paupers and felons, who have appealed to public charity; and who have offended against the peace and good order of society. And appalling as is the number, how few are they compared with those who are aided by private benevolence, and the vast multitude of drinkers who resort by day and by night to the numerous dram shops which are open for their reception!

But it should not be forgotten that the CONSUMER, whether of strong liquors or of milk produced from the dregs of whisky, in connection with the DISTILLER and VENDER, is one of the *triple league* in this work of destruction; and though last named, he is not the least important partner; for upon his connection with the business, depends its continuance. It is clear, that the producing and selling of these articles must cease, when men refuse to buy and use them. The consumer, therefore, is responsible with the maker and vender. He it is that kindles up the fires of the distillery, patronizes the rum-seller and the impure milk vender, and perpetuates the evils which flow from these occupations. For his own safety, therefore, and for the benefit of his suffering fellow-creatures, he is in duty bound to abstain from all such use. There is neither consistency nor common sense

in any other course. He is really an accessory, and, with the distiller and vender, is held amenable at the bar of public opinion, and at the tribunal of his own conscience and of God, for the mighty accumulation of evils, which but for his co-operation and agency, must soon cease to exist.

Here then is the point, where the work of reformation must begin. As honest men, we must ourselves have pure consciences and clean hands, before we can reasonably expect a removal, or even a mitigation of the evils of which we complain. And in endeavoring to extend the work of reform to others, it should only be attempted by persuasive appeals, and by kind and conciliating measures. All violent means must be most carefully avoided; for besides their criminality, they necessarily defeat their own object. We live under a government of laws, and every act of disrespect for the laws will unite good men in the support of them, and fix the seal of public reprobation on every unlawful encroachment upon the legal rights of others. The object of all law is the well being of the people; and if certain laws, as a *necessary consequence*, operate unequally and disastrously; if they promote pauperism, diminish wealth, encourage corruption, and tend to the injury of the health and morals of the people, it is evident there is a departure from first principles, and a culpable error in legislation, which, however difficult it may be, should be retraced. That such are the revolting effects of the license laws as generally administered, and that they are susceptible of such perversions, there is, in their history, the most conclusive evidence. But public men who execute the laws, it should be borne in mind, are the servants of the public, and censure is often cast upon them, which justly belongs to the people

who put them in office. They cannot correct existing abuses without the consent of the people. Nor is it to be expected that they will generally have the moral courage to risk their popularity and loss of office by opposing the habits, and appetites, and prejudices, and the real or supposed interests of their constituents. The restrictive system of the license laws is thus too generally a dead letter, and ever will be, until the virtue of the people will support a virtuous and efficient magistracy, or until the licensing power is placed beyond the bias of party or personal influences.

The remedy, therefore, is in the hands of the people. When their opinions and practices demand it, the existing evils will be corrected. They are the only legitimate source of power; and it were vain to expect that the streams will rise higher than the fountain. In this crisis we are called to act as did our patriotic fathers in their struggle for independence. When by an arbitrary stretch of power their pleasant beverage was taxed, they resolutely gave it up, rather than suffer the smallest encroachment upon their rights. But what was the tax upon tea, compared with the tax which this hydra-headed alliance imposes upon us? A mere nothing. There must be total and universal abstinence from strong liquors and impure milk, and from whatever is produced by the distilleries, or their fires will never be put out, and the still-slop nuisances never be abated. We see no relief, but in the entire prevalence of temperance principles.

To conclude. Allured on by the attractions of the subject, the essay has imperceptibly reached a point, beyond which, the limit the Author had assigned it will not permit

him to advance. He has already far exceeded the bounds of his original design: but considering the novelty and the interest of many of the topics brought under review, he trusts that he has neither gone too far, nor attempted too much. In many particulars, being obliged to rely chiefly upon his own observations and inductions, he will be peculiarly fortunate, if in no instance he has misapprehended facts or been betrayed into mistakes. But even these he will scarcely regret, if other minds are thereby drawn to such investigations as will add to the stock of well ascertained facts, and lead to a thorough, practical knowledge of this important but hitherto neglected subject.

