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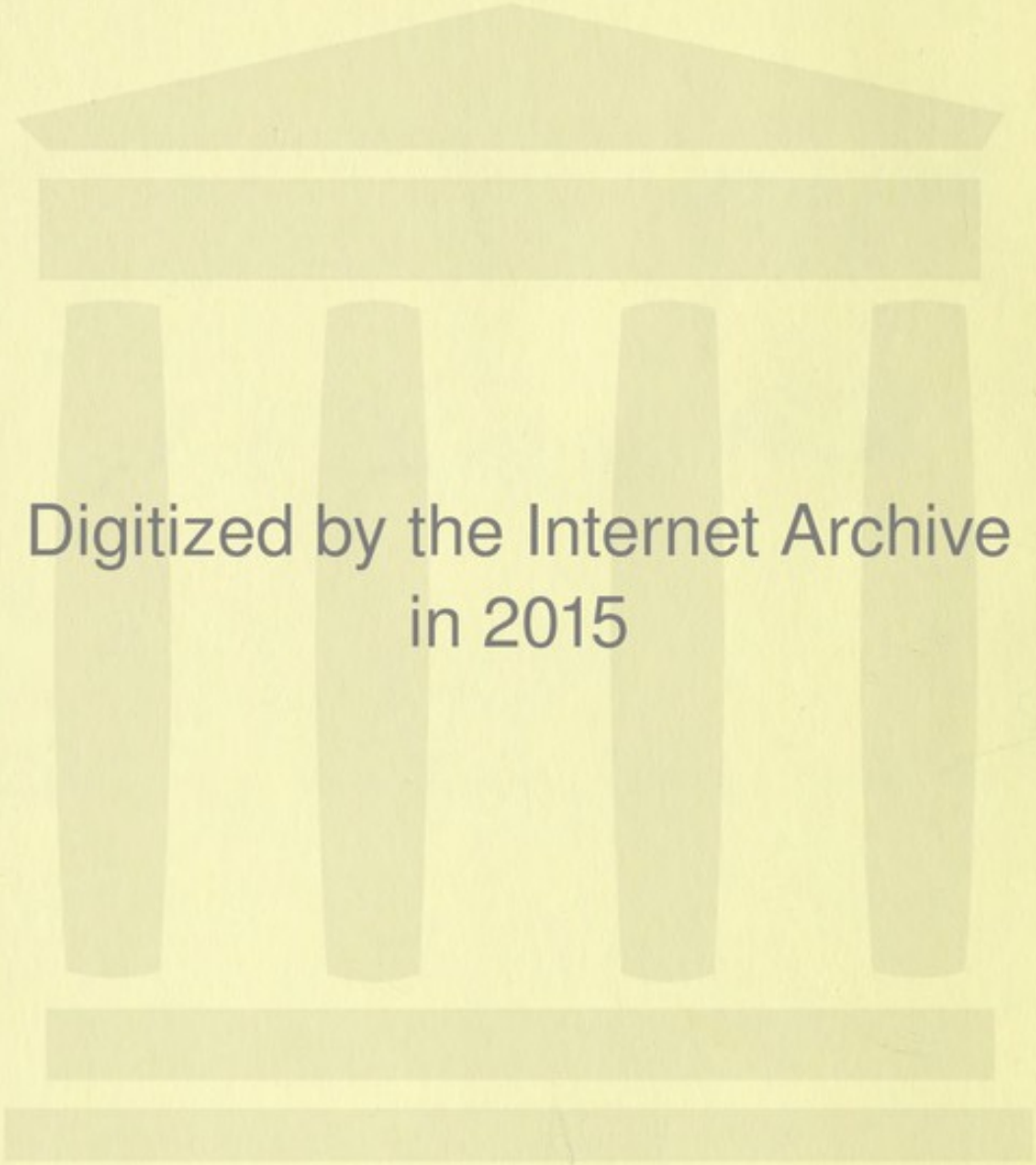

INFANT FEEDING.

INFANT FEEDING

AND

ITS INFLUENCE ON LIFE:

OR, THE

Causes and Prevention of Infant Mortality.

BY

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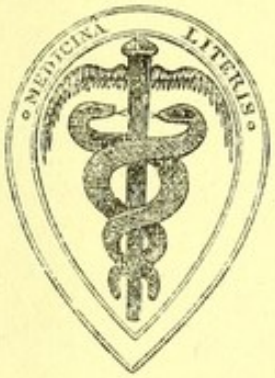

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PREFACE.

THE influence of injudicious feeding upon infantile disease and mortality has occupied my attention for some years. Accordingly several of the divisions of the subject, now given collectively, have from time to time appeared as separate papers in the medical periodicals. They are put forth in a more connected form,—it is hoped also in a more matured shape. Like most other subjects, however, the question has grown under consideration, and this must be my excuse for the length to which these remarks have been necessarily extended. Possessing, moreover, a strong affection for little children, and for this reason much interested in the well-being of mothers to whom they are naturally confided, I have wished to develop the subject in its double phase. In the hope of effecting this, I have spared no pains in the inves-

tigation, and have given myself heartily to the work. In addition, preconceived opinions have not been allowed to bias conclusions. The truth has been honestly sought out, in proof of which it may be said that many of the results obtained have taken me by surprise. I was not prepared for them. I could scarcely have supposed that the ignorance of the masses of the proper manner of feeding infants was so great — that the constituted authorities in the realm could permit so much dishonesty in those who have to provide food for infants; still less that the whole question was so intimately connected with the development of much social evil and moral crime; yet beneath the careless sanction of the community these are gradually yet certainly attaining alarming proportions. Fortunately, the public have themselves begun to see the danger. Mothers in high position are exerting themselves to remove this ignorance. Already the Ladies' Sanitary Association has done good service. If the Government be slow in carrying out the work of reformation, those high in authority and connected with it, united in sanitary associations, are bestirring

themselves to stem the torrent, and preparing the ground for future legislation. The clergy and the medical profession, always foremost in works of charity, are heartily co-operating in the work. This is a cheering prospect. Ere long we may hope to see this land, blessed with so much spiritual and general knowledge, also stand pre-eminent in this direction for sanitary improvement. We may soon see the movement ripening to the salvation of many lives now annually sacrificed before the shrines of ignorance and vice. For myself, I pretend to no knowledge superior to that of my compeers, but I have some zeal to acquire it; and it is impossible for even an ordinary mind to look closely on any subject without obtaining from the very application some useful information. In the wish to follow in the public wake, and to communicate the lessons I have learnt, I have been led to publish my views. In doing this, I may have erred in two ways. Perhaps my style is not so popular as some may wish; still I trust the majority will understand my meaning. Others, on the other hand, will perhaps think I have spoken too plainly, but on so important a social question

to speak too scrupulously from a mock attempt at prudery, would be puerile. I have a higher game to play than merely to court the popularity of the fastidious. In either case my fault will only tend to bring out, by the clashing of different opinions, that which I should scorn to obscure—the plain, incontrovertible truth. And although it be a difficult task to contribute in any way towards the elucidation of a complicated question, or to assist in the smallest degree in unravelling laws, which in their future development may ensure public weal; still, as the magnitude of the good hoped for is real, so the attempt to do so becomes a pleasing duty to the zealous philanthropist.

52, Montague Square,
June 1860.

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INFANT MORTALITY.

PART I.

CHAPTER I.

INFANT MORTALITY.

IMPORTANCE OF QUESTION—CONFLICTING STATISTICS—FRENCH, IN REFERENCE TO FOUNDLING HOSPITALS, PREFERRED—USUAL ERROR OF ASCRIBING IT TO WANT OF BREAST-MILK—CHIEFLY FROM TABLES OF LYONS, RHEIMS, AND PARIS.

THE subject proposed for consideration in these pages is one of immense importance, both to the state and to individuals. It relates to the mortality of infants, its causes, and the means of its prevention. Take an example. In the year 1854 there were born in England 634,405 children. In the same year there died 99,209 children, or 15·6 per cent., under one year old; and 178,185, or 28·8 per cent., under five years. Surely to prevent by any means so great a mortality is a scheme well worthy of a philanthropist. A wide field for medical inquiry is thereby offered, if statistics can be obtained upon which we can reasonably argue, and from which we may deduce the vital

laws which regulate and control this mortality. Unfortunately, however, although there is an outcry everywhere against *red tape* and *routine*, yet both are still very prevalent among ourselves and our medical institutions. Most of the latter, except a few which stand out in honourable contrast, do not give us the benefit of their experience; and thus it is that, in England, much information which if regularly published, might lead to a just comprehension of many difficult questions in science and in medicine, is lost to the profession. The subject of this work is in this category. The books and pamphlets that have been written on it are *legion*. De Watteville enumerates a hundred and thirty; yet all this foreign and British experience has, after all, effected but little good.

To what cause is this failure due? I believe chiefly to a very general, if not universal influence. It is a fault with many authors to take up peculiar theories, and upon these to work out their facts. The direction of these theories is guided by the fashion of the day, or the popularity of particular schools: and thus as a great variety exists in these influences in different places, we seldom have data given in one country in such a form as to admit of comparison with those of another. If we have good facts, they are worked out in a different way, or in a sectarian manner;

and thus great truths, which must as belonging to the same family of man be applicable to all nations, can only be imperfectly deduced—it may be only glanced at. In other words, we have, as it were, a host of weights, but we possess no means of reducing them to a common *scale*. True, the Registrar-General's statistics of England are invaluable, but in many points they cannot be compared with those tables setting forth the experience of Europe. Even England, Scotland, and Ireland, in this respect, have no common language.

From sheer necessity, therefore, I have been compelled chiefly to use French returns, although of course wishing to make them bear almost exclusively on England and Ireland. Exactitude in the figures given is thus not to be expected. At most, I can only bring out results which shall be *true relatively;* and this I hope I have done. Still, in many cases, my conclusions may be also *true absolutely*. Vital statistics, in the present day, are found to be governed generally by the same common laws; and, although the actual figure of per centage may occasionally vary to a small degree, the difference is not by any means so great as it may appear to be at first, even where populations of different countries are taken. Hence it is often allowable to deduce from data which we do not possess for our own country, conclusions which, nevertheless, are perfectly true when applied to

ourselves. Take, for instance, Paris and London. The mortality may vary by 1 or 2 per cent., but, nevertheless, it is still governed in the two cities by the same general laws.

With these few remarks, necessary as an introduction, I proceed at once to the consideration of my subject.

It is generally believed that the highest mortality among infants, is that which occurs in foundling hospitals, and this chiefly because the children in these institutions are *brought up by hand* and *without breast-milk*. It may be well, therefore, to consider the subject of foundling institutions generally, as a preliminary argument to judge how far facts accord with the popular opinion.

Nearly all writers who have endeavoured to explain the mortality of foundlings, have chiefly attributed it to the want of breast-milk.

Years ago, Sir Hans Sloane, in a letter to the Vice-President of the Foundling Hospital (quoted at length in Mr. Brownlow's Memoranda of that hospital, pp. 215-16), gave the following results of his experience :—

Date of admission.	Total.	To wet nurses.	Deaths.	To dry nurses.	Deaths.
March 5, 1741 ...	30 ...	2 ...	— ...	28 ...	15
April 17, 1741 ...	30 ...	7 ...	1 ...	22 ...	11
May 8, 1741 ...	30 ...	17 ...	4 ...	13 ...	8
	—	—	—	—	—
	90	26	5	63	34

Six of the dry nursed were taken out. The mortality of the suckled was 19·2 per cent., against 53·9 of those dry nursed.

Later writers are fond of alluding, as examples, to the hospitals of Paris, Lyons, Rheims, a place called X, and Parthenay. Thus, in Lyons and Parthenay, where the children are suckled at the breast, the mortality is respectively 33·7 and 35; whereas, in Paris, Rheims, and X, where artificial feeding is either extensively or very generally employed, the mortality is respectively 50·3, 63·9, and 80 per cent.

Again, to these more particular results, it is usual, as a general confirmation to the whole, to add the figures of mortality observed in other European institutions, which are given in the Appendix, in which the mortality varies from 40 to 91 per cent.*

A more recent and succinct account by M. de Watteville, who has very ably treated the whole subject, includes all France, and gives the following results, viz.†

"In comparing the deaths of *enfants trouvés*, whether with the totality of their number or that of the *expositions*, this is the result obtained. One dies out of seven, from 1 day to 12 years, or about

---

* See Appendix A, at end of chapter.

† See Appendix B.

14 per cent.; and the mortality of such children in the first year of their existence is 50 per cent."

There is but one foundling exposed in every 39 births in France, while the number of foundlings in institutions is one to every 353 inhabitants. Again, the number of foundlings *exposed* is one-fourth the entire number of foundlings actually existing in institutions, whence it would follow that the mean duration of life of foundlings is four years. Fortunately, of late years this mortality has been diminishing. Thus, for all France, it was for children from 1 to 12—

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1838	14·02	1841	13·30	1844	11·33
1839	13·37	1842	12·60	1845	11·30
1840	13·25	1843	11·35		

These results, albeit the mortality is lessening, are nevertheless bad enough.

It is not surprising, therefore, that upon statements like these the conclusion, that want of breast-milk is the principal cause of the excessive mortality, should have been so generally adopted. It is manifest, however, on closer examination, that, although these figures may represent the mortality of foundlings, their difference is too great to be referrible to one cause only, and that cause want of breast-milk; for, however fatal and injurious this want may be, it will appear in the sequel that there are many others, far more so, also co-operating.

The institutions referred to are placed in every variety of circumstances, as to climate, cleanliness, number of inmates. The quality of food supplied, and the principles upon which the children are fed, are so different, that want of breast-milk could only account for a small share of the mortality. This I hope to prove.

First, then, to speak more particularly of the three hospitals before alluded to; and in the hope of tracing therefrom that there are several causes in operation, I shall quote at length from M. Villermé's work *On the Mortality of Foundlings* (*Annales d'Hygiène*, vol. xix. p. 47), the same as given in abstract by Dr. West, in his *Diseases of Children*:—

"Lyons is apparently, of the great cities in France, that in which most care is paid to foundlings. I have been witness of this in 1825; and I can certify that nowhere have I seen so much attention, and so wise a care exercised, as in this hospital. So soon as the infant is deposited in the tower, it is taken out, warmed, cleaned, its linen changed; and it is given to a nurse, who always *suckles* the child; or it is sent to a wet nurse by a messenger. By whomsoever, however, the child is taken from the institution (and it is generally by the hospital nurse herself), it is never allowed to pass more than two or three days without suckling at the breast. It is necessary that this hospital

nurse herself should see the child put into its bassinette at the moment of departure, all precautions being taken to avoid its being chilled in any way. The child's body is almost entirely surrounded by cotton, and hot clothes, always adapted to the season. Finally, the bassinette itself, in which the child is taken away, is surrounded by coverings; and at certain distances, whether the nurse or a messenger carries it, she must stop at some house which has been selected beforehand to accommodate and change the infant. It was not, however, before 1824, or more particularly 1831, that the hospital administration had so far perfected this department.

"The foundlings of Rheims are fed by the bottle and *petit pot* (and never at the breast) by women from the country, who take them away at the end of twenty-four hours or seven days after their deposition in the hospital. Up to the hour of their departure they are very well taken care of, under the direction of the head midwife.

"The children of the Paris Foundling Hospital are kept longer than those of Lyons and Rheims in the house where they are received, and their nurses (a large number of whom live at great distances) bring them up generally at the breast."

The arrangements, both in Paris and Rheims, appear, from the above account, to be very defective. To keep children, as in Paris, a long time in

hospitals, is to expose them to much contagion. It is a bad feature to have nurses living at a great distance; and in the difficulty of procuring wet nurses, it is to be feared *bad* selections are made, perhaps of diseased females, whose antecedents are not known. At Rheims the management is even worse. To keep many of these infants as long as seven days on unsuitable diet, and then to send them far up the country, where they may not be carefully looked after (since over these nurses there is no supervision exercised), must be very imprudent. In Lyons, however, the arrangements made appear to be praiseworthy: but even here exposure before reception in the hospital is not prevented.

The first question which presents itself, therefore, is the following:—Is there any common law of mortality observed in these three institutions, or even in the same institutions in different years, which might lead us to suspect a common *cause* in operation? If so, can this cause be determined? In the hope of deducing this law, and for the purpose of *comparison*, I reduced the mortality of these three institutions to a scale of 1000. This table, published elsewhere, I do not here reproduce, because my expectation in this respect has been belied; the causes of this mortality are too numerous, and vary so much in different institutions, and even in the same institutions at different times, that they require separate consideration. Some of these

are doubtless *endemic* to particular institutions; others are often so peculiar and generally misapprehended, as to necessitate separate study. Writers have already specified many of these causes. A few of them have, however, been overlooked; and thus, although in some respects I may be guilty of compilation, I hope also to bring out some original points, the whole to be practically useful.

APPENDIX A.

Mortality in Foundling Hospitals in different parts of the World.

	Per cent.	Period.
Dublin	91	Close of last century.
Marseilles	90	
St. Petersburgh	40	
Florence	40	
Barcelona	60	
Paris	80	
All France	60	1824
,,	75	1818
Dublin	48·7	1750-60
Paris	50	1838
Mean	63·4	

APPENDIX B.

Mortality of Foundlings in the Departments of France in regard to the totality of their number.

(*a*) Departments showing the highest rate of mortality.	Per cent.	(*b*) Departments showing the lowest rate of mortality.	Per cent.
East Pyrénées	33·3 to 50	Haute-Sâone	0
Seine-Inférieure		Haute-Garonne	2·2 to 2·5
Gironde	25 to 33·3	Haut-Rhin	
Loiret		Jura	2·5 to 3·3
Seine-et-Marne		Hautes-Pyrénées	
Aube	20 to 25	Ardèche	3·3 to 4
Cantal		Finisterre	
Cher		Moselle	
Côte-d'Or		Vosges	
Ile-et-Vilaine		Gers	3·3 to 5
Loire-Inférieure		Lot-et-Garonne	
Seine		Nièvre	
		Basses-Pyrénées	
		Bas-Rhin	
Mean . . .	26·5	Mean . . .	3·6

Mortality of Foundlings in France in regard to the number of Expositions.

Highest.	Per cent.	Lowest.	Per cent.
Basses-Alpes .	83·3	Haute-Saône . .	0
Loire-Inférieure	76·9	Haut-Rhin . . .	5·6
Loiret		Vosges . . .	6·3
Seine-Inférieure		Moselle . . .	11·3
Vaucluse		Ponts	13·
Ardèche	71·4	Finisterre . . .	15·8
Aude		Ariège . . .	15·9
Aveyron		Hautes-Pyrénées .	16·3
Cher		Jura	17·4
Gers		Nièvre . . .	17·5
Gironde		Bas-Rhin . . .	17·8
Ile-et-Vilaine		Haute-Garonne . .	18·4
Manche	60	Lot-et-Garonne . .	19·2
Seine			
Mean. .	72·4	Mean . . .	13·4

CHAPTER II.

USUAL MORTALITY OF CHILDREN OF TENDER AGE IN TOWN AND COUNTRY.

First, I think most writers have forgotten in the outset to state what is the actual mortality of infants brought up at the breast in the same, or in analogous places in towns, as contrasted with that of infants brought up by hand or otherwise in Foundling Hospitals. As this is essential for truthful comparison, I shall begin by determining this mortality, especially for early ages.

This will be found, from the table given below,* to vary from 19 to 45 per cent. for the ages 0 to

---

* *Percentage of Mortality of Children from* 0 *to* 1 *year, and from* 0 *to* 10 *years, after Benoiston de Châteauneuf and Quetelet for all Europe.*

	0 to 1 year.	0 to 10 years.
Switzerland	19·109 ...	34·871
Holland	19·642 ...	36·214
Geneva	19·507 ...	39·329
Paris	21·287 ...	52·511
Brussels	21·30 ...	42·97
Southern Netherlands ...	22·49 ...	43·44

1 year, and from 34 to 55 per cent. for children from 0 to 10 years old.

If we take Ireland, selecting indifferently different years, the returns obtained betray some most extraordinary results, which will tend to explain, in some measure, the excessive mortality of children in Foundling Hospitals. In Ireland, as for that country the Census Tables invariably distinguish between rural and civic districts, advantage has been taken of this distinction to deduce the relative mortality in both districts.

There is, however, no extant table of the population of Ireland for 1850, so that, *per force* the returns have been calculated on the deaths of 1850 with the population of 1851. This introduces a slight error, still one scarcely of much importance for practical deductions; because such returns will be found, as a rule, only to diminish slightly the cypher of mortality; since, from emigration and physical deterioration, the population in the sister island has been steadily on the decrease. (See table next page.)

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	0 to 1 year.	0 to 10 years.
France	23·248 ...	44·452
Provence	24·211 ...	47·024
Petersburgh	27·897 ...	41·974
Sweden	28·393 ...	50·044
London	36·371 ...	48·453
Berlin	39·538 ...	54·108
Vienna	45·594 ...	55·578

These returns may be more particularly considered. In Ireland, taking rural districts as well as towns, it may be said the mortality for all children under 1 and under 5 years old is greatest in the latter; the mean rate being 14·7 per cent. for towns, and 8·8 for rural districts, for the first period, and 8·1 per cent. for towns, and 4·3 for country, for the latter period. (See table below.)*

The returns for England cannot, with the data I have been able to procure, be as accurately determined, simply because the difference between rural and civic districts is not given; another instance of the want of one common scale for comparison.

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* *Percentage of Deaths to Population of each age in Ireland.*

Date.				Under 1 year.		Under 5 years.
1850-1	...	All Ireland.	Civic Districts	15·4	.....	8·4
,,	...	,,	Rural ,,	8·4	.....	4·2
,,	...	Ulster.	Civic ,,	12·3	.....	6·9
,,	...	,,	Rural ,,	6·9	.....	2·6
,,	...	Connaught.	Civic ,,	15·4	.....	7·7
,,	...	,,	Rural ,,	8·6	.....	5·0
,,	...	Leinster.	Civic ,,	15·6	.....	9·3
,,	...	,,	Rural ,,	9·01	.....	4·3
,,	...	Munster.	Civic ,,	15·1	.....	8·4
,,	...	,,	Rural ,,	11·0	.....	5·6
1850	...	All Ireland.		6·0	.....	.
		Mean.	Civic ,,	14·7	.....	8·1
		,,	Rural ,,	8·8	.....	4·3

One reason, doubtless, is this: in the English returns, even when a town or civic district is spoken of, the population always includes a small number of families engaged in agricultural pursuits. Again, when rural districts are spoken of, reference is made to an entire county; the returns thus necessarily include many families engaged in manufacturing pursuits, and town residents. So far there is error, which should not be overlooked; and no calculation made can be otherwise than approximative. It has, however, been made; but it is only necessary here to state that so far as it goes it justifies the same conclusion as that deduced from the Irish tables. It follows, therefore, from the preceding inquiry, that as among all *town* children of tender age the mortality is so much greater than that among *rural* children, so it is very important to distinguish between foundlings living in the country and in towns. Unfortunately, however, after long inquiry, I do not find this distinction made in any work on foundlings which I have seen; nevertheless, I have attempted to deduce it from some figures given in the general statistics of foundlings in France, published by authority of the Government. But here, as in the former case, the data being insufficient, I am unable to obtain more than an approximative result. The relative mortality, however, between town hospital foundlings and those placed in the country thus

comes out more strikingly than we might have supposed. Thus, in five years,

Out of 52,883 town hospital foundlings, the mortality was 72·2 per cent.

Out of 122,110 country ditto, the mortality was 11·5 per cent.

This conclusion proves that Foundling Hospitals, if established at all, should always be placed in the country.

CHAPTER III.

MORTALITY IN EARLY PERIODS—GREATEST IN FIRST YEAR, BOTH FOR FOUNDLINGS AND ALL CHILDREN—MORTALITY IN DIFFERENT QUARTERS OF FIRST YEAR—GREATEST IN FIRST—IN FIRST MONTH GREATEST OF ALL—EXTRAORDINARY MORTALITY IN IRELAND—IS ACTUALLY LESS IN LYING-IN HOSPITALS THAN IN GENERAL POPULATION.

It has been shown by all writers that the mortality of foundlings is always greatest during the early periods. The data before given for Lyons, Rheims, and Paris, prove this.

1st. *In early years.*—De Watteville states the mortality during the first year at fifty per cent. The same fact is set forth in the table given below from Bordeaux and Lyons.*

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* At Bordeaux, out of 928 foundlings of the same age, the deaths in twelve years, as given by M. de Watteville, were as follow :—

Year.	Deaths.	Per cent.	Remaining.
1	480	51	448
2	112	28	336
3	37	10	299
4	14	5	285
5	13	5	272
6	4	3	268
7	2	1	266
8	7	3	259

This mortality, however, is not confined to inmates of foundling hospitals, but applies to all children. Thus, from Quetelet's researches, it appears that in the Southern Netherlands the

Year.	Deaths.	Per cent.	Remaining.
9	3	1½	256
10	4	2	252
11	3	1½	249
12	4	2	245
	683		

Thus the average annual per centage of mortality was 10 ; or 73 per cent. on twelve years.

At Lyons, out of 8053 children from birth to twelve years, the deaths were :—

Year.	Deaths.	Per cent.	Remaining.
1	3098	37·10	4955
2	1114	22·41	3841
3	383	9·47	3458
4	157	4·50	3301
5	84	2·54	3217
6	57	1·77	3160
7	39	1·20	3121
8	33	1·05	3088
9	20	·64	3068
10	26	·84	3042
11	15	·49	3027
12	8	·28	3019
	5034		

Thus the average annual per centage of mortality was 8 ; or 62 per cent. in twelve years.

rate of mortality of children from 0 to 5 years is as follows:—

Years.	Deaths.
0	100,000
1	77,507
2	69,470
3	64,799
4	61,899
5	59,864

Upon this table he remarks that rather less than a quarter of the children born die in the first year following their birth. And this is true for all children of whatever country selected.

2nd. *In early months.*—When we come to consider the question of the mortality in early months, specially for each month of the first year, this mortality appears to be far greater. Burdach gives a table for the first year, for the term of each quarter.

Mortality in different quarters of the first year. (*Burdach, Physiologie*, Vol. IV., S. 523, p. 387.)

	Brussels.	Bwick.	Berlin.	Hamburgh.	Paris.	Vienna.
Mean Term	1 in 17	1 in 10	1 in 16	1 in 21	1 in 24	1 in 17·6
1st Three Months	,, 8	,, 3	,, 7	,, 11	,, 8	,, 7·
2nd ,,	,, 23	,, 13	,, 19	,, 27	,, 51	,, 26·6
3rd ,,	,, 25·07	,, 21	,, 23	,, 30	—	,, 31·8
4th ,,	,, 25·12	,, 41	,, 21	,, 26	—	28·0

The same fact is brought out by Mr. Acton in his paper on Illegitimacy (*Statistical Society's Journal*, December 1859). Out of 336 illegiti-

mate children born in St. Marylebone, St. Pancras, and St. George, 110 died under three months.

Of all the months in the first year, however, it is the *first month* which is most fatal, although the distinction is not usually made. The subjoined table, from Quetelet, which relates to the mortality of Brussels, makes it during the first year of life 1034 deaths in the first month, against 3538 for the whole year, or 29·2 per cent. (See table below.*) So that more children die in the first month than in any of the remaining months of the first year. In Paris, and for the year 1823 (*Annuaire du Bureau de Longitudes pour* 1826), the corresponding numbers are in the proportion of 1764 to 693, or 59·2 per cent.

The mortality for the first and following months is distinctly set forth in the arranged table from Ireland, from which it appears always to be greatest in the first month, in the civic districts of Connaught reaching the high figure of 38·8 per cent. (See Appendix A.)

An attempt has been made to explain the high mortality in foundlings, by attributing it to the

---

* 1st month 1034
2nd month 890
3rd month 231
4th month 185
5th month 156
6th month 156
7th month 162
8th month 152
9th month 140
10th month 150
11th month 142
12th month 140

close confinement. This cannot be the case with the high mortality in Ireland, shown forth in the table before referred to. But it is more clearly proved by other figures.

There is an excellent table for Ireland setting forth the mortality in *public institutions* for all ages, and from one to twelve months in particular. From this the exact rate of mortality due to this confinement might be deduced, if we had a corresponding table of population in public institutions for the same years; but this last is not given; so that it is, after all, of little use. The only tables which bear at all upon this point apply to the first month, and are those obtained from lying-in institutions, or from the statistics collected by accoucheurs of large hospitals, under whose care the infants, with their mothers, have remained for the month in hospital. These afford us the means of deducing the probable mortality in public institutions for one month. In the summary for all Ireland for ten years, from 1831 to 1841, for the Irish lying-in hospitals, this mortality is brought out at 6·1 per cent. (See below.)*

Again, from the tables published by different

---

* Total births 35,131
Total deaths 2,258
Mortality per cent.... ... 6·1

accoucheurs, we may deduce almost the same per centage cypher of mortality. (*Vide* table below.)*

So far both modes of procedure give a similar result. But here a difficulty presents itself. When we come, in the case of Ireland, to measure the mortality in the first month, which the tables for that country enable us to do, we find the mortality is at least five times, sometimes six times, as great. Thus, in Ireland and its four divisions, we have—

Deaths per cent.

	Civic Districts.		Rural Districts.
All Ireland	33·1	...	21·6
Ulster	24·	...	15·9
Connaught	38·8	...	24·9
Leinster	35·7	...	24·6
Munster	35·6	...	23·9
Mean	31·6	...	22·2

I can find no tables for England illustrative of the same fact. (See Appendix B.)

	No. births.		No. deaths.		Per cent.
* Madame Lachapelle. . .	22,243	...	837	...	3·7
Dr. Ramsbotham . . .	49,528	...	2723	...	5·6
Drs. Hardy and McClintock .	6,702	...	467	...	6·9
Dr. Arneth (Vienna) . .	6,608	...	244	...	3·7
	85,081		4271		6·1

APPENDIX A.

Table showing the Mortality in Ireland from One Month to Ten Years: distinguishing the Rural and the Civic Districts: 1850—51.

	Month 1.	Month 2.	Month 3.	Month 4.	Month 5.	Month 6.	Month 7.	Month 8.	Month 9.	Month 10.	Month 11.	Total under 1 year.	Total 1 year and under.	1 year and under.	2 years.	3 years.	4 years.	5 to 10 years.
Ulster: Rural districts.																		
Population in 1851	5072	3331	3875	2494	2116	5571	1957	2431	4492	2436	2109	35874	31368	67242	40904	31927	41365	266480
Deaths in 1850	809	223	233	134	75	209	64	72	215	94	57	2185	1120	3305	710	497	429	1246
Per cent.	15·9	6·9	6·01	5·4	3·07	3·7	3·2	2·9	4·7	3·8	2·7	6·9	3·8	4·9	1·6	1·6	1·3	0·4
Ulster: Civic districts.																		
Population in 1851.....	1063	684	680	530	500	789	530	571	673	554	427	7001	5229	12230	6374	4915	5367	35306
Deaths in 1850	276	55	82	54	39	60	59	41	86	56	53	861	494	1355	283	180	161	441
Per cent.	24	8·03	12·06	11·3	7·8	7·4	11·1	7·2	12·7	10·1	12·4	12·3	9·4	11	4·4	3·9	3	1·2
Connaught: Rural districts.																		
Population in 1851.....	2542	1472	2441	1168	809	4610	721	708	3047	753	602	1883	14154	33037	10499	16296	21033	175540
Deaths in 1850	627	166	239	85	40	269	26	28	181	33	30	1624	957	2581	704	470	403	1260
Per cent.	24·9	11·2	9·7	7·2	4·9	5·8	2·1	3·9	5·7	4·3	4·2	8·6	6·7	7·8	6·7	2·8	1·9	0·8
Connaught: Civic districts.																		
Population in 1851	265	166	178	119	90	285	100	121	210	117	79	1730	1270	3000	1746	1320	1381	12212
Deaths in 1850	103	25	26	14	9	32	6	10	22	11	9	267	121	388	93	56	39	138
Per cent.	38·8	15·06	15·02	11·7	10	11·2	6	8·2	10·4	9·3	11·3	15·4	9·5	12·9	5·3	4·2	2·8	1·1
Leinster: Rural districts.																		
Population in 1851.....	3268	1953	2243	1689	1357	3214	1477	1644	2720	1794	1401	22860	18834	41694	25316	22731	27436	180765
Deaths in 1850	805	170	187	105	81	167	93	98	187	103	79	2075	1139	3214	801	553	573	1713
Per cent.	24·6	8·7	8·3	6·2	5·9	5·1	6·2	5·8	6·8	5·6	5·6	9·07	5·1	7·7	3·1	2·4	2·1	0·9
Leinster: Civic districts.																		
Population in 1851	1654	1074	1240	960	802	1321	914	997	1060	913	656	11591	8990	20581	10056	8560	9335	61419
Deaths in 1850	581	153	134	121	98	151	112	101	163	96	88	1798	966	2764	553	458	381	1119
Per cent.	35·7	14·2	10·8	12·7	12·2	11·4	12·2	10·1	15·9	10·5	13·4	15·6	10·7	13·4	5·5	5·3	4·08	1·8
Munster: Rural districts.																		
Population in 1851	3851	2221	2689	1624	1191	4538	1317	1502	4039	1603	1372	25952	19915	45867	29626	26089	33017	236028
Deaths in 1850	920	373	343	111	86	407	71	76	306	90	73	2856	1660	4516	1352	904	846	2797
Per cent.	24·4	16·8	12·7	6·8	7·2	8·9	5·3	5·06	7·5	5·6	5·3	11	8·3	9·8	4·5	3·5	2·5	1·1
Munster: Civic districts.																		
Population in 1851	1220	767	887	666	551	1112	625	721	952	658	532	8701	6430	15133	8017	6433	7024	53142
Deaths in 1850	435	103	132	78	50	139	63	63	135	72	45	1316	758	2074	504	310	299	880
Per cent.	35·6	13·4	14·8	11·7	9·07	12·5	10	8·7	14·1	10·9	8·4	15·1	11·7	13	6·2	4·8	4·2	1·6
All Ireland: Rural districts.																		
Population in 1851	14643	9082	11248	6975	5573	17933	5472	6386	14298	6476	5484	103569	84271	187840	115445	97043	122571	857304
Deaths in 1850	3167	832	1002	445	282	1052	253	274	889	320	239	8699	4876	13575	3797	2424	2251	7016
Per cent.	21·6	9·1	8·9	6·3	5·06	5·8	4·6	4·2	6·2	4·9	4·3	8·4	5·7	7·2	3·2	2·5	1·9	0·8
All Ireland: Civic districts.																		
Population in 1851	4212	2691	2985	2275	1943	3507	2169	2410	2895	2252	1694	29023	21925	50940	26193	21228	23107	162071
Deaths in 1850	1395	336	774	267	197	382	240	215	406	235	193	4640	2339	6979	1443	1004	880	2588
Per cent.	33·1	12·5	25·9	11·7	10·1	10·8	11·0	8·9	14·0	10·4	11·3	15·6	10·6	11·7	5·5	4·7	3·3	1·5

[*To face page* 22.

APPENDIX B.

We have some excellent tables, set forth by the Registrar-General, giving us the deaths in the first, second, third, etc., months of life; but, as we have not corresponding tables of the living population at such periods, the per centage mortality cannot be deduced. There is, however, reason, I fear, to believe it is also very high, if not higher, in many parts of England. We have, in these statistics before alluded to, the totality of births in the year given. From the Irish tables, by including all one year old and under, we also obtain a number which may represent all the births in one year. Comparing these in both cases with the number of deaths in one month, we may get a number which may express at least the relative mortality in both countries.

Deaths to 100 *Births in First Month of Life.*

	Civic Districts.		Rural Districts.
All Ireland	2·7	...	1·1
Ulster	3·0	...	1·2
Connaught	3·4	...	1·9
Leinster	2·3	...	1·8
Munster	2·2	...	2·0
Mean	2·7	...	1·6

If the number of deaths per cent., compared to the population living, of one month old, in Ireland, bears any relation to these returns, whether taken for Ireland or for England, it would appear that the per centage of mortality to the population of one year old is actually greater in England. But, with the difficulty of isolating rural and civic districts as before stated, and the small difference observed between the two districts here spoken of, it is evident this is not a fair inference. We may, however, conclude this mortality to be at least as

high in England as in Ireland; and this result may be brought out another way. Considering all deaths at all ages as 100, the deaths will be, under one month—

	Towns.		Country Districts.
Metropolis	4·0	...	—
Manchester and Salford . .	5·0	...	—
Liverpool	5·3	...	—
Leeds	7·4	...	—
Birmingham	5·9	...	—
Norfolk and Suffolk . . .	—	...	7·3
Huntingdon and Cambridge .	—	...	8·6
Essex	—	...	5·4
England and Wales . . .	—	...	6·4
Wales, with Monmouthshire .	—	...	5·3
Middlesex (except Metropolis), Hertford and Bedford . .	—	...	7·5
Mean	5·5	...	6·7

The disparity between town and counties is actually in favour of towns, but no doubt referrible to the difficulty of distinguishing the two classes.

Comparing this result with that for Ireland, for ten years, 1841-51, (considering, as in the case of England, all deaths as 100,) the deaths for one month and under will be as follows:—

	Civic Districts.		Rural Districts.
All Ireland	5·0	...	3·7
Ulster	5·4	...	3·7
Leinster	5·3	...	3·4
Connaught	4·9	...	3·6
Munster	4·6	...	3·6

Whence I think we may conclude that the mortality of children under one month, great as it is in Ireland, is not much smaller in England, even in ordinary populations; and this among children mostly wet nursed, and in private houses, not in foundling or other hospitals—a fact, I think, which has

been generally overlooked, or, at least, not sufficiently insisted upon.

But this difference of mortality under one month may be set forth in another way, and one by which we can speak more decidedly to the senses. Taking England and Wales on the same scale, all deaths at all ages being represented by 100, 6·4 deaths take place under one month, and 21·8 under one year; *i. e.*, out of 28·2 deaths, 6·4 are deaths of children under one month, or 27 per cent. In all Ireland, reckoning all deaths as 100 at all ages, 4·3 die at one month, 13·6 die under one year; *i. e.* out of 17·9 deaths, 4·3, or 24 per cent., are deaths of children under one month. This is an appalling mortality. Does it not prove the extent of neglect, mismanagement, and crime rampant, even in a civilised country like this? Indeed, in regard to the latter, I am told by Mr. Wakley, the coroner for Middlesex, whose opportunities of knowing this are only equalled by his untiring zeal in the cause of humanity, that at least 300 children are known to be the victims of infanticide, albeit often returned as stillborn, or as having died from other causes. If this be the case in London, where there is so large a detective police force kept up, and where the opportunities of disposing of a child are so small, what must it be in retired districts and towns, where police authorities are either few and far between, or absent altogether, and in which it is so easy to hide or bury a child out of the way?

CHAPTER IV.

OF SOME OF THE CAUSES IN OPERATION WHICH APPLY TO FOUNDLINGS IN PARTICULAR.

IMPURE AIR; THE EFFECT OBSERVED IN DIRTY IRISH CABINS —A STRANGE NURSE'S MILK—CONGENITAL DELICACY—EFFECT OF REMOVAL—OF EXPOSURE—OF SEASON—ABUSE OF RECUMBENT POSITION AND WANT OF EXERCISE—WANT OF BREAST-MILK.

SOME of the causes in operation in inducing this great mortality, more especially as they refer to foundlings, are at once obvious.

Infant foundlings are placed often in very *impure air*, which, I make no doubt, greatly interferes with nutrition and healthy development; and has a great deal to do with the great mortality among children. It will be at once and by all recognised that hospital aggregation must necessarily make the children more obnoxious to contagious diseases. Two of these, which produced the highest mortality in the Parisian hospitals,—the *endurcissement cellulaire*, and the

muguet or *diphtheritis*,—were particularly contagious, and, as such, highly fatal. But this would apply equally to all diseases, such as scarlet fever, hooping-cough, etc. etc. Even in London alone, taking a year (1849) indiscriminately, from diseases peculiar to infants, including small-pox, measles, scarlatina, pertussis, croup, thrush, diarrhœa, remittent fever, tabes, hydrocephalus, convulsions, bronchitis, laryngitis, pneumonia, teething, inflammation of bowels, want of breast-milk, and premature birth and debility, the deaths were—

	Under 1 year.	Under 5 years.
From the above-named diseases	8,197	16,138
All diseases	12,122	24,814

The births amounted to 72,612; so that the gross mortality of children for that year, under one year old, amounted to 11·1 per cent.; for those under five, to 22·5 per cent.; and from all diseases, in the first case, to 16·6 per cent.; in the second, to 34·1 per cent.

The per centage of deaths to all deaths from diseases of children, for children under 1 year old, is set forth by the Registrar-General's tables at 7·1 per cent.

Apart from this source of common mortality, which should apply equally in both cases, I think it must be admitted, by all those who have had much to do with infant children, that the hos-

pital atmosphere engendered by children congregated together is peculiarly offensive and injurious. Even the cleanest children have a peculiar faint, soapy odour: when this comes to be mixed with that arising from urinous towels drying by the fire, and from foul motions, it is very abominable; while the delicacy of infants, and the easy way in which they catch cold, render a certain degree of closeness of the atmosphere imperative; at least, it is always kept up. And herein, I think, lies a fertile source of fatality in bringing up infants in hospitals or foundling institutions, where of necessity they must be congregated together. And in it, too, we may find an explanation of the high mortality of infants in Ireland. The writer of the article in the *Quarterly Review*, on Ireland Past and Present, No. 203, p. 78, thus describes the homes of its inhabitants:—

"Any one who has travelled through Ireland, until within the last few years, must have been struck with the miserable condition of the dwellings of the poorer peasantry. They were built of mud; the roof was sunken, and seldom whole. The thatch was black and rotten; water had saturated it, and grass and weeds grew rank upon it. The window was generally a hole stuffed with hay and rags; and, where glass had been formerly put, there remained scarcely an unbroken pane. The chief access for light or air was the door, which

was always open. Close to the door, and generally in front of it, was a fœtid pool, in which foul straw, potato-stalks, dung, and all kinds of abominations, were fermenting and macerating; while half-naked and squalid children enjoyed themselves around it. Inside there was as much dirt and discomfort as without; the floor was broken and uneven; the walls were dark from smoke; there was but one room common to the family, their poultry, and their pig. Something like a bed, in which all sexes and ages slept, an iron pot, an old tub, a stool or two, a rude table, and a dresser, with some broken plates, constituted the furniture and all the family possessions."

No wonder, then, if, under such circumstances, an atmosphere was generated, even in rural districts, peculiarly fatal to the children, and not better than hospital air.

A strange nurse's milk is of itself a source of mortality. M. Benoiston de Châteauneuf has shown that the mere substitution of a hired wet nurse's for a mother's milk increases the mortality 10·64 per cent. per annum, *i. e.* from 18·36 to 29 per cent. I know of no facts on any large scale to verify this statement, although, from the high character of the observer, I cannot doubt it. One fact has been communicated to me, however, by my friend Dr. Wright, who had it from a lady correspondent. It is so

far confirmatory. It applies to six twins, *i. e.* twelve children. Six were fed by their mothers, and all did well. Six were entrusted to hired wet nurses; three died; and of the remaining three, two at twelve months were looking puny and delicate, as if they could not long live; the sixth was quite healthy. No doubt can be entertained, that even hired wet nurses, although well paid, and with all their preference for their sucklings, if not well looked to, will often, when failing in their milk, or from other causes, sacrifice their sucklings to their interest. I have seen this, and know it to be the case. It may be perhaps in a measure due to ignorance, but in other cases it is wilful injury—in my mind, as much wilful murder as a more open attack, albeit the law does not acknowledge it. Hence another influence at work to increase the mortality of foundlings, and children generally. I shall, however, again refer to this subject.

So far, then, we have certain causes in operation which are not exclusively confined to foundling institutions, which may explain some of the mortality, viz. :—

Residence in town will account for from 5·07 to 6·1 per cent. for children under one year old. During the first month, if the number of inmates of hospitals die only in proportion to the number which die out of them in civic districts, the mortality may

be as high as 33 per cent. Of this amount, under the most favourable circumstances, 6·1 per cent. must take place in the first month. At least, from 16·6 to 34·1 per cent., or the mean of 25·3 per cent., should be put down for the effect of contagious diseases. To absence of the *mother's* breast-milk, 10 per cent. per annum may at least be referred: in all, 47 per cent., at least, for children under five, from causes not peculiar to foundlings—a large per centage to be deducted from their usual mortality. It should also not be lost sight of that, as the mortality of children is generally greatest in the earlier years, and as, in a given population of foundlings, there is a higher per centage of younger children, so necessarily the whole per centage mortality must be greater.

Passing on from these general causes of mortality, but which affect more severely foundlings, I proceed to speak of some of those to which children of this class are particularly exposed: and here, in the first place, I should premise that such children are by their very constitution particularly obnoxious to disease. Thus remarks M. de Watteville: "These unfortunate children in general have already been injured while yet in their mothers' wombs; a very large proportion suffering, from their birth, from defects of body which, later in life, quite unfit them for labour. And then, it

should be added, want of care in infancy, whether in a hospital or when put out at nurse, contributes a great deal to make them weakly and obnoxious to disease."

1. *Effect of Removal.*—Under this head we have conflicting opinions. From Mr. Wakefield's tables, it appears that 59 per cent. of all infants who had been brought from a distance of more than fifty miles died in the hospital, whereas the mortality among other children did not exceed 48 per cent.—a difference of 11 per cent. from this cause alone. M. Gaillard brings out the same point by comparing the mortality of foundlings deposited in the town and hospice of Poitiers, with that of infants at Lyons, who were merely removed there from the Maternité. During six warm months, seven of the former died to six of the latter; during six winter months, nineteen of the former died to ten of the latter. At Poitiers most came from a distance, whereas at Lyons they were chiefly supplied by the city itself. This appears natural. A child brought a long way very soon after its birth, the mother probably too ill to accompany it, fed in the interim in a very improper manner, weakened by hunger and fatigue, is placed, no doubt, under very unnatural and unfavourable circumstances; yet it is a question how far, in practice, this rule applies. We learn from

M. de Watteville's book (*Statistique des Etablissemens et Services de Bienfaisance*, p. 23) that this mortality cannot be due to the transport, since in other cases, where the children are not very ill, and not exposed, the mortality is actually decreased. Thus—

Out of	8,879	children,	aged from	1 day	to	2 years.
,,	12,110	,,		2 years	to	6 ,,
,,	7,661	,,		6 ,,		9 ,,
,,	3,958	,,		9 ,,		12 ,,
	32,608					

Excluding 8,000 who were taken out of these institutions by their parents, only 13 died during the journey, and 209 only in the month following their removal—a cypher of mortality positively below that which obtains in such institutions. No doubt want of care, and neglect of infants in removal, will increase the mortality; and in this way we may perhaps explain the different results obtained. This last is best considered, however, under the next head.

2. *Effect of Exposure.*—This is a great cause of mortality in foundling institutions. On comparing the French returns before given, the per centage mortality of exposed children, as compared to that of the ordinary foundlings, was 13·4 to 72·4 for

exposed children, and only 3·6 to 26·5 for foundlings.*

Upon this point, as explanatory of the great mortality in the building, Mr. Brownlow speaks admirably in his very interesting work (*Memoranda of the Foundling Hospital*). He says: "This practice of transporting children from remote towns was condemned by a distinct resolution of the House of Commons, and a Bill was ordered to be brought in to prevent it; but this Bill was never presented; so that parish officers and others still continued to carry on their illicit trade, by delivering children to vagrants, who, for a small sum of money, undertook the task of conveying them to the hospital, although they were in no condition to take care of them, whereby numbers perished for want, or were otherwise destroyed; and even in cases

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* *Exposed Children.*

In the Departments.	Highest.		Lowest.
Where it was highest	83·3	to	60
Where it was lowest	19·2	to	0
Mean	72·4	to	13·4

Foundlings.

Where it was highest	50·	to	20
Where it was lowest	5·	to	0
Mean	26·5	to	3·6

(See this table in full at page 11.)

where children were left at the hospital, the barbarous wretches who had the conveyance of them, not content with the gratuity they received, stripped the poor infants of their clothing into the bargain, leaving them naked in the basket at the hospital." (P. 173.) Indeed, Mr. Wrottesley, in his report to the House of Commons, states what is almost too horrible to believe—"that parents brought their children in a dying state, for the purpose of having them buried at the expense of the hospital." (*Report* of 1836.)

Mr. Brownlow makes, a little further on, the following very pertinent remarks:—"It has been truly said, that the frail tenure by which an infant holds its life will not allow of a remitted attention even for a few hours. Who, therefore, will be surprised, after hearing under what circumstances most of these poor children were left at the hospital gates, that, instead of being a protection to the living, the institution became, as it were, a charnel-house for the dead? It is a notorious fact, that many of the infants received at the gate did not live to be carried into the wards of the building; and, from the impossibility of procuring a sufficient number of proper nurses, the emaciated and diseased state in which many of these children were brought to the hospital, and the cruel conduct of some of those to whom they were committed (notwithstanding these nurses were

under the superintendence of certain ladies, sisters of charity), the deaths amongst them were so frequent that out of the 14,934 received, only 4,400 lived to be apprenticed out, being a mortality of more than 70 per cent." (P. 175.) These children were doubtless deprived of breast-milk. To attribute their death, however, to this cause, would be manifestly unjust.

3. *Influence of Season.*—The mortality of children is usually believed to be greater in winter than at other seasons, because the weather is so much colder. The Abbé Gaillard pointed out this contingency in the case of the Foundling Institution at X. Thus, in November and December, 1829, out of 29 children, 19 died in the first month after admission; whereas, in July and August of the same year, there died only 11 out of 25 admitted. We all know, also, from the Registrar-General's return, how the mortality is increased by a cold week, the very young and old suffering under its baneful influence. The conclusion, however, which I am bound to come to is, that, in *public institutions*, the greater number of deaths take place in *spring*, the least in autumn. It appears that, the deaths being 100 in all seasons, 30·8 will take place in spring; in summer and winter it will be about the same—27·1; while in autumn it will be least, only 14·3. The effect may be somewhat different with children not living

in public institutions; but for residents these results, extending over a period of ten years, must be admitted as true. (See Appendix A, p. 46.)

4. *Influence of the Recumbent Position and Want of Exercise.*—In the *Union Médicale*, November 2nd and 23rd, 1852, there are two very able papers by M. Hervieux, on the abuse of the horizontal position at the Hospice des Enfans Trouvés, and its influence on the mortality of the newly born infants. The following is an abstract:—

The *nursery* of this hospital is sixty feet long by twenty wide, and from twenty to twenty-five feet high. Light is introduced by eight windows, besides a painted one. The temperature is kept up by a large fireplace in the centre, around which persons can sit at ease, besides two large stoves at each extremity; so that the heat is equally diffused. Dry oak boards, covered by carpets, constitute the flooring; and the walls always appear most dry.

The *linen* is very clean and white; altogether, everything that could be desired, in the way of neatness and cleanliness, is carried into effect.

In this room there are eighty-four cots to receive infants. Nine women are engaged in feeding and cleaning these little creatures, which is done four times a day, 6 A.M., 9 A.M., 12, and 4 P.M. The food is given in the *spoon*. Besides these nine day nurses, there are two night nurses employed in the same way all night. Thus, including the

most restless and the quietest children, it may be assumed, on an average, that each child is taken up six times a day. To clean and feed a child would occupy about twenty-five minutes in the hands of inexperienced nurses, ten or fifteen in the hands of those more experienced. Thus, the children, on an average, are held twenty minutes— $6 \times 20 = 120$; so that each child has only two out of twenty-four hours exercise or movement. Now, what is the effect of this? A child, under natural circumstances, even if fed, generally lies upon the bosom of its mother or nurse; here he obtains artificial heat; and, in the hands of others, through the shaking, petting, etc., he obtains ample exercise. Thus his heat is maintained. But, short of this exercise, the temperature of the child's body will fall; the extremities will cool; the circulation become slower; the respiration will be embarrassed; all the major functions will fail; the cellular tissue will harden; the visceral organs will become congested; some will die by "scleroma," others by passive pneumonia (which is, after all, only proof of congestion of the lungs); some of serous effusion or hæmorrhage in the head or spinal cord. These are simply the results of cold superadded to those of starvation.

Now, in order to prove that these children are starved, M. Hervieux proceeds to speak against the system of feeding infants only at regular hours.

Looking at the case of many infants who keep sucking thirty to forty times a day, and who are very often kept constantly to the breast, MM. Natalis Guilliot and Lamperière, of Versailles, have shown that infants absorb in the twenty-four hours from 48·1 to 60·4 oz. Such children thrive wonderfully; and hence to stint and feed a child so precisely by rule — a child who, in the earlier two or three years of life, gains half the height and weight he will acquire in all his life, is little less than absurd.

This large amount of food has been objected to, as giving rise to gastric derangement; but if such diseases are rarely found in towns, among the rich and those poor who, when they can do so, almost always oversuckle their children, this objection cannot be correct. It is true, part of the mortality of such infants may be attributed to the hereditary taint from diseased parents, to the close aggregation of the infants in the hospital, and often to the injurious artificial food which has been supplied. But there must be something more than this; many poor diseased parents inhabiting filthy localities have children who thrive. To their credit be it said, the milk will often be provided for the child, though they themselves want the common necessaries. A child wants good food and air; but this will not suffice: he requires to be moved about; to go out in the open air and sun;

and to be properly attended, in a hygienic as well as a dietetic manner. M. Hervieux therefore recommends that, instead of nine, there should be at least thirty-six nurses to tend the children.

5. *Want of Breast-Milk.*—It is to the deprivation of this kind of food that the mortality is usually assigned. Now, I believe this is only one of several causes—a powerful one, no doubt, but still it must be obvious from what has preceded that its injurious effects are much exaggerated. This becomes manifest if we look to the actual number of deaths attributable to want of breast-milk, as occurring in a general population, and irrespective of foundling institutions altogether. I have selected the Registrar-General's tables for London. In the quarterly returns, however, under this head, we are referred to cold, atrophy, and privation, as, no doubt, under these heads many cases are included which, properly speaking, should be returned under that of death from want of breast-milk. Perhaps we should include some others, as, for instance, diarrhœa; albeit I make no doubt, when diarrhœa may have been present in most of these cases as a symptom, death has been referred to the cause, want of breast-milk. This is, however, only a supposition; and hence, in the impossibility to measure the amount due to diarrhœa, I am obliged to neglect it. I have, however, to make amends, included all cases of *premature birth and debility*

under one year old, which is a large number, but which must needs comprise many who are not thriving under the poor breast-milk given, or the food substituted. Taking the six years, 1849 to 1854 inclusive (see table below*), it follows that out of 473,865 births in six years, 15,241, or 3·2 per cent., died from want of breast-milk in its widest sense; or, out of 73,227 deaths from all causes, occurring to children under one year old, 20·8 per cent. might be referred to deprivation of this kind of diet.

My own experience completely bears out these conclusions. I am connected with two institutions which, each in its way, have satisfied me that the congregation of foundlings or children whom it is wished to bring up by hand in towns is

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* *Mortality of Infants from various causes.*

	1849.	1850.	1851.	1852.	1853.	1854.	Total.
From all causes under one year old	12208	10349	11631	12272	12981	13896	73227
Privation	5	2	—	2	1	1	11
Cold	3	1	3	3	4	2	16
Want of breast-milk	174	178	229	240	255	337	1413
Neglect	8	4	—	—	9	3	24
Premature birth and debility under one year old	1232	1241	1470	1537	1475	1518	8473
Atrophy, ditto	874	757	784	827	971	1091	5304
Total	2296	2183	2486	2609	2715	2952	15241
All births	72612	74564	78300	81250	82254	84885	473865

almost invariably fatal; so that their distribution, even in circumstances of poverty, is almost always less injurious, and often their salvation.

An attempt was made in connexion with one of these (an infant nursery, where children are received during the day, in the absence of their working parents) to take in boarders; that is to say, the infants of mothers who were engaged as wet nurses. A large nursery,—well aired, scrupulously clean, temperature uniform, 70° usually, was selected, in which an experienced nurse, directing four or five young women in the arrangement of the children, was placed. The most approved system of diet was enforced, and yet none of these children throve. The mortality was certainly four out of five, if not more. The diseases that prevailed were—diarrhœa, which resisted all treatment, aphthæ or diphtherite, with or without diarrhœa. Lastly, atrophy prevailed largely; it often succeeded the cases of diphtheritis which recovered. Sometimes, however, it was the only symptom present. These children ate enormously, but got thinner and thinner, till at last they died, with all the symptoms of inanition. Usually a removal from the institution led to a recovery; except, however, in cases of atrophy. This disease, once induced, generally persisted, and proved fatal.

The other institution was a penitentiary for females of a better class, but who, having fallen *once*,

were taken in to be confined and reclaimed. Many of these went out as wet nurses. Some of the infants came to the nursery before spoken of; others were brought up by the hand, by *friends* of the patients. Among the latter I could not trace one case of death. Although this statement should be taken with reservation, as, after some months the children were lost sight of, still there is no doubt that, although these infants were brought up in circumstances of poverty, and that those who cared for them were often in penury and want, yet they throve better and proved longer lived than our nursery infants. I have no doubt that the causes enumerated by M. Hervieux—the hospital atmosphere, the insufficiency of exercise in the open air—contributed greatly to these results. I might perhaps add another,—the inaptitude of the assistants to the head nurse, and their inexperience of children. I am sure I have seen this in private practice. I have seen a child under the care of a nurse, and that nurse exact, too, in her duties, but not a mother, not having had much experience in the handling of children; that child has pined away, and become weak and thin. An experienced mother has now taken the child in hand; and albeit the same food has been given, and apparently, in as far as regarded external circumstances, the child has been placed exactly as before, it has now thriven well, and recovered health and

strength speedily. I cannot measure the extent of this influence by figures, but of its existence and powerful operation I have no doubt.

To recapitulate, therefore, I have shown—

1. That for the ages one year and under five, the mortality, even under ordinary circumstances, is in towns nearly double what it is in country; but this difference in the mortality according to residence is nearly seven times as great for foundlings: therefore, foundlings should never be maintained in towns.

2. That in Ireland, while it is doubtless very high in the first month, for those under one year it is only 30 per cent. in towns, and 22 per cent. in country; the worst mortality with foundlings being 50 per cent.

3. That travelling in fair seasons is not dangerous to foundlings.

4. That the mortality is greatest in spring, and least in autumn, with children in public institutions.

5. That a chief cause in the mortality of foundlings is want of exercise, and the abuse of the recumbent position.

6. That want of breast-milk will only account for a mortality of 3·4 per cent. additional.

7. That a depraved hospital atmosphere and certain endemic contagious disorders are the chief causes of the mortality in foundling hospitals.

From which results we are justified in concluding—(*a*) That if foundling hospitals are to be maintained at all, they should be always built in the country. (*b*) That large open single wards should be converted into small well-ventilated rooms, capable of containing from three to four cots, with one nurse at least to each small ward so constructed. (*c*) That where it can be done, and wet nurses can be supplied, preference, if possible, should be given to the children's mothers. (*d*) That means should be taken to insure the proper exercise of the infants.

APPENDIX A.

Mortality in Ireland from June 6th, 1841, to March 30th, 1851, in Public Institutions.

Age.	Spring.	Summer.	Winter.	Autumn.	All Seasons.	Per Cent.			
						Spring.	Summer.	Winter.	Autumn.
One month and under .	15,106	13,128	13,506	7,009	48,569	31·	27·2	27·7	14·4
Two months	3,694	3,443	3,409	1,806	12,452	29·5	27·5	27·2	15·8
Three months . . .	4,619	4,810	4,607	2,636	16,672	27·6	28·2	27·5	16·7
Four months	2,163	2,187	2,199	1,032	7,781	27·	27·1	27·1	18·8
Five months	1,300	1,174	1,349	738	4,561	28·4	25·4	29·1	17·1
Six months	5,684	4,895	4,514	2,692	18,785	30·2	26·	24·	10·2
Seven months . . .	1,428	1,252	1,428	796	4,804	29·7	26·	29·7	14·6
Eight months. . . .	1,388	1,235	1,352	1,078	4,653	29·5	26·2	28·7	15·6
Nine months	4,815	4,088	4,219	2,067	15,189	31·6	26·8	27·7	13·9
Ten months	1,654	1,342	1,426	677	5,099	32·4	26·3	27·9	13·3
Eleven months . . .	1,347	1,103	1,075	614	4,238	32·	26·2	25·6	16·2
One year	25,716	22,484	21,841	10,886	80,926	31·9	27·8	26·9	13·4
Two years	22,759	18,639	18,113	8,748	67,259	33·7	27·6	26·9	11·8
Three years	15,837	13,500	12,558	6,074	47,969	32·9	28·1	26·1	12·9
Four years.	13,381	11,327	10,140	5,048	39,926	33·5	28·1	27·9	10·5
Five to ten years . .	44,161	36,954	29,667	15,823	126,605	34·7	29·	23·4	13·9
Mean						30·8	27·1	27·	14·3

PART II.

ON WET NURSING.

CHAPTER I.

ADVANTAGES OF BREAST-MILK IN INSURING LIFE AND GOOD DEVELOPMENT—DRS. MEREI AND WHITEHEAD'S TABLES—TABLES FROM BRIGHTON.

HAVING thus reviewed some of the causes of mortality of infants, and shown that it is by no means due so much to want of breast-milk as to other causes co-operating, I have now to consider the advantages which follow upon its use over all other kinds of food, to the infant as well as to the mother.

In my first chapter I had to allude to the little public good usually derived from hospital experience to the profession. I have now to allude to one of the honourable exceptions, viz., the first, second, and third Reports of the Clinical Hospital for the Diseases of Children, in Stevenson-square, Manchester, prepared by Drs. Merei and Whitehead. These are most able and philosophical documents, not a fact being asserted which is not substantiated by accurate statistical researches—documents which

might be yearly produced by every hospital, and confer endless good upon thousands. I shall first, in a short summary, quote a few of those results which bear upon this portion of my subject.

The direct and baneful agency of want of good breast-milk may be inferred from the table given below,* from which it appears that the larger the supply of breast-milk and the more exclusively it is given, the better is a child developed, and *vice versâ*. Thus, taking the extreme points of the table, we have in the former case 62·6 per cent. well developed, and only 14 badly developed; in

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* *Results observed in* 1,041 *Children.*
First and second years.

			Per cent.
1. Children having had breast-milk alone to ninth month or longer, some to fifteenth, eighteenth, or twenty-fourth months.	Well developed . .	94	62·6
	Medium ,,	35	23·3
	Badly ,,	21	14
	Total.....	150	
2. Those who had breast-milk up to sixth, eighth, and ninth months; after which they were partially weaned; about 20 per cent. of them partially receiving for some months longer other food beside the breast.	Well developed . .	65	57·4
	Medium ,,	29	25·6
	Badly ,,	18	15·9
	Total.....	112	
3. Those having breast-milk moderately abundant and bread-food along with it from birth or early ages.	Well developed . .	110	51
	Medium ,,	54	25
	Badly ,,	52	24
	Total.....	216	

the latter case, 10 per cent. well developed, and 64 badly developed.

Again, it is further stated, that among the cases noted during the first year, there were 34 children who were *marked as having an eminently good development and a strong habit of body*—of these 32 had breast-milk exclusively, and it was generally continued to an advanced period. Thus 4 had it for 18 months and upwards to two years; 7 had it up to the 15th or 17th month; 7 up to the 12th or 13th; 7 up to the 9th or 11th; 3 up to the 6th or 8th; 4 up to the 4th or 5th month; of the remaining 2, one had an

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		Per cent.
4. Children who from birth or the age of two or three months, besides an abundance of breast-milk (as stated by mothers), had received additional food, generally boiled bread and milk, or merely with water, sugar, and arrowroot.	Well developed . .	55 or 52
	Medium ,,	29 or 28·6
	Badly ,,	21 or 20
	Total	105
5. Children who have had from the earliest infancy a moderate or small supply of breast-milk; some for a few months only, others up to nine, twelve, fifteen, or eighteen months, or longer, with other food from birth.	Well developed . .	100 or 26·8
	Medium ,,	107 or 26·3
	Badly ,,	191 or 45·9
	Total	407
6. Children fed entirely by hand, and with no breast-milk at all.	Well developed . .	5 or 10
	Medium ,,	13 or 26
	Badly ,,	32 or 64
	Total	50

abundance of breast-milk from birth, together with bread and milk; the other insufficient breast-milk with bread and milk food.

Among those noted in the second year as being of very good development—*i. e.* those most rapidly advanced in dentition, ossification of the skull, and facility of walking (most of these having commenced to walk before 12, many at 10 and 11 months) —there were 59, of whom 43 had breast-milk alone from 9 months and upwards to 12, 15, 18 months, a few of them even longer; 8 had breast-milk alone to between 6 and 9 months; 8 only received, besides the breast, other kinds of food before the 6th month. It may be added, that the respective 59 mothers were at most not only healthy, but of strong constitutions, and had great abundance of milk.

Out of the 1,548 children affected with various diseases treated in the second year, in the Clinical Hospital, there were—

		Per cent.
Well developed	585 ...	37·1
Medium	462 ...	29·1
Badly	451 ...	29·1
Not noted	50 ...	3·2

Of these, 27 per cent. had a full supply of breast-milk, or at least for upwards of 6 months; 29 per cent. had a medium supply, with bread or other food; 38 per cent. had scanty breast-milk and some farinaceous food from birth or earliest in-

fancy; 3 of them had no breast at all from birth or earliest infancy.

From these facts we cannot otherwise than conclude, that bringing up a child on its mother's breast-milk is, without doubt, the best method where the mother's milk is abundant. The worst is to bring up a child exclusively by hand; *at least, in the way in which it is usually done.*

These conclusions, however, it should be insisted on, valuable as they are, apply to *towns* only, and those in which the artificial food supplied is not good. Of this last point, more anon. I think, however, sufficient evidence is now before us to justify the conclusion that, if a mother be healthy and have sufficient milk, it is her duty to suckle her child.

The valuable notice of deaths occurring at Brighton, given in the Appendix, was kindly forwarded to me by a lady correspondent, and one of the Committee of the Society for Improving the Sanitary Condition among the Lower Classes. It can be fully relied upon, and emphatically illustrates the same fact, although brought out from a different point of view.

These 50 cases may be thus classified :—

Convulsions (in 7 coroner's inquests, verdicts "overfeeding:" several not investigated) .	22
Diarrhœa, and other disorders of stomach and bowels	12

Total cases traceable to overfeeding and injudicious feeding	34
Or per cent.	68

The other cases (16 in number) were affected with hereditary, structural, developmental, and epidemic diseases: most probably in these cases death was wholly independent of *diet*. At least, it is remarkable that, in these last-named 16 cases, the children were in general either fed from the mother's breast entirely, or, if brought up by hand, were fed with more judgment than is commonly observed.

The cases of convulsions (Nos. 12 and 15) could not be traced to any cause. They were not hand-fed at all; and probably the attack in each might have been induced by some irregularity in the health or diet of the mothers.

Fed on bread food without the bottle: some having the breast in addition to bread food; some having other food, as sago, arrow-root, etc.: dying of convulsions, or of diarrhœa	24
Fed entirely from mother's breast	11
Fed from the bottle	1
Fed entirely on cow's milk and water	2

The mortality of those artificially fed is very much greater than that of those fed at the breast, but from the preceding table it is obvious more is due to the injudicious method of feeding the child than to mere absence of breast-milk. Thus both classes of cases prove that breast-feeding is the most encouraging where it can be successively carried out.

APPENDIX A.

Infant Mortality in Brighton.

Fifty cases taken from the books of the Registrars of the several districts, showing the age of each child, the cause of death as *certified*, with additional information obtained by personal inquiry into the method of feeding, etc.

1. Girl; aged 4 months. Died suddenly in a fit. Coroner's inquest.

2. Boy; aged 9 months. Died of bronchitis and convulsions.

3. Boy; aged 8 months. Died in a convulsive fit. Coroner's inquest. Alleged cause, teething.

4. Girl; aged 7 months. Died of diarrhœa (during dentition).

5. Boy; aged 5 weeks. Died of diarrhœa.

6. Boy; aged 8 months. Died of hooping-cough.

7. Girl; aged 2 months. Died from want of breast-milk.

Fed on boiled French roll given with a spoon; very little breast-milk. Fed freely.

Fed on boiled rice and sago, and the breast. A fat, heavy child.

Fed upon tea and *muffin* heartily the night before it died. Always ate heartily, and had also breast-milk. Was a very thin and puny child.

Fed partly from breast, partly with boiled milk.

Fed partly from breast, partly with boiled milk.

Fed entirely from mother's breast.

The mother died when the child was five weeks old. It was weakly from birth, and did not thrive upon the food given. The bottle was not tried.

8. Girl; aged 6 weeks. Died of bronchitis and convulsions. Death sudden.	The mother says it had nothing but the breast as food; and no drug or medicine except given by a medical man.
9. Boy; aged 6 months. Died of hooping-cough and convulsions.	Had breast-milk the first four months; then bread and water food sweetened.
10. Girl; aged 3 months. Died of marasmus.	The mother, not having sufficient breast-milk, tried bread and milk, and then milk and water, without success.
11. Boy; aged 9 months. Died of mesenteric disease.	The child was weaned suddenly, and fed without judgment.
12. Girl; aged 3 months. Died of convulsions.	Fed entirely from mother's breast.
13. Boy; aged 5 weeks. Died of bronchitis.	Had boiled bread food and the mother's breast.
14. Boy; aged 9 months. Died of diarrhœa and convulsions.	Was suckled by its mother till three months old; then put out to dry nurse, and fed with milk sop, arrow-root, beaf-tea, mutton-broth, etc.
15. Child; aged 3 months. Died of convulsions.	Fed entirely from mother's breast.
16. Girl; aged 4 months. Died of marasmus.	Fed entirely from mother's breast.
17. Girl; aged 4 months. Died of diarrhœa and convulsions.	Partly fed from breast; also with all kinds of food, which the stomach rejected. "Delicate from birth."
18. Boy; aged 3 months. Died of diarrhœa.	Partly suckled; also had boiled French roll.
19. Boy; aged 5 months. Died of atrophy.	Had arrow-root — probably insufficient in quality.
20. Girl; aged 4 weeks. Died of convulsions.	Fed on mother's breast and arrow-root. Mother says it was an "eight months' child."

21. Boy; aged 10 months. Died of convulsions.	Mother's breast, and boiled French roll.
22. Child; aged 9 months. Died of convulsions.	Weaned at three months; then fed chiefly on gruel. Ailing from birth. Mother sickly.
23. Girl; aged 10 months. Died during dentition.	Nursed entirely from mother's breast.
24. Girl; aged 3 months. Coroner's inquest: verdict, "Affection of brain from overloading the stomach."	Two cups of arrow-root, milk, and water, in addition to breast-milk, within a very short time.
25. Girl; aged 6 months. Coroner's inquest: verdict, "Accidental death." No blame attached to nurse.	Suffocated by being overlaid by the wet nurse, a heavy sleeper. She was questioned as to taking any extra drink herself, or giving any narcotic to the child, which was often very restless.
26. Girl; aged 4 months. Died of marasmus.	Weaned at eight weeks; then fed on arrow-root and boiled bread. "Pined to a skeleton."
27. Boy; aged 8 months. Died of diarrhœa.	Born a fine healthy child; lost its mother in the first month; was put out to dry nurse, and shockingly neglected; removed to care of another person when 7½ months old; lived 13 days in a state resulting from starvation and disease. No coroner's inquest.
28. Boy; aged 4 months, Died of phthisis.	Partly suckled; partly fed. Constitutionally delicate.
29. Boy; aged 1 year. Died of phthisis and convulsions.	Ditto, ditto. The father of these two children (28 and 29) died of consumption; al three deaths occurred within a week or two.
30. Girl; aged 11 months. Died (as alleged) of con-	Partly suckled by mother, partly fed, for six months: a pint of thick

stitutional debility. Died in a fit of convulsions.	food three or four times a day. After six months was put out to dry nurse; fed with bun and milk and gruel a few minutes before it died. Probably a case of over-feeding.
31. Child; aged 9 months. Died of bronchitis.	Suckled entirely by the mother.
32. Girl; aged 1 year. Died of hooping-cough.	Weaned at ten days old; fed on arrow-root and gruel.
33. Child; aged 6 months. Died of choleraic dysentery.	Weaned *suddenly* three weeks before death; fed on bread and milk.
34. Boy; aged 3 weeks. Died of "exhaustion of vital powers."	Suckled by a wet nurse; but fed also on rolls and cow's milk.
35. Girl; aged 9 months. Died of hooping-cough and pneumonia.	Suckled entirely by the mother.
36. Boy; aged 6 months. Died of convulsions.	One of twins; suckled by the mother; also fed on prepared barley. Ailing from birth.
37. Boy; aged 3 months. Died of hooping-cough.	Suckled by the mother.
38. Child; aged 1 month. Died of "constitutional weakness."	Suckled entirely by the mother.
39. Boy; aged 1 month. Died of "diseased stomach."	Fed on cow's milk and water.
40. Girl; aged 8 months. Died in dentition.	Fed on the mother's breast.
41. Child; aged 9 months. Died of bronchitis.	Brought up by hand, on new milk and tops and bottoms.
42. Girl; aged 6 months. Died of pneumonia.	Fed partly from breast, partly with biscuit powder and cow's milk.
43. Girl; aged 7 months. Died of convulsions during dentition.	Fed entirely on cow's milk and water. Dentition unusually early; ten or twelve teeth in seven months.

44. Boy; aged 5 months. Died of hooping-cough and convulsions.	Fed partly from mother's breast; also on bread sop.
45. Child; aged 1 year. Died of hydrocephalus.	Always fed a great deal (the mother having difficulty in suckling). When weaned, had anything (*i.e.* everything). Convulsions came on with teething. Treatment consisted of blister to top of head, mustard to the back of the legs, and neck, and leeches to the temples.
46. Boy; aged 1 year. Died of convulsions.	Partly fed from mother's breast; also with boiled bread.
47. Girl; aged 2 months. Died of diarrhœa.	Very little breast-milk; had baked flour and biscuits boiled.
48. Child; aged 5 months. Coroner's inquest: verdict, "Overfeeding."	These cases happened together in the same house. The child of a wet nurse, and her nursling, were fed on a hearty supper of bread food; and were found dead at 4 A.M.
49. Child; aged 7 months. Coroner's inquest: verdict, "Overfeeding."	
50. Child; aged 4 months. Coroner's inquest: verdict, "Overfeeding."	A similar case to the preceding two.

CHAPTER II.

REASONS WHY HIRED WET NURSES SHOULD BE AVOIDED.

SOME OF THE OBJECTIONS URGED AGAINST THE MOTHER SUCKLING HER OWN CHILD ANSWERED—1. REASONS URGED WHY SHE SHOULD.

But there is another point of view which affects the mother, and which should be insisted upon. "La femme," says Burdach, "éprouve un sentiment voluptueux en têtant son enfant;" and naturally so. It is always agreeable to perform a duty; how much more a maternal obligation. Is there a more delightful occupation for a mother than to watch the little babe hanging upon her breast, so helpless, and yet so fondling, nestling so closely to her, and feeding so contentedly upon her milk. Is there any means by which love can be more riveted than between two beings in such intimate and close relation? "Can a woman forget her sucking child?" And when every day brings new pleasures, and ripens on both sides the mutual affection,—when the child thrives well, and, as if in tender gratitude, lies smiling upon the mother's lap, what a comfort,

what a happiness for the mother! It is scarcely credible, yet a painful evidence of our fallen nature, that there are to be found those who can so far forget themselves, and their responsibility before God and man, as to transfer to others the performance of those duties, nay, who will even conceive them irksome, because for a time they interfere with their pleasures and gay occupations. Could the brute creation speak they would cry "shame" upon such, and all nature united re-echo the cry upon such egotistical and cruel parents.

But this is not all. The mother will not only suffer moral punishment: in this matter the chances are, she will find if she sows to the flesh, she has of the flesh reaped corruption. Not only may her own natural feelings and those of her offspring towards herself become blunted and callous, but she may also be the victim of immediate bodily suffering, perhaps ultimately of loathsome disease.

Painful distension of the breasts, fever, and very painful abscesses may occur, which, by weakening the system, lay the foundation of exhaustive diseases, such as anæmia, indigestion, and even consumption. The less selfish mothers fare better. Young (De Lacte, p. 7), quoted by Ferris, gives the cases of 2,400 women in different lying-in hospitals; two only of such had milk sores: and Nelson, in his "Essay on the Government of

Children " (p. 52, in a note), instances 4,400 cases, of which four only had milk sores, and " these had no nipples, or had had formerly sore breasts." (Ferris, on Milk, p. 12.) All these women suckled their own infants.

But it may be worse than this. It has been said, that cancer is the ultimate result. Haller, Ferris, and Sir A. Cooper all adhere to this opinion. The late Dr. Hunter also believed that a very considerable proportion of those unfortunate women who are afflicted with cancer of the breasts are such as refuse to nurse their own children.

I am aware this opinion is not quite confirmed by recent inquirers. My friend Mr. Birkett has favoured me with an analysis of 485 cases of cancer which he has made, and which have come under his personal observation. Of this number there were—

Married women	389
Single women	96
	485

This proves that the disease is more common among married women. Most of these belonged to that class of life in which the mothers usually suckle their own infants, so that it is difficult to show that the disease is mainly produced in those who suckle least. However, this opinion

appears to be the most probable, from the observation of the high authorities before quoted. For it remains to be seen whether all Mr. Birkett's cases not only suckled, but did so for a proper term. It is known that at least 28 per cent. of these women usually go out to work (Chap. II. Part IV.), and neglect to nurse their children properly. The question must, therefore, be still considered *sub iudice*. Still, Haller's opinion is certainly more in accordance with theory, if we compare the appearance and condition of those mothers who do not nurse their children, with those who do. The former, as a rule, deteriorate in every way. Their nutrition is defective and perverted—a condition highly favourable to the development of cancer. On the other hand, suckling mothers acquire proportion, size, and health, a condition in which cancer seldom if ever occurs. The exceptions are only found in those cases where either suckling is carried on to excess, or where poverty and want forbid the taking that quantum of food necessary to the proper performance of this function. Nothing tends so much to develop women as suckling.

The above reasons should be sufficiently powerful to induce parents to put off the adoption of a hired wet nurse as long as possible. But, more than this, it is better, if it can be in any way accomplished, to put off the day for other reasons. First, there is often great difficulty in procuring a

fitting wet nurse. It sometimes happens that a suitable one for a given child cannot be found. I have known as many as seven wet nurses successively tried before one was obtained to suit; and this no doubt because, as Burdach states, the milk only of that child's mother would have agreed with it; and *vice versâ*, that child's mother's milk would not have proved useful to another child. Secondly, the later the employment of a wet nurse is put off (unless, indeed, it is so manifestly necessary and indicated that the child's death appears imminent), the better chance there is of the child living through this probationary period, since the chances of life increase with the age of the child.

CHAPTER III.

REASONS URGED AGAINST A MOTHER NURSING HER CHILD—WANT OF MILK—BAD MILK—DANGER OF DRY NURSING.

WANT of milk, with or without weakness, is one of the reasons usually put forth why a woman should not suckle her own child. That is a legitimate conclusion, but it is no reason why a wet nurse should be selected. Other means may be recommended. Without, however, forestalling what I have to say on the substitutes needed in the sequel, it may suffice here to remark, that cow's milk, or goat's milk, duly sweetened, watered, and deprived of some of its casein, may often suffice, with but a very small portion of its mother's milk, for all the wants of a child; and that the admixture of two different kinds of milk is not accompanied with those disadvantages which have been attached to it by popular prejudice. If there be weakness on the mother's side, it may be in great measure removed by proper food, and specific soups and medicines. Upon the whole, under proper management, those

cases which prove resistant to these measures are comparatively few, and usually depend, either upon the measures taken having been begun too late, or upon some specific organic disease in the mother or child, which no wet nurse's milk can overcome.

I may here allude to some of the reasons usually urged against allowing a mother to suckle her own child.

A specific disease in the mother.—It is stated that where disease of the parent exists, such as *scrofula*, to an unusual degree, *phthisis*, *mania*, *cancer*, *syphilis*, and other dangerous hereditary diseases, it is not wise to let a child derive its nourishment from this source of contamination. I am bound to admit the full force of this objection, which is doubtless valid in the greater number of cases; yet in *scrofula* and *syphilis*, perhaps (both of which diseases are often very amenable to treatment), this excuse is not always good. The mother must be treated, and the remedies which cure her will equally cure the child. This is especially true in the case of the syphilitic taint: for it should also be remembered that in putting such a child to a wet nurse, we must of necessity also contaminate the nurse, who in a little while is scarcely in a better position than the parent herself. The case of scrofula is precisely one of those in which the child, in

addition to the breast-milk it receives from its mother, can be also artificially fed upon scientific rules, and the mother thus enabled to rally in her own health, because the drain upon her is diminished,—can be so cared for as to produce, if not a large quantity, at least a sufficiency, of good milk for her infant.

Evidence that the mother's milk does not agree with a child.—No doubt, if it be clearly shown that such is the case, this is another legitimate reason for not allowing a mother to suckle her child, but even here treatment sometimes will effect a good deal. Change of air, change of food on the part of the mother, wine, some artificial food, and medicine to the child, will often prove more beneficial; a week or two of perseverance and attention in these respects will frequently remove all source of irritation. Those cases, I must say, which have resisted these measures, have occurred either in a very early or a later period of nursing. In the former instances, the simple substitution of a wet nurse seldom suffices alone. So much treatment is required besides, that it is often a difficult question to determine how much is due to treatment, and how much to the wet nurse. Still, I must admit, that in a few cases the salutary effect of the change is very obvious. In later periods of suckling, *i. e.* after eight months, weaning often proves as effective as the adoption of another wet nurse.

Lastly, *the danger of dry nursing* is considered so great, that in cases where a mother cannot feed her child, it is believed wiser to employ a wet nurse. The truth of this proposition cannot be denied. It opens, however, another wide field for discussion. It will suffice to repeat here what has been shown statistically in a previous chapter, that mere absence of human breast-milk taken in its widest sense will only account for a mortality of 3·8 per cent; that the mortality in hand-fed children is due rather to injudicious feeding—I might also say to poisonous feeding, especially with vegetable matters; to crowding together, want of exercise, epidemics, &c. These several points are certainly all of great importance. A few of them have already been touched upon; others will occupy attention in the sequel. So far, however, we may conclude that they may be avoided altogether, under judicious feeding, and life be saved thereby.

CHAPTER IV.

REASONS WHICH INFLUENCE SELECTION OF A WET NURSE FROM AMONG FALLEN WOMEN BENEVOLENT AND SELFISH—THERE ARE GREAT DIFFICULTIES IN MAKING THIS SELECTION—INJURIOUS INFLUENCES IN A HOUSEHOLD.