But if mistakes have occurred, they are probably inferential; and as truth cannot be invalidated by incorrect inferences, it does not thence follow that the main positions advanced, and in which the public has the greatest interest, are thereby affected. The question of fact in relation to fundamental principles, being as fully in accordance with the known laws of the animal economy as verified by familiar experience, he considers these principles too firmly established to admit of dispute. The entire system of dairy management impugned, has sufficiently developed itself to show that it is an unpalliated enormity, and utterly incapable of vindication. If this fact is indisputable, though some others are less accurately understood, it were to question the benignity of Providence, and libel human nature to doubt that, with the disclosures of time, it is destined to receive, from an indignant public sentiment, the execration it deserves.

In some subordinate particulars, as for example, the exact nature, extent, and effects of impure milk on health, our knowledge is doubtless less perfect than of leading principles; and this is only what might be expected in the

incipient stages of an investigation, when information is necessarily both limited and defective. Such must ever be the case, when, as in the present inquiry, the only way to truth is by the observance of facts; for anterior to experience, analysis or chemical laws can never determine the effect of substances on the tissues of the living body. Our acquaintance consequently with details, can only become clear and definite, as facts, which are the result of careful and extensive observation, shall throw their light upon the subject.

Whilst the inquiry, therefore, especially invites the attention of medical men, from whom, as the constituted guardians of public health, much is naturally expected, yet neither is our farther knowledge of the subject, nor the extirpation of the evils to which such knowledge refers, necessarily limited either to their investigations or exertions. The whole matter is so accessible to ordinary observation and influence, that the humble and unpretending may contribute to the stock of information, and aid in consummating the anticipated reform. All, indeed, who desire and expect the ultimate removal of the woes which afflict and debase the world, by their alliance with others for the extermination of this flagitious form of evil, will assuredly advance not only their own immediate good and that of the community around them, but happily become instrumental in preparing the way for the advent of that promised era of primeval purity and peace, so long foretold in prophecy, and invoked in sacred song.

APPENDIX.

THE following letter from the Honorable SAMUEL STEVENS, not being received in time to be inserted in its appropriate place, as it contains suggestions which appear too valuable to be omitted, it is here introduced.

TO R. M. HARTLEY, ESQ.

New-York, December 30, 1841.

DEAR SIR:

The time you loaned me the sheets of your "Work on Milk," has only allowed me cursorily to peruse them; and although, when I commenced doing so, I confess I did not see how you would extend your subject so as to make so considerable a volume, I am now convinced that the subject should excite in our city, at least, great and universal attention.

To so much of your subject as relates to the incredible mortality of children in our city under five years, my attention was long since called when a member of the Common Council; and with a view to more correct statements on this subject, I spent considerable time in maturing a plan for the registration of births.—We have now only statements, showing an approximate result, of infantile mortal-

ity—that is, we can now only compare the mortality of children with the mortality of the whole population of the city.

The difficulty in carrying out any plan of registration, was so great that I could not digest one which appeared practicable, although on various humane accounts it was very much to be desired, particularly with a view to judge and determine if the infanticides occurring in our city did not justify the establishment of a Foundling Hospital, even at the hazard of encouraging crime of a less heinous character.

This was nearly twenty years ago; and your tables now disclose the wonderful fact, that, as compared with the deaths of adults, the deaths of children under five years have since that time nearly doubled.

I know no cause to attribute this to, unless that brought before the public by the temperance reformation, (and now so fully and amply discussed by yourself,) deleterious milk.

Parents should ponder on the truths told them in your treatise, and should awaken to the unusual hazard of life, (heretofore, entirely, as far as I am informed, unaccounted for,) in which their offspring live, far exceeding that of London or Paris, and while too, adults in our city live longer and are not so liable to death as those of the European cities.

Your position, that bad milk is the cause, is rendered the more probable by the universal opinion, that children almost immediately recover from sickness when removed to the country, and again by the opinion that the second is the *trying* year. Then it is that this deleterious milk is the general food of the infant, the quality of which is entirely changed when infants leave the city.