We pass on now to those cases where it is imperative to employ a wet nurse. It is usual in our profession to select a fallen woman. Now let us well consider

First. *The reasons which induce the selection of a wet nurse from this class.*—These may be fairly included under two heads—those actuated by a *benevolent* motive towards a hired wet nurse; and those which take their origin from *selfish* considerations of personal advantages to the hirer. Among those who are actuated by the first feeling we find many in our profession. It is one which has been strongly, yet I think unwisely, urged by a high medical authority; and there are not wanting other members of the profession who side with him. A fallen woman, it is urged, is, as it were, an outcast of society, shunned by the virtuous, and if sometimes

courted by the vicious it is only to urge her more greedily into crime. She is generally attractive. Her attractions have been her snare; and the vanity which has caused her to fall once, and the difficulty of curbing strong passions once roused, make her an easier prey. Surround such a person by a virtuous family, let benevolence be shown to her, let her recover a respect for herself, and in the kindly attentions received, and those she tenders to the child she now suckles, and under the happy influence of religion, you may stop her downward course—you may arrest the tendency to a repetition of the offence—you may preserve a useful member to society, and thus save her from ruin. These I admit are powerful motives; the more to be regarded because purely unselfish, and wherever the woman has fallen but once, been perhaps deceived by a too confiding disposition, and hitherto has borne an irreproachable character, their full force cannot be denied. But such cases are few and far between. The end in the greater number will, I fear, seldom be found to have justified the means.

But, secondly, in many instances the principle which rules those who select from among this class of wet nurses is more purely selfish. With many it is that lower wages will be required ; or that from her isolated position, if she comes, she is more likely to remain than a married woman. Her

love for her child is the only attraction which will take her away; and it is known that after a time, so strong is the affection of a woman for the child she suckles, that her love for this last will in time exceed that which she bears to her own child, and so she will cling to the foster-child, and forget her own. Again, there are no conjugal affections or domestic duties at her own home to draw her away. A fallen woman who is obliged to seek employment as a wet nurse is generally abandoned by her seducer; and so, if she be selected and suits, she will be more likely to remain. I pass over the unnatural act (if not a mortal crime) thus committed, in leading away a woman to forget her own offspring, which the Creator intended she should love and nourish.

Secondly. *There are great difficulties in the selection of a fallen woman as a wet nurse.* It is believed that a diseased woman will produce diseased milk, and that if the disease be hereditary it will as certainly be communicated to the child suckled, as if the wet nurse herself were the child's mother. Hence in the selection of a nurse we avoid *syphilitic, phthisical, cancerous, epileptic, weak women,* as well as those in whose parents insanity or any other mental eccentricities exist, or have existed. Unfortunately, however, the history of these cases, at least in London, is almost *always obtained from the applicant herself.* Now it is

manifest that an adept in such cases (paticularly if the disease is only latent) may deceive any medical man. He asks if she has had syphilis. She denies it. Yet she may have uterine syphilis, so well described by Mr. Langston Parker. Delicacy forbids a more complete investigation. Moreover, external examination in most of these cases is limited to the breast, which may even in a case of uterine syphilis appear quite healthy. To prove that this is not merely a theoretical opinion, but one founded on fact, I will relate a case. A woman became a patient of mine. She represented herself as married. I found out subsequently that she was single. She denied having ever had syphilis. Atrophy came on in her infant, and a very suspicious roseolar eruption around the thighs. I demanded an examination, and found an indurated uterus and a chancre within the os, extending towards the external os uteri. The child died, but there can be no doubt that had I not trusted her, and had she been properly examined, and that at an early period, the child's life might have been saved. But fallen women may also deceive you in a host of other ways. A common deception relates to the age of their milk. On one occasion when I was seeking for a wet nurse, a woman presented herself to me; she had, she said, been confined three months, was married, and had had two children before. The

milk appeared good, and I selected her. It turned out she was unmarried, had not had a child for a twelvemonth, and, to keep the infant now in her charge quiet, drugged it. Another woman who had just been delivered, stated she had only been seduced some ten months back. I found out she had cohabited with a *roué* for two years, and had had two miscarriages previously, and so on. These examples are suggestive, and prove how small is the dependence that can be placed in the class of women we are alluding to; and if they are deceitful as to *present* faults, why should we trust them as to their antecedents and immunity from disease acquired in earlier life?

Thirdly. *The influence of a wet nurse upon a household* is another reason why a fallen woman should not be selected. If it may be operative for good sometimes in reclaiming her, it may, if the woman be a bad character at heart, be operative also for evil on the mistress, the master, but particularly the other servants, especially so if in the principles of any there are favourable dispositions. These women often "speak unadvisedly with their lips," and have frequently doubtful peculiarities.

As to the effect upon a mistress of a household in a country where the purity of our wives is unimpeachable, and their virtue proverbial, the tendency to corruption by conversation with such women is fortunately very rare, and I believe,

seldom, if ever, occurs. To dwell on this point were therefore unnecessary. Still all will admit that too frequent association and companionship of the better classes even with virtuous domestic servants is nearly always prejudicial. A lover of low company in our ranks of life is soon regarded as an interloper in better company, and one to be avoided. Let us also bear in mind that the intimacy of a mistress with her child's wet nurse is of no ordinary kind. It is close, and for the time, constant. It is fostered, in great measure (at least in the beginning), by the maternal love, which overflows with gratitude when she beholds her once weakly child thriving upon the milk of the hired wet nurse. Such alliances (more dangerous where the nurse is the only nursery attendant, as in the case of newly-married couples with small means) are, to say the least, an unfortunate contingency. And surely, if it be right to prevent our wives from visiting ladies of doubtful reputation, it cannot be right to admit fallen women to their intimacy, and this in their very houses. If it be true that "ce n'est que le premier pas qui coûte," surely it is better to avoid taking it.

The same reasons apply, albeit less forcibly, for reserve when we come to speak of the masters of households. Not to allude to those endless petty annoyances which so commonly arise in connexion with hired wet nurses of this class, it may suffice

to remark that the records of medicine, the annals of our Divorce Courts, and the history of social evil, prove married men are not exempt from error in this direction.

But, thirdly, it is chiefly amongst the women-servants in an establishment,—those who in their station are on equality with the wet nurse,—that the danger is greatest. In the *Dublin Quarterly* there is a review of Dr. Stranger's book.* From this review I epitomize the following sad story. It is the case of an honest, hard-working, but poor servant, attracted by the splendour of a passing courtesan on horseback. She is sad, not, alas! at beholding a fallen creature, but because she compares her own comparative poverty, unassuming garments, and hard toil, with the courtesan's gay habiliments and luxurious mode of life. Gently chided by her mistress, who has also been a silent spectator of the scene, she acknowledges her error with tears. Yet in a year or two that misguided girl has launched into a similar course of vice in New York. A little while longer she is placed prematurely on her death-bed. One look has sufficed to tempt her from the right path! But the wet nurse in her favoured position is a daily and a more lasting picture. Covetous people there are, and not a few have strong

* On the *History of Prostitution in New York.*

passions. "What a difference of wages! what superior food is given to her! She rides in the carriage as a lady visitor. She is more considered than any other servant in the establishment. What prevents my doing likewise?" True religion and innate modesty will triumph, it is true, over these whisperings of the Evil One; but all have not these, and ours is the guilt in putting the stumbling-block before them.

I trust I am not misunderstood. I make these observations entirely believing that the worst effects produced are only of very exceptional application. I know that nowhere in this world is the purity of a domestic home so great as in these realms. But it is because faithfulness and virtue are so estimated among English women, and because such vices are held aloof and reprobated; because, as yet, no looseness of morals, as on some parts of the Continent, are tolerated in good society, that I speak. I would pity, I would relieve, and I would let the good and strong-minded of both sexes do their best to reclaim these poor fallen sisters—nay, I would bless them for doing so; but let it be done by seeking for them other employment less dangerous and objectionable, and not in employing them as wet nurses, and familiarizing our households with the spectacle of vice rewarded.

APPENDIX.

As far as regards the influence upon a household of a fallen woman employed as a wet nurse, I must acknowledge that there exists a great diversity of opinion. I find in the profession two classes of practitioners, whose opinions are diametrically opposed. Some have met with several unfortunate examples; others have met with none. I do not pretend to explain this difference in the social experience of medical men. Still, *all* admit the inconveniences to be great, and, therefore, as such, I think the custom should be discouraged.

CHAPTER V.

THE SAME SUBJECT CONTINUED.

THE EMPLOYMENT OF FALLEN WOMEN IS AN INCENTIVE TO CRIME IN A COMMUNITY—IT MOST COMMONLY INSURES THE DEATH OF THEIR CHILDREN—DR. BACHHOFFNER AND MR. COSTEN'S STATISTICS OF THEIR MORTALITY—THE PROBABILITY THAT INFANTICIDE IS OFTEN THE CAUSE OF THEIR DEATH—OPINIONS OF MR. WAKLEY—STATISTICS OF MR. ACTON.

FOURTHLY. What holds, however, for the household applies equally to the community. *It is an incentive to crime.* If fallen women are preferred to married, if we give better wages to them than to other female servants, if we pass over their fault lightly, and allow them to occupy a superior position in households, we may rest assured we are only adding fuel to fire; we are favouring the passions of the frail sisterhood; we are encouraging the base seducer in his course of infamy, by giving lucrative employment to some who may be willing victims. Already some of the advertisements in our daily papers, where women hold out their shame to a premium, prove that it is an incentive even now in full operation.

Fifthly. But we are doing worse. We are, perhaps, encouraging murder; at least, *authorizing the death of the nurse's child.* Upon this point let us hear Dr. Bachhoffner. He is reported to have spoken before a meeting of the Vestry of St. Marylebone as follows:—

He had already said, that of 1,109 illegitimate children born in the rectory district, 820 had been born in that house; and of that number there had been 516 deaths of illegitimate children registered during the same period, or 46 per cent. In St. Mary's district there had been registered 592. In this district Queen Charlotte's Hospital was situate. The number of deaths had been 109 children, or 18 per cent. In All Souls' district, out of 145 illegitimate children born there had been 87 deaths, or 53 per cent. Out of the 592 illegitimate children, nearly 400 had been born in Queen Charlotte's Hospital. In Christchurch the case was worse: of 223 births of illegitimate children, there had been in the same period 209 deaths, or 93·7 per cent., up to the age of 3 years. In St. John's, out of 140 births there had been 129 deaths, or 87 per cent. These last two were the "dry-nursing districts;" and speaking from 16 years' experience as district registrar, it was a remarkable fact, that usually within three or four weeks of the registration of the birth they were called upon to register the death of the same

children, the cause being mesenteric disease, diarrhœa, inanition, and other diseases resulting from the mode of feeding and deficient attention to the children. In Cavendish-square (a moral district), there were 40 births and 36 deaths, or 96 per cent., the worst of the whole. (*Lancet*, vol. ii. 1859, 415-16.) But when we speak of stillborn children, returned as such, the case may even be more horrible. It is known that in some parts of the immoral community of this professedly Christian land, the mere existence of burial clubs proves a sufficient inducement to heartless parents to sacrifice by poison, or otherwise, their infant children, whom perhaps they have known for a few years and actually loved. It is manifest that when an infant is in the way it may as easily, and perhaps more easily, be got rid of by neglect as by more direct measures. For *stillborn* is often only another word for *infanticide*, since so many infants are returned under that title to avoid registration. Who is there (as the *Lancet* remarks in a leading article for Oct. 22) that, having any experience of the society in which we live, will not ask with a shudder, what security our laws or our administration provide against the concealment of *infanticide* under the word *stillborn?* How do we know that these illegitimate children have died without foul play?

In a letter from Mr. Costen he writes me, that

in the St. Pancras Infirmary, out of 200, which is the average number of women confined there yearly, about 174, or 87 per cent. of these are unmarried, including prostitutes suffering from syphilis and its effects, servants, &c.; 8 per cent. of the children are stillborn; 5 per cent. die before they are one month old. Now the usual number of stillborn in a population is much less. From Dr. Barne's London Maternity Reports we find, that the normal proportion is 308 stillborn, out of 10,561 labours, or only 2·9 per cent. Now, why this disparity?

As the women leave the workhouse after the month, no further details as to these children could be supplied to me by Mr. Costen. Several of the more healthy women go out as wet nurses, but their children do not remain in the Infirmary. In fine, all vital statisticians—Burdach, Farr, Quêtelet—agree as to this greater mortality among illegitimate children. *Want of experience* and *dry* nursing will explain part of this mortality, but to be accurate we must put down a large figure to infanticide. It is the opinion of Mr. Wakley, the coroner for Middlesex, that at least 200 infanticides in London annually escape detection. If so, why hold out greater incentives to the crime?

Mr. Acton, however, should be heard upon this point also. He gives us a table of deaths of children under one year of age returned as having

occurred in England and Wales in 1856 from violent causes.

Injury at birth	104
Poison not distinguishable ...	7
Opium	13
Laudanum	40
Godfrey's cordial	19
Drowned	16
,, found	48
Strangled	14
Suffocated	223
,, by food...	8
,, bedclothes	206
,, overlaid	69
Murder (not stated)	5
Manslaughter	2
Accident (means)	6
Injury (kind)	14
Infanticide	52
	846

And then remarks: "It is a frightful list; no less than 846 babies are recorded officially as hanged, strangled, poisoned, suffocated, and so forth, during the year 1856. The great majority of these *we are justified in assuming were the illegitimate offsprings of first falls in virtue.*" Is it possible? and yet we can recommend those who may be murderesses as wet nurses in virtuous families!

In justice, however, to Mr. Acton I should say, that he believes it is because these women, so

long as they are burdened with their children, cannot find employment, that infanticide among them is so common; but that if they were more generally selected as wet nurses, the motive being removed, the crime would no longer occur so frequently. This is, however, a mere gratuitous assumption. Have they not all the employment as wet nurses which can be given to them already? Are not they, as a class, already sought after and recommended by all the faculty? unless, indeed, it is wished to oblige our wives not to suckle our children purposely to give these women greater opportunities of usefulness. But suppose we did so, and the infanticides did not occur so frequently, (which position, however, remains to be proved,) if a woman is abandoned enough to commit infanticide, what other crime will she not be ready to perpetrate so soon as a temptation sufficiently powerful occurs? and if so, where is the security in confiding our children to such women? There must be some mistake here. I believe but few of these frail sisters are bad enough to commit infanticide. Those that are, are criminals, and dangerous in more ways than one. They must be dealt with as such, and not put in positions of trust. The larger majority of them, if their antecedents are known to be good, may be employed, but not as wet nurses. It is not lawful to do evil in order that good may follow.

CHAPTER VI.

THE SAME SUBJECT CONTINUED—DANGERS TO THE FOSTER-CHILD FROM VITAL LAWS—INEXPERIENCE OF WET NURSE—HER MISCONDUCT.—OBJECTIONS TO MARRIED WOMEN—THEY ARE OCCASIONALLY AS BAD—DIFFICULTY OF GETTING AT THE PROPER HISTORY OF A HIRED WET NURSE.

SIXTHLY. There are dangers to the foster-child itself, which may be classed under three heads. The first applies even to the best of wet nurses, viz., that the mere substitution of a wet nurse for the mother of the child increases the chance of its death. The second, to the inexperience of all women with their first children. The third, to the great fear of misconduct in many of these fallen women.

1. *The mere substitution of a hired wet nurse increases the mortality;* for it should be borne in mind that the chances of life, precarious as they always are in a young infant, are rendered still more so by transferring a child from its mother to a wet nurse. From a reference to the *Annuaires de Mortalité* in Paris, Quêtelet obtained nearly everywhere the same result,—that, in the first three months after birth, twice or three times

as many children die as in the other months of the first year. Other authors, he says, have made the same observation; and from their inquiries they have imagined the cause of this disproportion in the mortality was referrible to the habit which mothers have either of suckling their own children or of abandoning them to hired wet nurses. Here is what M. Bénoiston de Châteauneuf, in his excellent work on the *Enfans Trouvés*, says on this subject:—"It is true that, to preserve the life of a child, care does everything, and climate nothing, or very little; and Switzerland and Holland are the countries where the smallest number die. Is the explanation of this fact, already offered by Muret, to be found in the habit which all the mothers, at the foot of the Alps as on the borders of the Amstel, have of suckling their children themselves? We cannot say; but we shall only add, that, having been curious to compare the mortality of children at nurse with that of children brought up in Paris, we obtained the following results. Of 100 children suckled by their mothers, 18 die in the first year; of the same number at nurse, 29 die." (*Recherches sur la Population, Décès, etc., du Royaume des Pays Bas.* Par A. Quêtelet. F. 18, p. 142-3.)

The following facts, for which I am indebted to the kindness of Mr. Brownlow, the efficient Secretary to the Foundling Hospital, lead to a conclusion similar to that arrived at by Bénoiston de

Châteauneuf. From some parish registers given in the Report of the Special Committee to the Governors of the Foundling Hospital, it appears, also, the mortality is much greater among those children nursed by strange women, than amongst those nursed by their mothers.*

This table gives a gross mortality of 14·2 per cent. upon admissions; or, out of 100 deaths, 31·2 will occur among those nursed by their own mothers, while 68·8 will occur among those nursed by the

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*Thus, between the years 1762 and 1770, the annual mortality was as follows from children of and under four years old :—

Admitted :—	
Foundlings	877
Illegitimate	5,283
Casual	1,821
Legitimate	19,562
Total	27,543
Died :—	
Nursed by their mothers	1,229
Nursed by workhouse nurses	2,698
Total	3,927
Removed :—	
To the Foundling Hospital	525
To their mothers	3,623
To friends	2,961
Total	7,109

workhouse nurses. These numbers have, of course, no absolute value, as it is not stated how many children were nursed by their mothers, and how many by workhouse nurses. Still as, out of this number, only 877 were foundlings, and as many as 7,109 were removed to the Foundling Hospital, or to their mothers, or friends, we may presume this number only were not nursed by their own mothers at the workhouse. Deducting, also, those children who, as sent to the Foundling Hospital, were probably among the number previously included in Foundling Hospitals, we shall have 7,641 children who were probably nursed by the workhouse nurses, giving a mortality of 36·1 per cent. for such children, to 6·1 per cent. for those nourished by their mothers. These numbers are doubtless exaggerated, from the nature of the data, but I think the reasoning adopted will justify our concluding, that the risk of substituting a wet nurse for a mother is great, and that it will certainly increase the probabilities of the suckling's death.

2. *There is danger from the wet nurse's inexperience.*—It may be urged, that when we are quite certain that a woman has fallen but once, and that she has previously borne a good character, and her antecedents are well known, the objections above made do not apply, particularly if full medical examination be made before an engage-

ment. True; but then with delicate children—and these are generally the class which require suckling by a hired wet nurse—it is important that the nurse should have *experience* in the management of a child. Women who have fallen for the first time, in most instances, have *none*. Nothing can be more amusing than to see a man, who is quite ignorant and unaccustomed to children, take up a child and nurse it. But among women a novice is equally uncomfortable to look at, and the result, unfortunately, is very sad for the infant. I remember meeting an example which made a great impression upon me. A lady was very ill, and the child had to be taken away from her and from the care of the monthly nurse. It was given into the charge of a married woman, who had herself had no children, and was inexperienced. The child began to droop, and became ill and thin to a degree. The moment, however, the monthly nurse was able to resume her attention to it, the circumstances of food, lodging, clothing, &c., being the same, the child began to thrive, and eventually did very well. A woman upon her *first fall* is not likely to understand the management of children, unless she has been a nurse before—a rare exception. If employed at all she must be as carefully looked after as the child, by the mother, or another nurse. It may be urged in reply, that the same objection applies to the employment of a married woman

with her first child, and the objection is a valid one; but then the fallen woman is selected because she is a first transgressor, the married woman should be chosen among mothers of many children. Indeed, all who have had much to do with delicate infants must be conscious how exceedingly important it is to have a good nurse, and one who understands children well. It is by far the most important element in bringing up a child.

3. *There is danger from misconduct on the part of the wet nurse herself.*—There are some faults which women of this class are especially liable to commit. One is *drugging*, the other is *starving*, an infant. A great number of women do not like to lose a good place, and so little morality have they often, that sooner than lose their situations, or in the hope of keeping them as long as possible, they will not hesitate to sacrifice the life of the child. I will cite a case. I engaged a wet nurse for a child about six weeks old. The woman's milk was, from her account, about six weeks older. The breasts appeared full; the milk itself was rich in milk globules, and answered to the usual tests—it was pronounced good. I subsequently found that this woman had had two natural children, and that she had very little milk. The deceit practised by her when she appeared for examination before me was similar to that adopted by dealers with the cows they wish

to sell, *i. e.* not milking them for some twenty-four hours before sale, so that the udders shall appear full. To keep the child easy it was regularly drugged with some opiate after the breast had been given. The parents were deceived;—milk upon which the child slept so well was supposed to suit it. The child, however, began and continued to lose flesh, till in fact it was reduced to so great a state of weakness that it became questionable whether the child could live many minutes. The nurse was changed, and after some time it did recover, but with difficulty.

Here is another instance. A gentleman selected, under medical advice, a fallen woman as a wet nurse for his weakly child. After some days she disappeared. He set off to seek the fugitive, and found she had gone back to the man with whom she had formerly cohabited. However, as her milk agreed well with what had been before a weakly child, he prevailed upon her to come back. Some months afterwards he found out that every night she used to spend her time with the cabmen of a stand in the neighbourhood.

A more common fault is illustrated by the following case. I engaged a wet nurse, also a fallen woman. The milk suited in every way at first. Subsequently the child did not seem to thrive. It was always crying, although pacified when put to the breast, but apparently never

satisfied. I examined the milk frequently, microscopically and chemically. I always found it good, nay, even unusually rich; but I soon discovered it was insufficient in quantity. This was detected by offering the child food immediately after it had been suckled, and finding that it partook of it with avidity. Had this not been found out the child would have died of starvation. These are only a few of the tricks practised by wet nurses selected because of their want of morality. But there are various accidents of a similar nature likely to occur when infants are given into the charge of women without principle.

But, again, as a justification of their employment, it has been averred that first, many married women are quite as bad as these. Secondly, that many of these fallen women are persons of good constitution, and of favourable age and previous excellent character; and it is conceived that if proper care be taken to select those *free from disease*, in the great majority of instances they would be found very suitable wet nurses, and very good domestic servants.

Upon the first of these points I am not ready to cavil. It is sometimes a true proposition, but then their shame is not openly and unblushingly proclaimed; the example offered, is not the same glaring encouragement of vice; the evil is not prominently displayed. Still, if we know a married

woman to be vicious, who could recommend her engagement? The possibility of doing harm by employing a married woman is no reason for doing more harm by engaging a fallen woman.

Secondly. It is all very well to talk of fallen women being excellent characters, save and except in the one sin by which they fell. This may be true for small towns and country places, where everybody's antecedents are known. It is only true for London and very large towns as an exception. For how are wet nurses procured? They are generally wanted in a hurry; application is made at a lying-in hospital, and the matron kindly furnishes the names of several, one of which is usually selected. But these are not generally women whose antecedents she knows. They are persons who apply to her for a wet nurse's situation, and whom she recommends in consideration of a small fee, because the age of the milk suits, but she is very often deceived. Some of these women are found on subsequent inquiry to have fallen more than once, and to have had much experience in evil ways, although they may not have been upon the streets. Many of these have at one time or other of their lives suffered from those syphilitic diseases peculiar to their class. A few may have contracted habits of swearing, intoxication, and dishonesty; and some there are who, if the occasion again offered and proved remunerative,

would gladly revert to their bad habits. What dependence could any one have on such a woman that she would care properly for a child? It is true that sometimes even the most degraded may be restrained in their vicious course by strong affection for the little innocents that hang upon their breasts; and the power of religion can even soften the heart of the most depraved creature upon earth. But to hold out a premium for crime upon the bare chance of such a conversion is fraught with the greatest danger, and is only, after all, doing evil *palpably*, in order that good may come out of it *possibly*. Except, therefore, in a case of *extreme necessity*, and where the life of the child can only be saved by employing a wet nurse, and where none other can be found but a fallen woman, I hold it is a gross moral and social wrong to employ such a woman as a wet nurse.

I would not, however, in regard to this unfortunate class, wish my words to be misconstrued. Woman is to me always an object of interest; and, even in her most degraded state, she is an object for Christian pity and reformation. Many are rather sinned against than sinning—the victims of villains who have deceived their too confiding love. If we are assured of this, if the woman be one of a class not previously depraved, the peculiar circumstances of the case may be taken into account, and it may be allowable to select her

as a wet nurse; and then if she is carefully watched while attending to the child, and her own child is also well looked after, we are giving that woman an opportunity of gaining an honest livelihood, and once more reclaiming a lost position in society. But I know from experience, that where you have to do with a woman of bad character (particularly if she has been confirmed in her vicious habits—if she be a harlot in taste and habit), do what you will, you cannot obtain from her reliable information, either as to her own antecedents or those of her family, or as to any peculiar taint with which she may have become infected: and thus you may be doing irretrievable injury to the little babe which you require her to suckle.

It is not likely that a woman who has obtained her livelihood by the sacrifice of every principle of virtue will hesitate to assert the most deliberate falsehoods, when by so doing she will obtain a remunerative occupation, and one which may place her (albeit nominally a servant of a wealthy establishment), in the highest possible position to which a woman in her station of life can hope to attain. If this be so, it only points out the immense importance of selecting a wet nurse who shall be as healthy in *mind* as she is in *body*. If, therefore, fallen women are to be employed as nurses at all, let them do the menial work in large hospitals or prisons, under proper, kind surveil-

lance; but a virtuous household is not her proper domicile.

A curious point here presents itself for inquiry,—Are mental peculiarities of a good or bad kind transmitted through the milk of a wet nurse, as well as bodily infirmities? This is an all-important inquiry. As it borders, however, on the metaphysical, and is much more difficult or doubtful of proof, I think it wise not to discuss it here. I have done so elsewhere; and those who are curious on the point I must refer to the Appendix.

CHAPTER VII.

THE PHYSICAL QUALIFICATIONS OF A WET NURSE TO BE SELECTED—1. SHOULD HAVE GOOD MILK: CHARACTERS OF GOOD HUMAN MILK—2. HEREDITARY PREDISPOSITION GOOD—3. AGE NOT TO EXCEED 30—4. THE AGE OF HER MILK SHOULD BE NEAR THE AGE OF THE MOTHER'S MILK—5. MELANCHOLIC TEMPERAMENT—6. MILK IN SUFFICIENT QUANTITY.

THERE may be a state of health present in the mother which renders the selection of a wet nurse essential. If she be weak or pale, hysterical to a degree, if there be copious leucorrhœa, but particularly if there be headache and a sensation of sinking at the epigastrium, or if the sight become impaired,—the mother should desist from suckling. This defect in the sight will become blindness if the nursing is prolonged—a blindness sometimes persistent, and always most difficult of cure. Moreover, as shown by Drs. Merei and Whitehead, such milk is not only injurious to the child at the time, but does not contain sufficient nutriment for its proper development. As such, it is noxious. Then, again, the child's mother may be dead. Or, lastly, the child, after an abortive attempt to bring

it up by hand has been made, has passed into a state of dangerous atrophy, diarrhœa, &c. In such a case there must be a change; and a wet nurse should be selected. In this choice we must have due regard, lest we injure the child to be nursed, to her mental as well as physical qualifications.

To the former, however, I do not here recur. But in reference to the latter, I believe that to make a judicious selection is one of the greatest difficulties which a medical man has to encounter, because so very much depends upon the person chosen.

The physical qualifications of a wet nurse may be summed up under the following heads :—

1. She should have good milk.
2. Her hereditary predisposition should be good.
3. Her age should not exceed 30.
4. She should not have been confined many months before or after the child's mother.
5. She should be of the melancholic temperament.
6. She should have not only a good quality, but also a sufficient quantity, of milk.
7. When a wet nurse cannot be given to a child exclusively, a married woman suckling another child may be employed to assist the artificial feeding.

1. *She should have good milk.*—This point is best treated in the consideration of what are the

characters of good human milk. One of the best evidences of a wet nurse's good physical constitution is, the secretion of an *abundance* of healthy and nutritious milk. Good human milk has an average specific gravity of 1032, varying from 1030 to 1034. It is always strongly alkaline; this alkalinity it usually retains from five to six days, when it becomes acid. To the taste it is sweet, much more so than cow's milk. When allowed to stand, it will be seen to separate into two portions. The superficial very white substance, known familiarly as *cream*, is chiefly the oil-globules which, being of a lower specific gravity than the other portions of the milk, rise to the surface. The more transparent subjacent liquid, known popularly by the name of *skim* milk, when the cream has been removed from its surface, consists of casein, sugar, and salts, held in suspension or solution in a white, opaque liquor.

The agitation of the superficial portion, or cream, breaks asunder the oil-globules, which in this state constitute *butter*. If the subjacent portion, after the cream has separated from it, be kept any time, the sugar contained in it becomes converted into lactic acid, which gradually precipitates the casein as a curd. Rennet, or the mucous membrane of the stomach, and most acids, have the same effect. The fluid which now remains, technically called *whey*, contains still in solution

a large quantity of sugar and the salts of milk, which are readily separated by evaporation. When looked at through the microscope, milk is found to consist of a colourless fluid, the *liquor lactis*, in which are floating a number of bodies—(*a*) *Oil-globules*, similar to those found in all parts of the body. (*b*) The proper *milk-globules*, smaller in size, varying from 1-95,000th to 1-7,000th of an inch. These also appear to be oil-globules, from the fact that they reflect light strongly; but, from the difficulty experienced in dissolving them in ether, they are evidently covered with a layer of something else, which surrounds them as a capsule. (*c*) There are a great multitude of *small granules, or granulated corpuscles*, floating amongst the milk-globules, most abundant in milk secreted at a very early period. The *liquor lactis* holds in solution the casein, though some observers believe that the external layer of the milk-globules is also made up of casein.

According to the latest analyses by Becquerel and Rodier, the composition of human milk may be stated as follows:—

	Mean.		Maximum.		Minimum.
Specific gravity . . .	1032·67	...	1046·48	...	1025·61
Water	889·08	...	999·98	...	832·30
Solid constituents . .	110·92	...	147·70	...	83·33
Sugar	43·64	...	59·55	...	25·22

	Mean.		Maximum.		Minimum.
Casein and extractive matters	39·24	...	70·92	...	19·32
Butter	24·66	...	56·42	...	6·66
Salts by incineration	1·38	...	3·38	...	·55
	1000·00		1000·00		1000·00

There exist in addition certain *volatile principles*, which may be obtained by the evaporation or distillation of milk, and to which in great measure is probably due the odour of new milk. I shall have occasion again in the sequel to refer to these several principles in detail. It may suffice here to make a remark in reference to two of these, —the extractive matters, and the volatile principles of milk. Of the first it may be stated here, that most of those peculiar changes in milk which render it detrimental, do not occur so much in the casein, sugar, butter, or salts, as in the *extractive matters*, concerning which, it must be added, in the emphatic words of Lehmann, so aptly used by Becquerel and Vernois, "we know absolutely nothing."

The same is true in reference to the volatile principles, the nature of which has not yet been determined by chemical inquiry, although several experiments for that object have been made.

It will be seen that the extreme limits in the composition of healthy milk exhibit a very marked

difference, and hence one great difficulty in selecting a wet nurse.

2. *Hereditary predisposition.*—In the inquiry made as to the hereditary predisposition of a wet nurse, the greatest care is required.

Medical men are in this situation invariably guided by the principle, that diseases which are known to be hereditary from parent to child, can be also conveyed to a suckling through a wet nurse's milk. Hence, it is usually the custom to reject those affected with any taint of consumption or tubercular affections, syphilis, or other similarly communicable maladies.

The great extent to which the former of these affections prevails may be gathered from the fact that the proportion of deaths from it, to 1000 deaths from all diseases, is 154·5 for males, 172·3 for females, and 163·4 for all persons. Syphilis is not generally fatal, but its consequences upon the life of a child are very deplorable. It is known that a woman thus tainted will consecutively bring forth stillborn children, or have a succession of miscarriages; but it is not as generally known, or at least enforced, that even the healthiest children will, if they partake of this milk, gradually become atrophied, and die. Simon mentions a case of a young woman who contracted this disease after the birth of her first child, and who, in consequence of improper medical treatment, *carried*

the disease about her for years. Her children continued pretty well till they reached the age of six months, then became highly scrofulous, and died in a state of general marasmus; and yet this woman's milk, when analysed, appeared to be quite healthy, and even rich. Donné, from several examinations of the milk of syphilitic women, concluded that no difference could be found in either the chemical or microscopical characters of such milk. Meggenhofen, however, found that it was *acid* in reaction.

It is sometimes, as I have before said, very difficult to make out syphilitic disease, although present. I have already alluded to Mr. Langston Parker's opinion, and given a case as an example. This points out the necessity of full examination wherever the slightest suspicion of contamination exists.

Again, sufficient caution is not usually taken in the case of cancer. It has been said, that of late years *cancer* has been on the increase. Thus the deaths amount to 14·3 for all persons per 1000 annually; but the proportion of women affected is greater than that of men, being 20·5 for the former, against 8·5 for the latter. The disease is known to be hereditary; and therefore is it necessary to be doubly cautious in making a selection where any blood relative of the patient has laboured under the malady. What is true of cancer I

would equally apply to *insanity*. This is also an hereditary disease, the taint of which, even if not actually transmitted as insanity, often develops itself in after life, in analogous, although milder, affections. Extraordinary peculiarities, eccentricities, strong dispositions to crime or sexual indulgences, more frequently a deficiency in intellectual power, are apt to follow — evils greatly to be deplored, and therefore, if practicable, to be avoided.

3. *The age of a nurse should not exceed thirty.*— I would further venture to state that it should not be much under twenty-five. I have already shown elsewhere that the age of the highest sexual development in a female is twenty-six, at which age she is in the best condition to fulfil her maternal duties. After thirty this power slowly deteriorates; and before twenty-five she can scarcely be said to have completely recovered that physical health, which has been weakened during the progress of puberty and the changed position which she has been made to occupy in society. It is but right to add, however, that we do not find the milk itself very much altered, chemically or microscopically, between the ages of fifteen and forty. Still, at the extremities of the scale, the differences are obvious. In the very young, the butter, casein, and solid matters generally—excepting the sugar, which exists in diminished quantity—are on the

increase: in the older women, there is a larger proportion of water and sugar; the amount of butter and casein is diminished, although the latter is still in excess as compared with the normal condition;—from which it may be inferred, that the milk of a very young person is less digestible, and therefore less to be recommended for a delicate infant.

4. It is usually said that *the wet nurse selected should have been confined as nearly as possible about the same time as the mother of the child for whom the milk is required.* Too much stress, however, should not be laid on this contingency; for it should not be forgotten that the constituents of milk not only vary in relative quantities in different animals, but even in the same. So liable are they to vary, that the different circumstances of life may materially affect them in the same individual. Indeed, Parmentier and Deyeux have shown that the milk of women of the same age, confined at the same time, and submitted to the same influences, was always different—in fine, that the milk of the same animal, obtained at different times, varied greatly. (Burdach, *Physiologie*, s. 520, p. 356.) All that we should look to is, that the milk be good, and that the age of it be not too far removed from what the child's mother's milk was; for milk materially changes in its composition as the period of lactation is prolonged; and thus

the female, although possessing very excellent milk, may yet supply a fluid which will prove injurious to the suckling. The results of age, as applied to the milk, are summed up as follows by Becquerel and Rodier. The specific gravity varies much. The proportion of water increases from the fifth to the sixth month, and from the eleventh to the twelfth; it diminishes from the first to the second, and from the eighteenth to the twenty-fourth. The solid matters increase in a marked degree from the first to the third. The sugar decreases during the first month, but increases from the eighth to the tenth month. The butter increases considerably up to the sixth month, and then considerably decreases from the fifth to the sixth, and from the tenth to the eleventh month. The salts undergo a slight increase in quantity from the first to the fifth month, then correspondingly decrease. These changes are really most important to trace, as they are an index as to the substitute which, bearing a proper proportion to the amount and quality of nutritive matter required, is best fitted for a child whom it becomes obligatory to wean, or for whom another diet is imperatively called for. It must be confessed, however, that the constituents of milk vary so much, that it is very difficult readily to estimate its goodness from their present quantity. Its composition varies also within the limits of health so much, that we have

often no better method of testing it than trial with the child, when, if it agrees with it, we may conclude it is good. "It may, however, be stated as a rule, that if the butter is in excess, the milk is poor in quality, excepting in syphilis and phthisis, particularly when the latter is accompanied with diarrhœa, and in mental disturbance. In the former it may fall to 9·12 per cent.; in the second, to 12·7; in the latter, to 5·14; the normal proportion being 26·6. Thus in acute diseases the mean is 29·8; in chronic, 32·6; in acute enteritis, 31·5; in acute pleurisy, 54·2; in acute colitis, 54·2. In nurses of feeble constitution it is 28·78, as compared to 25·96 in those of robust constitution. In very young nurses it varies from 15 to 20, 37·8, and so on."—(*Becquerel and Rodier.*)

5. *A wet nurse of a melancholic temperament should be preferred.*—The milk of brunettes is generally richer in solid constituents than that of blondes; for which reason the former are preferred as wet nurses. The following analyses, quoted from Simon, were made by L'Héritier:—

	Blonde, aged 22.		Brunette, aged 22.	
	1	2	1	2
Water	892·	881·5	853·3	853·
Solid constituents .	108·	118·5	146·7	147·
Butter	35·5	40·5	54·8	56·3

	Blonde, aged 22.				Brunette, aged 22.			
Casein	10·	...	9·5	...	16·2	...	17·	
Sugar of milk .	58·5	...	64·	...	71·2	...	70·	
Salts	4·0	...	4·5	...	4·5	...	4·5	
	1000·0		1000·0		1000·0		1000·0	

These are extreme cases; but the average ratio of solid constituents lies from 120 for a blonde to 130 for a brunette. There is yet another reason why a brunette is to be preferred. Blondes usually belong to the sanguine or scrofulous temperament. A fair skin, with brilliant colour, light blue eyes, very light or red hair, are usually present in such cases. The whole digestive powers are weak, and an unusually irritable state of manner is a frequent accompaniment. As a consequence of this sanguine and more passionate character, the milk of blondes is very apt to become altered under mental excitement. In extreme cases it has been known to produce the death of the infant; but it almost always produces serious results.

In the case of a recently delivered woman, who was in a state of considerable fever, induced by a fit of passion, the child after partaking of her milk was seized with vomiting, diarrhœa, and convulsions. This milk was examined by Simon: it had an alkaline reaction, and a strong animal odour, when boiled. After twelve hours it developed a large quantity of sulphuretted hy-

drogen; and yet the casein, sugar, and butter had not undergone any change in quantity or quality.

Brunettes usually belong to the bilious or melancholic temperament. In disposition they are more gloomy and dull than blondes. The milk is richer; and a precocious child is, as it were, restrained by this milk from over-excitement in its mental manifestations. Its body has time to be formed and to develop itself before it is exhausted by undue psychical excitement, and a stronger child is the result.

Among the brunettes there is to be found another variety, closely connected with the sanguine. The eyes may be very dark, even black; and so also the complexion; but with this there is a transparency in the look; the eye is unusually bright; the veins appear vividly blue through the skin. Such persons have all the vivacity of character common to the sanguine, and are to be avoided for similar reasons.

Intermediate between the sanguine and melancholic is the lymphatic or phlegmatic temperament. It is the reverse of the sanguine. It is characterised by weak pulse, languid circulation, cold extremities, and pallid skin. There is deficiency of red blood, of vascular action, of tone; and the proclivity is to watery fluxes and other chronic affections. Such persons are not calculated to

make good nurses, and should therefore be scrupulously avoided.*

Lastly, the nervous temperament is to be rejected. This is characterised by agitation and trepidation of manner. There is an exaltation in the nervous phenomena, and a general tendency to nervous and hysterical diseases. (Druitt, Williams.) When we remember that a child is eminently impressionable, and has to go through an excitable period in teething, to exalt a nervous tendency cannot be wise. Deyeux examined the milk of a woman who was liable to frequent nervous attacks. He found that, simultaneously with these attacks, the milk became transparent and viscid, like albumen, and did not resume its normal condition till some time afterwards. To expose a child to such variations is most injudicious.

6. *She should have not only good milk, but it should be in sufficient quantity.*—This is very important; for upon no point do I think we are so liable to be deceived as upon the quantity of milk supplied. Hervieux, whom I before quoted, states the amount consumed by a child in twenty-four hours to be sixty ounces. This may be exaggerated; but still, when we consider that a child has in the first year of its life to acquire not far

* Druitt's *Vade Mecum.*

from one-third of its full growth and size, we must consider that it requires, at the same time as it has to supply waste and wear, a large quantity of food to meet the emergency. Quêtelet, from his calculations, considers that, as a mean, children grow in length, in the first year of life, males from 20 to 26 inches, and females from 19 to 26⅓ inches; the weight in the former increasing from 6 lbs. 13 oz. to 20 lbs. 7 oz., and in the latter from 6 lbs. 3 oz. to 18 lbs. 14 oz. These data do not clearly set forth the extent of food required. We may, however, infer this from experiments made upon animals. The philosophical Boussingault has shown that a calf increases—

	lbs. per diem.
During the period of suckling	2·4
Under 3 years old	1·5
Above 3 years old	·2

From this we may conclude that the greatest amount of growth and consumption of food takes place at the suckling period. This increase of weight, however, bears a direct ratio to the quantity and quality of food supplied. Boussingault has admitted what might be presumed at first sight, that an animal of great size, *cæteris paribus*, will require a larger amount of forage. Again in regard to the quality; in winter, usually, cattle

which are not set aside to fatten are stinted in their food, and fed almost exclusively on straw. Straw is an aliment which, compared to hay or other kinds of fodder, is deficient in both combustible and incombustible element. Hence, towards spring the cattle are thin, and yield but little milk, and have lost much strength. If these results happen to a full grown, they will, *à fortiori*, occur to a growing animal. The following table from Boussingault gives this statement. It will appear that, for every hundred pounds of living weight, neat cattle require—

	lbs. of hay.
For simple sustenance	0·7
When labouring (Pulsh)	2·0
When in milk (Pulsh)	3·0
Ditto (Perrault)	3·12
Ditto, large cows (Boussingault)	2·73
Growing rapidly (Boussingault)	3·08

An infant, therefore, requires proportionally a much larger quantity of food than an older child, or a man. Strange to say, farmers, who are generally libelled as deficient in intellect, have found out this truth, which many persons in London, who keep boys as pages instead of employing men-servants, appear still to ignore. If they can do so, they always refuse to employ growing lads when grown men are to be had, having found out that, although their wages are lower,

they more than compensate for this advantage by the larger quantity of food they consume.

There is another disadvantage in employing a wet nurse. The breasts often appear large and full of milk. But whether this is owing to an increase of adipose tissue between the lacteal ducts, or to the peculiar conformation of the breast in some women, and although the milk, when examined chemically or microscopically, is found to be particularly rich and good, yet it is often *insufficient in quantity*. And some nurses are often so anxious to keep their situations, and so devoid of honest principle, that they will keep their fatal secret, and if it be not discovered, the child will die. Yet it is a fraud which, from what I have before said,* can be easily detected. The child cries frequently; his sleep is disturbed; he becomes thin, and generally pines away. Let the child be watched; and, the moment he has had the breast, and the nurse has left the room, offer it artificial food. The avidity with which he will attack this, the quantity he will consume, and the sleep of quiet and comfort which will almost instantly succeed, will reveal the fraud, and oftentimes be the means of saving the child's life.

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* Page 89.

PART III.

CAUSES OF DEFECTIVE ASSIMILATION IN RELATION TO THE PRINCIPLES OF ALIMENTATION.

CHAPTER I.

CAUSES OF MORTALITY AMONG CHILDREN, AS SHOWN BY THE REGISTRAR-GENERAL'S REPORTS—GREATEST LOCAL AND DEVELOPMENTAL—CHIEFLY FROM DEFECTIVE NUTRITION—THIS IS DUE TO DEFECTIVE ASSIMILATION — PREDISPOSING CAUSES OF THIS AFFECTION — THREE VARIETIES OF THE DISEASE, OR THREE STAGES—POST-MORTEM APPEARANCES—CONSIDERATION OF TREATMENT DEFERRED.

We have now to show that among the usual causes of mortality among children, especially those which are hand fed, faulty nutrition, otherwise *defective assimilation*, is the most frequent; this disease being the result not so much of absence of breast-milk, as of injudicious feeding.

This point has already been considered in the First Part of this work, where reference was made to some of the returns of mortality in foundling institutions, and those of the Registrar-General.

It was then shown that the mortality from want of breast-milk as compared to the number of births, did not exceed in its widest sense 3·2 per cent.; and in regard to deaths, that it constituted 20·8 of all deaths of children under 1 year old.

In the Registrar-General's Tables for 1853 (p. 98), there is a very valuable table, which throws great light upon this point. It applies only to females, it is true, and to all ages; but the mortality of males for the same ages, though somewhat greater, bears a close correspondence to that of females, and especially so when we have only reference to young children from 1 to 5 years old. If corresponding tables of population were given for the corresponding ages, the deductions made would be most valuable. Unfortunately this is another instance of the bad custom prevalent at present in our public offices, of adopting different scales, and so the various figures obtained do not admit of comparison.

So far, however, some facts may be deduced. The diseases in the tables which I have given at pp. 113, 114, and 115, are classified as follows:—

"*Zymotic*, or diseases which are either epidemic, endemic, or contagious, induced by some specific body, or by want, or the bad quality, of food.

"*Constitutional* sporadic diseases, affecting several organs in which new morbid products are often deposited, sometimes hereditary.

"*Local* sporadic diseases, in which the functions of particular organs or systems are disturbed or obliterated, with or without inflammation, sometimes hereditary.

"*Developmental* special diseases, the incidental result of the formative, reproductive, and nutritive processes.

"*Violent diseases,* or deaths which are the evident and direct results of physical and chemical forms acting either by the will of the sufferer or others."

These results enable us to calculate the causes of mortality in a three-fold point of view. First, the per-centage number of deaths, for all ages, and the respective ages from under 1 year to 5 years, for each class individually, compared to all the deaths that take place in the year during those ages respectively. (See Table A below.*) Se-

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* TABLE A.

Per-centage of all deaths from specified causes of specified ages, to number of deaths of these same ages referred to the five classes.

Specified causes of death	All ages.	Under 1 year.	One year.	Two years.	Three years.	Four years.	Under 5 years.
(all) .	100	100	100	100	100	100	100
Zymotic . . .	24·2	24·3	42·1	55·2	62·2	66·9	36·3
Constitutional .	22·4	7·1	13·9	12·7	11·6	11·0	9·5
Local	33·1	36·7	28·4	24·4	22·2	18·1	21·5
Developmental .	18·1	29·5	13·6	5·1	2·2	2·3	20·2
Violent . . .	1·8	1·5	1·5	2·4	3·3	4·1	1·7

condly, the per-centage of a number of deaths for each class, for the same ages compared to the number of deaths that occur at all ages in these several classes. (See Table B.*) Lastly, it enables us to determine how far these cases apply to diseases of children properly so called, and diseases of nutrition.

On referring to the first table (A), and confining myself for the present to the period under 1 year old, which more naturally concerns my present inquiry, it appears that though the most fatal causes are the local, viz. 36·7 per cent., the high figure which developmental causes attain—29·5—is remarkable. This fact is still more strikingly brought out by the second table; when, compared to the mortality of persons at all ages, 34·7 per cent. die at the age under 1 year old from developmental causes. Unfortunately we are not able to calculate the effect of hereditary taint from these returns,

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* TABLE B.

Per-centage of deaths for the ages between under 1 *and under* 5, *to the number of deaths of all ages of the class spoken of.*

	All ages.	Under 1 year.	1 year.	2 years.	3 years.	4 years.	Under 5 years.
Zymotic	100	21·4	14·3	9·3	6·9	4·9	56·7
Constitutional...	100	6·7	5·	2·2	1·3	·9	16·6
Local	100	24·8	7·	3·	1·3	1·03	36·8
Developmental	100	34·7	5·5	1·1	·3	·2	7·7
Violent.....	100	14·9	6·7	5·1	4·8	4·2	36·1

since, among the local as well as the constitutional causes, hereditary influences are included; but the figures given above show how very powerful for evil defective nutritive and reproductive causes are. Lastly, a comparison of the mortality *from diseases of nutrition*, and *from diseases of children* properly so called, proves the danger of injudicious feeding still more forcibly. Confining myself to the same period, under 1 year old, the result obtained is, that out of 100 deaths occurring at this age, 7·1 only can be referred to the latter, while as many as 22·3 are due to the former. (See Table below.*)

It is very unfortunate that a table of the popu-

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* TABLE C.

Specified causes of death for each age considered as 100.

	All ages.	Under one year.	One year.	Two years.	Three years.	Four years.	Under five years.
Diseases of children ...	3·8	7·1	6·8	2·9	1·9	2·1	6·1
Diseases of nutrition...	5·3	22·3	6·3	1·3	·2	·2	14·

	1856.	1857.	1858.	Total.	Per cent.
Diseases of Abdominal organs	224	249	1116	1589	23·4
Developmental	59	256	279	594	8·8
Rachitis	28	74	107	219	3·2
Atrophy	—	116	178	294	5·2
					30·6
All diseases.....	785	1548	4407	6740	100

lation for these respective ages does not exist, as the results thus obtained would be much more exact; but the above data suffice to prove how very commonly death is due among children to the improper nature of the food supplied.

Passing on now to disease among children as it occurs in hospitals, the same general conclusion is confirmed.

If there be one fact clearly made out by hospital experience, it is that *abdominal* diseases in children, whether viewed in their immediate or remote effects, are by far the most numerous class which we are called upon to treat. Taking the report for the three years of the Clinical Hospital of Manchester, we find that they constitute 23·4 per cent. of the number of all diseases; or if we include those diseases which result from defective nutrition also, they constitute 30·6 per cent. of the whole. (See Table on p. 115.)

In speaking of the principal causes of mortality among children, Messrs. Merei and Whitehead instance, that out of 117 deaths 96 or 82 per cent. occurred in children under 2 years, and 93 or 79 per cent. in children affected with diseases arising from *defective or faulty nutrition,* which were partly the direct, and partly the co-operative, causes of the fatal issue (p. 29). Insufficient and unwholesome breast-milk, and early bread-feeding, were the chief noxious agents at work.

Upon the subject of these several diseases it is not my intention to dwell here in detail. I think it better to consider more fully the subject of *defective assimilation* as a general morbid state brought on by injudicious feeding, and because it is doubtless the very "*fons et origo*" of the several diseases above referred to, and of many others closely allied to them. For the same reason the term defective assimilation will be made use of in lieu of that which is more usually employed, *atrophy* or *marasmus*, which is only a very characteristic form in which it frequently occurs.

In the third Clinical Report of the Manchester Hospital for Children (p. 69), Mr. Whitehead gives the following opinion, which is very confirmatory of my own on this disease :—"Almost invariably it may be traced to bad nursing, erroneous diet, impure air, or want of cleanliness. I believe it to be entirely preventible by proper hygienic measures, as it scarcely ever occurs in the children of attentive and thrifty mothers. This is a most serious malady and not of uncommon occurrence, as 178 cases of decided form were treated, of which number 50 (or 29 per cent.) died." So serious an affection should be most closely watched; it comes on so treacherously that it needs all the intelligence of a medical man to detect it, particularly in its first stage; for when once it has reached its second stage in many cases, but almost always

when it has reached its third, then it is, so far as I know, perfectly incurable. I do not include, however, those cases of atrophy arising from simple tuberculosis and syphilis. I believe both these varieties, the latter very frequently, are curable; but I wish exclusively to confine myself to those cases of atrophy arising from defective assimilation.

Causes.—The *predisposing* causes of this disease are a tubercular hereditary taint, debilitating disease, but more especially the sequelæ of exanthemata. The *exciting* causes are those previously enumerated, viz., injudicious food, bad air, want of cleanliness. These causes appear to be so powerful in their operation for evil that district registrars often call attention to them. Thus, in one of the reports of the registrar, in November, 1859, we read—"In the East Wymer sub-district, the large number of deaths (18) from atrophy, seems, on inquiry, to depend upon improper food, from the mothers not suckling their children, as they say it would interfere too much with their work." (*Medical Times*, November, 1859, p. 542.) But even the healthiest children may become subject to the malady, especially when they are deprived of breast-milk *in the earliest periods*, and are fed indiscreetly. From my own experience I should also gather that one of the most powerful causes of its production, is that peculiar atmosphere which

is invariably developed when young children are congregated together in any large number.

Forms of the disease.—In order to describe the disease more conveniently, I shall divide it into three stages: The 1st, or premonitory; the 2nd, or emaciative; the 3rd, or exhaustive.

First stage: the child may appear at times to be in ordinary health, and its spirits may be good; more frequently, however, it is unusually peevish and irritable by fits and starts, apparently without reason; the flesh feels flabby, and loses that silky texture so common in young children; it will frequently throw up its food, which then smells intensely acid; its appetite is not good; its sleep is disturbed. There may be constipation of the bowels; the motions when passed are like clay, with white lumps in them. In the second stage all these symptoms are increased in intensity; there is more decided irritation of the intestinal canal; vomiting may now be of frequent occurrence, and there may be diarrhœa, the motions being very green, intensely offensive, and very acid, so as often to excoriate the fundament and surrounding parts,—the emaciation is now more rapid, the eye assumes a peculiarly bright expression, and the child looks aged; sometimes there is no diarrhœa, but the process of emaciation continues, and the motions are replete with undigested matters. The third stage is but a further

development of all the symptoms already enumerated; the child's appetite is now voracious to a degree; nothing seems to satisfy it, but all the food it takes does it no good. Aphthæ now appear on the mouth, which gradually extend down the alimentary canal. If there be diarrhœa present, it proves perfectly unmanageable. Thirty and forty motions daily are not of uncommon occurrence, and these appear to be nothing else but undigested food; the emaciation becomes perfectly frightful in the course of a few hours—the child has the look of a wrinkled old man in every part of its body; the eyes possess an unnatural brightness, and seem to project out of their sockets. It is voracious to the last, so long as it has strength to take food: it is sleepless, constantly whining and crying for more; it loses its flesh more and more, till it dies in the last stage of inanition.

When the disease assumes this aphthous character, especially if a number of children be congregated together, so that an infantile hospital atmosphere pervades the apartment, it is apt to assume a contagious character, and become exceedingly malignant; so much so, that if the same towel or the same artificial nipple be employed by another child, it will catch the disease. Children previously quite healthy will become affected by the disorder, which will speedily pass on in most

cases to a fatal issue. The affection does not confine itself to the alimentary mucous membrane; sometimes it is so fearfully contagious that no measures of precaution prevent its extension to other mucous membranes. On one occasion, in a nursery where the disease broke out, two of the adult girls in attendance became affected with these aphthæ on the conjunctiva, having much the appearance of scrofulous ophthalmia, only the ulcers were more lengthened, and there was no photophobia. Chloride of lime was largely used in the rooms; the whole walls were washed with a solution of it. The same spoon was never used for another child, and was always washed after use in a solution of chloride of lime. A separate nipple was kept for each child. Still the disease often recurred, and proved equally contagious. These children ate enormously, but got thinner and thinner, till at last they died, as I have before said, with all the symptoms of inanition.

Where diarrhœa is not present the illness may extend over a period of several weeks. But the symptoms are analogous, and as certain to be developed, only more gradually so. It is singular, even in such cases, how the little shrivelled old-looking child will sometimes smile at you, particularly after a meal. It is, alas! but a temporary sunbeam in the midst of the general wreck; no quantity of food given, not even cod-liver oil,

will do any good, however assiduous and varied the trials made.

Sometimes the disease having reached the second stage, or while yet in the first stage, does not pass on to the third; that is, the *primary* assimilation is defective only, but not entirely prevented. *Tuberculosis*, with other developmental disorders, then makes its appearance, generally as *tabes mesenterica*, more rarely as *phthisis*. By far the most common of the diseases it gives rise to is *anæmia*, with more or less of *rachitism*. Painful as these latter complications are to behold, they exhibit, nevertheless, a fortunate phase in the original disease, because, under proper treatment, they are comparatively manageable, whereas defective assimilation, in the third stage, is very seldom, if ever, cured.

The *Post-mortem Appearances* present different peculiarities: 1st, in those who have died from diarrhœa, as a complication; and 2nd, in those in which this last has not occurred. In both varieties there is great emaciation, scarcely any fat remaining; the cellular tissue is very scanty, and the muscular tissue much wasted. In the variety where diarrhœa has existed, the alimentary canal, from its beginning to its termination, is lined with red patches and aphthæ; these vary in size from the size of a pin's head to that of a bean: and, as has been shown, these, after a

time, become more or less filled with the *oïdium albicans*. In addition, Peyer's glands are much reddened and swollen. Sometimes there are no aphthæ, but the mucous membrane from below the liver is much reddened with a bloody and intensely acid mucous exudation upon its surface. In those cases where there is no diarrhœa the mucous membrane of the alimentary tract is pale, but Peyer's glands are very much swollen, and project from the mucous membrane as round patches about 3 or 4 lines broad by 10 or 12 long, apparently filled with exudation, and precisely resembling those enlarged Peyer's glands found in cases of Asiatic cholera.

CHAPTER II.

PRINCIPLES TO BE OBSERVED IN ALIMENTATION—WARMTH AND POSITION—ANIMAL FOOD INDISPENSABLE.

A CLOSER inquiry into the proximate and remote causes of defective assimilation would materially elucidate the principles to be observed in its treatment. On the other hand, the due comprehension of these causes depends so essentially on a perfect acquaintance with the rules of alimentation, that the latter must be first discussed and understood, and this in a twofold aspect: first, as regards the contingencies necessary in the exhibition of food to infants; secondly, the indispensability of animal food in the earliest periods of life. These two points will be therefore first considered. In Chapter IV. Part I., it may be remembered, I laid great stress on the abuse of the recumbent position of children, so beautifully explained by M. Hervieux, and so fearful a cause of their mortality. The effects produced were cold and starvation. (See p. 37.) Decidedly, therefore, in any plan adopted

to bring up a child by hand, these effects must be especially combated against and avoided.

I. In discussing the contingencies to be observed in giving infants their food, I would lay down the two following positions as essential to the child's preservation :—

(*a*) That, in early ages especially, a child should be kept warm, artificially or naturally, especially during the time it is being fed.

(*b*) That a child should be made to take at such periods the semi-erect, which is the natural position.

I believe that the comparative anatomy and physiology of mammalia entirely proves that attention to these two rules is a necessity.

(*a*) *Warmth required by an Infant.*—The records of mortality prove indisputably that *cold* is very deadly in its influence upon children. Whenever a week is more severe than the preceding one, instantly the Registrar-General's returns show an increase of deaths; and this especially among the very old and very young. It is of the latter only that I have to speak. The whole bearing of comparative anatomy goes to prove that heat is indispensable for the preservation of new-born and very young animals. The common sparrows, ortolans, and swallows, are born quite naked; others almost so, as in the case of linnets and magpies; but then their nests are very warm. Among the *gallinaceous*

birds, the *grallatores*, and some of the *palmipedes*, the young are covered by a species of down, which, albeit transitory and succeeded by feathers, is notwithstanding very warm. It is observed that this down is preserved longer on young birds which are obliged to remain in the nest a long time, and are unable to seek abroad for their food; as, for instance, in the goose; and the parent birds themselves are provided with similar down on the belly between the feathers, which only disappears some time after incubation. Many of the young, besides this down, are provided with a thick coating of grease, to preserve them against external cold. This is the case among the *procellaria*. But even among mammalia, the first coating is not like that which follows, although also transitory. The hedgehog has a fine velvety hairy coating; the seal, a long soft hair. Added to this, as has been well shown by Edwards, the calorifying power is always imperfect in the very young. Birds and mammalia, which are born naked, have little proper heat, and derive it chiefly from the parent. The animal heat of young sparrows withdrawn from their mother (the temperature of the atmosphere being 64° Fahr.), fell in one hour from 87° Fahr. to 66°; and when the external atmosphere was 71·6° Fahr., it fell to 73·4°. The same result is observed in dogs and rabbits. But one fact is remarkable here, especially in reference to its application to a

child. It is not the *difference of the external covering which is the cause of this fall:* external furs may be put around the young to keep them warm, and yet the loss of temperature is the same. This is not the case with older birds; for in these, even when all their feathers are cut away, the heat is retained. The maternal heat is all that a young bird needs the first day, since the umbilical vesicle of the egg still supplies it with food. It is interesting to note, that these young animals, although they lose skin heat so readily, and become, as it were, insensible from cold, will yet regain it, and recover, on being artificially warmed. This power, however, is lost in proportion as the animal becomes older, and more able to generate heat itself.

The mother's nest, among those animals which are born naked, is invariably both deeper and warmer than amongst those which have the warm covering. This is remarkable with birds; but, even among mammalia, in proportion as the young are born more or less naked or blind, so do the parents take greater or less precautions, and make their beds or nests warmer. Less care, however, in this respect, is taken among mammalia which are in the habit of having their young in summer. In some instances, where a nest is not so readily made, the heat is maintained by a persistent connexion between the mother and young. In the kangaroo

tribe (the connecting link between the oviparous and viviparous animals), there is a pouch to keep the animal warm attached to the abdomen, where the young kangaroo remains with the mother's nipple persistently in its mouth for seven weeks. But in a higher class we have the *simia rhesus*, which, for a fortnight after birth, fixes itself to its mother's nipple, and never leaves it but to take hold of the other. All this indicates, apart from the necessity for food, an equally great necessity for the maternal heat.

The application of these facts to man is most important. The infant is born naked. It is true, his eyes are open, but, according to Burdach, for the first month he is, as it were, blind; perhaps able to distinguish light, but that indistinctly. Heat is essential only to him at first, and he will rapidly lose it on exposure. The proverb, "Can two lie together, and not have heat?" should be proved in the case of every infant and its mother. Temporary separation may be, and should be, recommended; for then, owing to the power of the infant of again recovering its heat near the mother, no harm is likely to follow, but it should not be long maintained. These remarks apply generally to the young animal at all times, but especially at meal times. During digestion, there is a continual flow of the blood towards the alimentary canal; and hence the sensation we experience of feeling

cold after dinner, which a proverb among us has interpreted as a *sign of a good digestion.* It is only after this is complete, that the blood resumes its position more on the external skin, and the sensation illustrated by another proverb, "The south wind blows after dinner," is brought about. But, as the means of producing heat in the infant itself are very limited, and its meals are frequent, so it requires that the artificial heat from its mother should be often given to it: therefore, during meals, a child should be kept warm.

(*b*) *Position of a Child while taking Food.*—This is not less important to a child brought up by hand. "The child," says Dewees, "should not receive its nourishment while lying. It should be raised, which will not only become a pleasanter position, but it also diminishes the risk of strangulation." (*Diseases of Children,* chap. v. p. 178.) The semi-erect position which the child adopts in sucking is not only favourable, as affording it the readiest means of partaking of its mother's heat, but there is besides an anatomical reason. The stomach is placed more perpendicularly as to position. There is but feeble muscular power in it; and the cardiac opening is less able to contract and retain food taken. Thus, in any other position of the child but the semi-erect, the milk taken is likely to be brought up again, and lost to the child. Yet it is strange that, in feeding children by the bottle,

nurses are usually in the habit of laying the child on his back on their knees, often with the head lower than the trunk, so as precisely to favour those accidents which it is desirable to avoid. To correct this abuse, with the assistance of a very intelligent chemist, Mr. Cooper, of Oxford-street, I had a new bottle constructed, to which his new stop-cock was applied. This last is so constructed as to prevent the child from taking down air with his food; and thus those pains from flatulence, so common in children, and often so distressing, do not occur. This bottle is shaped like a female breast, with two openings in it: one for the use of the child when very young without the stop-cock, but with the tube and a small nipple of India-rubber; the other, with the stop-cock and with its tube, and a larger nipple to be used when the child is older. It may be worn by the female in the position of the breast, or across the chest, kept in its position by a handkerchief or band, and if next the skin, is kept warm, if need be, all night or day. The child, on taking the food out of such a bottle, is placed in the normal position, and at the same time kept warm by the female.

There is another way in which it may prove useful. Mothers often tell us that the child will not take the bottle: and the reason is obvious. It is not likely that a child, accustomed to the semi-erect position and maternal heat, will readily

assume the new and recumbent position, at once a less pleasant one from habit, and so much colder. With the *mammary bottle*, this source of difficulty is at once removed.

I had thought I was the original inventor of this bottle, at least of the glass part of it; but I hear that something like it is in use in America. Be this as it may, as it is founded on *scientific principles*, and has many advantages, I think it should be used in preference to others.

II. The manner in which food should be taken by infants having been thus considered, we have next to show that animal food is indispensable to a child in the earliest periods of life. Food, as is well known, to be capable of supporting life, must contain three substances in due proportion: — 1. Plastic or nitrogenous matters, to nourish the fleshy parts of the body. 2. Calorifiant or combustible matter, *i. e.* hydro-carbons, to supply the respiratory process, to keep up animal heat, and to provide fat for the body. 3. Mineral matters, or salts, to supply the bones, and hold in chemical union, combination, and action, the solids and liquids of the body. Among the first class are fibrine, albumen, or casein; among the second, fats and oils, sugar and starch; among the third, lime, potash, soda, magnesia, in union with phosphoric, sulphuric, hydrochloric acids, and many others. Some one or more of these are contained in all

aliments in beautiful combination, and so they are found capable of supporting life. Singly, however, or as a simple substance, these plastic, fatty, or mineral matters cannot do this; starvation, in modified forms, being always observed to follow their employment when given alone.

Milk contains these elements in combination. There are casein, the plastic ingredient; fat and sugar, two combustible substances, and the several mineral matters needed. As such, if given in sufficient quantity, it will support life for any length of time. The proportions in which these substances are contained in other aliments vary; but it should at least be 10 of plastic to 30 or 40 combustible, and the mineral should vary from 1·5 to 6 or 7 per cent.

Now the whole analogy of comparative anatomy proves that all young animals require animal food for some time after birth, because (*a*) this, or* some adventitious animal structure, is generally supplied by the parent. (*b*) The infant itself is so anatomically and physiologically made as to be capable of digesting animal food only.

(*a*) In many species of mollusca, and especially in gasteropoda, in many insects, and among the batrachian reptiles, the mother produces, together

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* See Burdach's *Physiologie.*

with the egg, what is called a nidamentum, which nourishes it for some time after its birth. Certain insects even feed upon the external envelopes which surround them, as in the case of the *stratismys chameleon.*

The yellow substance which surrounds the abdominal parietes in some animals, or which is enclosed in the central abdominal cavity, is an auxiliary of this kind. Its presence explains the fact that spiders and snakes, for instance, remain some time after birth without requiring any other kind of food. The raw food which the greater number of birds give to their young is exclusively animal; hence the more readily obtainable and digestible. The northern ducks and the petrels, with their nests situated on high rocks near the sea, easily procure this food, and they always return to their nests richly laden with fish. The sparrows nourish their young with insects and worms, which they find everywhere in abundance; and hence certain rapacious birds, which require a greater amount of animal food for their young, become at the breeding season particularly audacious in order to procure it.

Some of the sparrow and crow tribe bring the nourishment in their beaks, emptying it into those of their young. The rapacious birds, on the contrary, bring it in their claws, place it before their young, and tear it in small pieces for them.

The heron and the pelican bring the fish in the pharynx, which is dilated to a large pouch below the bill; and the pelican applying its lower jaw against its own breast, allows its young to eat out of this pocket as out of a plate. Among some species of vultures and dark-winged eagles, the crop seems to serve as a reservoir for the food intended for the young. Approximating to a higher degree of maternal co-operation, the female does not give nourishment to her young till she has in part digested and assimilated it. The bees and wasps are of this class, and swallow some pollen, and then disgorge it mixed with honey. Among pigeons, the greater number of *grallatores*, some *palmipedes*, and many sparrows, the mucous membrane of the œsophagus is dilated into a crop, well supplied with vessels, into which the grain which is difficult to digest is first conveyed, and then softened under the chemical influence of a fluid analogous to the gastric juice of the stomach. When half-digested, and converted into a kind of chyme, it is subsequently disgorged into the beak of their young. This modified chyme it is which is popularly called pigeon's *milk*. The male assists in this operation as well as the female. Finally, in mammalia we arrive at the production exclusively by the mother, of milk, which bears in its composition considerable resemblance to the diluted yolk of egg, and in some respects to the

nidamentum. It will be seen from the preceding review that the food which is required by the young is essentially animal; and in those cases even where the birds themselves are granivorous, or vegetable feeders, they either supply their young with animal food exclusively, or else with vegetable food so semi-digested in, or so intermixed with, the animal fluids, that for all purposes it may be regarded as animal food.

Gradually as the young animal becomes older this exclusive dependence upon the maternal supply ceases. Among pigeons, for instance, after three days the young bird begins to partake of other food also. The reindeer at the end of some days begins to eat grass and lichens, and the calf in about three weeks can no longer live exclusively on its mother's milk, but requires other food. Still the dependence of young animals upon the food which they directly obtain from the mother in the natural state, is very close. In the case of the *simia rhesus*, that animal attaches itself to its mother's nipple, and remains in this position for fifteen days, in sleeping as well as waking, never leaving one breast but to attach itself to the other. To endeavour, therefore, to nourish any young animal exclusively on vegetable food, is contrary to the entire law of nature, and especially so in man, where the parental relations are so much closer, and maintained for so much longer a period.

(*b*) The infant itself is so anatomically and physiologically constructed, as to be capable of digesting *animal* food only.

One would have thought that a very little reflection would have convinced any observer, that if among *herbivorous* mammalia the young require animal food, this is, *à priori*, a strong argument against the use of vegetable food in *omnivorous* or *carnivorous* animals; yet even upon this point our medical authorities are not agreed; many vegetable compounds are both recommended and taken. Apart from the common-sense view of the question, let us look to the physiological construction and anatomical arrangement of the alimentary canal of a child. Upon these points Burdach, in his *Physiologie*, speaks graphically. It is remarkable that suction is the only faculty for the prehension of food which the child possesses on birth, and even this is soon lost if not practised. The jaws are not so constructed as to permit active movements, nor the gums to bear pressure. The hard palate is, moreover, but little developed; although the cavity of the mouth is sufficiently wide. There is, moreover, no saliva secreted for the first two months, so that no species of preparatory change can take place in it, as, for example, in the conversion of starchy matters into sugar, through the agency of this fluid (saliva). The mouth is, therefore, merely an organ of transmission and suction. The lips are large;

and the tongue and pharynx, uvula, and soft palate, are well developed, to secure these ends.* The stomach in infants is a small tube-shaped membrane, dilated in the centre, one extremity ending in the œsophagus, and the other in the pylorus, resembling in this character that found in carnivora through life. In position, also, it lies more parallel to the trunk; the large and small curvatures and muscular structures being but very little developed. The liver at birth is unusually large, the pancreas perhaps not more developed than the salivary glands; the intestinal tube is much shorter, and the large intestine approaches more nearly in its length to the small. The cæcum (in which, moreover, it is believed a sort of additional digestion occasionally occurs) is very small. The peristaltic motion is more rapid. All these are evidences that food taken will be kept for a shorter time in the canal, and therefore should be in the condition most favourable for digestion.† In no other of the mammalia, lastly, is there, in the first periods of life, such a complete absence of teeth. In man they appear latest, and are longest in obtaining their full development. In fine, comparing these appearances with those observed in herbivorous animals,

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* Burdach, p. 434.

† See West's *Diseases of Children*, pp. 402, 403.

viz., well-developed salivary glands, compound stomachs (sometimes four in number), muscular gizzards (as in some birds), long intestines, large cæcum, &c., it is manifest they are the exact opposites to what we find in young infants. As the child grows, the peculiarities which are permanent in herbivorous animals gradually present themselves. The stomach assumes a more horizontal position, the valvulæ conniventes become well developed, the peristaltic motion of the intestines becomes slower; in fact, all the changes calculated to retard the food in its progress, and thus to expose it more completely to the solvent juices for digestion, occur. All this proves indubitably that animal, not vegetable food, is the proper diet for an infant.

CHAPTER III.

OF THE VARIOUS KINDS OF ANIMAL MILKS TO BE SUBSTITUTED FOR HUMAN MILK — COMPOSITION OF MILK — HUMAN — ACCORDING TO BECQUEREL AND RODIER—ASS'S MILK.

Substitutes for Human Milk.—(*a*) The simplest substitute for human milk is clearly milk from another animal. Of this fluid three kinds are usually spoken of: *ass's* milk, which is said to come nearest to human milk; *cow's* milk; and *goat's* milk. I will speak of each of these varieties *seriatim*. Before doing so, however, it will be well to set forth in a tabular form the relative quantities of the solid ingredients and the water contained in human milk, at periods of three months for the first year, and of six months for the second year; so that we may be enabled thereby to judge of the amount up to which each of these ingredients should be brought, and which is best adapted to the age of a child, when we substitute for its

mother's milk that of the ass, the cow, or the goat. (See Table below, pp. 141, 143, and 145.*)

Ass's Milk.—It has usually been said that ass's milk is the nearest to a woman's milk; but I believe this to be an error. It contains, certainly, more water, only about half as much casein and butter, but about twice as much sugar and salts. In a note below, I have given five analyses of ass's milk, of specific gravity from 1023 to 1039.

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* COMPOSITION OF HUMAN MILK.

Table calculated from one given by Becquerel and Rodier.

	Specific gravity.	Water.	Solid constituents.	Sugar.	Casein with extractive matter.	Butter.	Incinerated salts.
1st quarter	1032·50	877·33	122·67	42·30	33·39	34·94	1·73
2nd ,, ..	1031·81	893·14	106·86	43·71	37·95	23·89	1·37
3rd ,, ..	1033·07	890·83	109·17	43·67	40·89	23·40	1·21
4th ,, ..	1031·24	892·98	107·03	45·79	36·89	23·03	1·29
12 to 18 mth.	1032·05	891·34	108·66	43·92	36·98	26·44	1·32
18 to 24 ,,	1030·81	876·55	123·45	41·33	37·32	43·47	1·33

COMPOSITION OF ASS'S MILK.

	Simon. (Milk 1 year old.)		Peligot. (Mean of several analyses.)		Chevallier and Henri.
Water	907·00	.....	904·7	.....	916·3
Solid constituents ...	91·05	.....	95·3	.....	83·5
Butter	12·10	.....	12·9	.....	1·1
Casein	16·74	.....	19·5	.....	18·2
Sugar, with extractive matters and salts ...	62·31	.....	62·9	.....	—
Sugar	—	.....	—	.....	60·8
Salts	—	.....	—	.....	3·4

I shall endeavour to show in the sequel how it is that this milk so often disagrees.

Goat's Milk.—In many parts of the world the goat is the substitute for the cow as the provider of milk to the population. The objection usually made to it is its disagreeable odour, from the presence of hircic acid. Observers differ greatly as to its composition, as may be seen from the table on p. 143, partly given by Simon. (*Animal Chemistry*, vol. ii. p. 65.)

The analysis by Boysson gives a composition not unlike human milk. Mayer, indeed, says that goat's milk is preferable to cow's milk, because it resembles more than any other milk that of a woman; and this is doubtless true, particularly if we compare with it the milk of very young women. It is certain that many children thrive very well on it in Ireland, Malta, Switzerland, and other mountainous countries. One advantage which the goat possesses over other animals that

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COMPOSITION OF ASS'S MILK.

	Lehmann.	Vernois and Becquerel.	Human milk.
Water	795·0 to 789·1 ...	890·12 ...	889·08
Solid constituents	205·0 to 210·9 ...	109·88 ...	110·92
Butter	12·1 to 12·9 ...	18·50 ...	34·61
Casein	16·0 to 19·0 ...	35·65 ...	39·24
	(with extractives.)		
Sugar	68·0 to 62·9 ...	50·46 ...	26·66
Salts	— — ...	5·24 ...	1·38

yield milk, is the greater impunity with which she sustains the various vicissitudes of the weather. She will sleep readily under a powerful sun, without suffering; she will remain unaffected, if exposed to rain or storm; she will bear a great amount of cold, although to this last she is more susceptible. Experience, however, has proved that the goat, as well as the cow, will yield a larger flow of milk if fed in stables upon proper fodder; but then great attention should be paid to the cleanliness of the stable, and the removal of all offensive matters. The best milk afforded by the goat is that which it yields about two months after kidding. The peculiar odour of goat's milk, from the presence of hircic acid, and which is not always very agreeable to those who taste it for the first time, is an objection; but persons soon get accustomed to it, and come to like it. This smell, however, is not *essential* to goat's milk, being chiefly present, and then most strongly, when the goat is allowed to associate with the ram; and is greatly diminished if the animals are kept clean, and especially if they are washed from time to time. It is also far less marked in those goats which have no horns: in these there is little more odour than in the milk of the cow. (Parmentier.)

It is interesting to notice here a fact established by Becquerel and Vernois; that is, that the

character of the goat's milk, like that of the cow, may be regulated by the quality of the food supplied. If a highly nourishing and rich milk is desired, it is best to feed the animal on straw and trefoil; but if a light milk is required, beet-root is preferable. This difference is set forth in the table below,* to which I have also appended the composition of human milk, for comparison.

Cow's Milk.—This is the substitute for human milk best known in these regions. The absence of unpleasant odour, and the greater ease with which it is obtained in Great Britain, are advantages in its favour. In appearance it is of a bluish white colour, almost tasteless, specific gravity varying from 1030 to 1035. Its microscopical characters are about the same as those of human milk, excepting that the milk-globules are more abundant.

	* Goat's Milk.			Human Milk (normal).
	Fed on straw and trefoil.	Fed on beet-root.	Normal (mean).	
Specific gravity...	1031·10	1026·85	1033·53	1032·67
Water.....	858·68	888·77	844·90	889·08
Solid constituents	141·32	111·23	155·10	110·92
Butter.....	52·54	33·68	56·87	34·61
Casein & extractive matters.	47·38	33·81	55·14	39·24
Sugar	35·47	38·02	36·90	26·66
Salts	5·93	5·72	6·18	1·38

Now it is clear, comparing this with woman's milk, that—1. The quantity of water is less in that of the cow; 2. The solid matters are in greater quantity; 3. The sugar is less in amount; 4. There is more casein; 5. And more butter; 6. The salts are also in excess.

It is quite manifest that, if the above analyses are to be depended upon, a simple dilution of this milk will not suffice. Water may be added to diminish the relative quantity of casein and butter to the normal figure it attains in human milk; but it will also reduce unduly the amount of sugar; and thus, at the outset, we meet with a difficulty in its employment.

As with the goat, however, so with the cow,—the food supplied, and the circumstances under which it is given, will, in great measure, modify the character of the milk yielded; and there are also some other circumstances quite compatible with health, referring to the circumstances in which cows are placed, which materially affect the nature and yield of milk.

(*b*) *Country Milk and Town Milk.*—The former is stated to be preferable to the latter. The reason is, no doubt, that the cows are less crowded together, and the milk is less watered.

Becquerel and Vernois have also proved the truth of this popular opinion from their experi-

ments. (See Table below. The mean figures only are given).*

This difference is not, however, due to the mere exposure to country air, because experiments have proved that when cows are fed on hay, with oats or barley-straw, or the ordinary culinary roots with a certain quantity of wet bran, a similar milk is obtained from them in towns.

(*c*) *Summer and Winter Milk.*—Owing to the difference of nutriment given, the composition of these two milks is not the same. The principal difference observed in winter is a diminution of the water, and among the solid constituents an increase of the butter only: both the casein and sugar are slightly diminished. In summer there is more water; but what is remarkable is, that among the solid constituents the casein, sugar, and salts are diminished, and the butter is considerably increased.

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* *Composition of Cow's Milk.*

	Paris.		Country.
Specific gravity	1033·10	.....	1033·72
Water	869·78	.....	857·80
Solid constituents	130·42	.....	142·20
Butter	33·66	.....	38·85
Casein & extractive matters	53·66	.....	57·00
Sugar	37·07	.....	38·99
Salts	6·03	.....	7·36

(*d*) *Results obtained by various kinds of Food, and Beet-root in particular.*—Dr. Playfair adduces an example of a cow fed on much nitrogenous matter, in which not only was the amount of nitrogenous matter or casein in the milk increased, but also the butter. Certainly the yield of milk is increased by much of that stimulant diet which is occasionally administered after a time to cows, such as refuse slop from whiskey distillers, which is known to be given largely in America, and for which cows acquire so depraved an appetite, that they will not take afterwards their ordinary food. (Hassall.) Other less exciting food has the same result. Thus, Parmentier and Deyeux found that cows fed on the leaves and stalks of maize yielded more milk than when fed on ordinary fodder. Moreover, the milk was extremely sweet. The milk obtained from cows fed on potatoes and common grass was much more serous and insipid. That from cows fed on cabbage was disagreeable to the taste. Hermanstadt found also that fresh aliments caused a larger quantity of sugar to appear in the milk than dry food. Mr. Curwin found (*Treatise on Milk,* 1825) that coleseed when given to a cow was far the most productive of milk (Brassica Napus. Rape); and in this respect was superior to Swedish cabbages and Kohl-rabbi.

Among the most approved fodders for cows are

sainfoin, Spanish, and ordinary trefoil; but there are a vast number of other annual plants among the graminaceæ or leguminosæ, which, if cultivated and given to the cows, would prove exceedingly useful. Indeed, Anderson assures us that cows fed upon trefoil, in addition to grass, yielded a superior kind of butter to that afforded by cows fed upon this famed pasture only. The ancient faculty of medicine in Paris appointed a commission in 1771 to trace the effects of various roots on the milk of cows. These reported the potato to be particularly useful in increasing the quality and the flow of milk; also, that its administration to mothers of thin, weakly children, had led to the rapid improvement of these latter in every respect.

The effect of several varieties of food is set forth in figures in the table given below,* compiled from

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* *After Chevallier and Henri.*

	Ordinary fodder.	Beet.	Carrots.
Water	870·2	868·8	866·7
Casein	44·8	37·5	42·1
Sugar of milk	31·3	27·5	30·8
Butter	47·7	59·5	53·0
Salts	6·0	6·8	7·5

After Vernois and Becquerel.

	Summer food.	Winter food.	Normal Human milk.
Water	859·56	871·26	889·

one quoted by Dr. Hassall from Chevallier and Henri, and from another given by Becquerel and Vernois. Chevallier and Henri's cows were fed on ordinary fodder—beet-root and carrots. The winter food of those referred to by Becquerel and Vernois was one bundle and a half of trefoil or lucern, weighing from 12 to 13 pounds; half a bundle of oat-straw, weighing from 9 to 10 pounds; and 25 *kilogrammes* of beet-root, half in the morning and half at night, with two buckets of water for drink. The summer food was green trefoil and lucern, Indian corn, barley, grass, in no fixed quantity; in amount, however, estimated at from 45 to 50 *kilogrammes*. At night, in returning from the field, the cows were given in the stable from 5 to 6 *kilogrammes* of grass. Drink as in winter.

These tables prove that if cows be fed on carrots, the casein and butter are diminished, but the sugar increased in quantity; whereas if fed on beet-root, both the casein and butter are much diminished, and the sugar is much increased. Here, as in the case of the goat, a milk is produced,

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	Summer food.	Winter food.	Normal Human milk.
Casein and extractive matters	54·7	47·81	39·24
Sugar of milk	36·38	33·47	26·66
Butter	42·76	42·07	34·61
Salts	6·80	5·34	1·38

which, except in the excess of the salts, is very like woman's milk.