There is one subject, not foreign from the object and design of your work, which I beg to allude to. You present the evil in bold relief, relying on the consciences and duty of all our citizens, to apply the remedy, and to refrain from purchasing distillery milk. Now this is a work of time and difficulty. The remedy I fear can only be completely effected, by the humane adopting some plan, by which wholesome milk can be had at a cheap rate.

I am aware that rail-roads and steam-boats will assist to bring good milk to the city; but we shall probably always have extensive stables of milch cows, in and near our city.

My suggestion is to encourage the manufacture of sugar from the beet-root. The books assert that seventy tons have been raised from an acre. The "Cultivator" states 2500 bushels as having been raised on the acre.

Our country is admirably suited to the cultivation of this vegetable, which yields ten per cent. of sugar, under the best process of manufacture.

The residuum is left in cakes, not dissimilar from the flaxseed cake, pressed by steam power, and is said to be, and I have no doubt is, an excellent food for milch cows, and being in cakes, is convenient for transportation.

In France a very large quantity of sugar is manufactured, and so successful has been the manufactory that a duty has either been imposed on the making of sugar, or it has been proposed in the Chamber of Deputies.

This manufacture was a favorite of Buonaparte's, as rendering France more independent; but his subjects laughed at him, in caricature representing his son sucking a beet-root, with the words, "*Father says there is sugar in it.*" The result shows the foresight of Napoleon.

The manufacture of this article can be commenced and

now carried on with little loss, and probably before long may be sustained with profit.

It would not only help to give *good milk*, but would afford employment to northern laborers, and would, so far as it succeeded, diminish the necessity of increased labor in the cultivation of the sugar-cane, which it is urged will (or can only) be cultivated by slaves.

Wishing that society may realize all the good which you anticipate, and that your work may have general circulation,

I remain, respectfully, your ob't serv't,

SAMUEL STEVENS,

No. 42 Warren-street.

The value of the sugar-beet root (*beta vulgaris*) as food for dairy cows, is most probably not overrated by Mr. Stevens, and his suggestions, we trust, will receive as they deserve the attention of the producers of milk and other practical men. The beet when eaten freely is said to be injurious to the human stomach, but we have not heard this objection urged against it as food for ruminant animals. But being unacquainted with the particular condition in which the residuum of the root is fed, and also of the quality of the milk thereby produced, we are incompetent from personal knowledge to express an opinion on the subject. As the saccharine principle of this succulent vegetable constitutes, however, but a little more than *one half* of its nutritive properties, we may safely infer that, in connection with a suitable proportion of gramineous food, it will be found both healthy and nourishing. To show that these conclusions are fully sustained by experiment, and therefore deserve the serious consideration of dairymen, we subjoin an extract from a communication on the subject by

an intelligent correspondent of one of our public journals.

"Within the last two or three years," he remarks, "the attention of the public has been frequently called to the very impure, and almost poisonous article of distillery slop-milk, which forms the principal supply of New-York and Brooklyn. My object is to suggest a substitute for the present mode of feeding milch cows, which will not only be *less expensive* to the producer, but will furnish the consumer with a rich, pure, and wholesome article; and which is quite within the power of every dairyman occupying one acre of land for every three cows. I refer to the cultivation of the sugar-beet for feed during six or eight months of the year. When beets are planted early, they are ready for feeding by the middle of August, and may be continued until the middle of May, when proper means are taken to preserve the roots, by which time the first crop of lucerne, rye, or other green food, may be cut for feeding.

"In order to make the excellence of this substitute apparent, let us first see what is the character and quality of the sugar-beet, as food for milch cows. Mr. Chaptal, the author of a very valuable work on agriculture, and who cultivated the beet twelve or fifteen years for the purpose of making sugar, says of the pulp or residuum, which contains little more than one half of the nutritive principle of the beet, 'this is most excellent food for cattle; cows and sheep that are fed upon it, give large quantities of milk.' D. L. Child, Esq., who has recently written a work on the culture of the sugar-beet, after a residence of eighteen months in the sugar districts of France, says: 'In France, extensive as is the culture of the beet for making sugar, it is still greater for forage. It is particularly valuable for milch cows, improving their milk, both in *quality* and

quantity, and imparting a richer and finer flavor to the butter.'