It is manifest, therefore, that a great deal depends upon the manner in which cows are fed. Generally this is done in the cheapest possible way, because milching cows so deteriorate in value after eight or nine months' use as such. I am told that cows purchased for £18 or £20 at the beginning of a season, will sell at a loss of £6 or £8 at the end of it; they look so small and meagre. This mode of feeding cows is after all only evidence of great short-sightedness in the owner, since this deterioration may be easily prevented. A very intelligent gentleman in Nottinghamshire has informed me, that if the cows are fed upon a steamed food composed of chopped hay, bran, malt culms, and rape-cake, not only will they produce an extra quantity of milk, but keep throughout the milching period in first-rate condition; in fact, they will at the end of the six or nine months look as well as they ever did.

APPENDIX A.

Analysis of Goat's Milk.

	Chevallier and Henri.	Clemm.	Boysson.	John.	Payen.	Stipriaan, Liuscius, and Bondt.	Lehmann.	Donné.	Vernois and Becquerel.	Human Milk.
Water ...	868·0	865·175	892·8	849·3	855·0	744·0	886 to 884	819·4	844·90	889·08
Butter ...	33·2	42·507	29·9	11·7	40·8	45·6	33·2 to 42·5	48·6	56·87	34·61
Casein ...	40·2	60·321	52·9	105·4	45·2	91·2	40·2 to 60·3	43·8	58·14	39·24
Sugar.....	52·8	44·065	20·7	23·4	—	43·8	40 to 53	with ext. 91·2	36·91	26·66
Salts	5·8		—	—	—	—	— —	—	6·18	1·38
Residue of whey ...	—	—	—	—	58·6	—	— —	—	—	—
Cream ...	—	—	—	—	—	7·5	— —	—	—	—

APPENDIX B.

Analysis of Cow's Milk.

	Simon.			Herberger.		Lecanu.	Boussingault.	Chevallier and Henri.	Poggiale (10 cows).	Playfair (9 cows).	Vernois and Becquerel (30 cows).
Water	857	861	823	853·0	862·0	868	874·0	870·2	862·8	—	864·06
Butter	40	38	55	38·9	37·5	36	39·0	31·3	43·8	49·0	36·12
Casein	72	68	67	69·8	67·0	56	34·0	44·8	38·0	41·6	—
Ditto, and extractive matter ...	—	—	—	—	—	—	—	—	—	—	38·03
Sugar	—	—	—	—	—	—	—	—	52·7	—	55·15
Sugar, and extractive matter ...	28	29	51	31·3	26·3	40	53·0	47·7	—	—	—
Fixed salts	62	61	13	7·0	7·2		—	6·0	2·7	—	6·64
Earthy salts.....	—	—	—	—	—	—	2·2	—		—	—

CHAPTER IV.

OF SOME OF THE OBJECTIONS TO THE USE OF ANIMAL MILKS.

ASS'S MILK; EXCESS OF SUGAR AND SALTS — GOAT'S MILK; ADVANTAGES FROM ITS EMPLOYMENT—COW'S MILK; DIFFICULTIES IN ITS EMPLOYMENT—ADULTERATION CHIEFLY WITH WATER — ACIDITY — MEYER'S EXPERIMENTS — UNHEALTHY SHEDS FOR COWS—REVOLTING FILTHINESS OF SOME IN LONDON—NECESSITY FOR PARLIAMENTARY INTERFERENCE.

Ass's Milk.—To the excess of salts is probably due the purgative effect of ass's milk occasionally noticed in adults who take it. The saline matter amounts as a minimum to twice, as a maximum to four times, as much as in human milk. Now if it be a fact, as is usually stated in books, that ass's milk is the best substitute for woman's milk, where are the experiments to prove it? Do children fed on it exclusively, thrive? Answers to these questions are important desiderata; but till the problem is solved, the substitution of ass's milk cannot be urged merely because it contains more sugar than cow's milk, or because it proves wholesome food

to invalid adults. To many adults, cow's milk in any quantity produces nausea and vomiting. It is usually well borne on the stomachs of infants, although it may disagree otherwise. And indeed, after all, to make up the requisite quantity of casein and butter, twice as much of ass's milk would be needed. The quantity of sugar, as well as the *salts*, thus taken would be greatly in excess. Would not then scrofula be developed as a result? and what good effect on the brain and bones would the excess of the salts produce? We know that sugar is not of itself capable of supporting life when it is given singly. Besides the debility which supervenes, abscesses form on the cornea, which penetrate internally, so as to let the humours escape. Finally death occurs. The *post-mortem* appearances are—general atrophy of the muscles, contraction of the stomach and intestines, &c. These experiments, chiefly instituted by Magendie, however cruel and revolting, are not without their practical importance. Although it may be urged that no children are fed exclusively upon sugar, and that therefore the objection does not apply, still we often meet with a class of cachectic patients, eminently scrofulous, with morbid tastes for sweets. In these, strumous ophthalmia, with ulcers on the cornea, make their appearance. Is it not reasonable to conclude that these morbid products are due to a diet too exclu-

sively saccharine? and have we not some grounds for fearing that very similar results would occur if we ventured to bring up children exclusively upon ass's milk?

But more than this: it has been shown by Lehmann and Elsasser, that *fat* exists in most of the fluids secreted by the body, and assists digestion along the whole course of the alimentary canal. The solution of food, although delayed by *excess*, is hastened by a moderate quantity of fat. So also, in early or fœtal development, it is the fat-globule which attracts, as it were, the albumen or nitrogenous elements around it, acting in the cell-growth as the nucleus around which parts grow. Moreover, the fats of the blood are also deposited in the blood-globule—the portion in the blood generally admitted as most concerned in the nutrition of the body; and this is doubtless one of the reasons why cod-liver oil proves often so useful. To attempt, therefore, to feed a child on food poor in fatty matters, as ass's milk, is evidently unphilosophical.

It has been stated by Mr. Lobb, that, by adding two and a half per cent. of *cream* to ass's milk, a very good substitute for human milk would be procured with great ease. "The expense of ass's milk," remarks Mr. Lobb, "would put it out of the reach of the poor." He might have added, the expense of *cream* also in towns. The sugges-

tion, however, is a good one, because in the country it might be easily procured. In many parts of Great Britain, asses are to be obtained at a very cheap rate. I am told five shillings are in some places, in winter, gladly accepted; and I believe thirty shillings is the usual price. If, therefore, ass's milk can be thus successfully modified by the addition of cream, to a foundling hospital a herd of these animals would prove most useful, not only in providing milk for the infants, but in affording a ready method of exercise; while as beasts of burden they would prove valuable, particularly in a country neighbourhood or by the sea-side. To determine, therefore, the practical usefulness of ass's milk, would be no small matter, and would be fraught with immense advantages; but as theory condemns its use on scientific grounds, I for one, till its usefulness is proved by practice, must oppose the popular prejudice.

Goat's Milk.—The table given at p. 150 shows that the milk from a goat, if she has been fed upon beet-root, very closely resembles in chemical composition that of a woman, only that it is richer in sugar and salts. Still it comes much nearer to human milk than ass's milk. Indeed, as evidence that practice confirms theory in this instance, I may cite experience in Ireland. In that country, I am informed, the foundlings of Dublin were, very

many years back, sent to the mountains of Wicklow, to feed upon the goats' milk. As the children grew older, the goats came to know them, and became very tame; so that the infant sought the goat, and was suckled by it as he would have been by a human wet nurse. These children throve remarkably well. The same results obtain in Malta.

It is therefore to be much regretted that an animal so easily kept and obtained should not be more generally employed. If our Foundling Hospitals were to have establishments in the country, where goats might be kept in numbers, there would be no need for exclusiveness in admission of cases, and the hundreds of babies now sacrificed to the murderous system of dry nursing might be saved to their parents and the nation.

Cow's Milk.—The disadvantages met with in the employment of this variety of milk are well known to most of us; they are disadvantages dependent upon its bad quality, and are very serious in their results, and very difficult to overcome.

A few of these I will consider *seriatim.* They are—

1. Adulteration of cow's milk.
2. Its acidity dependent upon stall feeding.
3. The effect upon milk produced by keeping cows in unhealthy sheds.

1. *Adulteration.*—The most painful part of our experience in towns is, that pure milk cannot be procured; it is almost always adulterated. In the excellent work of Becquerel and Vernois, the *Annales d'Hygiène,* it appears to be adulterated in Paris by the following substances: — water, glucose, flour, starch, dextrine, infusion of amylaceous matters (rice, barley, bran), yolk of egg and white of egg, sugar, gelatine, liquorice, boiled carrots, broken down calves' brains, serum of blood, several salts, bicarbonate of soda, chalk, turmeric, emulsion of hemp or almond seeds, &c. We do not, however, find that in England these are commonly employed, but adulteration by water is extensively practised. Dr. Hassall, out of 26 samples of milk, found that 11 were adulterated with water in the proportions of from 10 to 50 per cent.

Dr. Sanderson, the medical officer of health for Paddington, found out of thirty-two specimens of the milk examined by himself and Dr. Alfred Bernays of St. Mary's Hospital, that in all, except one, the quantity of water was greater than it was in pure milk. In twelve instances the quantity of solid constituents was only half as great as it should be, in a few only one-fourth; many specimens contained less than 6·5 or 5·8 per cent., a few 3·5 instead of 12·98, as in pure healthy milk.

Dr. Hillier, the medical officer of St. Pancras,

examined twenty specimens of milk, and found that the quantity of water added varied from 25 to 50 per cent. That supplied to the workhouse was one of the poorest. Instead of a gallon containing nearly 9,000 grains of *solid* matter, it contained only 5,425 grains, or two-thirds the proper quantity. Dr. R. D. Thompson found in Marylebone, that the gallon of milk, in seven samples, weighed as a mean 71,680 instead of 72,415 grains, which amounts to the withdrawal of 1·44 oz. of solid matter, well calculated to nourish the body, and substituting for it water. Dr. Hyde Salter and Mr. Hunt, from the confessions made to them by milkwomen, their patients, state the quantity of water usually added is one gallon of water to two of milk. What sort of food can this be for an infant, especially if diluted, as it almost invariably is, by the purchaser, and often afterwards by medical direction? Is it to be wondered at that children fed on such weak milk do not thrive?

2. *Acidity.*—Cow's milk, except the animal has been fed exclusively upon grass, is almost always *acid* in stall-fed cows; human milk is always alkaline; hence another reason why cow's milk disagrees with many children.

The experiments of Dr. Mayer of Berlin are particularly conclusive upon this point. He says that for a considerable time he had been in the

habit of examining the milk supplied to householders in Berlin, and testing it by litmus paper, according as the cows were fed from brewery slops or brandy lees, gardeners' produce, or in the country. In every instance, except one, he had found the milk decidedly sour. *a.* Of cows fed with brewers' lees, red potatoes, rye bran, and wild hay, in five instances the milk was slightly sour, in one very much so. *b.* Of forty cows fed with potato mash, barley husk, and clover and barley straw, in ten which were examined the milk was sour, in three very sour. *c.* From among fifty cows, fed on potato husks, barley husks, and wild hay, five were examined, and in all the fresh milk was sour. *d.* From fifty-two cows, fed on potato mash, husks, wild hay, and rye straw, out of twelve selected for examination the fresh milk of all was sour. *e.* From six cows, fed by a chief gardener on coarse beet-root, red potato, bran mash, and hay, the fresh milk was faintly sour. *f.* From five cows, fed by a cow-feeder on lukewarm bran mash and hay, in four the fresh milk was quite neutral, in one it was decidedly alkaline. The whole of these experiments were made in the winter season, when cows were necessarily stall-fed, and confirm the truth of the general opinion, that the fresh milk of stall-fed cows is almost invariably acid. Dr. Mayer does not believe that this acidity is due to want of exercise, so much as to the unscientific

manner in which the cows are fed; and he particularly objects to the potato mash, which he considers the cause of this acidity. The milk of the cows of gardeners and cow-feeders is usually praised by the Berlin women as being particularly good. But Dr. Mayer has observed that it often gives rise to diarrhœa and cutaneous eruptions in children; which, he supposes, is due to the cows being fed with the cabbage, turnip, and potato refuse. The very worst milk is that supplied by cows fed on potato refuse from brandy distillers, the best that obtained from the cows of cow fatteners, which feed on hay and grass in stalls. By substituting the milk of the latter for the former, he was often enabled to arrest at once the intestinal derangements previously referred to.

3. *Effect on Milk produced by keeping Cows in unhealthy Sheds.*—The supply of good and selected food is, however, only one part of the management needed to insure good milk from milk-bearing animals. Excessive cleanliness should in every way be enforced. Upon the subject of the cleansing of cow-sheds, Messrs. Parmentier and Deyeux remark:—"Nothing contributes more to maintain the good quality and quantity of cow's milk than scrupulous cleanliness in the shed. If the refuse matters are left about and removed only at long intervals, the cows lying amid all this mess are always weak, the udders are hot; and the milk,

so susceptible of acquiring a bad odour, soon contracts a bad taste, of which it is with difficulty again deprived. The great reputation of the cows of the Prevalaye is due to the remarkable cleanliness in which they are kept, which also enables them to yield an abundance of milk, and to be particularly free from disease."

A very slight glance at what is revealed to us in Dr. Hassall's book as to the unhealthy localities and ill-ventilated sheds in which cows are kept in London, will convince any man of common sense that the cows in such localities cannot be healthy, and that their milk must also prove occasionally very detrimental.

I have, in the course of a large dispensary practice, visited some of the wretched inhabitants living either in the immediate neighbourhood, or over these sheds. On one occasion I remember having to cross through the shed to get to the small upper room above it, where lay a child infected with fever. The puddles of liquid and fæcal matters through which I was forced to pass, and the abominable odour pervading the apartment, I have not yet forgotten; and yet from this cow-shed a large proportion of the neighbourhood was supplied.

The character of disease which attacks the wretched inmates of the small, close cottages just around it was always low, if not typhoid. Many examples are given in Dr. Hassall's book of the

wretched, filthy, and offensive sheds in which cows are kept. A common sewer would be in many cases equally pure. These facts are well known to most medical and to many general readers of the *Lancet*. I shall, however, content myself with a quotation from the *Lancet*, which details Dr. Normandy's experience, and with some of the reports of the Officers of Health of later date.

In the Report of the Commission on adulterations (quoted by the *Lancet*, ii. 1855, p. 551), Dr. Normandy states he was lately in the neighbourhood of Clerkenwell for the purpose of examining a well in that locality, when he met with a sight which prevented him from tasting milk for six months afterwards. Dr. Normandy saw from thirty to forty cows in a most disgusting condition, full of ulcers, their teats diseased, and their legs full of tumours and abscesses; in fact, quite horrible to look at; and a fellow was milking them in the midst of all this abomination. This was by no means an exceptional case, a great many dairies being in the same condition. The milk in consequence provided was really *diseased milk*. This state of the poor animals must have been produced by the manner in which they were kept.

In speaking of cow-sheds, Dr. Hillier says of St. Pancras, that there are ninety-two such establishments, some well placed, with good drainage; twenty-two are not near inhabited dwellings;

others quite underground; twenty with inhabited rooms above them; some surrounded by noxious exhalations. Their size is often very insufficient; the cubic space for each cow is sometimes as low as 230 feet; 1,000 to 1,500 being not at all more than cows require. The drainage is very bad in twenty or thirty. Very few are efficiently ventilated; whilst from forty to fifty are as bad as they can be in this respect. Forty of the sheds are kept in a most filthy condition. Seven sheds are without water supply. The manure is kept too long in seventy-six cases; in sixty-three, there is no suitable pit for it; in scarcely any is the place covered over. Occasionally the manure heap is immediately under the windows of dwelling-houses, and in some instances is made the receptacle for the contents of human retirades. The grains on which the cows are fed are usually kept until they are sour, and give out an offensive smell. In seventeen sheds the cows drank distillers' wash, which was kept in uncovered receptacles, and was very offensive. In addition, there is often vegetable matter lying about the yard in a rotten state. In fifteen of the sheds pigs are kept as companions to the cows. Some of the animals are very clean, being curried and attended to in the same way as horses. In many instances, on the contrary, they are fearfully neglected, and their coats are either one entangled mass of filth, or else are free from

hair, owing to a diseased state of the skin. The deaths from diseases of cows are enormous. One gentleman, out of a large number, lost in one year ninety; another, who keeps fifty cows, lost three hundred in six years; another, with from four hundred to five hundred cows, considered it not bad luck to part with two cows weekly from disease. Insurance prices tell a tale. *Country* dairy cows are insured at sixpence to sevenpence halfpenny in the pound; *London* dairy cows, at eighteen pence to two shillings in the pound; so that they consider the risk on town cows three times as great as on country cows. Dr. Sanderson in his report says the mortality of cows in Paddington was three hundred and four in 1856. In a large proportion the drainage and ventilation were deficient, and fatal disease had prevailed to a frightful extent among the animals kept. No less than 19 per cent. of the whole number of cows had died in three months: in one case all the cows died.

So much for a few dainty spots in this great town. But is it better in other parts of England, or in other great towns? When diseased cows—many of which, to use a common term, are in consumption, or whose bodies are one mass of ulcers and abscesses—are the animals selected to provide milk in our large towns, is it wonderful that so many children brought up by hand die in these towns,

while so few comparatively die in the country? No wonder, then, as Dr. Merei says, is it that cow's milk is so depreciated among the working classes. That gentleman states, that, including children fed on other articles besides bread (and the number, from another table, appears to be 602 out of 722), only seven, or 1·1 per cent., received cow's milk without bread or other admixture; twenty-seven, or 4·4 per cent., used it with arrowroot or sago, partly with flour.

There can be no doubt, from the foregoing remarks, that if the subject were more closely studied, cows and goats might be so cared for and so fed as to yield a quality of milk which would be found most serviceable to children brought up by hand. The milk obtained from cows fed upon beetroot, with a very small dilution of water, might be brought so closely to resemble human milk as in all respects to perform the same services. But every day's experience proves that nothing but the most stringent measures can effectually remedy the abuses that prevail. *Parliament must interfere:* and in what better cause could it do so than by compelling all cowkeepers to sell good milk, thereby preserving the lives of thousands of helpless babes, and strengthening the bone and sinew of its people? Till this is done, our best efforts, it is to be feared, will prove nugatory.

CHAPTER V.

OF OTHER ANIMAL SUBSTITUTES—CREAM—DESICCATED MILKS; MOORE'S AND GRIMSDALE'S—EGGS—BONE SOUPS AND JELLIES—BEEF-TEAS—SWEET BREAD TEA—RAW MEAT—CAUTION IN EMPLOYMENT OF LATTER.

THE difficulties which surround the employment of cow's milk, in the state in which only it is procurable, have led to ingenious contrivances for its modification. Thus—

Cream as a Substitute.—I have before said that there are some cases in which no wet nurse can be found to suit a child; and in these, moreover, milk in its several forms may be tried, but the efforts to bring up that child upon milk will fail altogether. In many of these cases, it is observed that there is a great quantity of acid produced in the stomach of the child, and the same effect results when that child takes saccharine matters. It is in such instances that the mixture of one part of cream to three of water proves often very beneficial. I have known of a child reduced

almost to a state of complete atrophy, gradually recovering its good looks and strength on this change of diet. Cream in composition contains pretty nearly the same ingredients as milk, except that the casein is diminished, and the fatty matters considerably increased. In this manner, the absence of sugar is compensated for by the excess of fatty matters; and thus the fluid produced is sufficiently rich, both as a nutritive and as a calorifiant aliment. The addition of water diminishes the density, and makes the mixture more digestible. If to every half-pint of this mixture half an ounce of lime-water be added, the tendency to the formation of acid is removed, the solubility of the casein and the emulsion of the fatty matters are insured, and both these last become more assimilable.

Something like a substitute may be found, however, in the employment of desiccated milks, to which, if water in proper proportions is added, a milk presenting all the peculiarities of good rich milk is produced. Two of these kinds are known in London—Moore's Patent Concentrated Milk, and Grimsdale's Patent Desiccated Milk. In a communication received from Mr. Moore, through a late friend, that gentleman stated that his milk could be manufactured at 1*s.* 4*d.* per lb., which would be equal to one gallon of pure milk. The milk is, I understand, merely evaporated at a tem-

perature under the boiling point. It appears to possess many advantages.

The other preparation, Grimsdale's Desiccated Milk, is not in the form of extract, but rather of powder, of the same bluish white colour as milk. This has rather a gritty feel to the finger, and, when put on the tongue, a strong milky taste; and it mixes readily with boiling water. It is sometimes acid, sometimes alkaline. From calculation, one ounce of the powder requires 6·4 oz. of boiling water to make it of the same strength as milk. I have no experience of its uses or advantages. The objection to it seems to be, that it needs boiling water for its solution; nor am I aware if it is in its preparation evaporated to the consistence of an extract by heat above or under 212° Fahr.

Other Substitutes for Milk. Eggs.—It would appear natural, from the lessons comparative anatomy and chemistry give us, that where milk could not be procured, *eggs* would afford a good substitute. Indeed, in composition the egg presents several points of analogy to milk. It is true we have albumen in the place of casein; but these two substances, for all practical purposes, may be considered as identical. The white of the egg is albumen in a very pure state, with about 22 per cent. of water, and 0·65 per cent. of salts. The yolk, with 52 per cent. of water, and 1·52 per cent. of salts,

contains as its albuminous compound a substance called *vitelline*, very like albumen in composition, but coloured by an oil containing phosphoric acid, and in its ultimate composition being a little richer in hydrogen and oxygen. Moreover, Barreswill has determined the presence of sugar in the white of egg. It has an alkaline reaction, which is due to the presence of carbonate of soda. The yolk, on the contrary, contains little or no alkali, and its emulsive character is to be ascribed to the presence of a substance very like pancreatic juice. The proportion of white of egg to yolk may be stated as 60·6 to 39·4 and 58·4 to 41·6.

By reference to the subjoined table* it will at once be seen, that in the quantity of phosphoric acid, and of chloride of potassium, only to a larger

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* *Composition of Egg* (Gobley).

		Yolk.
Water		51·5
Vitelline		15·7
Margarine and Oleine		21·3
Cholesterine		0·4
Phosphorous body	7·2	
Oleic acid	1·2	8·4
Phosphoglyceric acid		
Cerebric substance		0·3
Salts		2·3
		White.
Water		77·15
Albumen		22·2
Salts		0·65

extent, egg resembles milk and flesh, and, as such, must possess similar properties in nourishing a child.

The white of egg, however, should be given as nearly as possible raw, or, if warm, only heated to 130° Fahr. Beyond this temperature it coagulates, and then becomes much more difficult of digestion. If the egg be put in boiling water for two minutes only, except a thin external layer of albumen which will have been coagulated, it will be warmed throughout. Cow's milk contains 5·5 of casein per cent.; and white of egg as much as 11·1, yolk 1·5—together 12·6. Eggs should, therefore, be diluted; and, with a little sugar of milk added, would form a very fair substitute for milk.

Bone Soups and Jellies have been recommended

The salts raised to 100 parts contain according to Polack—

	Yolk.		White.
Chloride of potassium	—	...	42·17
Chloride of sodium	—	...	14·07
Potass	6·57	...	16·09
Soda	8·05	...	1·15
Lime	13·28	...	2·79
Magnesia	2·11	...	3·17
Sesquioxide of iron	1·19	...	·55
Phosphoric acid	66·70	...	5·79
Carbonic acid	—	...	11·52
Sulphuric acid	—	...	1·32
Silica	1·4	...	2·04

as aliments for children. The opinion at present almost universally entertained is, that gelatine, the chief ingredient in such soups, &c., although a nitrogenous substance, is, like hair, innutritious. It is unassimilable in children, as well as in older persons; and it only overloads the blood with nitrogenous products, which render this fluid impure and unfit for the purposes for which it is required. Still, as an emulcent in cases of irritation of the bowels, or for the exhibition of wine or particular remedies, jellies may be useful, occasionally, just as arrowroot may be given in similar affections.

Next in order, as substitutes for milk, are beef-teas; and of these I shall speak of three kinds only—Liebig's Beef-tea, a beef-tea made with artificial gastric juice, and Hogarth's Essence of Beef. Meat possesses this advantage over vegetable food—in a given weight it contains more nutritious matter. An essence or extract of meat thus contains, in a still smaller weight, all the nutritive properties essential to the maintenance of life, and, if mixed with a little fat, all the nutritive and combustible properties to be desired. Unfortunately, a complete extract of meat, entirely soluble in water, cannot be made, owing to the insolubility of fibrin.

Liebig's Beef-tea.—When flesh is finely lixiviated with cold water, all its soluble matters are

removed, and a perfectly tasteless, inodorous residue is left, which in every case is white like fish. The solution remaining is highly coloured, and consists of lactic and inosinic acids, creatine, creatinine, and a nitrogenous organic acid, which forms a pellicle on the surface like casein, though differing from it in many other respects. There are several other ingredients not very clearly made out, besides tartrate of potash, phosphates, especially of the alkalies, a little lime, and more magnesia.

It is this solution which is to be evaporated to dryness, and constitutes the best extract of meat. In doing so, however, as the albumen in it coagulates at 133° Fahr., and the colouring matter at 158° Fahr., and would above this temperature be precipitated, it is advisable to evaporate it in a sand bath, at 120°; in this manner all the nutritive, combustible, and mineral matter will be retained. To this extract more or less water may be added, according to the strength of the tea required. It is well to use on these occasions the flesh of young animals in preference to old. In the latter case the albumen will vary from 1 to 2 per cent.; while in the former, it will be as high as from 12 to 14 per cent. The extract prepared by Mr. Roberton, of Manchester, and obtained in the form of a dry powder, is the best I am acquainted with. However, except in cases where haste is required, there is

scarcely any need of using this extract, since the beef-tea itself, prepared by lixiviation in water overnight, is more easily obtained. This, also, should not be heated above 120° to 130°; never boiled. If more body is required, a little flour or fine oatmeal may be added to the tea, so as to thicken it; in which state also finely divided meat may be suspended in it. Lastly, a little lime water may be mixed with it to remove any excess of acidity.

A beef-tea has been recommended which promises to have some advantages even over Liebig's. I allude to one made with a prepared or artificial gastric juice. We are all aware that the digestion of nitrogenous matters is chiefly effected in the stomach, and this through the instrumentality of a fluid called "the gastric juice," which possesses the particular property of dissolving very speedily all azotized aliments. This artificial gastric juice can be readily prepared by digesting the mucous membrane of the stomach of any animal in dilute hydrochloric acid. The best proportion for preparing the latter is three drops of the strong acid to one ounce of water. By exposing this mixture to a gentle temperature of 70° Fahr., we obtain a fluid possessing all the properties of gastric juice. If beef-tea be prepared on Liebig's plan, and then after a few hours' maceration in cold water the artificial gastric juice be added, and the temperature raised

to 70° Fahr., some of the fibrin will be taken up as well as the albuminous matters before in solution in the supernatant water; and a beef-tea much richer in azotized food—in fact, an artificial chyme—will be obtained. For cases of defective or weak assimilation, the advantages of such a beef-tea are very obvious.

The same result can be obtained by addition of the Liquor Pepsinii, or the essence of rennet, in both of which we have the principal ingredient of gastric juice, which in cases of defective assimilation is so much required.

Another method, of which I have no experience, yet which theoretically appears very plausible, would be the addition to beef-tea, or to milk, of a solution of sweet-bread, *i. e.* a pancreatic tea, or broken-down pieces of the sweet-bread itself. It is known that fatty matters are saponified by the secretion of this gland, which is always contained in some proportion, in the substance of the gland itself, and may, therefore, be substituted for it. The secretion also converts starch into sugar, and probably also exerts a solvent action upon azotized matters. I shall, however, again refer to this point in the sequel.

Hogarth's Essence of Meat.—Of the composition of this material I can say nothing, except that I believe it is a concentrated solution of meat-tea—in fact, a meat-tea reduced by the evaporation of

its watery ingredients to the consistence of a syrup. I can, however, confidently speak from experience of its utility. It is certain that children who have been reduced to a state of great weakness by hand feeding, or improper diet, occasionally recover, and that almost marvellously, under its influence. I have used principally the essence of beef. Its taste is much liked; and in doses of five or six teaspoonfuls daily, with a very little water, it is well digested by children. Indeed, it is often borne in infants affected with exhaustive diarrhœa from weaning, when milk and farinaceous food disagree.

This result may probably explain the success occasionally obtained by the administration, in exhaustive diarrhœa, of raw meat, which is but a step further in the same direction. "In these circumstances," says Dr. West,* "there is still one article of food—raw meat—which, strange as it may seem, is often eagerly taken, and always perfectly well digested. Professor Weisse, of St. Petersburg,† first recommended its employment in children suffering from diarrhœa after weaning; and it has been since then frequently given by other physicians in Germany in cases of long-standing diarrhœa. The lean either of beef or mutton very finely shred may be given in quantities at first of not more than

* Diseases of Children, p. 498.

† *Journal für Kinderkrankheiten*, vol. iv. p. 99.

two teaspoonfuls four times a day to children of a year old, and afterwards, if they crave for more, a larger quantity may be allowed. I have seldom found any difficulty in getting children to take it; often, indeed, they are clamorous for it; it does not nauseate if given in small quantities, nor does it ever aggravate the diarrhœa; while, in some instances, it has appeared to have been the only means by which the life of the child has been preserved. With returning convalescence the desire for this food subsides, and the child can without difficulty be replaced on its ordinary diet."

Upon this point more lately some very important facts have been recorded by Dr. F. P. Leverett, of South Carolina, in an article published in the *Charlestown Medical Journal*,* and reproduced in an extract in the *Dublin Medical Press*.† As the subject is most important, I may be pardoned for giving this abstract almost in full. "In the fall of 1855 Dr. Caspar Lewis introduced the use of raw beef into the children's ward of the Philadelphia Hospital, to which he was the attending physician and lecturer. He had the fillet of beef as free from fat as possible, scraped with a knife, so as to obtain the pulp, as Weisse, of St. Petersburg, recommended. This he seasoned generally with salt, sometimes

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* Of September, 1859. † Of May 9, 1860.

with sugar, so as to tempt the children. He gave of this pulp at first a teaspoonful, three or four times a day, and gradually increased the amount as the child's fondness for it increased. It required but a few days in any case to get the child to take it with readiness, if not avidity; some even relished it from the first. Many of the students who attended Dr. Morris's clinical lecture in 1855, witnessed the great benefit which many of the children derived from this remedy, then new in our country. Weisse some years previously recommended its use in the diarrhœa ablactatorum, but to the comparative inattention it received in Europe may be assigned the reason of its being almost unknown to us. Dr. Morris mentioned to Dr. Leverett, that it had been suggested to him by his friend Professor Thomas, of Baltimore, who had used it with great benefit for one of his children suffering with chronic diarrhœa."

There are several cases related in the paper above referred to, in which raw meat was given with the greatest advantage. Their consideration, however, more properly belongs to the *treatment* of defective assimilation, and will occupy our attention when we come to discuss that portion of our subject. It was necessary to mention this remedy in this place, as a most important mode of cure, and one often eminently successful when all other means have failed. The objection to it is one to which

Dr. Leverett in the above paper also refers, namely, that raw meat, often at least on the Continent, contains the ova of tape-worm, and hence those who take it in this state become affected with this parasite. A case of this kind has lately occupied the attention of medical observers; and as raw meat is likely now to become from its manifold advantages a frequent remedy, it is as well to refer to it in this place by way of caution.

"On January 12, 1860, a robust maid-servant was admitted into the Dresden Hospital. She had been indisposed since Christmas, and confined to bed since New Year's Day, complaining of depression, lassitude, sleeplessness, loss of appetite, and thirst. These symptoms persisted on her admission. There was considerable pyrexia; the abdomen was painful and tympanitic, and although neither splenic tumour nor roseola were present, the case was put down as one of typhoid fever. A remarkable affection of the whole muscular system now rapidly supervened, consisting in extreme painfulness of the extremities, with contraction of knee and elbow joints, and œdematous swelling, particularly of the legs. The pain was so severe that the patient was continually moaning. Pneumonic symptoms now appeared, and death took place on the 27th inst., preceded by an apathetic condition. The *post-mortem* examination showed in the internal organs merely an atelectatic condi-

tion of the left lung, with numerous small lobular infiltrations, bronchitis, and hyperæmia of the mucous lining of the ilium. The muscles, however, which showed a greyish red colour and a slightly freckled appearance, were found, on microscopic examination, to harbour vast numbers of non-capsulated trichinæ. The parasites were living, some coiled in spirals, others with extended bodies, and all (as Professor Virchow was the first to show, in a fragment of muscle which was forwarded him for examination) living in a sarcolemma of the primitive fibrils. They showed various stages of development. They were diffused over all the striated muscles of the body, with the exception of the heart, and that in such vast numbers that, under a small magnifying power, as many as twenty were counted in the field of vision simultaneously. The muscular substance was otherwise fragile, homogeneous, and non-striated, and showed numerous transverse fissures. The intestinal mucus was found to be swarming with mature trichinæ of both sexes; and the remarkable fact was elucidated, that female trichinæ are viviparous, the central portion of the bodies being observed to be full of well-developed embryos.

"Inquiry being directed to the probable source of trichinatous infection, it was ascertained that on December 21, four days before the patient was taken ill, two pigs and an ox had been slaughtered

on the establishment of her master. Some smoked ham and sausage, prepared from the meat of one of the pigs, were fortunately obtained, and on examination proved to be full of trichinæ. The parasites had a shrunken appearance, otherwise unchanged; reassumed a normal appearance on addition of water, but showed no signs of vitality. It is particularly worthy of remark, that to the naked eye the ham appeared quite healthy. It is very likely that the deceased had partaken of some of the raw meat. The butcher of the establishment (butchers notoriously indulge in raw meat) had also been taken seriously ill a short time afterwards, and had been confined to his bed for three weeks with severe muscular pains, his whole body being semi-paralytic, &c. This complaint was ascribed to rheumatism at the time, but Professor Zenker correctly surmises, that an immigration of trichinæ not sufficiently extensive to prove fatal, may have been the cause of attack, and that capsulated trichinæ would be very likely discernible in his muscles."*

It may be stated that muscles are liable to two kinds of parasitical infection—commonly found in the abdominal muscles of sheep, and often present in the rabbits of London. One of these is the *cysticercus*. The muscle is covered by a number of

* *Medical Times*, June, 1860.

small bladders. On opening one of these, a small animal, bladder-shaped also, with a prolonged portion, at the extremity of which is the head, is observed. The other variety is the *trichina spiralis*, above alluded to. This creature is generally confined to the voluntary muscles, and is occasionally found in animals who during life have been apparently in good health. The muscles affected with this parasite are more fragile than usual; and to the naked eye, instead of looking red and clean, have a freckled appearance, or here and there a greyish aspect, which it is at once obvious is not due to an intermixture of fat. Looked at more closely, numerous transverse fissures are found on the surface, together with a number of white spots or vesicles, which are oval-shaped, and opaque at each extremity. Within each vesicle is a *worm* coiled upon itself. This is the *trichina*. Meat about to be given *raw* should, therefore, from prudential reasons, be carefully examined: if it appear grey, and there are any spots on its surface, it is a suspicious specimen. A small magnifying power will at once, however, clear up the doubt. Fortunately in this country beef is seldom infected with these parasites, and it is this variety of meat which is usually prescribed in a raw state.

CHAPTER VI.

ON SOME GENERAL DEDUCTIONS IN REFERENCE TO ALIMENTATION MADE FROM THE COMPOSITION OF MILK AND ITS SUBSTITUTES.

SALINE INGREDIENTS OF MILK—PHOSPHATE AND CARBONATE OF LIME—USES—PHOSPHATE OF SODA—PHOSPHORIC ACID—IMPORTANT RELATIONS OF CHLORIDE OF POTASSIUM.

1. THE remarks before made upon the need of maternal warmth, and of the semi-erect position for a child, have, I conceive, shown the advantage of employing some kind of mammary bottle, and of letting the child recline against the body of the person so feeding it.

2. That the recumbent position, and continued judicious exercise to obviate starvation, are imperatively required.

3. That the child is by formation and all analogy of comparative anatomy, constituted to receive in early ages animal food only. But there are other general principles to be brought prominently forward, which are made at once obvious by the

consideration of human milk in its component parts.

I shall first speak of the *saline ingredients*. Their due appreciation will give us a key to the quality of substitutes required when artificial food is given, and also set forth some very important principles in alimentation.

The salts of milk are not the least important of its constituents. They are stated in the annexed table for human and cow's milk:—

Mean of two experiments.

Cow's milk.		Human milk.	
Phosphate of lime	2·84	. . . .	0·706
Phosphate of magnesia	1·06	Carbonate of lime	0·069
Phosphate of peroxide of iron . . .	·07		
Chloride of potassium	1·63	Other salts .	0·053
Chloride of sodium .	·29	. . . .	0·098
Soda	·43	Sulphate of soda	0·074
	1·00		1·000

Schwartz in his *Journal* (vol. viii. p. 270) mentions, as contained in 100 parts of human milk, the following enumerated salts:—Soda, resulting from the decomposition of lactate of soda, 0·03; chloride of potassium, 0·07; phosphate of soda, 0·04; phosphate of lime, 0·25; phosphate of magnesia, 0·05; phosphate of iron, 0·001.

First, of the *phosphate of lime*. This salt, especially when combined with carbonate of lime, is most useful in the process of alimentation. It is

on their combined agency that the solidity of the skeleton depends. Moreover, it is a peculiar property of phosphate of lime to make carbonic acid more soluble in the blood. Its administration, whether in a separate form or in aliment to a growing animal, is thus peculiarly indicated. Deformity of every kind in the skeleton may depend on an insufficient quantity of this salt in the blood; for it should be remarked, firstly, that not only is it useful because it is itself appropriated to the system; but, secondly, phosphate of lime, when present in a fluid (which in the present case is milk, and by subsequent assimilation blood), has the property of enabling that fluid to take up more carbonic acid. Now when carbonic acid in its turn is in excess, it dissolves carbonate of lime. Hence, the quantity of carbonate of lime held in solution in the blood is thereby made greater, and is in this way from time to time more easily and largely deposited in bone. Chalk, or carbonate of lime, is insoluble in distilled water; but in proportion as this becomes saturated with carbonic acid, so a larger quantity of the chalk is taken up—a property never to be lost sight of when it is wished to strengthen a growing child. Again, the *phosphate of soda* has an alkaline taste and reaction like the *carbonate*, and its solution in the presence of free carbonic acid takes up as much of that acid as car-

bonate of soda does; and, like it, only more easily, gives it off by agitation *in vacuo*, or by evaporation, without losing its power of again absorbing carbonic acid. Hence it follows, that in adults the change of carbonic acid combined with alkali by phosphoric acid has no pernicious influence, which occurs when animal food is taken in lieu of vegetable food, and *vice versâ*, because it gives rise to no alteration in the essential properties of the blood. The processes of sanguification, of the production of heat, and secretion, are carried on alike under the influence of the predominating alkali, as before stated.*

But phosphate of soda seems to possess another useful property in the economy. The fatty acids, stearic and margaric, are converted into emulsions in the chyle through its agency, so as to allow of their easy assimilation in the system. This peculiar property, discovered by Dr. Marcet and lately exemplified by Dr. Thudichum before the Medical Society, is of immense importance in the explanation of the digestion of fatty matters, and is another reason for supplying food rich in phosphoric acid and soda, which is especially the case with animal aliments, to growing and weakly children; fat, as is well known, being the nucleus around which albuminous matters are deposited.

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* Liebig's *Letters*.

In the uses of *phosphoric acid,* particularly when viewed as an acid, and in regard to alimentation, there are several very interesting points. The blood is alkaline, and, as opposed to this, flesh is acid, the acidity being due to phosphoric acid; and this is true for other solid portions of animal food, but for muscle especially, which contains an excess of phosphoric acid. But in muscle, and in soup made from muscle, we have also excess of *chloride of potassium* in lieu of chloride of sodium. Now there is considerable analogy in this respect to milk which contains an excess of chloride of potassium, although it also contains some chloride of sodium. (See Table below.*)

No doubt this large excess of the potash salt in milk answers many of the purposes of chloride of sodium in the economy. But chloride of potassium enjoys the peculiar property, in common with carbonic acid, of dissolving carbonate of lime, or chalk. The advantage, therefore, of giving to the infant this salt for the purposes of the skeleton, and in supplying to the muscular system a salt

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* *Composition of ashes of flesh.* (Keller.)	When boiled there enter into the soup.		*Composition of ashes of milk.* (Com.)	
Phosphoric acid	36·60	26·24	Phosphate of lime	50·7
Potash	40·20	35·42	Phosphate of magnesia	9·5
Earths and oxide of iron.	5·69	3·15	Phosphate peroxide of iron	1·0
Sulphuric acid	2·95	4·95	Chloride of sodium	5·0
Chloride of potassium ..	14·81	14·81	Chloride of potassium..	27·1
(Liebig's *Letters,* p. 428)			Soda	6·7
	100	100		100

essential to that structure, must appear at once obvious.

The excess of potash salts generally, but of chloride of potassium especially, which last, as in muscular flesh and milk, so greatly exceeds in quantity the chloride of sodium, is very remarkable. My friend Dr. Andrew Clark has also informed me that potash salts are always in excess in cell-developments, even when the growths are morbid —a fact of great importance, although often overlooked, as showing that those animal foods which contain an excess of potash salts should be preferred as aliments for growing children.

While, however, these facts are admitted, it is important to oppose a fallacy usually made, in speaking of chloride of potassium. Robin and Verdeuil have properly insisted upon the impropriety of confounding this salt with chloride of sodium, or common salt, in all its agencies upon the animal economy. Although it is true that they may be mutually substituted for each other in plants, they cannot always be similarly substituted in the animal body, particularly in the young animal. We have said that chloride of potassium exists in large quantity in muscles; it is found also in small quantity in blood. The reverse is true as regards chloride of sodium. This proves a peculiar antagonistic power in these two salts. It is remarkable also to notice, in connexion with this opposite action, the fact that muscular tissue

which contains a large excess of chloride of potassium has an *acid* reaction, whereas blood which contains a large excess of chloride of sodium has an alkaline reaction. Now this correlative antagonism cannot be purely accidental. Nay, its constant occurrence proves that it is intended to fulfil some wise purpose, although we may not fully appreciate it. It is also curious to note that the potash salt, so needful to cell-growth, is in milk (the food *par excellence* for babies, and in whom growth is so rapid and continuous) conveyed not as a sulphate, phosphate, or carbonate, but as a chloride. This preponderance of chloride of potassium and phosphoric acid in milk is also remarkable in a portion of the blood. I allude to the blood-globules; a coincidence the more remarkable, as the blood-globules are eminently concerned in nutrition. Upon this point I quote Lehmann's remarks.

"Although we are able to calculate the quantity of the *mineral* constituents in the blood-cells, the questions still remain to be answered,—whether there are certain salts which especially accumulate in the cells, and if so, which they are. These questions have also been answered by C. Schmidt, for he has discovered that the fluid of the blood-cells (*i. e.* the water contained in the blood-corpuscles) contains in addition to the organic matters a preponderance of *phosphate* and *potash* salts; so that, consequently, the phosphate of potash and

the greater part of chloride of potassium pertain to the blood-cells, whilst the chloride of sodium, with a little chloride of potassium and phosphate of soda, is found in the plasma, *i. e.* the serum and fibrin. In the plasma the organic materials are combined only with soda; while in the blood-cells the fatty acids and the globules are combined both with potash and soda.

"C. Schmidt, in analysing a specimen of food which contained 396·24 p. m. of blood-cells and 603·76 p. m. of intercellular fluid, found 1·353 of chloride of potassium and 0·835 of phosphate of potash, in the former; while there were 3·417 parts of chloride of sodium, besides 0·267 of phosphate of soda and 0·270 of chloride of potassium, in the latter. Schmidt has examined and tabulated the relations between potassium and sodium and between phosphoric acid and chlorine in the blood-cells, and in the intercellular fluid in several of the mammalia. (See Table below.*)

* 100 PARTS OF INORGANIC MATTER.

	Blood-cells.		Plasma.		Blood-cells.		Plasma.	
Genus.	Potassium.	Sodium.	Potassium.	Sodium.	P. O.	Chlorine.	P. O.	Chlorine.
Mean of 8 experiments .	40·89	9·71	5·19	37·74	17·64	21·	6·03	40·68
Dog	6·07	36·17	3·25	39·68	22·12	24·88	6·65	37·31
Cat	7·85	35·02	5·17	37·74	13·62	27·59	7·27	41·70
Sheep	14·57	38·07	6·56	38·56	8·95	27·4	3·56	40·89
Goat	37·41	14·98	3·55	37·89	9·41	31·73	5·90	40·41

"These results coincide with those of Nasse, who found most phosphates in the blood of those animals which were distinguished for the abundance of their blood-corpuscles, namely, swine, geese, and hens; in sheep and goats, on the other hand, in whose blood he found comparatively few corpuscles, he also found the least phosphates. On another occasion Nasse has expressed the opinion that the phosphates must be principally contained in the blood-corpuscles."*

It is also worthy of remark, that as metallic chlorides exist in extraordinary quantity in the gastric juice, and in the saliva also, as chlorides of sodium, and potassium especially, this may be probably another reason why chloride of potassium is provided in excess in milk, which is the natural food of young infants, in some measure to compensate for the supply usually afforded by saliva.

When, however, the functions of the blood-globules are considered, it is manifest that as in their constitution they on the one hand possess a remarkable correspondence with muscle in the large quantity of potash salts, especially chloride of potassium, and on the other hand a like correspondence to nervous matters in the large quantity of phosphuretted fat contained within them, it appears reasonable to conclude that they are espe-

* Lehmann, translated by Day, ii. 188.

cially destined to elaborate materials for the nervous and muscular tissues, whereby the fleshy organism and vital activity of the nervous and muscular systems are strengthened. Coupling this fact with the larger quantity of blood-globules in animals of high animal heat and in youth, their excess in dynamic fevers and plethora, their diminution in weak persons and low fevers, and generally in all cases where the system is badly nourished, we cannot fail to perceive how intimate is the relation between the process of nutrition and the quantity of blood-globules, and as a consequence the important relation in this process of phosphates and chloride of potassium. Hence, perhaps, one reason why chloride of potassium exists in such large quantities in milk to supply an ingredient so much needed by a young and growing animal. (Lehmann.)

CHAPTER VII.

ON SOME OF THE NUTRITIVE PROPERTIES OF MILK — MORE ESPECIALLY IN RELATION TO THE COMBUSTIBLE AND NITROGENOUS ELEMENTS—FATTY MATTERS—USES—DISADVANTAGES OF DIET TOO EXCLUSIVELY FATTY—SACCHARINE MATTERS —USES—EFFECTS OF A DIET TOO EXCLUSIVELY SACCHARINE— CASEIN; ITS USES — EFFECTS OF A DIET TOO EXCLUSIVELY CASEINOUS—GENERAL CONCLUSION ON ALIMENTS.

THE nutritive properties of milk depend on the combination of three alimentary substances, which may be classified as: first, the combustible, or those subservient chiefly to respiration and the fattening of the body, which are two in number, namely, the fatty portion in butter and the saccharine portion, the sugar of milk; secondly, the *nitrogenous* or *plastic ingredient*, subservient to the development of the fleshy and parenchymatous portions of the body; lastly, the *mineral ingredients*, which have already been discussed in the previous chapter.

I. The *combustible* materials.—Two of these, namely, sugar and fat, enter into the composition of human milk.

1. *Fat.*—Important as we have shown the relations of the mineral ingredients to be in the organism, those of the fatty matters are perhaps more so. Amongst fats, as they occur in the body, we have stearine, margarine, oleine, phoceine, and butyrine, all compounds of oxygen, carbon, and hydrogen, united in such proportions that one portion of the elements constitutes a fatty acid, fixed or volatile, whereas the other portion plus water constitutes *glycerine.*

A fat, however, does not consist of fatty acid and glycerine, but of fatty acid and oxide of *lipyl,* which last has the composition formerly ascribed to glycerine (C_3H_2O), and in its separation from the fatty acid appropriates the water.

In this way these several fats may be considered —margarine as margarate of oxide of lipyl, oleine as oleate of oxide of lipyl, &c.

The importance of fatty aliments for a young child is very great. A healthy child is almost necessarily fat. A sickly child almost as necessarily thin. Now the substances which produce fat in digestion are, first—with great waste, however, of the substances so used—nitrogenous ingredients; secondly—with a very great saving in the amount of aliment employed—alcoholic or fermented liquors, fatty or oily, saccharine and starchy matters. To two of this last class only, the fatty and saccharine, which exist in large

quantities in milk, we can properly here refer. Milk, indeed, contains a larger quantity of fat than any other animal fluid. An average of 2·9 per cent. of fat has been found in a woman's milk.

Fat is needed particularly as the nucleus in the cell-growth, around which the albuminous or nitrogenous matter is deposited. A deficiency, therefore, of fatty matter in the food will lead to atrophy, because there may not be a sufficiency of it in the system to supply the nuclei. This must be the case, except other matters convertible into fat are taken to supply this ingredient. Besides the mechanical services which fats render the animal organism, they take part through their chemical metamorphoses in the most varied animal processes; they take an active share in the digestion in the primæ viæ, and preside generally over all the processes by which the fluid nutrient substances are converted into the solid substrata of the organs. The formation of the colourless blood-corpuscles seems also to owe its first impulse to the metamorphosis of fat, which thus serves as the most important auxiliary in the formation of blood. Special attention should also be given to the fact that no animal cell and no fibre are formed independently of the presence of fat, although the concurrence also of albuminous substances is required. But even if fat is taken as aliment to be absorbed, *i. e.* assimilated, it must be in a free

state as a fatty acid; as fat it will not be absorbed. As before stated, fats consist of a fatty acid and oxide of lipyl. In the adult it is the pancreas which effects this separation into these proximate constituents. We all know that, if this change does not occur, the fat passes off unchanged by the bowels; and, as Bernard has shown, the expulsion of fat is one of the truest indications of diseased pancreas. In the infant, judging from the want of development of the salivary glands, the pancreas probably does not suffice to the complete performance of this function. It is here that we remark one of those wonderful adaptations of nature. First, in butter we have excess of a free fatty acid; therefore rendering the assimilation of it possible without the assistance of the pancreas: secondly, in the large proportion of *phosphate of soda* in the human milk we have another way in which it can be formed into an emulsion, and so taken up in the system.* It is important to notice that as phosphate of soda is probably absent in *cow's* milk, this may be one of the reasons why it occasionally disagrees when given to very young children.

Again, as in the adult, while excess disagrees, a small quantity of fat favours digestion. The effects of a diet too exclusively fatty present many

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* *Vide supra*, p. 185.

resemblances to those changes induced by one too exclusively saccharine. Magendie fed dogs upon olive oil and water. All the phenomena were the same. During the first weeks there was comparatively little difference, then weakness and loss of power supervened, and finally death took place. With butter the effects were the same; the dog died on the thirty-sixth day, although afterwards in pity meat was given on the thirty-second day. One eye ulcerated, and the urine was destitute of *phosphates* and *uric acid.* Generally speaking, however, this ulceration was less common. In combination with other aliments excess of oleaginous food appears to exert a beneficial effect, particularly in cold countries. In Iceland, where all circumstances considered usually favourable to the development of the scrofulous diathesis are present, the inhabitants enjoy a remarkable immunity from it, without any other assignable cause than the peculiarly oleaginous character of the diet usually employed.*

Fatty matters are occasionally accumulated in the blood. Several cases are on record in which the blood was quite white, in consequence of excess of fat. In some cases it was chyle, unchanged. Short of this, milky serum is not very unusual from this cause. The face and general appear-

* Carpenter's *Physiol.* 383.

ance of such persons are very greasy and oily-looking, quite the character of what Dr. Gibb terms "the atheromatous constitution."

The proportion of butter required for an infant, taking human milk as the average, is 1 part in 2·8; or, taking solid constituents, as much as 1 in 3.

2. *Sugar* exists in the body in two forms—First, *Sugar of liver*, or *diabetic* sugar, which is identical with the *grape sugar*, as it occurs in the grape; and 2nd, as *sugar of milk*. It is of the last only we have to speak particularly, and it has several very important bearings. In alkaline blood it certainly assists to dissolve the carbonate and phosphate of lime. Even if some salt of lime be present, yet the sugar may, as in the chick, combine with the alkali or lime in the alkaline fluid, and then dissolve the carbonate of lime as a compound of sugar with lime or soda, as shown by Barreswill.*

But sugar is capable of being transformed into fat in two ways: first, by undergoing a kind of *vinous* fermentation, the atom of sugar being decomposed into carbonic acid and a substance poor in oxygen; or, secondly, by a kind of *butyric* fermentation, hydrogen, carbonic acid, and a compound poor in oxygen being found, which last is one of the known fatty acids. In all these cases a

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* Day's Lehmann, ch. iii. 220.

peculiar ferment is developed, which is capable of separating the oxygen from the hydrogen. The *lactic* precedes this *butyric* fermentation, and of all nitrogenous bodies it is with *casein* especially that this change is effected. This, doubtless, is one of the reasons why casein is the nitrogenous aliment found in milk. This butyric fermentation, like the lactic, requires the addition of equivalent quantities of alkalies for its perfect accomplishment.*

"But in every case the deposition of fat within the animal body betrays a certain deficiency of oxygen, showing that the amount of oxygen respired is insufficient to allow the complete separation of the sugar into water and carbonic acid."†

Another important use of sugar is, that it is essential to the formation of bile. Sugar is not secreted by the mammary gland. The sugar is probably merely separated from the blood in which it exists. It is not readily detected in the blood; but this is probably due to the rapid manner in which it is excreted. Certain it is, if an animal is fed on starchy or saccharine matters, the quantity of sugar is considerably increased. It is upon these grounds that a milk containing more sugar and more closely resembling human milk, can be obtained from a cow or goat, if either be fed on beet-root in excess.

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* Lehmann, i. 282. † Ibid., iii. 221.

Allusion has been already made to the effects of a diet exclusively saccharine. Magendie fed dogs exclusively on sugar and distilled water. In the first seven or eight days they were sufficiently brisk and active; in the second week they began to lose flesh, although all along the appetite continued good; in the third week they became feeble and lost their appetite. Films also appeared in the eye, followed by an escape of the humours of the eye. From six to eight ounces of sugar could up to this time be taken; now, however, they could only consume three or four. Debility increased till voluntary movement was impossible, and death resulted from the thirty-first to the thirty-fourth day. General atrophy of muscular structure, and signs of inanition in the intestines, which were pale, empty, and contracted, were well marked on a *post-mortem* examination. These results may be expected in a minor degree where children have their food either too much sweetened, or if the breast-milk contains too large a proportion of saccharine matter compared to the other ingredients—a state I have remarked in some wet nurses with very thin milk. The proper proportion of sugar in milk should be 1 part in about 2·3, or, taking solid constituents only, 1 in 2·6.

II. *The Nitrogenous Aliment.*—Liebig states, "In the same way as in the egg, the albumen of the blood holds the first place in the powers of

formation of the fœtus, to which it is conveyed from without. By its elements it takes a share in all processes, it determines growth, and also the production and amount of all organized tissues in the young as well as in the adult frame. . . . Only those substances are, in a strict sense of the word, nutritious articles of food which contain either albumen or a substance capable of being converted into albumen."

In milk "we find it in the shape of *casein*, a substance which, like albumen, contains sulphur and nitrogen, and the absence of every other nitrogenous compound in milk renders it perfectly certain that from casein alone the chief constituent of the young animal's blood, as well as its muscular fibres, membranes, &c., are formed in the first stage of its life."*

From the experiments of Guillot and Leblanc it appears to be a normal constituent of blood in man and other animals, at least so far as the examination of seventy specimens of blood in men, women, oxen, cows, rams, sheep, &c., justifies the inference; but the quantity is notably increased during pregnancy.†

It differs from albumen in not being coagulable by heat, but it is precipitated by all acids, even

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* Liebig's *Letters*, pp. 247-8.

† *Comptes Rendus*, 1850, xxxi. 520—585.

acetic and lactic acids, which have no effect upon albumen. The addition of water to milk favours the separation of the casein, and renders it harder and less digestible.

One advantage, however, which casein has over albumen, among many others we have dwelt upon, is that it facilitates more readily than any other nitrogenous body, a butyric fermentation of milk where the lactic fermentation has been induced. It is doubtless in assimilation converted into albumen and fibrin wherever so required; for instance, the albumen which accumulates around the fatty nucleus of the cell-growth.

Dogs fed on casein exclusively live for a long time, but become weak and thin, and lose their hair. Its quantity in human milk varies, *e. g.* 20 to 40 per cent. in 1000 parts, or in reference to solid constituents, 1 part in 5 to 1 part in 10.

In speaking of these several alimentary substances it may be stated, that "after an animal has been fed for a long period on one kind of aliment, which, if long continued, will not support life, allowing him his customary food will not then save him, but he will die as soon as if he had continued to be restricted to the one article of food which was first given."* A variety is therefore essential to the maintenance of health. It is perhaps

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* Baly's Müller's *Physiology*.

because in artificial feeding due regard is not paid to this variety that the third stage of defective assimilation is induced, from which, as I have before stated, recovery very rarely, if ever, occurs.

It follows as an important corollary from the foregoing general remarks, that if inferior milk be given, or if artificial animal food be prepared from milk in an improper manner, the same results for evil will follow, because excess or defect in one or more of the ingredients will be given. It becomes, therefore, important to look at the question in another point of view.

CHAPTER VIII.

MODE OF CORRECTION OF IMPURE MILKS, AND OF PREPARATION OF ARTIFICIAL MILKS TO RESEMBLE HUMAN MILK.

In the foregoing chapter sufficient has been said on the use of the various kinds of milk in their natural condition. Let us now consider the questions—1. The correction of inferior milks, so as to adapt them for the sustenance of infants; 2. The preparation from strong and rich milk of a compound resembling human milk.

1. *Correction of Inferior Kinds of Milk.*—Here I am especially indebted to Dr. Merei of Manchester for information (in great measure incorporated in this chapter). If we take a tube nine inches long by half an inch wide, graduated into sixteenth parts of an inch, and put into it about two ounces of milk and the same quantity of water, and expose it to a temperature of 50° to 60° Fahr. for about eighteen or twenty-four hours, the cream will be found to have separated, and will be ob-

served as a whiter, more opaque substance, floating on the surface of the milk. If this stratum above the milk amounts to seven or eight of the graduated degrees, that milk is essentially good and rich, and contains about six and a half to seven and a half of butter. Medium milk will contain only five or six degrees; the worst kinds, only three degrees; and the inferior qualities supplied to the poor (skim milk), only two degrees. Here, then, is a ready means of measuring quality.

Now, experience has shown that such poor milk causes more gastric disorders than rich milk; nay, more, that to obviate this result it requires a greater dilution than rich milk, notwithstanding its poverty. Dr. Merei attributes this to the preponderance of casein, which is one of the chief causes of gastric disorder. This casein, it is observed, is both *harder* and *coarser* in cow's than in human milk. This is, no doubt, one cause; but there is another which, I think, applies, and which is mainly due to the dishonesty of milk-dealers. The cowkeeper has already watered his milk, to separate a certain amount of cream from it. The retail milk-keeper has done the same very frequently. The butter has thus been already taken out. Lactic acid has formed, and what butter remains in the milk is scarcely now contained in perfect combination as an emulsion, but is disintegrated, or, as it were, in imperfect mechanical

suspension only. The casein is perhaps in the same state.

Dr. Merei's experience in the method he adopts to improve inferior milks seems to point also to this view of the case.

In case of feeble children, with bowels previously deranged, he recommends that, instead of diluting the milk with water, we should add a decoction of arrowroot, made with one teaspoonful of this substance to three-quarters of a pint of water, this quantity to serve for the admixture of the whole day's supply. In more severe cases, the arrowroot may be increased to two teaspoonfuls. This arrowroot is not given as an aliment, but as a softish substance to soothe by its mechanical pressure the irritation of the intestinal mucous membrane. Langenbeck, indeed, believes that in such cases the granules of starch intersperse themselves between the particles of casein, and thus in a great measure prevent the formation of hard indigestible curds. The mixture Dr. Merei gives consists of three or four pints of this thin decoction of arrowroot to one part of new milk slightly boiled, and in the twenty-four hours' amount of food thus prepared he adds about one to two tablespoonfuls of *cream*. Children will digest well from a pint to a pint and a half of this mixture in twenty-four hours, according to age. As they grow older, he increases the proportion of milk, but not of the cream. If an

infant be tolerably strong and regular in his bowels, and has to be bottle-fed, under four months of age, a mixture of first-rate quality of milk simply with water, in equal proportions, or, after three to four months, one part of water to two of milk, agrees well, if given at a temperature of 90°. For children liable to diarrhœa, a very thin and weak infusion of aniseed tea, instead of water, may be substituted. Where the gripings and diarrhœa are severe, it is well to combine a teaspoonful, three or four times a day, of dill or peppermint water and water in equal parts, with lime water and a trace of opium to allay the irritation.*

The above has been very generally the plan upon which I have acted in these cases, with two exceptions. The ease now-a-days of giving cod-liver oil to infants, and its cheapness as compared to cream in towns, have led me usually to prefer the former, which doubtless acts in the same way as cream in supplying an oily but highly assimilable combustible aliment. Also, I have usually combined sugar, because it exists in cow's milk in smaller quantity than in human milk, and to favour a butyric fermentation.

2. *Preparation from Rich or Strong Milk of a Compound resembling Human Milk.*—My attention has been called to this possibility by Mr. Harry

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* Extract from a private letter.

W. Lobb, a gentleman who for some time past has closely studied the subject. In page 133 of his little work on *Hygiene*, he gives us the following method of preparing Professor Falkland's milk for infants. I subjoin it here in full.

One-third of a pint of new milk is allowed to stand until the cream has settled; the latter is removed, and to the blue milk thus obtained about a square inch of rennet is to be added, and the milk vessel placed in warm water. In about five minutes the curd will have separated; and the rennet, which may again be repeatedly used, being removed, the whey is carefully poured off, and immediately heated to boiling, to prevent its becoming sour. A further quantity of curd separates, and must be removed by straining through calico. In one-quarter of a pint of this hot whey is to be dissolved three-eighths of an ounce of milk sugar; and this solution, along with the cream removed from the one-third of a pint of milk, must be added to half a pint of new milk. This will constitute the food for an infant of from five to eight months old for twelve hours; or, more correctly speaking, it will be one-half of the quantity required for twenty-four hours. It is absolutely necessary that a fresh quantity should be prepared every twelve hours; and it is scarcely necessary to add, that the strictest cleanliness in all the vessels used is indispensable.

The above is a very ingenious process, but it is open to objection in one or two particulars.

a. Messrs. Parmentier and Deyeux have shown that there is a disadvantage in boiling milk. When eight pounds of milk obtained from cows fed on grass, cabbage, potatoes, and maize, respectively, were distilled, eight ounces of a colourless fluid were obtained. That from those fed on grass was aromatic; on cabbage, offensive; on maize and potatoes, quite inodorous. Hence they infer, that if this volatile principle constitutes in any way one of milk's constituent parts, it must be wrong to deprive milk of it, or to expose it to those circumstances which favour its separation. Experience with infants has also shown me, that boiled milk is seldom so well borne as milk simply warmed by the addition of hot water. To this volatile principle I shall again recur.

b. The objection has been made by Mr. Lobb, that in Dr. Falkland's process scarcely enough casein is removed. That gentleman has another method of preparing this artificial human milk, which he calls *mincasea,* which I here subjoin.

"Half a pint of new milk is set aside for the cream to separate, which latter is removed; and to the blue milk half a teaspoonful of prepared rennet is added; this is placed over the fire, and heated until the curd has separated, when it is broken up with a spoon, and the whey poured off. In winter,

three drachms of powdered sugar of milk are added to this warm whey; and the whole is mixed with half a pint of new milk. In summer, three drachms and a half of sugar of milk are added, and with the new milk are all boiled together."

There is another formula given by Mr. Turner, a homœopathic chemist, of Manchester. Although I disbelieve the doctrine of homœopathy, I am not above taking a lesson from an adversary. His formula is very simple. "Dissolve one ounce of sugar of milk in three-quarters of a pint of boiling water, and mix with an equal quantity of good fresh cow's milk." This process is simpler than Professor Falkland's and Mr. Lobb's, and, as such, I prefer it, and would fain recommend it, except that I should prefer water of a temperature of 160° Fahr. to the boiling water. The most ignorant nurse might prepare it easily in any part of the country where good milk can be procured.

The disadvantage which applies to this process in towns, as I have before stated, is the difficulty which attends the procuring of good milk. The same objection applies to many other places, as for instance, on board a ship.

CHAPTER IX.

VEGETABLE SUBSTITUTES FOR HUMAN MILK.

INFERIORITY OF THE VEGETABLE AS AN ALIMENT—INDIGESTIBILITY OF STARCH — INJURIOUS QUALITIES OF ARROWROOT AND BARLEY—OF WHITE BREAD PAP AS COMPARED WITH BROWN—INSOLUBLE PHOSPHATE OF ALUMINA AND ABSENCE OF CHLORIDE OF POTASSIUM—DEATH FROM OVER-FEEDING WITH PAP — ADULTERATION WITH RICE-FLOUR — USES OF LENTIL POWDER — MRS. WELLS' VEGETO-ANIMAL FOOD—BAKED FLOUR WITH PHOSPHATE OF SODA—ROBB'S BISCUITS —THE SAFE PERIOD FOR ADMINISTERING VEGETABLE FOOD.

HAVING now considered the animal substitutes for human milk, we have to consider another important class of substitutes, *i. e.* those from the vegetable kingdom, and at the outset two questions present themselves for consideration.

(*a*) Is the chemical constitution of vegetable food such that we may safely employ it as a substitute for animal food? and if so, (*b*) at what period should it be given?

(*a*) As I have elsewhere said, animal food is, as

it were, the essence of vegetable food, and far more digestible. But there is another peculiarity possessed by animal food. Liebig has shown that the blood in the body is preserved alkaline in carnivorous animals through the agency of the *subphosphate of soda;* whereas, in the case of herbivorous animals, the salt which maintains the alkalinity of the blood is the *subcarbonate of soda.* This last result, however, only applies in the case where the food consists exclusively of the lowest grains, roots, green vegetables, and fruits, the ashes of which contain carbonates; because if lentils and the higher cerealia, as wheat, oats, &c., be employed, since their salts are nearly the same as the salts of blood, the subphosphate of soda is also found in the blood. But more than this; in meat, and the higher cerealia, not only have we a larger quantity of mineral ingredient, but we have also a large quantity of plastic or nitrogenous element. The hydrocarbonaceous, calorifiant, or combustible element contained is also in fair proportion, so that any of them may then be safely used. Still there is a very great disparity between these vegetable substances among themselves, and as compared with animal compounds. In order to make this clear, I have annexed the following table, compiled from Liebig and R. D. Thompson, in which the amount of nitrogenous or plastic matter being expressed by 10 in all cases, the relative amount of

combustible or respiratory material is given for purposes of comparison.

Proportion of ten plastic to the following quantities of respiratory matters in the following articles of consumption :—

Veal	1	Rye flour	57
Hare	2	Barley	57
Beef	17	Maize	70
Lentils	21	Potatoes, white	86
Beans	22	East Indian rice	100
Peas	23	Dry Swedish turnips	110
Fat mutton	27	Potatoes, blue	115
Cow's milk	30	Rice	123
Linseed	30	Buckwheat flour	130
Fat pork	30	Arrowroot	260
Human milk	40	Tapioca	260
Wheat flour	46	Sago	260
Oatmeal	50	Wheat starch	400

The respiratory ingredient in these vegetable substances with large figures being chiefly starch (such as if digested at all becomes converted into sugar), would, as proved by Magendie's experiments, lead to the development of scrofula, from deficiency of plastic or nutritive ingredient. But from the non-development of saliva at an early period, it is to be feared that even this change would not occur. And this seems, often at least, to be the case. In a paper published on the "Diet of Infants," Dr. Stewart, of New York, in speaking of the Parisian hospitals, says: "It is the custom at these and similar institutions, whenever an

infant is sick, to withdraw him altogether from the breast, and to substitute for the milk some farinaceous substance, made fluid by boiling—arrowroot, gum, and rice water, or a thickened preparation of rice, known as 'crême de riz,' and other preparations of a similar kind, forming the diet of a sick infant. In the reported cases of the Foundling Hospital, and those for the reception of sick children, prescriptions of this nature form a very important part of the treatment, as will be seen by referring to the different treatises in French on the diseases of children." "The attention of M. Guillot having been directed to the changes which the food given to children underwent, and to the excessive mortality among them, he instituted a series of investigations in a number of cases of death, with special reference to the state of the contents of the bowels. He was struck with the uniform similarity,—a jelly-like substance being present in the bowels, and in some instances lining both the small and great intestines. This was subjected to the test of the tincture of iodine, which produced an intensely blue colour, thus proving it to be starch."*

This jelly-like substance is sometimes tinged with blood. Its presence, however, in the bowels of a

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* Dr. Stewart on "Diet of Infants," *Dublin Journal*, 1845, pp. 141-2.

child proves that starch is not digestible, at least in the early periods of life, which is, in fact, what we might have anticipated. In adults it is converted into sugar; but if this change is not effected in the child, in whom one of the principal organs that bring about this change does not act at all, or at least very imperfectly, the presence of starch in the bowels in any excess must be detrimental and injurious. But more than this. From the absence or great diminution of sugar, which assists, as before seen, in dissolving the carbonate and phosphate of lime, these salts are not taken up in sufficient quantities in the blood for the purposes of the economy. Hence a tendency to rickets is established. These ingredients are not assimilated. There is, moreover, a deficiency of sugar for the respiratory processes, and a loss of animal heat, the oily matters only remaining to supply this want by conversion into sugar. Whether this is easily accomplished in a child has not, so far as I know, been proved by experiment. Practically judging from the injurious effects of a diet too exclusively starchy, there is reason to doubt it. Yet how frequently, even by medical men, is arrowroot ordered in cases of diarrhœa as the exclusive diet!

I cannot conceive anything more injurious than this popular arrowroot feeding. I believe it is a cause of the death of many infants. The following

example, one out of many, received from an authentic source, will suffice to prove this. A poor woman had had five children; all had been brought up artificially on arrowroot, and all had died. A sixth in due time was born, and she was strongly urged by a kind friend to try nourishing food, such as milk, beef-tea, &c., instead of the arrowroot. This she agreed to do. Meeting her accidentally some time afterwards, this friend inquired about the infant. The reply was, "Oh! it is dead; but it is no fault of mine, as I fed it on the best arrowroot that could be procured." Thus strongly rooted is the popular prejudice in favour of this starchy ingredient, which contains only 10 parts of plastic matter in 260 of combustible matter, instead of 10 in 40, as in human milk (see table, page 212), and therefore never can suffice to nourish a child, especially a weakly one.

A favourite substitute, also, for human milk is *barley*—or more properly what is known as patent barley. Here, again, we have a flour comparatively poor in nitrogenous material. But, besides this, it contains *dextrine*, a substance which even in the adult is difficult of digestion, and, *à fortiori*, must be so in an infant. Its starch corpuscles are less soluble in the gastric juice, the milk is slightly acrid, and it is somewhat laxative. (Hassall.) When barley paste is washed, the milky fluid

deposits not only the starch, but also a protein matter, supposed to be *insoluble* casein.

Next in esteem with the public is *pap*. Now pap is given very early. I have seen it given to a child from birth. It seemed to thrive upon it at first; but in about a month's time the child, which was of enormous size, sickened, and recovered only after much difficulty. Unfortunately the popular prejudice in favour of white bread proves often a cause of death. Magendie's experiments made with dogs have set this point at rest. A dog fed on white bread, wheat, and water, did not live more than fifty days, whereas a dog kept on soldiers' *brown* bread did not suffer. The explanation in this case can be satisfactorily given. It is to be found in the relative differences of the saline constituents of wheat, as compared with those of milk.

The objections to pap may be classed under three heads—

1. The disadvantage of wheat-flour, given in bread, is due to the decomposition of the free phosphoric acid, and, perhaps, the phosphates, into insoluble and therefore useless salts to the economy, and also to a marked deficiency in chloride of potassium, the action of both of which we have already seen is so marked in nutrition.

If we except those of the pea and bean tribes, most of the edible flours are deficient in the

same way. *There is no chloride of potassium in wheat, &c., and, necessarily, in bread. But, more than this, the phosphoric acid is partly, often considerably, neutralised in its effects.* (See note below.*) Englishmen like to use white bread, which, independently of containing less nutritive matter than brown bread, as I have fully shown elsewhere, contains alum. This adulteration is known to make inferior flour, and flours generally of a bad colour, white, and equal in appearance to flours of superior quality; and, secondly, it enables flour to retain a larger quantity of water, by which means the loaf is made to weigh heavier. (Hassall.) The bread is also less liable to crumble as it gets stale. Accum, quoted by Hassall, states the smallest quantity of alum that can be employed to produce this white appearance is 4 ounces to a sack of 240 lbs. Dr. P. Markham states 8 ounces to be the usual quantity employed, and Mitchell found that in the 4-lb. loaves he examined the amount of alum varied from 34½ to 116 grains in

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* Composition of ashes of wheat by Erdmann, exclusive of peroxide of iron, 1·33 per cent., and silica and sand, 3·37 per cent.

Alkaline phosphates for 2 mo.	49·13
Earthy ditto for 2 mo.	23·13
Free phosphoric acid	27·69
	100

each. 114 grains would amount to 20 ounces to the sack. (Hassall.) Out of 28 samples of London bread examined by Dr. Hassall, in all alum was found, in smaller or larger quantities. The injurious effects of alum cannot be too strongly urged. Alum forms with phosphoric acid, as Liebig has shown, an *insoluble salt*, and so prevents the phosphoric acid from being appropriated to the economy. The blood becomes incapable of performing its duty, and hence children fed on it deteriorate, and in the end will die. And herein is the explanation of the frightful amount of disease observed in pap-fed babies. The phosphoric acid, so essential to them, is in a great measure lost. The brain and nervous system, and the bones are arrested in their development; and hence also one reason for the great comparative success in bringing up children by hand in the country on home-baked bread, which contains no alum, and which, although of darker colour, provides phosphoric acid in an assimilable state to the child.*

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* From an analysis by Erdmann, given below, it would appear that 100 lbs. of ashes of wheat contain—

Alkaline phosphates	46·48
Earthy ditto	21·87
Free phosphoric acid	26·19

But as 100 lbs. of wheat only contain 1·83 lbs. of salts, and

2. It is not necessary, however, that the *whole* phosphoric acid should be lost in order that the white bread pap should disagree. The experiment of Magendie, before alluded to, proves that a dog fed on white bread would not live longer than fifty days, dying at the end of this period with all the signs of inanition; and we must expect that the same rule before quoted, which applies to other animals, will hold good here, namely, that after continued restriction to any one kind of aliment which cannot singly support life, a return to ordinary food will not save life. The power of general assimilation has been lost. Moreover, a pap-fed child, because obliged to use the spoon, cannot be brought again to suck the bottle or the breast. He has lost the instinctive power of suction from want of habit. So the habit of digestion of particular kinds of food once completely lost is

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since 80 lbs. of flour will make 100 lbs. of bread, the 100 lbs. of bread will contain--

	lbs. Avoir.	grs. Troy.
Alkaline phosphates.	·69	4830
Earthy ditto	·319	2233
Free phosphoric acid	·37	2612

But as a sack of 240 lbs. contains from 4 to 20 ounces of alum, *i.e.* from 1·7 oz. or 743·7 grains, to 8·3 oz. or 3621·2 grains, it will contain 82·3 to 391·3 grains of alumina. Looking now to the composition of phosphate of alumina, $Al_2 O_3 PO_5$—*i. e.* $(2 \times 51{\cdot}44) + (3 \times 71{\cdot}44) = 317{\cdot}2$—we have enough alumina to saturate 184·1 to 853·6 grains of phosphoric acid.

perhaps never again acquired. I believe one reason many pap-fed children among the lower classes live spite of the pap they take is this:—the infants, fortunately for themselves, are often spoilt; they keep asking for what they see on the table, and besides the pap-food are given the piece of meat, herring, cheese, &c., which form the usual food of the parents: and so that which in the better ranks of life would be considered unwholesome, and therefore would be withheld, is the providential means of saving their lives, because the food is then not exclusively pap, and the phosphoric acid needed is obtained from other sources. Again, the reason why some kinds of baked flour agree so well is, that phosphate of soda is added, and so in the excess of phosphoric acid given the bad effects of the alum are neutralised.

3. But there is another way in which pap proves injurious. It is more often, perhaps, than is recognised, the immediate *cause* of death. It has long been known that bread and milk, if given to canaries in full quantity, swells in their stomachs, and thus, pressing against the heart, impedes its action, and often causes their death. The same result sometimes occurs in the infant. At pp. 53-57 *supra*, I have enumerated several fatal cases in which the coroner's verdict assigned over-feeding with pap as the cause of death.

Another fraud extensively practised in London

is the large admixture of *rice-flour* in bread. This, I believe, is not generally known. Its great whiteness, and its great power of absorbing water, are properties peculiarly well known to bakers, and not only to ordinary bakers, but to many of those who supply workhouses. I have been informed by a wholesale corn and flour merchant, that there is a species of rice-flour which is expressly kept for the purpose of adulterating bread, and which is largely employed in some of our London workhouses. In this way the nutritive power of the bread is considerably diminished, although the calorifiant power is increased, the proportion of the former to the latter being, instead of 1 to 7, as it ought to be in wheat-flour, increased to 1 in 10 or 11, producing precisely the same results in the human frame as those which follow the employment of a diet too exclusively saccharine, viz., scrofula, atrophy, and all its dependencies, so commonly observed in some of these large establishments.

Among the vegetable substances, that which comes closest to milk in its composition is, without doubt, *lentil powder*, or, as it is called for the purposes of obtaining a better sale, Revalenta Arabica, containing both phosphoric acid in abundance, and chloride of potassium; it also includes casein, the same principle which is found in milk. Moreover, its nutritive matter is to its calorifiant

matter in the proportion of 1 to 2½, milk being in that of 1 to 2. No wonder, therefore, that under its influence many children affected with atrophy and marked debility have completely recovered. I have given it with the very greatest advantage in such cases, and, so far as I may judge from my own experience, I should conclude that practice fully carries out what theory, from a knowledge of the composition of lentil powder, would have led us to anticipate. Lentils have also a slightly laxative effect, and therefore in many instances, where the child is of a constipated habit, they are to be recommended. Peas and bean meal in this respect resemble lentils; the former, however, is objectionable, because it produces flatulency. The latter is not generally obtainable; still the bakers take advantage of this fact in regard to the beans, and usually, where wheat by partial germination has lost some of its nitrogenous aliment, or where the flour used is poor in quality, add a proportionate quantity of white bean flour to restore it to its proper nutritive value.

The only advantage which another popular ingredient seems to have (I allude to what is called *baked flour*) is, that it contains a smaller quantity of water, which has been expelled during the heating process, and in this respect it comes to resemble more closely, because more concentrated, an animal compound. Moreover, by the baking,

the starch granules are rendered more separable, and so as an aliment it is more nutritious and digestible. Again, from its greater capacity to absorb moisture it is somewhat more astringent, and less likely to produce diarrhœa, which indeed it often checks; but the absence of chloride of potassium and fatty matters in it, both so essential in growth and cell development, is, I think, a fatal objection to it. Indian corn flour, which contains much oily matter, is for this last reason to be preferred. Hence, if either be given, they should, to supply fat and chloride of potassium, be mixed with milk.

Baked flour enters into the composition of many of the ordinary foods for children. The best combination which I have seen, and heard most favourably spoken of, is that prepared by Mrs. Wells, of the Laurels, New Hampton, in which it is mixed with sugar of milk. Now as the salts of milk are usually left in its preparation in combination with it, the food prepared contains a sufficiency of phosphoric acid and chloride of potassium. When flavoured with a little spice, it forms a very agreeable food for infants: so far as I have tried it, I am satisfied as to its effects being beneficial. One advantage it possesses, common however to all properly contrived mixtures, when these are already mixed in due proportions: nothing is left to the discretion

or whim of nurses, often too careless when not too disposed to spoil the child's food by excess of sugar; so that in the hands of the most ignorant it may be safely used.

Among the best bread compounds made out of wheat-flour, that which from my own experience I should recommend (because I have seen it frequently attended with beneficial results to children, who were evidently losing flesh and strength under other ordinary foods) is Robb's biscuits. This kind of food is almost always readily digested, and infants seem to relish it wonderfully.

There is one more variety of child's food to which I must allude, because it seems to be prepared upon really scientific grounds. I am informed it is in common use in the north of England and in many families in London, and that the experience of those who employ it is, that their children will often thrive on nothing else. This statement, however, is doubtless exaggerated.

It is prepared by taking three pounds of baked flour, half an ounce of phosphate of soda, and a quarter of an ounce of carbonate of magnesia. Three teaspoonfuls of this mixture are rubbed up with a little cold milk or water, and reduced to a pulp; to this pulp a cupful of milk or water is then added, and the whole warmed. This soon thickens and constitutes the food. It will be seen two advantages are offered by this mixture. First,

excess of phosphoric acid is supplied; and secondly, the disadvantage usually resulting from artificial food, namely constipation, avoided.

It would occupy too much time to speak of the various kinds of children's food made and sold. I do not doubt there are several of great value; but it is no part of my intention to make an examination of each of these. I lay down general rules, which I believe are founded on a scientific basis. Their application to aliments is best left to others.

(*b.*) At what period may vegetable food be given? *My reply is, not before the eighth month:* and for these reasons. Man belongs to the omnivorous class; there must, therefore, be a time when vegetable food may be safely given. There is no doubt a relation between the period of time occupied in incubation or gestation, and the time when an animal is so far developed and grown as to partake of herbivorous food without danger. Thus, if a granivorous bird occupy three weeks in incubation, a mammal one month in gestation, we should, *à priori*, expect the offspring of the former to be sooner capable of maintaining life independently of its parent than the latter. Again, the same thing would apply to an herbivorous animal provided with a stomach fitted for digestion of vegetables, *i. e.* a compound stomach, which would be sooner independent than a carnivorous animal, with only

a simple stomach, even though the period of gestation were the same in both. Thus, in the cow and in the human female gestation has the same duration; but in the offspring of the former, the calf, we have the compound stomach of herbivora; in the child we have the simple membranous stomach of carnivora: and so the former depends less upon its parent, and attains soonest independent existence and maturity. But the best test of capability of independent life in man is the *dental apparatus*. The appearance of the teeth is the index that a child is maturing rapidly, or the reverse; or whether it is or it is not in that condition when vegetable food may be safely administered. It was formerly stated in books that the following was the order of appearance:—

Anterior incisors	7th month.
Lateral do.	9th ,,
Anterior molars	12th ,,
Canine	18th ,,
Posterior molars	2 years.