"Mr. Josiah Lee, an enterprising farmer of Berks county, Pennsylvania, fed his cows upon it without any grain, and the butter produced was of a very superior quality. The writer of this has also been testing the experiment, with the most satisfactory result. By referring to the agricultural journals of the day, hundreds of similar results might be adduced.

"All the authorities agree with regard to the beneficial effect of the beet culture upon the soil. Mr. Child says, that 'the beet culture, and the beet sugar manufacture, increase manure, and fertilize the farms in a manner unparalleled by any *art*, *contrivance* or *discovery* in the whole history of agriculture.' To confirm this, he cites the testimony of a large number of beet growers and manufacturers in France, taken before a committee of the Chamber of Deputies in 1837.

"And now to arrive at the *economy* of feeding upon the beet, let us look at the amount of production. James Pedder, Esq., in the very able report of his visit to the sugar districts of France, estimates the average produce of the beet under good culture, at forty thousand pounds per acre. Messrs. Chaptal and Child, to whom we have before referred, calculate the average production a little short of this, say about thirty-five thousand pounds. We have had numerous experiments in our country which far exceed these. Mr. J. Lee, of Pa., before mentioned, raised one hundred and forty bushels from less than one-eighth of an acre, being eleven hundred and twenty bushels to the acre. The Hon. Ellis Lewis, of Lycoming county, Pa., has raised during the past year upwards of thirteen hundred bushels to the acre. J. Kenworthy, of Oxford,

Philadelphia county, raised the past season at the rate of seventy-one thousand nine hundred and fifty-nine pounds to the acre;—and lastly, the writer of this has produced fifty-three thousand pounds from seven-eighths of an acre. The beet is estimated to weigh from fifty-six to sixty pounds per bushel, making the average of all these results, something more than one thousand bushels per acre. Thirty pounds, or half a bushel per day, with the appropriate quantity of hay which should be used in slop-feeding, would be sufficient feed for a cow. But to be certain in our estimate, we will base it on half this product, say five hundred bushels, making the produce of one-fourth of an acre, or one hundred and twenty-five bushels, the food for one cow, for a period of eight months.