Drs. Merei and Whitehead have shown, however, that there are some important modifications to this rule. From their results, "excluding those cases with only medium development, and reckoning those only with a favourable and those with unfavourable development, they conclude that in

the former case, *i. e.* in 128 out of 161 children (or 79 per cent.), the first teeth appeared before the 8th month was past, in 38 at 8 to 9 months, in 12 after the 9th, and in 3 after the 12th; while in the great majority of children with unfavourable development, namely, in 71 out of 119 children (60 per cent.), the first teeth were cut at 8 months and upwards, in 46 from 9 to 12 months, and in 16 even after 12 months, and only in 48 (44 per cent.) before 8 months."*

Upon these data, it would appear that the eighth month is about the earliest period that vegetable food may be borne. The teeth which appear are not of value because they are then capable of mastication, but simply as evidence that changes have occurred in the organs of digestion, which have progressed *pari passu*, and that the salivary and pancreatic glands, intestines, and the glands of the membranous stomach are in full development, and capable of digesting vegetable aliment. Then, and only then, therefore, as a rule, may vegetable food be given, and consequently weaning may be tried, if necessary. But even in this case the most easily digestible only should be administered, as a beginning; and it is best to continue also, in a great measure, the animal milks in combination.

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* Report of the Clinical Hospital, p. 14.

Individual cases may, of course, form exceptions. I have alluded to some of these before; and it is clear if development is earlier in some, we may conclude that these could bear vegetable food at an earlier date.

PART IV.

GENERAL TREATMENT OF DEFECTIVE ASSIMILATION.

CHAPTER I.

GENERAL REMARKS ON THE BRINGING UP OF CHILDREN—PRESERVATIVE INFLUENCE OF BREAST-MILK, EVEN WHEN COMBINED WITH INJUDICIOUS HAND-FEEDING—GENERAL PRINCIPLES TO BE OBSERVED IN THE MANAGEMENT OF THE MOTHER—SUSPENSION OF SUCKLING WHEN MILK DISAGREES—HOW AFFECTED—GOOD RESULTS OF ADMIXTURE OF ARTIFICIAL FOOD OBSERVED IN SOME CASES.

It is all important in settling the proper course to be pursued, to bear in mind these two axioms in bringing up children. First, that of all kinds of food, none is so excellent in its results as the mother's breast-milk; on the other hand, nothing is so injurious to the child as to bring it up by hand injudiciously. These axioms are brought out by the tables of the Clinical Hospital of Children before referred to (pp. 48-9).

1st. Feeding a child on breast-milk exclusively we have seen produces a good development in 63 per cent., medium development in 23 per cent., and bad development in 14 per cent. Nor, further, is there any advantage when the mother is in good health, and has abundance of milk, in feeding an infant on extra food besides. On the contrary, the results then obtained are only 52 good, 28·6 medium, and 39 bad development. Lastly, and as opposed to these results, injudicious feeding by hand produces 10 good, 26 medium, and 64 per cent. bad development.

By reference again to these tables, and by uniting the third and fifth classes together, which include children who have had breast-milk in moderate abundance *with* other food, from birth or early ages, which we are bound to assume from general experience was injudicious, the results are 35 good, 25·7 medium, and 39 bad development.

Between the cases where children are fed by hand, and those in which they are assisted by artificial food, there is a great and manifest difference. If, therefore, with injudicious feeding with moderate breast-milk the results are so favourable, the wonderfully preservative influence of breast-milk must at once be admitted.

But we may bring out this truth still more forcibly.

a. When we consider the gross ignorance of

those who take care of children, *injudicious feeding* is too mild a phrase. The food supplied acts in many cases little better than a slow poison. This I have shown in a former chapter when speaking of babies fed with aluminized bread pap, and the vegetable aliments supplied (p. 210, *et seq.*)

b. Actual experiment in this direction, and on a large scale, has been carried out by the London Foundling Hospital, and the returns prove the plan is eminently successful. In this hospital, the children are sent into the country to wet nurses, for the most part married women, with babies of their own to suckle besides; and these women keep them during the period usually allotted to suckling, and for some time afterwards, and so bring them up. They are afterwards returned to the hospital. Now it is manifest in such cases, that by far the larger majority of women are quite incapable of nursing two hearty children at the same time exclusively upon the breast. Indeed, the exceptions in which this can be done, without very serious injury to the woman, I conceive are very rare. Clearly, therefore, other food is given; and if so, knowing the little knowledge such women usually possess of what is proper food to give, we may well rest assured that the hand-feeding pursued is not always judiciously carried on. Notwithstanding these disadvantages, the results prove again how strong is the preservative influence on life of

breast-milk, even when partaken of only in partial quantities.

The following is the mortality, as given us in Mr. Brownlow's book before referred to.

Out of 100 children under five years of age, received at two separate periods, viz., from May 1835 to May 1837, and from May 1837 to March 1839, Mr. Brownlow shows the following was the mortality :—

	1st period.		2nd period.
Deaths in first year of their age .	12	...	9
Deaths in second year of their age .	5	...	10
Deaths in third year of their age .	2	...	2
Deaths in fourth year of their age .	0	...	0
Deaths in fifth year of their age .	1	...	0
	20		21

The causes of death were—convulsions in 9; diseases of membranes of the brain, 5 ; water on brain, 4; inflammation of bowels, 4; inflammation of lungs in 3; malformation of chest, 3; diarrhœa in 3; croup, 2; scarlet fever, 2; hydrocele, atrophy, bilious vomiting, scrofula, hooping-cough, teething, and breaking a blood-vessel, of each 1. Now, making all allowance for a country residence, which we have seen before exercises a favourable result upon hand-feeding (see p. 14), the results are very satisfactory. Indeed (where breast-milk cannot be exclusively given), they are, I think, sufficiently favourable to

justify our adoption of the plan. I am happy to learn that a distinguished accoucheur, Mr. Roberton, is in the habit of carrying out the same plan in Manchester. Where breast-milk is needed, and the mother of an infant cannot supply it, he employs a married woman, who, although suckling her own child, calls twice a day to feed the other.

c. As the danger is greatest in the early periods of life in putting a child to dry nurse (see *supra*, p. 19), so it is manifest the advantage must be great in providing an infant at such periods with as much breast-milk as can be supplied, in addition to any artificial food given.

The inevitable conclusion to which we are finally brought is, that in the management of children everything must be directed to secure the mother's breast-milk to the child as long as possible, but that, first, in cases where the mother cannot supply sufficient milk, she must not be made to desist from suckling altogether, but must be assisted by artificial food given to the infant; and secondly, the probabilities are, that if this last is supplied judiciously the plan will prove a means of saving many lives.

I. We assume then, that if the mother be in a condition to feed her child, however little, it is her duty to do so. We have next to consider the course of hygienic treatment to be observed at the same time. This will follow from what we have before

said, when speaking of the analogous effects produced on milch cows, and of those edible substances which have been found by experience to promote a flow of good milk. But the quality of milk necessarily depends upon the mother's strength. That must be kept up at all hazards; tonics (iron) and cod-liver oil, fresh and good air, are *sine quâ non* in those cases where the nursing has a tendency to exhaust a weak mother. The plan depends much for success upon the amount of artificial food which, in addition to its mother's milk, the child can take. At first the mother's powers should be taxed as little as practicable for safety. She may nurse the child but once a day, so as to keep the secretion of milk going: and then, by and by, as she regains her strength, the child may take the breast more frequently. Indeed, when a mother is thus properly cared for, the plan is usually attended with the greatest success. Surely it is no small encouragement for the mother to know this. Moreover, it must be a source of great thankfulness to feel she is able to suckle her child in a great measure, albeit not entirely upon her own breast-milk. The means of effecting this successfully will necessarily occupy us in a separate chapter. As an introduction, however, it may be well to allude to some exceptional cases which particularly concern the children.

It sometimes happens that the mother's milk,

even in the smallest quantity, disagrees with the child. Griping, it may be diarrhœa results, and there is no room to doubt the cause, for if the child takes artificial food he is quiet and apparently free from pain, whereas, if he takes his mother's milk, he suffers very much, and no longer sleeps. It is clear in such a case the milk does not suit; and it must be entirely suspended. Still, even in these cases, it is very desirable that the function should be maintained, until the milk be again improved in quality. It is here a woman needs some kind Samaritan sister to officiate, and it is an evidence of the kindly feelings of the sex amongst themselves, that however unpleasant the duty, one may generally be found to suck the breast for a few days till matters have mended, and the milk has improved. In the absence of such a friend it is usual to use the breast-pump. There is then apparently no alternative, but it frequently produces so much irritation that it cannot be persisted in. Sometimes, instead of the ordinary piston pump, one of those glass pumps, to which is attached an elastic tube, may be used with advantage. The suction in using this variety of breast-pump is not applied directly to the nipple, but to the end of the tube. If the patient herself is strong enough, she may thus relieve the breast herself. Friends at least are then always more ready to officiate. The

strain on the nipple is in this manner much reduced, and the breast is seldom, if ever, irritated. The old-fashioned remedy of a soda-water bottle dipped in hot water, and then speedily applied to the nipple, often succeeds in relieving the breast. When, however, these methods fail, which sometimes occurs from the large size of the nipple or some unaccountable peculiarity in the breast, we must either adopt some extraordinary course, or the secretion will be entirely suspended. In this dilemma it has often occurred to me that we might with wisdom adopt a custom observed by Continental physicians, namely, the substitution of small puppy dogs for the babe till such time as a happy change occurs in the milk. The custom is peculiar, and may prove distasteful to English ladies, but it saves much misery in the end.

Mrs. —— was confined, after a tedious labour, of a full-grown child. Both mother and child did well until about three weeks after delivery. The child then suddenly began to be griped very severely after each time it suckled its mother's breast, and diarrhœa, with five or six motions daily, set in, together with much sleeplessness and crying. The moment the child was put upon artificial food quiet sleep resulted, and all diarrhœa ceased. There was abundance of milk in the mother's breast. This milk, on examination, appeared rather watery, sp. gr. 1·030; and although it was kept in a well-stop-

pered bottle and examined during cold weather, two or three hours afterwards it was neutral, if not feebly acid. The lady's breast was now sucked by a female friend, and the child put exclusively on artificial food. The mother was freely purged by mercurials, and put on alkalies, and desired to drink as little as possible. At the end of two or three days she felt better. The female friend stated the milk tasted better and sweeter. The child was again put to the breast, and the milk agreed perfectly with it.

Here was a case in which there was no deficiency of milk; but Mr. Ballard has pointed out another cause where similar disorder may arise to the child from fruitless sucking at a breast with very little milk in it. The following is a case which occurred in my own practice, and which exemplifies his theory. Mrs. R., æt. 25, residing in Lisson Grove, was confined by a midwife, and neglected for several days. When I saw her, about the seventh day after delivery, she was complaining of great weakness; pulse small and wiry, expression of countenance anxious, some abdominal pain, relieved, however, by hard pressure; skin moist. She had had severe diarrhœa, with much griping. The milk was in small quantity, the lochia natural. She was put on astringents, and gradually recovered. The child, however, was severely griped and purged, its motions very green, and it could obtain no

sleep. Various astringents were tried, but failed; laudanum only, in one-sixth of a drop doses, produced sleep, and some amelioration in the diarrhœic symptoms, but after a time this failed also. The child appeared very hungry, and fought and cried at the nipple, when attempting to suck. The mother's explanation was that she had not enough milk. The child was now ordered to be fed artificially with fresh cow's milk, sweetened to the taste, and mixed with an equal quantity of water, half an ounce of lime-water being added to the half-pint of the prepared milk. The motions at once diminished to two daily, and assumed a natural character. She was ordered to feed the child from the bottle frequently, and if she observed the diarrhœa come on again, to diminish the amount of breast-milk, and to give more artificial food. The quantity of this last was to be regulated by the number of motions; if these became more numerous, it was to be increased. This treatment proved completely successful. Tonics and alteratives, and conger eel soup, were now ordered, to improve the quality of the mother's milk. This had the desired effect; but she soon abused her strength, and the child was fed either by the breast or artificially every two hours. The diarrhœa now returned, but when ordered to give more artificial food, and to feed the child every three hours only, the

symptoms gradually improved. What was remarkable, the child throughout appeared to thrive well.

The diarrhœa in this second seizure cannot be considered as wholly similar to the first seizure mentioned. Children are often *over*-fed, indeed actually surfeited, as well as *under*-fed. They seem, whenever you see them, to be taking food. The motions are healthy and properly coloured, and the child is excessively fat and gross. In these cases, if we diminish the quantity of food taken, the diarrhœa, which is only a safety-valve to the system, ceases synchronously. Indeed, it is well to be aware of this tendency to over-feeding in some nurses. Such gross children, moreover, are, under acute inflammatory disorder, very likely to have convulsions, and to succumb from the plethora which is superadded to the disease; but it is not uncommon to find them dying suddenly, as a result of this surfeiting. From the Brighton tables before given, out of 50 deaths 22 cases were referred to this cause. Mr. Acton, in his paper before quoted, gives us the numbers as 8 out of 846, where the cause of death was noted. The fatal result which occurs in these cases, as I before remarked, is analogous to that so common among birds. I have seen a death produced under similar circumstances in an adult girl, with a very flabby weak heart, and I believe it is a far more

frequent cause of mortality among children, especially those of weak fibre and imperfect cardiac action, than is generally believed.

So far we have been considering special cases. The best kinds of food for children will be more profitably considered when we come to speak of bringing up children by hand. It is best here to consider, in the second place, the means to be adopted to enable the mother to suckle her child satisfactorily. I shall do so in the next chapter, on defective lactation.

CHAPTER II.

ON DEFECTIVE LACTATION AND ITS REMEDY.

OBJECTIONS TO TRYING TO INCREASE FLOW OF MILK—DIVISION OF SUBJECT—DIETETIC AND MEDICAL REMEDIES TO ACT AS GALACTAGOGUES—FREQUENCY OF DEFECTIVE LACTATION—VARIETIES—PLETHORIC—ANÆMIC—TORPOR OF BREAST—CAUSES—AGE—ATROPHY—OBESITY—INSUFFICIENT USE, OR EXERCISE—PARALYSIS—MENTAL EMOTIONS.

THE difficulty of finding an efficient nurse is manifest from what has preceded. The object of the present and following chapter is the consideration especially of those cases where the secretion of milk is so scanty that it is insufficient to support the life of the suckling, and to point out the proper treatment by which it may be increased. We shall then be in a condition to show in a subsequent chapter, that while the mother is being treated the child may be artificially fed in part; thus setting aside the old dogma that it is wrong to mix two milks.

The principal objection usually brought forward

against such a course is, that you induce great debility and other marked signs of exhaustion in the suckling mother. That hyperlactation, by which term I understand lactation unduly prolonged, does give rise to serious functional, and sometimes organic lesion, I am free to admit. In an able paper by Dr. Ashwell in "Guy's Hospital Reports" (v. 1840), this has been well shown: still in these cases Dr. Ashwell lays down distinctly the proposition, that, "although lactation to be morbid need not be long, and that evil consequences may ensue occasionally after a few weeks of suckling, still these symptoms occur more frequently when the period is protracted beyond nine months" (p. 60). This is so far a ground for comfort to a mother who is anxious to try her utmost (as I think it is always her duty to do) to suckle her child, and thus give it a better chance of life; unless, indeed, there be present such hereditary or inherent disease in her organism, as to render that impossible. For reasons before stated (p. 225), I would never think of weaning a child as a rule before eight months, *i. e.* entirely to deprive it of its mother's milk. But there are many exceptions where this rule cannot be observed, and it is to these that I must advert. I will, therefore, lay down as the groundwork of my argument the two following major propositions:—I. Do all you can to increase the flow of milk in the mother by dietetic and medical

means; II. Assist the mother by giving the infant animal milks or animal substitutes for it.

I. *Dietetic and medical means for increasing milk.*—It is singular enough that we hear of cholagogues, emmenagogues, and sialagogues, and the like, although modern authors on Materia Medica scarcely allude to galactagogues in any way. The simple reason is that practitioners, besides adopting a few general and popular rules connected with alimentation, seldom turn their attention to the special employment of any remedies which may have the power to increase the secretion of milk. It was not so during the last two centuries. The authors of these periods had galactopoietics and galactides (their word for galactagogues) in their Materia Medica, and used them to advantage. This omission of a useful class of medicines, and the wish to bring them again into more general use as a means of saving life, must be my apology for dwelling at length on the subject.

In Drs. Merei and Whitehead's First and Second Clinical Report of the Children's Hospital, the results of the analysis of insufficient supply of breast-milk are given as follows :—

Of 952 mothers examined as to their sanitary condition, in the Clinical Hospital at Manchester, there were 629 strong and healthy, or 66 per cent. and 323 delicate or sick, or 34 per cent. Of the 629 strong and healthy, 420, or 66·7 per cent.,

had abundance of milk to six months and upwards, some even to two years; 114, or 17·8 per cent., medium milk; 95, or 16·5 per cent., scanty or no milk at all. Of the (323) delicate or sick, 88 or 27·2 per cent. had abundant milk, &c. as before; 69, or 21·5 per cent., medium milk; 166, or 51·3 per cent., scanty or none.

These results prove that among healthy mothers, as we should naturally expect, only 16·5 per cent. will be affected with defective lactation, whereas, among weak and delicate women the number will reach 51·3 per cent. But when we come to compare the cases of defective lactation among themselves as to the causes of the insufficient supply, the figures tell a different tale. I have here taken two tables of Drs. Merei and Whitehead from the First and Second Report (see below*); and the result obtained is somewhat extraordinary and unexpectedly large, namely, that out of these 952

	First Report.	Second Report.		Total.
	p. c.	p. c.		p. c.
Mothers going out to work....	32 or 24·9	152 or 29·7		184 or 28·7
Constitutional debility.....	..	132 or 25·8	or 33·4	193 or 10·
Suckling irregularly and immoderately	22 or 17·			
Illness or disease in mothers ..	..	39 or 7·6		
Advanced age				
Destitution, want of sufficient or suitable food	19 or 14·7	52 or 10·2		71 or 11·0
Domestic troubles	..			
Natural scantiness of secretion without obvious reason	56 or 43·4	136 or 26·6		192 or 30·2
	129 or 100·	511		640

women 640, or 66 per cent., were affected with defective lactation. The affection is, therefore, far more common than is generally supposed.

My experience is pretty nearly the same, although I cannot yet as satisfactorily reduce my results to figures as Drs. Merei and Whitehead have done. For convenience, however, I may speak of them more generally as follow:—

There are three varieties of defective lactation—1st. One arising from a state of hyperæmia, or over-feeding. This is the rarest variety, and by far the most remediable. 2nd. One accompanied with a weakened or anæmic state of the body. This is improperly supposed to be the most frequent variety, and it is among such examples that the effects of hyperlactation are most generally observed. The 3rd variety is, however, by far the most common. It usually obtains among middle-aged women, or those who have married at a late period in life, or who may be rather masculine in form and character. It commonly happens in these cases that during suckling periods the secretion of milk is never properly established, or, if present, soon disappears. As in cases of obstinate constipation of the bowels, so here there is difficulty in the power of secreting milk, although the body itself is well developed and the physical powers good. These three varieties require separate notice and treatment.

1. *Defective lactation from hyperæmia or plethora.* —This is a variety which I have chiefly observed among *hired wet-nurses* selected from the poorer classes, and admitted into wealthier families. It is a peculiarity of many of our London poor, indeed of domestic servants generally, that when obliged to support themselves, or put upon board-wages, they live, as it were, upon the smallest quantity of food possible; but when feeding at the expense of a master or mistress, the amount they devour often surpasses all moderate imagination. They, in fact, gormandize. If in such instances a wet-nurse is given all she asks for, she will be found often to eat quite as much as any two men with large appetites; and as a result she becomes gross, turgid, often covered with blotches or pimples, and generally too plethoric to fulfil the duties of her position. The plethora, as first induced, is of the sthenic variety; but it soon assumes an asthenic character; and as the immediate result, the breast no longer secretes its quantum of milk. There may be good milk secreted, but it is in small quantity; and this quantity diminishes daily. The breast may also enlarge, but it is from a deposition of fatty tissue in and about it, as in other parts of the body. The veins on the surface become less apparent, always a bad feature in a suckling breast, till

finally the flow of milk ceases altogether. It is remarkable how in such cases the administration of a simple purge does good: particularly castor oil. The tension on the vessels is removed, and a copious secretion follows. So also a mere change of diet, and the substitution of a more farinaceous and a less exciting food; the stopping of all alcoholic and fermented liquors, particularly the latter, will frequently in mild cases suffice for the removal of many of the symptoms of this plethora, and a copious flow of milk from the breast will be the result: speaking generally, the treatment should be mildly antiphlogistic; but at the same time, care must be taken that a due amount of nutritious matter be duly conveyed to the wet-nurse, lest the treatment carried out should produce by its excess a complete suspension of the secretion of milk.

2. *Defective secretion from anæmia or privation.*— This, as I have before stated, is generally believed to be the most common variety. But this is a mistake. From the tables before quoted, it appears that in Manchester they constitute about 14·7 per cent. of all the cases accompanied with defective lactation. Drs. Merei and Whitehead have offered another table (2nd Report, p. 10), showing that there was not that close relation between a deficiency of milk secreted, and the amount of aliment

taken or comfort enjoyed by their patients, so far as these could be measured by the amount of their wages.

Thus, among 608 children whose fathers earned	There were mothers who had A full supply of breast-milk.	Medium breast-milk.	Insufficient breast-milk.
Upwards of 18s. per week . .	120	60	122
Less than 18s. per week . .	122	72	112

whence it follows that the increase of wages and comforts did not necessarily influence the supply of breast-milk. This insufficiency of milk, however, is here taken relatively to the infant; the mothers perhaps might have had an abundant supply, had they not separated themselves from their infants during part of the day to attend to their trades. But this circumstance, of course, more frequently happens with those engaged in the less lucrative trades. (Pp. 10 and 11.)

The reason which has led probably to the belief that these cases so frequently occur as compared with other varieties, is, that they are precisely those which come most commonly under treatment. Thus, in Drs. Merei and Whitehead's Reports, we find it stated under the head of "suckling mother's diseases," that there were in the first year 43 cases; 30 of bronchitis, diarrhœa, &c.; and 13 of anæmia lactantium. In the second year, 53 cases, nearly all of constitutional debility and deterioration of milk from hyperlactation; and in

the third year, 79 cases, more than 60 of which were affected with anæmia lactantium. Nor is it surprising that such cases should be common among those examples of poverty which crowd our cities. Insufficiency of food must produce insufficiency of milk. The symptoms of this variety are well marked. The face of the patient betrays a haggard and starved look; it is remarkably pallid, the eyes are preternaturally bright, and with dark marks beneath them; there is breathlessness, with pains along the back, frequently copious leucorrhœa, and the patient generally complains of a sinking sensation at the epigastrium, and of exhaustion. It is extraordinary how in some of these cases the infants themselves keep up a remarkable amount of fat in their appearance; but in these instances, though not by any means in all, I have frequently traced the source of this *embonpoint* to the fact that those children were also fed artificially. The most fearful symptom, however, to which these women are liable is loss of sight, and frequently of memory; and in the lower orders, where the want of food required to compensate for the drain which has been made is got with so much difficulty, the recovery of the sight and of the mental integrity is a very long process, extending often over years. I know one case in which this recovery, notwithstanding a long-continued chalybeate treatment, with good food which was procured, was not

complete even after a period of two years. Dr. Ashwell, in his paper before alluded to on hyperlactation, enumerates several examples of this result; in addition, he shows that epilepsy and even insanity may result from women oversuckling their infants. I cannot say that my own experience confirms the occurrence of similar symptoms in women who, having an insufficiency of milk, have still persisted in nursing their children. I have seen many examples of weakness and anæmia to a marked degree, but none of these more severe results; and the reason is obvious—where defective secretion of milk first arises from debility, the complete suspension of the secretion generally follows before these mental and bodily symptoms to any marked degree can occur. These cases, however, will materially improve under proper treatment—better diet, particularly of the nitrogenous variety, stimulants, and the very reverse of that recommended in the former variety. These remedies will often overcome many of the symptoms, increase the flow of milk, and put the woman in a very fair condition to carry out the intentions of nature, particularly if she is assisted by artificial food administered at the same time to the infant. I do not mean to say that this result is always attainable, but it is frequently so—and this is so far very encouraging.

3. The third variety is the most common. A natural scantiness of secretion not due to want, occupation, constitutional debility, advanced age, &c., constitutes thirty per cent. at least of all cases. But I would add to this category many examples which occur in women of more mature age, probably comprehended in the tables under the term "advanced age," but which certainly cannot be so fairly designated. I would also include under this heading many of those cases of defective lactation produced by irregular suckling, and going out to work, because neither of these cases may be admitted as examples of hyperæmia or anæmia. This will raise the per centage to upwards of sixty per cent. of all cases of defective lactation. It is to this third variety also, considered relatively to their causes, that I wish to allude more especially, because it is usually less and appreciated, and because it is most amenable in many cases to treatment. I shall probably best illustrate the phases of this variety by referring to its causes.

Causes.—Some of these have already been alluded to in the foregoing remarks. They may be enumerated as follows:—Age, paralysis, fear, and mental emotions generally, and disease of the sexual organs (with or without atrophy of the mamma); excessive obesity, and a tendency gene-

rally to the deposition of fat in and about the breasts; impure air, and lactation insufficiently practised.

Age.—I have usually seen this variety in women who have not borne children till after 30, or in those of a peculiarly masculine nature. Their special functions long kept in abeyance, have led to the partial atrophy of the organs subservient to the offices of generation; and it thus not unfrequently happens that when these women come to marry and to have children, there is either very little milk present in the breasts, or this little soon disappears. This, as I have before said, sometimes depends upon partial atrophy of the breasts; but even if these be large and well formed, the feel of them does not convey to the hand the presence of large ducts. These last are few in number and flabby; but the sensation is rather one of more or less accumulation of fat in and about the ducts, which are felt with some difficulty. Occasionally, however, except that the veins on the surface of the skin are but little developed, the lacteal ducts are numerous, and well formed, but the milk is not secreted in sufficient quantity to feed the child.

There does not seem to be any deterioration in the *quality* so much as in the *quantity* of milk secreted, and the appearance microscopically may be good. The same results are observed in pre-

cisely the opposite class of cases, where the suckling mother is too young. Such cases are rarely found among the married in this country, although they do occur. The Irish tables show that many marriages occur under 17. Most, however, of these very young girls, often little better than children, who become mothers, are found among the victims of debased seducers. I have seen in London such a mother aged 13. In these cases the milk is very scanty, and the reason is sufficiently obvious. The function of generation has surprised an immature girl, whose breasts are not fully developed. The cure in both these cases, even if they are left to themselves, is carried out by Nature herself, and both are to be treated in the same manner. The complete use of the breasts may not be restored during the first period, but the effort will have prepared the breasts for future activity, and the function is usually effectively carried out after the second or third pregnancy.

Atrophy of the breast is occasionally present. This variety is usually observed after the catamenia have ceased to occur; and therefore when the breast as a lactiferous organ is not required. It may also occur after the long-continued use of iodine. But independently of these two circumstances, it is commonly present in unmarried women after 30, although of course not to the same extent. It is especially found in those cases where the sexual

feelings have been habitually restrained. These cases pass by insensible degrees to those included under the first category.

Hypertrophy of the organ I have never met with in reference to defective lactation.

Obesity of the organ itself, and the tendency to the deposition of fat generally in the body, is frequently connected with defective lactation. A certain degree of *embonpoint* is, as it were, a necessary accompaniment to a good nurse; but as a rule fat nurses and fat breasts yield but little milk. The nourishment taken feeds the body and the organ, but not the milk. A small breast, hard under the finger, giving the sensation of tortuous ducts with large tortuous veins of a vivid blue colour on the surface, is a far better secreting organ than the fat large plump breast. The one yields milk in abundance, the other yields little or none.

Insufficient use of the organ is also a frequent cause of defective lactation. From the table above given, out of 640 cases of defective lactation in suckling mothers, in 184 or 28·7 per cent. it was owing to the mothers going out to work. Suckling irregularly, included under a different heading, gives also a large per centage. And there can be no doubt that, as a mother may be exhausted by too constant a drain upon her, by overtaxing the breast, and so abusing its power, in like manner,

insufficient employment of the organ will lead to a cessation of its function. Here as in other cases the proverb holds good—"Practice maketh perfect."

Bad air, too sedentary a life, want of proper exercise, as they lead to insufficient exertion, generally equally affect lactation. These cases are not by any means rare. I have found them common among the young and spoiled children of opulence, although not confined to such classes. Late hours at night, and late rising after protracted lying in bed, kill all physical energy, and bring on a lassitude which seems to court further rest. This last, if taken, only increases the more the lazy habit, and has a very injurious influence on lactation.

Paralysis or torpor of the organ.—I have never seen actual paralysis of the breast, except in cases of partial paralysis of other parts of the body, nor have I seen even this partial paralysis in a suckling mother. I conceive it is possible, judging from analogous examples of disease, that such cases should occur. But short of actual paralysis there may be many cases of torpor of the organ, where no other obvious cause can be detected. As in constipation of the bowels, torpor of liver, &c., so the breast without known reason does not produce its quotum of milk. This, I believe, is a very common source of defective lactation.

Mental emotions.—Of all the causes which are active in inducing defective lactation, none are perhaps so powerful as mental anxiety and sorrow. These will very readily suppress the secretion. It is proverbial how soon a child is affected by the mental state of the parent. A sudden burst of passion, fright, or violent agitation, will often produce in the suckling child violent diarrhœa, vomiting, convulsions, and even death. (See *supra*, pp. 105-7.) Several such cases are on record. Under sudden and violent emotion, the milk may actually become as poisonous as it does in malignant puerperal fever, producing at once the death of the infant.

A reference to a few such instances may be here both instructive and interesting. "No secretion," says Carpenter, "so evidently exhibits the influence of the depressing passions as that of the *Mamma*."*

Quoting from Sir A. Cooper, "A fretful temper lessens the quantity of milk, makes it thin and serous, and causes it to disturb the child's bowels, producing intestinal fever and much griping. Fits of anger produce a very irritating milk, followed by griping in the infant, with green stools. Anxiety of mind diminishes its quantity . . . . as in the case of a mother anxious for a sick child. Her very milk will,

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* Carpenter's *Physiology*, p. 980.

under these circumstances, often produce green spotty motions with tormina. *Terror* is more powerful. Two striking instances, in which the secretion, although previously abundant, was completely arrested by this emotion, are detailed by Sir A. Cooper. Those passions which are generally sources of pleasure, and which, when moderately indulged, are conducive to health, will, when carried to excess, alter, and even entirely check the secretion of milk."

The case of the carpenter's wife who interfered to protect her husband in a quarrel with a soldier, wresting the sword from the latter, and who afterwards (when by the interposition of neighbours her passion was calmed down) gave her child the breast, is also familiarly known. "The infant in a few minutes left off sucking, became restless, panted, and sank dead upon its mother's bosom." Mr. Wardrop mentions,* "that having removed a small tumour from behind the ear of a mother, all went well until she fell into a violent passion; and the child being suckled soon afterwards died in convulsions. He was sent for hastily to see another child in convulsions after taking the breast of a nurse who had been just severely reprimanded, and he was informed by Sir R. Croft that he had seen many similar instances."

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* *Lancet*, No. 576.

Three other cases are recorded by Burdach.* "In one of them the infant was seized with convulsions in the right side and hemiplegia in the left, on sucking, immediately after its mother had met with some distressing occurrence. Another case was that of a puppy, which was seized with epileptic convulsions on sucking its mother after a fit of rage."†

But the effect of the poison may be more gradual. Carpenter gives two such cases. "The mother of several healthy children, fretting because absent from her friends, heard of the death, from water on the brain, of the infant of a valued friend, who had borne children cotemporarily with herself. The account impressed her deeply. One morning, shortly after suckling her own child, then in apparent health, it was seized with convulsions, and died. Another instance he gives is, that of a mother who had lost several children from a convulsive disorder. One infant, however, survived the usual fatal period. Whilst nursing him one morning she had been strongly dwelling on the fear of losing him also, although he appeared a very healthy child. In a few minutes after the infant had been transferred into the arms of the nurse, and whilst she was urging her mistress to take a more cheerful view, diverting her attention

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* *Physiologie*, p. 522. † Carpenter, *Ibid*, p. 981.

to his thriving appearance, he was seized with a convulsive fit, and died almost instantly."—*Ib.* Such cases are necessarily open to the objection, that the deaths were simply coincidences. Yet, when we see that long-continued anxiety will sometimes materially affect the nature of another organ's secretion, as in the production of jaundice, thus arresting the proper secretion of bile; or in the development of brain disease, or general dyspepsia, in which not only the organs themselves are affected, but necessarily the nature of their excretions or secretions; it is clear the long-continued use of an altered milk, secreted under diseased nervous action transmitted by the mind, cannot fail to do a suckling in the long run some harm.

"Ingens porro timor" (says Thorwarth) "horrorque ejusdem generis mala conficeri, quibus lactatio aboleatur. Atque demum iste curas acriores, sollicitudinis nimias, similes que plures mentis afflictiones conflare crebrius experimentur."—*Op. cit.*

CHAPTER III.

DEFECTIVE LACTATION CONTINUED.

TREATMENT :—1ST. MECHANICAL MODES OF TREATMENT—ARTIFICIAL SUCKING, OR DRAWING OF BREAST—INFLUENCE EVEN ON NON-PUERPERAL FEMALES AND MALES—CASES—ELECTRICITY—CASES—PECULIAR CO-EXISTENT SYMPATHIES OF BREAST. 2ND. DIETETIC TREATMENT—NITROGENOUS FOOD—WHITING-SOUP—CRUSTACEA—CONGER-EEL SOUP—LUMBRICI—DUCKS—MALT LIQUORS AND WINES.

MANY of these causes become more manifest in the consideration of the treatment required; and I think I shall best develope the subject in speaking of the treatment under the following heads :—1. Local or mechanical treatment. 2. Hygienic treatment. 3. Dietetic treatment. 4. Medical treatment. These several points to be considered both as affecting the mother and child.

1. *Mechanical Modes of Treatment.*—There are certain mechanical and physiological methods of inducing a flow of milk in the breast, *i. e.* where none of those powerful influences of mind we have

already spoken of are present to paralyse the function. They may be divided into, 1. Those which are applied locally to the breast; and 2. Those which are applied to the sympathising genitalia. Many suckling mothers have complained to me of the extreme annoyance to themselves and the child when it is put to the breast—their maternal feelings being so severely wounded at the attempts on the part of the child to procure milk from what appears to be a dried-up breast. The child is represented as fighting against it, and after fruitless efforts, as falling back, crying most bitterly. After a time, however, the draught comes, and the child obtains the milk, and is satisfied. Nevertheless, so painful is this ordeal to many mothers, that it compels them to cease suckling altogether. This fruitless sucking, besides, is not free from danger to the child itself. Mr. Ballard, in his work on "Diseases of Mothers and Infants," has shown that fruitless sucking is often in itself a cause of diarrhœa and convulsions in the child, and of that intestinal obstruction which is produced by intussusception. Without necessarily admitting these unfortunate results to be invariable, he has satisfactorily proved its baneful influence, and as such it should be avoided. Fortunately, the remedy in these cases is pointed out by the very result obtained. It is, after all, the suction of the child that induces the draught. It is well

known that this process alone will often induce milk in a breast which has ceased to yield it for months, if not years; nay, cases are not wanting to prove that it will induce it in withered old women, and even in men. Upon this point Dr. J. G. Thorwarth, in his inaugural thesis, "On Deficiency of Milk,"* says:—"Among the most powerful preservatives of the lacteal secretion, the first to be noticed is suction, which faculty nature has implanted in children, even though unconscious of existence themselves. . . . The Records of Medicine give us examples of most moral young virgins (integerrimæ), in whom the breasts having been sucked by infants, the habit of lactation has been induced."† So it has been observed among old women, in whom, because of their advanced age, the catamenia had been long suppressed, and yet in whom so copious a quantity of milk has been secreted through the mere suction of the breast by children, that they have continued to nourish them for a year."‡ Several cases are given and collected in Dr. Dunglison's "Human Physiology,"§ where women have done so; nor

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* Published in 1764.

† Phil. Salmust. cent. i. obs. 92, Ephema germ. cur. anno ii. obs. 135.

‡ Am. Lusitan. cent. i. cur. 47; A. Schenk, s. ii. de Mam. obs. 12 F.; Bouchardin. Eph. germ. cur. anno iii. obs. 10.

§ Seventh edition, p. 513.

does it seem confined to any particular class. It is most commonly and easily induced in females within catamenial ages; but Dunglison mentions several instances of females past those ages, even aged women, in whom the secretion was again induced by suction; nay, what is even more extraordinary, in unmarried and chaste females. One, indeed, quoted and given by Baudelocque, was the case of a young girl at Alençon, aged eight years, who suckled her brother for the space of a month. So also Dr. McWilliam states,* that in Bonavista the secretion is often induced in women within catamenial periods, by the use of the Bofareira plant, administered in a particular way, to be spoken of hereafter.

The remarks of the reviewer on Sir Astley Cooper's work on the Breast† are very pertinent on the subject. After alluding to the fact that girls before puberty, unimpregnated women, and even females of an advanced age have successfully suckled children, the milk having been induced by attempts of a child to suck, he adds, "This proves that an increased flow of blood, induced from other causes than sympathy with the mother, is able to produce a nutritious secretion. Nor is such a result at all anomalous, for we may gener-

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* *Lancet*, 2, 1850, p. 294.

† P. 111, Vol. X., 1840, of *Brit. and Foreign Med. Review.*

ally expect, where there is a determination of blood to any secretory gland, that there will be an increase of its secretion, not so perfect, perhaps, as that proceeding from the appropriate stimulus, but still of a very similar character."

Nor, indeed, are similar cases wanting, although* more rare, among *men*, who have become in like manner possessed of the function of a wet-nurse.† In Russia it is proverbial that many men possess this faculty, and often furnish much milk. Dunglison gives examples of several men in whom this faculty existed. Humboldt gives a case of a man, aged 32, who suckled his child for five months; Captain Franklin gives a similar case. Professor Hall exhibited to his class at Maryland a negro man, aged 55, who had suckled all his mistress's family, and also related the case of another who presented himself at the Philadelphia College with a left breast secreting milk freely.‡ "It must be admitted that suction, gentle and continued friction, pressure, kneading, and fomentation, and various other kinds of stimuli to the breasts, and especially the nipples, do assist materially the production of milk. At any rate, these measures certainly, if they cannot produce the milk, neverthe-

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* Anno iii. obs. 10.

† Alex. Benad. l. iij. Mat. c. 4. J. Schenke, l. ij. obs. ii.

‡ *Human Physiology*, 7th edit. p. 514.

less are of great use in provoking and increasing the flow."* But it is not always easy, and not always agreeable to the mother, to have her breast previously sucked by another person or child, till such time as the draught is induced, which is the readiest suggestion which presents itself to the mind to obviate the painful scene before described.† Moreover, if the practice is to be very frequently resorted to, there is reason to fear lest in the long run it may impede the production of milk. The mother feels so unhappy in the prospect; and those mental emotions of sorrow and anxiety are induced which are known to stop the secretion of milk. (See p. 256.) Breast pumps in such cases, and particularly the india-rubber variety, may in some measure obviate the inconvenience; but in my experience I have found that these pumps, unless very carefully used, do harm, and blood from the ruptured surface is frequently drawn out by them. The measures before recommended, when speaking of the unwholesome milk secreted by some mothers (p. 235), may be well adopted here also; but what is far more to the purpose, because it involves no waste or loss of the milk, is the gentle

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* De Lactis Defectu, p. 20.

† *Apropos* it may be a question how far upon these data Mr. Acton and other philanthropists might not hereby obviate the necessity of employing fallen women as wet-nurses, instead of duly trained honest women.

titillation of the nipple previously, catching hold of it between the finger and thumb, and pulling it gently outwards from time to time, imitating, in a milder degree, the milking movement which is practised upon cows.

Another mechanical mode of stimulating the breast to secrete milk is *electricity*. "A gland," says Mr. Lobb, in his work on Nervous Affections, "receives the *stimulus* from the nerves of the part. A rush of blood is the immediate consequence, and secretion the result." Mr. Lobb illustrates this flow of blood by the well-known experiment on the frog's web:—"The foot being firmly fixed, the wire of the electric magnetic apparatus is placed in contact with the leg, the other at the extremity of the toe of the portion of web under examination, and a weak current passed through. The arteries of the web immediately transmit a large supply of blood which is forced through the capillaries with great rapidity, the consequence being that the foot is bathed in serum. The nerves of the part stimulate the arteries to an increased flow of blood, and secretion goes on actively, until the stimulus is removed to some other complementary gland." He applies this doctrine to the breast, which, although capable, if excited to do so, may not perform its office for years; but the nerves, once stimulated, "allow a plethora of blood, and secretion" (of milk) "is the consequence."—P. 88.

The presence of a child by producing a mental influence; friction or suction, by determining a flow of blood to it, have the same effect; in both cases the nerves are stimulated, and thus plethora favourable to secretion occurs. Electricity is, perhaps, of all agents, that which most closely resembles the nervous force, and most effectually stimulates the nerves. Reasoning *à priori*, therefore, we should expect it would act very effectively, but here experiments are still in their infancy. It has, however, been known for some time that the secretion of glands is increased when an electric current is passed through them. M. Ludwig proved, before the Scientific Congress of Vienna, that the secretion of the salivary glands could be considerably increased by the action of electrical currents properly applied.*

M. Mazars de Cazelles by the same agent cured a case of impotence.†

Two cases, however, of electrical application to the breasts, and its effect in re-inducing the secretion of milk after its suspension, are given in M. Becquerel's work before quoted, p. 418. Such examples are so rare that I may be excused in giving them here in abstract. The first of these is bor-

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* Quoted by Becquerel, *Appendix de l'Electricité*, p. 420.

† *Ibid*, p. 295.

rowed from the *Gazette des Hôpitaux* (Sept. 2), and occurred in the practice of M. Aubert.

A woman, aged 26, mother of three children, and suckling the last, eleven and a half months, was attacked with inflammation of the lungs. Suction was maintained regularly, and spite of proper food and exercise, very shortly the breasts ceased to secrete milk. Artificial food was now given, but the child refused it, and as a result atrophy visibly set in. In this dilemma electricity was applied to the mother's breasts four days successively for twenty minutes at a time. From the first there was amelioration of the symptoms, and at the end of the four days the secretion was completely re-established, and continued till the recovery of the child.