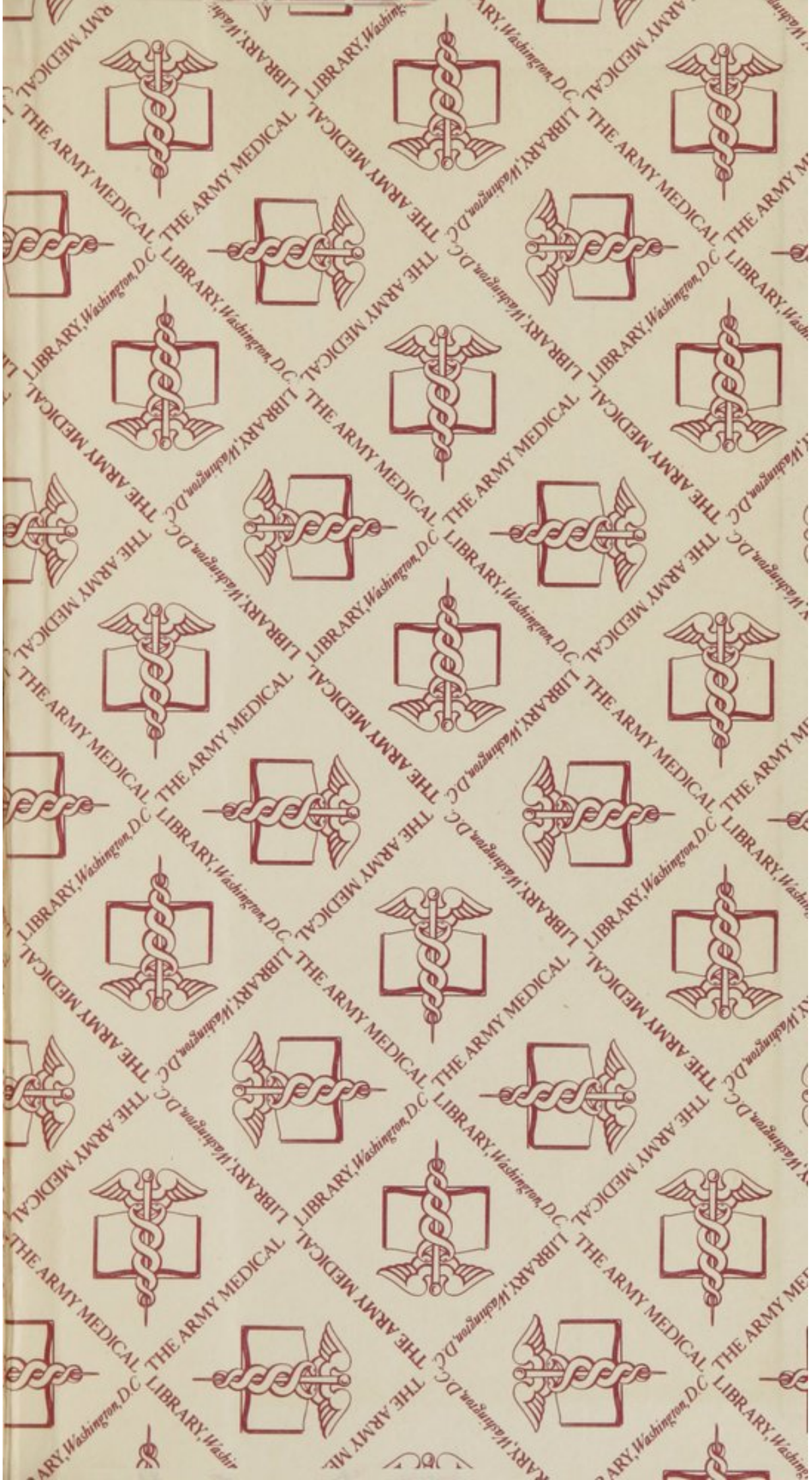
"And now for the *cost of the production.* Messrs. Chaptal and Pedder state, that beets are sold to the manufacturers in France, at ten francs per one thousand pounds, which is about eleven cents per bushel, and that this price gives very large profits to the grower. The actual cost of raising, according to Mr. Pedder, being little more than three cents per bushel. Mr. Child states the price at from three dollars and fifty cents, to three dollars and seventy five cents per ton, which is still less; and the highest estimate that I have seen in our agricultural periodicals, of the cost of raising sugar-beets, is forty-two dollars per acre, including rent, manure, seed, etc. The writer produced them the past season in Illinois, where manure was not wanted, at a cost of less than two cents per bushel. But assuming forty dollars to be the average cost per acre, which at the very low estimate before made of five hundred bushels to the acre, makes the whole cost of growing them eight cents per bushel, or four cents per day for the feed of one cow, instead of the usual quantity of one barrel of

still-slop at nine cents. But to this must be added the cost of transportation, which at the average distance of a mile and a half, cannot be less than five cents per barrel, making *fourteen cents per day* for this very deleterious food, instead of *four cents only per day* for the nutritious and healthy food of the sugar-beet."

As it is not our design to enlarge on these statements and estimates, we only remark, that they afford additional proof that the continuance of the impure milk system, with its train of abominations, is as manifestly unnecessary, as it is destructive and iniquitous. It is indisputable that remedial provisions are at hand, and may be readily made available. We owe it, therefore, to our children—to the common welfare—to the progress of humanity—and above all, we owe it to Him whose benignant providence has in so many ways supplied the means of correcting the evil, that our exertions relax not but with its extermination.

THE END.


THE ARMY MEDICAL LIBRARY, Washington, D.C.


THE ARMY MEDICAL LIBRARY, Washington, D.C.