Another case related by M. Becquerel occurred in his own practice. A young woman, aged 27, of good health and constitution, was suckling a healthy child, aged seven months. All was going on favourably, when in October, owing to some repeated mental emotions, the secretion began to diminish in the right breast, and was nearly entirely stopped in the left. The child was made to suck the breast some twenty times daily, but without success. Artificial food was now attempted, but diarrhœa supervened, and a wet-nurse was recommended. This course, however, was obstinately opposed by the mother. M. Bec-

querel, therefore, as there were still a few drops of milk on the right side, was satisfied in applying electricity only on the left side. This was done three days successively for fifteen minutes each day. On the very first day the milk appeared in the left side, on the third it did so abundantly, and from that day continued to flow in sufficient quantity. The right breast was not experimented upon.—*Ibid.*

Mr. Althaus, of Manchester-street, well known as having great experience in electrical therapeutics, has favoured me with the following example.

"The particulars of the only case of milk-secretion excited by electricity which has come under my observation, are as follows:—

"The patient was a lady in good circumstances, slightly hysterical; aged 31, primipara; parturition had been somewhat protracted, but no operation had been necessary. Both mammæ were extremely painful, hard and hot: no trace of colostrum, neither before nor after parturition. Both in the evening and in the morning she had sensations as if the milk would flow, but in spite of the usual local and external treatment it did not come. Six days after parturition I applied a strong current (with moistened conductors) to both mammæ for about twenty minutes. The following morning the milk flowed for the first time, though not yet abundantly. No further application of

galvanism was made, but in a few days afterwards, the secretion and excretion became as abundant as could be wished."

These cases are sufficiently encouraging to warrant the belief that electricity may often be found a successful galactalogue. But I believe M. Becquerel has since applied this treatment to six other cases, and with perfect success.*

If so, it is well to employ this simple mode, before having recourse to a wet-nurse.

2ndly. It is a known physiological fact, that there exists great sympathy between the breast and the genital organs, more especially those connected with parturition. The proper functional use of the one will influence the other. References to such sympathies are unnecessary, and on the score of morality are better avoided, but I have alluded to them, because it removes one of the objections usually made to the selection of married women as wet-nurses; and for which preference is usually given to fallen women. It points out the great impropriety there is in keeping a husband for a long period away from his wife, when she is suckling, particularly if she is a hired wet-nurse. This is generally done, because it is feared she may again become pregnant, or, by seeing her husband occasionally, may become discontented

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* *Medical Times.*

with her situation, and abandon the child; on the contrary, this very separation (where there is affection between the parties and no disease in the husband) is, I think, cruel, and is liable to bring on those very sorrows and anxieties which so soon and so effectually dry up the fount, when nature points out that the result of an occasional reunion would improve and excite the flow of good milk.

2. *Hygienic Treatment.*—Upon this point there is little need to say much. Nurses, of all others, should have frequent exercise as well as good food. Cleanliness in their persons is equally indispensable; a practice, I fear, which our poorer classes do not always adopt, since unpleasant emanations arising from neglect of personal ablution are frequently observed among them. To expect that a child nestling upon such odours could thrive, were absurd; but even in those who are cleanly, it is astonishing how pure air, or rather a change to a more rural air, will often induce a flow of milk, in a patient labouring under previously marked symptoms of defective lactation. I remember the case of a lady, against whom, certainly, no blame could be attached for want of cleanliness of person or activity of habits, who, while residing in London, had scarcely any milk whatever, but in whom, when removed to the sea-air, a most copious flow was induced, which persisted for months after, when she again returned to London.

What I have said before on the subject of milching cows and goats, and of the effect of keeping the animals themselves and their stables clean, is, of course, equally applicable to the human female. The question is one varying only in degree, not in kind.

3. *Dietetic Treatment.* — It has been long known that one of the most effective methods of increasing the flow of milk in all animals, is to give them an abundance of food; and it is almost exclusively this plan of treatment which has been followed out by practitioners of the day with their female patients. Simon has proved already, by a special experiment made upon a woman in very poor circumstances (and whose milk he examined at fifteen consecutive periods, commencing with the second day after delivery), that in proportion as he gave her good food, so did the quantity of solid matter in the milk increase, albeit the quantity of liquid matter was not so much affected. Hence one reason why practitioners have so much faith in this method of increasing the quantity and quality of milk, that they rarely adopt any other. The quantity of food given is far more closely investigated than the quality. Here, again, much that I have before said on the subject of milch cows or goats feeding (p. 143 *et seq.*), applies equally to a suckling woman. It is the same common office to be per-

formed in both cases, to produce milk not only sufficient in quantity, but rich in quality; and in this respect, therefore, the disadvantage of a diet too exclusively composed of vegetables with a small amount of azote is to be guarded against. Such food generally makes the milk thin and serous; and it is only when we give leguminous plants, or the higher cerealia or flesh, *i. e.* when in point of fact a due quantity of nitrogenous matters as well is taken, that both the quantity and quality of milk supplied are good.

Experience among suckling women proves the efficacy of analogous alimentation. First, among animal compounds, several are spoken of as galactopoietics.

There is a remedy that has some notoriety in the present day, viz., *whiting-soup,* which is generally believed to provoke a flow of milk. I believe this is true, but that the effects are somewhat exaggerated. Still it is a good change: fish, and particularly those varieties which are rich in phosphorus, I allude to oysters and crabs, are very efficacious. Of course these last must be sparingly taken at first, and particularly during the first months of suckling, because they do not always agree with the infant, producing urticaria and roseola; but where this effect is not observed, these kinds of food afford ready means of supplying the phosphates which are so beneficial to both mother

and child. As far as my own experience, however, goes, I give very much the preference to *conger-eel soup*. It is not generally known, but I am told it forms the basis of all rich and nourishing soups; and for this reason our French brethren, who have so much taste for "pôtages," import these eels in immense quantities from this country, and particularly from Jersey and Guernsey, where they abound. As a soup it is peculiarly nourishing, and very readily improves both the appetite and the strength. Like lentil powder, the stomach will often retain it when it will reject all other kinds of food. Mr. Jones, of Jersey, speaks highly of it, and gives a case in which, when all other means had failed, it checked vomiting after chloroform. Its comparatively low price also renders it very easily obtainable by the poor. Crabs, as a remedy for increasing the flow of milk, are of very old date. They are recommended by the author of "Gynæciorum" (p. 634, A), who also prescribes for the same object, a bluish coloured fish (*glauciscus*), taken in its juice, and a variety of smelts (*smarides*), taken with fennel sauce and boiled in milk.

Certain kinds of solid food and flesh have been recommended by eminent authors, in preference to those commonly in use. Ætius enjoins the use of fine bread, the legs of swine, tender birds, and the flesh of kids. Indeed swine's flesh, gene-

rally, is preferred to other kinds of flesh in several instances, and among these it probably claims the most favourable mention, after the fishy varieties already alluded to.*

Secondly, there are several vegetable aliments which act in a similarly favourable manner.

First amongst these stands *revalenta*, only another name for the ordinary *lentil powder*, but pea-soup and bean-soup have also a marked effect in improving the flow and richness of milk. The lentil and bean, however, are preferable to peas, where they are as easily procurable. Besides the better taste, the first is slightly aperient, and the latter does not produce flatus either to mother or child, which peas are apt to provoke.

There can be no doubt that some of the culinary plants usually taken are preferable to others. Women popularly ascribe peculiar galactagogue properties to turnips; and the Commission appointed to investigate the subject spoke very favourably of potatoes. To a certain extent I think it must be admitted this popular belief is founded in truth. It is, however, among those numerous edible fungi which infest our pasture-

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* From Galen: "Sunt autem hæ aves C. conia (swan) vespertalis, noctua apis, et quæ baccis junipero pascuntur, unde nominantur Germanis quam olifer turtorum genere adnumerant. . . . . Quam merito ejus ramenta jusculis adjicuntur utpote saluberrimmæ etiam puerperorum." See also Ægeneta on some kinds of game.

lands that those plants are to be found which are chiefly concerned in increasing this secretion. Their richness in nitrogenous matters may probably be the cause of this, as before stated. I must content myself with mentioning only one of these, the *Elaphomices granulatus* (Redwood, p. 563), or *Boletus* (*Lycoperdon cervinum*), or deer balls, which if taken increases the milk. To establish, however, more particularly the varieties of mushrooms best calculated to influence the secretion of milk, is a wide field open to further experiment and observation.

As to *drinks*, the greatest diversity of opinion prevails. In speaking of a kind of food administered to cows, I had occasion to notice the effect which refuse slop from whisky distillers had in increasing the quantity of milk of cows to which it was given (p. 59). Upon the same principle it is that ale and porter have so high a reputation as milk generators. From Ætius downwards all authors recommend them, and there is no doubt of their efficacy with many nurses. Many of these will tell you that they cannot do without it. To stout, and double stout especially, the preference is given, and in my own experience I have found the double stout of Barclay, Perkins, and Co. most efficacious in many cases. The use of such beverages, however, is frequently abused. Apoplectic tendencies of a slight character are in-

duced: although I have never seen anything like the result which obtains in animals fed on the exciting food before alluded to. If the porter, however, be taken too copiously, it soon ceases to exert the same beneficial effect upon the breasts, the function of which becomes less active, till, in fact, it is entirely suspended. What is true as a physiological law in other points, that continued excitement of the same kind exhausts nervous energy, is true also for the breasts. The exciting influence should vary in character as well as degree; and in this manner the exhausting tendency is counteracted. Fortunately, we have in an analogous bland fluid—I allude to milk from the cow or goat—a liquid peculiarly adapted to produce milk readily in the suckling mother; and if in such cases the stout and milk are given alternately to the extent of two or three tumblers of the latter, to one of the former, or if they are drunk in combination (a beverage more agreeable to the taste than would appear to the imagination), a less exciting and more nourishing food and drink is thus provided for the mother, which will enable her often to perform with much ease to herself her maternal duties.

Another kind of drink which was much praised by the ancients is *sweet wine*. Aristotle, it is true, forbids it. Oribasius, Ætius, Avicenna, Paulus Ægineta, and a host of others, on the contrary,

recommend it. My own experience, I must say, except in those cases where there exists such debility as to necessitate the employment of stimulants, is in this country against our ordinary wines; or spirits, indeed, of any kind. I do not say a wine-glass or two may not be indulged in; but the habit does not increase the flow of milk.

Much more efficacious are some of those soups usually made, and which have been already alluded to.*

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* Old recipe from "A Rich Storehouse in Treasury for the Diseased." By A. T. London: 1596. "1. A very good medicine to increase milk in a woeman's breasts, ch. clii. p. 31:—Take Fennel Rootes and Parsnepe Rootes, and let them be boiled in broth, which must be made of chickins. Then let the patient eat the same rootes with Fresh Butter, which must be new made, as possiblie it may be gotten, and this will cause great store of milke to encrease in any woeman's breastes. This hath been often proved. 20. Ch. 153.—Take rice and seethe it in Cowe milk, and creeme some wheathen bread therein, it must be such as is cleane without rie, and put into the said mylke some Fennel seed, beaten into fine powder, and a little sugar, to make it sweet, and this is known to be exceedingly good. 30. Ch. 154, p. 31, b.—Take a good quantity of greene wheate, which groweth between Michaelmas and Easter; you must take both of the blades and rootes, and stamp it very well, and straine it through a fine linen cloth into some posset ale, and put therein a little fine sugar, and this will encrease great store of mylke in woeman's breastes, within the space of three or four days. This hath been proved."

APPENDIX.

A remedy which I suppose bears some similarity to shell fish was in great vogue among the ancients. I allude to *earthworms*. It is one, however, which is not likely to take with the British public. I am, nevertheless, bound to mention it. Ætius, in his "Tetrabiblos" (serm. 4, ch. 33), thus alludes to them: "Take about five or seven worms of fishermen, which are found in the mud of rivers (and are called *lumbrici*), bruise them, and add to them boiled dates, and mix them altogether. Give this compound in beer to the woman upon an empty stomach daily, and in about ten days you will be surprised at the quantity and excellence of the milk found." The author of "Gynæciorum" also recommends their exhibition ! ! !*

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* "Lumbricorum vivorum: Scrup. ij. tere et cum mellis cyathis ij. bibat, ut non cognoscat."* He also recommends their exhibition boiled in milk and honey-wine, as a remedy most efficacious in inducing an abundant secretion of milk.

* "Lumbricus terrestris, officinalis, or earthworm, is so well known that I need not explain its figure. In its use it proves very diaphoretic, diuretic, and anodyne. It is a discutient and emollient. It is good in apoplectic cases, and where the muscles and nerves are affected; in the dropsy, the colick, and in the scurvy it has been used with great success."—(R. Bradley, F.R.S., Lecture on Materia Medica, 1730.)

CHAPTER IV.

TREATMENT OF DEFECTIVE LACTATION CONTINUED. MEDICAL.

MEDICINAL TREATMENT — REMEDIES — LAVER — BORAGE — LETTUCE — SOW THISTLE — ROCKET — CASTOR-OIL LEAVES — PARTRIDGE BERRY — CYTISUS — MILK WEED — MALLOW — GITH — PULSATILLA — COMMON SALT — CRYSTAL — SAKEIK — FESIRE — IRON AND COD-LIVER OIL.

Medicinal Treatment.—I proceed to speak now of those medicinal remedies which have been recommended. Paulus Ægineta, in speaking of these, says, "That medicines for the formation of milk are possessed of some efficacy, I am well aware, and yet I do not recommend them in all cases, for they greatly waste the body." This opinion seems to have been very generally acted upon in modern times by those who were acquainted with such remedies; but the fact is, by far the majority of practitioners make no use of galactagogues, because they do not believe in their existence.

I think the consideration of these different re-

medies is best taken according to their natural order. I should premise, however, by saying, that my experience is necessarily limited to a few of these only; I have not been able as yet to try all, nor even the majority; and from the difficulty of identifying plants spoken of by different authors of past centuries, with those under a different name in the present day, the experiments may in some cases have been conducted with the wrong plant. Again, preference has generally been given to those which were found most efficacious and most frequently named, and unmistakeably defined by ancient as well as modern authors. All, however, I have met with, are here subjoined in a tabular form :—

1. *Algæ.*

Porphyra lacciniata, laver (Galen).

2. *Boraginaceæ.*

Echium vulgare, bugloss; Borago, borage.

3. *Caryophylleæ.*

Saponaria vaccaria, cow basil (Redwood).

4. *Compositæ.*

Lactuca sativa, lettuce; Sonchus arvensis, common sow thistle.

5. *Cruciferæ.*

Eruca sativa, garden rocket (*English Phys.* enlarged).

6. *Euphorbiaceæ.*

Ricinus communis, castor-oil plant; Jatropha curcans.

7. *Ericaceæ.*

Gaultheria procumbens, winter green box berry.

8. *Labiatæ.*

Ocymum (basilicum) ? Melissa asinos, basil thyme.

9. *Leguminosæ.*

Cytisum scoparium. Coronilla juncea (milk vetch). Cicer.

10. *Malvaceæ.*

Malva sylvestris, marsh mallow.

11. *Rosaceæ.*

Quinquefolium vulgare, or Potentilla, creeping cinquefoil.

12. *Ranunculaceæ.*

Nigella sativa, or melanthium (Gith); Anemone pratensis, pulsatilla.

13. *Umbelliferæ.*

Pimpinella anisum, aniseed; Anethum fæniculum, fennel; Anethum dulce, dill; Apium sativum, parsley; Daucus carota, carrot (Galen).

Common salt, sakeik, fesire, iron, and cod-liver oil.

Boraginaceæ.

Echium vulgare.—Viper's bugloss. Flowers blue; July; biennial; found on sandy and chalky soils. Roots opening, and said to be slightly astringent. (Redford.) "The seed drunk in wine procureth abundance of milk in women's breasts."*

I have tried this remedy in the shape of a strong infusion; but I could not trace in any of the cases any effect as a galactagogue.

Borago officinalis.—Common borage. Flowers blue; June and July. Biennial. Borage and bugloss. "The seeds and leaves are good to increase milk in women's breasts."†

Of this plant I have no experience.

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* Culpepper's *English Phys.* p. 368. † *Ibid*, p. 39.

CARYOPHYLLEÆ.

Saponaria vaccaria. — Cow basil, vaccaria. Seed heating diuretic; this plant is said to increase lacteal secretion in cows fed upon it. (Redwood.) Galen speaks very favourably of it.

I have tried this remedy in a few cases only and as a strong infusion, and I think I can speak favourably of its effects. In my hands the patients seem to have remarked that the quantity of milk produced under its employment in their breasts was materially increased.

COMPOSITÆ.

Lactuca sativa.—There are many varieties. Has been substituted for opium to check diarrhœa; allays cough and diminishes rheumatic pains. Leaves refreshing; slightly anodyne, laxative, anaphrodisiac. The milk it yields constitutes, when inspissated, lettuce opium, or lactucarium. (Redwood.) "The juyce of lettice increaseth milk in nurses."*

I have no experience of this drug.

Sonchus arvensis.—There are several varieties of this plant. This, the corn sow-thistle; Sonchus ciliatus, or oleraceus, common sow-thistle; S.

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* *Ibid*, p. 142.

lævis, or smooth sow-thistle; S. asper, or prickly sow-thistle. In their effects they are described as possessing properties like those of lettuce. Culpepper speaks of the plant as follows:—"The decoction of the leaves and stalks causeth abundance of milk in nurses, and their children to be well coloured. It is good for those whose milk doth curdle in their breast." *

I have also used this remedy in a few cases, and in my results I should place it in the same category with Saponaria, which it closely resembles in its action.

Cruciferæ.

Eruca sativa.—Rocket. South of Europe; said to be antiscorbutic, diuretic, flatulent; seeds acrid, stimulant, exciting the stomach, and a good substitute for mustard. Culpepper speaks of it,—"The seed also taken in drink taketh away the ill scent from the armpits, increaseth milk in nurses, and wasteth the spleen."

Of this plant also I have no experience.

Avicenna states there are two varieties, one wild, and the other cultivated. When the seed is boiled into a decoction, and put, instead of mustard, as a poultice, it causes the milk to abound.

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* *Op. cit.*, p. 344.

EUPHORBIACEÆ.

Ricinus communis.—Oil bush. Castor-oil plant. India. Seeds are purgative, yield oil by boiling and expression. Root in decoction diuretic; leaves with lard used externally as an emollient poultice.

The galactagogue properties of castor-oil leaves were known to the Spaniards of Peru and Chili. M. Frezier, Engineer in ordinary to the French king, in his narrative of a voyage to those parts, performed during the years 1712-13-14, stopped for some days at San Vincente, one of the Cape de Verde islands. In his description of that island he states, that among other plants he saw there the *Palma Christi* or *Ricinus Americanus,* by the Spaniards in Peru called *Poterilla;* and they affirm that the leaf of it applied to the breasts of the nurses brings milk into them, and applied to the loins draws it away.*

The employment of castor-oil leaves as a galactagogue in this country dates since 1850. In a paper read before the British Association, at Edinburgh, in 1850, and afterwards published in the *Lancet* of same year,† Dr. McWilliam brought the effects of this plant before the profession. "The leaves of this plant in Bonavista in the

* Dr. McWilliam's Letter, vol. ii. p. 488, 1850.

† Vol. ii. p. 294, 1850.

Cape de Verde Islands are known as the *bofareira*, which is in reality the *Ricinus communis* of botanists, and occasionally the leaves of the *Jatropha curcans*, both belonging to the natural order of Euphorbiaceæ. Two kinds are known in these islands, the *red* and the *white*. They are both varieties of the same plant, but the red is avoided by the natives, the former being said to be galactagogue in its properties, the latter eminently emmenagogue. In cases of childbirth, where the appearance of the milk is delayed (a circumstance of not unfrequent occurrence in those islands), a decoction is made by boiling well a handful of the white bofareira in six or eight pints of spring water. The breasts are bathed with this decoction for fifteen or twenty minutes. Part of the boiled leaves are then thinly spread over the breast, and allowed to remain until all moisture has been removed from them by evaporation, and probably, in some measure, by absorption. This operation of fomenting with the decoction, and applying the leaves, is repeated at short intervals until the milk flows upon suction by the child, which it usually does in the course of a few hours. On occasions where milk is required to be produced in the breasts of women who have not given birth to or suckled a child for years, the mode of treatment adopted is as follows:—Two or three handfuls of the leaves of the *Ricinus* are taken and

treated as before. The decoction is poured, while yet boiling, into a large vessel, over which the woman sits, so as to receive the vapour over her thighs and generative organs, cloths being carefully tucked around her so as to prevent the escape of the steam. In this position she remains for ten or twelve minutes, or until the decoction cooling a little, she is enabled to bathe the parts with it, which she does for fifteen or twenty minutes more. The breasts are then similarly bathed, and gently rubbed with the hands; and the leaves are afterwards applied to them in the manner already described. These several operations are repeated three times during the first day; on the second day, the woman has her breasts bathed, the leaves applied, and the rubbing repeated three or four times. On the third day, the sitting over the steam, the rubbing, and the application of the leaves too, with the fomentation of the breasts, are again had recourse to. A child is now put to the nipple; and in the majority of instances, it finds an abundant supply of milk. In the event of milk not being secreted on the third day, the same treatment is continued for another day; and if then there still be want of success, the case is abandoned, as the person is supposed not to be susceptible to the influence of the bofareira.

"Women with well-developed breasts are most easily affected by the bofareira. When the breasts

are small and shrivelled, the plant then is said to act more on the uterine system, bringing on the menses, if their period be distant, or causing their immoderate flow, if their advent be near."

Dr. McWilliam gives the cases of three women (occurring under the notice of Drs. Almuda, Sir George Miller, and Consul-General Rendall) in whose breasts milk was induced by the employment of the bofareira. In all these cases pregnancy had occurred some years previously.

Dr. Tyler Smith has made some experiments upon the use of this plant. He tried the effects of the leaves in five cases, in three of which it proved successful. In one it produced a copious flow of the catamenia, in another of leucorrhœa. From his experiments he believes that the castor-oil leaves, applied externally, have distinct galactagogue effects. He followed out in his experiments the description given and quoted above from Dr. Williams's paper, but did not apply the steam of the decoction to the generative organs; nor does he appear to have given it internally.*

I believe I am the first who has used castor-oil leaves and stalks internally as a decoction in this country. I was led to do so from having frequently observed that suckling women, after taking a dose of castor oil, noticed that they

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* *London Journal of Medicine*, vol. ii. p. 951, 1850.

secreted a larger quantity of milk—a result which I certainly cannot entirely attribute to the removal of accumulated fæcal matters; because I have not seen the same full effect from the use of other purgatives. Dr. Tyler Smith* alludes to this effect having been noticed by others, although, he adds, it may do this by moderating febrile excitement. It occurred to me, therefore, that in defective lactation, the exhibition of castor-oil leaves and stalks in a decoction might produce, or more directly cause, a flow of milk. I have now given the remedy in several cases, and I must say I have not been disappointed. The flow has been remarkably increased. Four objections, in practice, against its use, however, should be mentioned. 1st. Some patients complain while taking it of a sensation in the eyes, not exactly amounting to pain, but accompanied with dimness of sight. I do not think this effect, however, is due to any peculiar effect of the castor-oil plant. I have only noticed this symptom in weak women; and I rather attribute it to the forced flow of the secretion, an effect exactly analogous to that which is observed in nurses who have suckled too long, when the child takes the breast. 2nd. A second is, that the dose after a time requires to be much increased, as the remedy appears to lose its effect.

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* *Ibid*, p. 954.

A temporary suspension, and the substitution of another galactagogue, remedies this inconvenience. 3rd. The third objection is a more serious one, but one which I hope in time will be remedied—the difficulty of procuring the leaves or stalks in sufficient quantity. It appears that they are not imported into the country, and all those that can be obtained are produced in botanical gardens. The larger number come from the gardens of Mr. Butler, of Covent-garden; but then the supply is but small. I have, however, found this remedy so important as a galactagogue, that I hope ere long it will either be imported or grown in larger quantities, so as to be used much more extensively.

The last objection applies to an occasional effect observed after its administration. The roots in decoction were before said to be diuretic. The leaves in decoction are occasionally so also. I have heard of two examples. In the one, so far as I could hear, a large quantity of water was daily passed under its influence, and it did not appear to produce any increase of the secretion of milk. In this case, however, I am not aware if the breasts were kept warm. If not, it is conceivable that an effect similar to that observed with diaphoretics should occur. These remedies, it is known, will not act as sudorifics if the surface of the skin is kept cool, but as diuretics. If an analogous explanation applies to galactagogues, it

points out the importance of keeping the breasts very warm when the decoction of castor-oil leaves is given internally. Moreover, we are led to this mode of management by noting the manner in which the remedy is employed in Bonavista. Hot fomentations of the leaves are there always applied locally to the breast. Where this diuretic effect is produced, it is well therefore to smear the extract of the leaves over the breast in the same manner as a belladonna extract is sometimes used, with a warm ordinary poultice outside it, and this combination will probably fulfil all the indications in the treatment. In the second case, both the secretion of the kidney and the milk were much increased, and to such an extent as to make it obligatory for the sake of the patient's strength to discontinue it. I am not aware (as both of these cases occurred in the practice of others) whether hot fomentations were also applied to the breasts. The breasts as a rule should always be kept warm, when this remedy is given; and when the diuretic effect is produced, not only kept warm with poultices, but well smeared over with the extract.

When the castor-oil leaves are given as an infusion to women *who are not suckling*, I have observed two effects, both of which seem to denote its specific action. First, it produces internal pain in the breasts, which lasts for three or four days.

Then, secondly, a copious leucorrhœal discharge takes place, after which the effect on the breasts entirely disappears. During the duration of the pain at the breast I make no doubt that, if a child had been applied, the suction would have determined the lacteal secretion. This, however, is an experiment to which I have never found a patient willing to submit herself, and so have not been able to prove.

I have not observed yet any very decided action of the leaves as an emmenagogue. In some women it seems to possess scarcely any influence. The preparations of this drug which I have used have been a strong decoction or liquor, and an extract, the dose of the former being from one to two drachms daily, in water; of the latter, five grains.*

Of the various plants which succeed in my list, except those mentioned among the Umbelliferæ, I have no experience. One only I have tried, the *cytisus;* but my trials have been so limited that

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* Avicenna mentions a particular plant under the name of Albetaflores palmarium, or Albata, which when taken causes the secretion of milk to be much increased. Is this the Palma Christi? It is also spoken of by him as Bussura (*i.e.* Palma), Besser, and Beda, which he has not further described, because, he adds, "they are well known." It appears to have been a plant in his time in very common use.

This remedy is prepared and sold by Mr. Greenish, 20, New-street, Dorset-square, W.

I cannot speak of its effects at present. I shall content myself, therefore, with their mere enumeration, and the properties they are alleged to possess.

ERICACEÆ.

Gaultheria procumbens. — Winter green box berry, chequer berry, partridge berry, mountain tea; North America. Leaves, Gaultheria, Ph. United States, used for tea. Fruit contains an aromatic, sweet, highly pungent volatile oil, which is antispasmodic and diuretic; a tincture has been useful in diarrhœa. Coxe states that the infusion is useful in asthma. It is used in North America as tea. The brandy in which the fruit has been steeped is taken in small quantities, in the same way as common bitters. It has been employed as an emmenagogue, and with the view of increasing the secretion of milk; but its chief use is to impart an agreeable flavour to mixtures and other infusions. It is employed as an infusion, but also in the form of an oil, which is more used in regular practice than the leaves. Instances are on record of deaths resulting from the use of the oil by mistake in the dose of one ounce. On examination after death, there were strong evidences of gastritis.

LABIATÆ.

Ocyminus.—There are several varieties. Album,

Toolsie tea; dried leaves used as a substitute for tea; juice in one-drachm doses given for colds. O. Basilicum, Basilicum; sweet basil, strong scented, emmenagogue, gives the peculiar flavour to Fetter-lane sausages. According to Anstie, assuages childbirth pains. O. cavum, sudorific, anti-gonorrhœal. O. cuspum, anti-rheumatic remedy, &c.

It is probably the O. Basilicum, which has been by some believed to be the basil spoken of as a galactagogue.

Avicenna speaks of this plant as the Bedareng, which is known as well as its oil to be the beneficial ingredient of oil of marjoram. Its water and leaves increase the secretion of milk.

Mellissa acinos.—Syn. acinos vulgaris, basil thyme, and mellissa chenopodium, wild basil; supposed also by some to be the basil meant by older authors as a galactagogue.

Leguminosæ.

Cytisus.—A large number of ancient authors speak of this remedy as an effective galactagogue. I do not find the variety, however, further specified. "A decoction of the young tops of Cytisus scoparius is said to be diuretic and cathartic, even to animals who browse upon them. The flowers (used as a pickle for table) and seeds are cathartic, sometimes roasted as coffee. C. laburnum, seed

and bark poisonous, narcotic, acrid, leaves diuretic, resolven.t" (Redwood.)

Johann Nardius speaks of the Cytisus as a galactagogue, if given in the food of animals. The remedy, indeed, is as old as Hippocrates.

I have used the Cytisus scoparius once or twice. I cannot say I have noticed galactagogue results.

It is not impossible, however, that the Cytisus that is here meant is in reality altogether a different plant from the Cytisus we now know. The following passage from Ætius (*Tetrabiblos*, 78) seems to favour this view :—

"Tythymalli and those medicines that are called galactides, or galactagogues.

"*Halimon sive Halmyris.*—Some eat the seeds of the fruit of halimon, and having cooked them serve them. The plant gives strength to milk and to the seminal secretion. A drachm of the root drank out of water, quiets convulsions, and tormina, and both attracts and increases milk." The dictionaries give the following meaning to halimon :—"*Halimon i.* n. ἅλιμον ; some kind of *marine fruit :* ab ἅλιμος maritimus." Plin. l. 17, c. 24. ad fini ex Theophrast. Hist. Plant. l. 4, c. 24. "Et *cytisus* necatur eo, quod *halimon* vocant Græcii. Alii *halimon* (lege halimon) olus maritimum esse dixere soldum, et unde nomen, ἅλμιρος salsus, genus nitri."

It may be some kind of sargossum or sea laver

—perhaps the *Ulva lactuca, sea lettuce, or lettuce green laver,* both edible varieties of sea-weed—is meant. It is remarkable, too, that the author of Gynæciorum enumerates among his recipes to increase the secretion of milk,—"Lac vaccinium bibat; aqua salsa valida vel marinæ fomenta et post vino calido."—P. 71.

Avicenna has likewise alluded to this plant under the name of "*Melha.*" "This," he states, "is the *halimus* which resembles *hauserigi;* its leaves, like olive leaves, only wider, are eaten as vegetables. The expressed juice causes milk to abound."

Coronilla juncea. — Syn. polygala vera. Milk vetch. This herb in decoction increases milk.

I believe this is the same plant which is known and sought for in London by many suckling mothers—indeed, kept for that purpose by herbalists. It is usually obtained from Gravesend, and known more popularly as the *milk weed.* I have used it largely, and I must also speak very favourably of it. Second only to castor-oil, and of about the same efficacy as the fennel, it is more readily available for most persons. I have also used the leaves of this remedy as a decoction, and have found it very efficacious. I have not tried the roots or the seeds. Probably the medicinal effects of these parts of the plant would be even more marked, and in winter they would be more readily procurable than the fresh leaves.

Cicer arutinum has been said by some to exert a galactagogue effect. "The seeds are heavy, but wholesome, roasted for coffee, farina resolvent."

MALVACEÆ.

Malva sylvestris. — This plant, so commonly known, marsh mallow, is stated by Culpepper to be a galactagogue. "The leaves boiled, used by nurses, procureth them abundance of milk." (*Op. cit.* p. 150.) This effect, I presume, is chiefly due to its nutrient qualities, rather than to any peculiar medicinal effect.

Avicenna speaks of a variety of *Malva* as a galactagogue under the name of *cubeze*, "which is a wild kind of Malva, as the *Muluchia* is a domestic variety. Cubeze," he adds, "is a species which is known as the Muluchia *arbaca;* and this is the *Althæa*, popularly the *Jewish vegetable*, not the *Luxinquum*, which is a different species, and is *red*. The leaves and flowers make the milk to abound."

ROSACEÆ.

Quinquefolium vulgaris, or *Potentilla reptans*. —Creeping cinquefoil, five-leaved grass, said to be a galactagogue.

RANUNCULACEÆ.

Nigella sativa.—Gith, fennel flowers, devil in a

bush. Nigella arvensis, or Melanthium sylvestra: seeds acrid, oily, attenuant, used as a spice. Paulus Ægineta recommends sweet gith as a galactagogue.

Anemone pratensis. — Pulsatilla. This plant has been recommended by Avicenna.

Umbelliferæ.

Five plants in this order are commonly recommended: — The Pimpinella anisum; Anethum fæniculum, or fennel; Anethum dulce, or graveolens, dill; Apium sativum, or parsley; and Daucus carota.

All these plants are too well known to require description. All older authors, from Hippocrates downwards, speak of them. The *fennel* (marathron of the Greeks), indeed, seems to be the staple ingredient of most of the remedies employed to promote secretion of milk. Ægineta recommends the root and fruit of the fennel boiled in ptisan. Ætius recommends the leaves of the *dill.* Ægineta directs that the fruit of the *carrot* should be given in such cases. My experience of these several plants has been confined, in a medicinal point of view, to the fennel. I have used pretty extensively the infusion of fennel seeds; and of all those plants which I have tried, I consider it as second only to castor-oil. It is remarkable how materially it increases the flow of milk in those who take it,

producing sensibly the draught in many women who have been strangers to this sensation to any extent for weeks. In one respect it differs, not producing the same amount of dimness of sight which the castor-oil leaves do; at least patients have not complained to me of this effect when taking it. The appearance of the children has been also particularly good under its influence.

There are two other specific galactagogues which must here be alluded to. One is *common salt*. The other is a substance spoken of by authors of the last century as *chrystal*.

Common Salt.—We are all pretty well aware of the effects of common salt upon the body in proper quantities; one of the most important of which, according to Liebig and Boussingault, is to improve the glossy and smooth appearance of the coats of animals. Nardius, in his *Analysis of Milk* (*op. cit.*), has the following remarks on it:—"Albertus says that insular cattle are larger because of the saltness of their pastures; the salt, moreover, having a quieting (taming) effect upon them, so that they yield an abundance of milk. Whence it happens, that in sea-side places, where cattle feed on salt pasturages, they are more prolific; their flesh is more tender; their milk more abundant, and richer in cheese. The learned Mercurialis, it is true, controverts this opinion; but still he admits that a moderate use of salt

does increase milk." (Moreover he adds, "that sheep will fatten upon salt drinks; and that for this reason it is customary to give every fifth day to them salt, in the proportion of about 200 pints for every 100 sheep.") So also the poet testifies:—"Let the lover of milk bring frequently to the mangers of his cows, cytisus, lotus, and salt herbs. These last they love best, and the effect will be to swell out their breasts. Moreover, having partaken of these, they will drink more, and so a larger flow of milk will be provoked." (Nardius, *Analysis de Lacte*, p. 153.)

The last substance to be mentioned is *Christall*, differently spelt as Christal or Crystall. I find this substance used in several receipts of old farmers and numerous works of the last century, and then much in vogue as a galactagogue. "Take crystall, and beat it into fine powder, and mingle it with as much fennel seed, likewise beaten in fine powder, and a little fine sugar. Let the woman use to drink hereof somewhat warm, with a little white wine, and this will cause great store of milk to increase in her breasts: yea, it will restore her milk again, though it be clean gone from her."* Whether, from what has been premised on com-

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* Collection of Pamphlets, 1650-1652, Brit. Mus. Rich Storehouse Treas. for the Diseased. By A. T. 1596. Ch. 155, pp. 31—36.

mon salt, it may be supposed Rock Crystal is meant, I do not know. In some of the old medical dictionaries, the *crystallus* is further designated as "crystallus mineralis, potassæ nitras fusus sulphuris paucillo mixtus." Also, as "sal prunellæ." Nicholson, in his *Dictionary of Chemistry,* describes the Crystal Mineral as follows:—"In the ancient dispensatories we find a formula for making a salt of this name, by fusing nitre, projecting a little sulphur thereon, and afterwards casting it into little cakes."* On this supposition, nitre would possess properties not at present attributed to it. I have not, however, with the view of testing this surmise, tried the remedy.

Two other plants used as galactagogues by the Arabians, are mentioned by Avicenna—*Sakeik* and *Fesire.*

"*Sakeik,* called *Sakaik* (alnaman), is a rose, vehemently red. If its flowers and stalks are boiled with a decoction of barley and eaten, they make the milk to abound.

"*Fesire* is the *hezargiesum* or *hezar chasen,* otherwise the *vitis alba.* The juice of this drunk with a decoction of wheat insures the flow of milk."

I cannot close the category of medicines to be

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* Nicholson's *Dictionary of Chemistry,* 1808.

given to a suckling woman without referring to two other remedies in more common vogue—*iron and cod-liver oil.* I am quite aware that in reference to the first of these many learned writers have shown that iron often exerts a repressive influence upon the lacteal secretion, and facts apparently in confirmation of this opinion, chiefly occurring when patients take chalybeate waters, have been given. Mr. Stanislas Martin observed at Châteauneuf in Auvergne, that cows on drinking ferruginous waters, to which they were very partial, lost their milk. The same effect was observed on a young wet nurse, upon whom he experimented.* I believe, however, this is an error, and that these effects are rather due to ill-timed administration, or to the preparation of iron given. Any remedy which will be likely to induce constriction generally of the system, we should expect would be *à priori* detrimental. Besides, if we look to the appearance of a woman who has long nursed, and may be said to be exhausted by the process, we shall notice some well-marked symptoms which indicate at once the remedies to be employed: general pallor, amounting often to anæmia, debility, languor, copious leucorrhœa, pain in the back, headache, increased by the erect and

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* *Bull. de Thérap.*, Dec. p. 554; *Med. Times and Gaz.*, Jan. 23, 1858, p. 96.

relieved by the recumbent position, and general emaciation. All these symptoms are clearly those of want of red globules in the blood, and precisely those which experience proves most readily subside under the exhibition of iron. Few having to treat such a case would hesitate to give it. The use of iron here, if given *pari passu* with the nursing, would have prevented, or at any rate delayed, the occurrence of exhaustive disease. So also the emaciation is often painfully remarkable after nursing. In milch cows (as I have before said, p. 149) it is this very emaciation which deteriorates so much from the value of the animal after two or three months, as to make it a losing concern for a farmer to keep a milch cow at all. Amongst milch cows, it is only by giving highly combustible food (oil cakes) that this result is obviated. Why not apply the same rule to the human female? It is with the intention of fulfilling this indication that I have given cod-liver oil. Of the preparations of iron I usually give the iodide, especially when there is any strumous disposition to contend against, or the syrup of the superphosphate, which from the excess of phosphoric acid, so important to both mother and child, is peculiarly applicable; sometimes, where there is excess of acid, or gastrodynia present, the sesquioxide or carbonate—the more astringent preparations I entirely discard. In addition, a teaspoonful dose of cod-liver oil

twice a-day after breakfast and dinner. Indeed the usefulness of these two remedies, from observation in cases where intense debility and anæmic symptoms with emaciation were wont always to make their appearance from the third to the seventh month of suckling, cannot be doubted. Having on subsequent pregnancies attended such cases, and given them during their suckling periods both iron and cod-liver oil, beginning as early as the sixth week after delivery, and sometimes even earlier, and continuing the remedies up to the period of weaning, I have been gratified on finding at the end of that period that these distressing symptoms of debility and emaciation never recurred: on the contrary, the patients were unimpaired in health, strength, and looks, and the children were far stronger and larger than those which preceded them. Perhaps it is the dread of physic, and a disregard to the artificial life women lead in towns, which are in great measure the causes of the common prevalence of symptoms of hyperlactation.

As a *resumé* of the foregoing remarks, it may be concluded that defective lactation is in many cases a curable affection; and that under proper treatment the mother may be enabled to fulfil her maternal duties, not only without injury to herself, but with great advantage to her offspring. These results, if fully carried out by future experiment—

which may be looked for with great interest, but I must also say, with full confidence—are of great importance: to the public generally, and morally, in excluding from our domiciles fallen women to act as wet nurses at high salaries, and thus no longer affording a premium for crime; to the mother, in putting her in an enviable position, in which she has never been before placed; and thus providing for her children the very nurse of all others to be desired.

CHAPTER V.

ON THE METHOD OF BRINGING UP CHILDREN BY HAND—ADVANTAGE OF ALLOWING CHILDREN TO SUCK ANIMALS DIRECTLY—THE VOLATILE PRINCIPLES OF MILK ARE THUS NOT LOST—DIFFICULTIES IN THE CONVEYANCE OF MILK—ERRORS OF MANAGEMENT IN OUR FOUNDLING HOSPITALS.

HAVING now dwelt upon that class of cases where the mother is either able, or can be made able to suckle her own child, we pass on to the second inquiry referred to, viz.—If she be not able to wet-nurse the child at all, certain principles ought to be observed in feeding it, whether the artificial food given be animal milks or something more distinctly artificial, leaving the employment of a wet nurse as a *pis aller*.

In those cases where we are compelled to bring up a child by hand, there is the greatest need of care and judgment. Prior to eight months this difficulty is considerably enhanced. (See p. 225.) At that period teeth are generally present, the anatomical conformation of the alimentary canal is well-nigh completed, and the child is enabled to digest even

vegetable materials. But in the earlier periods, and particularly in the first three months of existence, the danger of death under artificial feeding is very great; most of the tables above given prove this. This is especially true for illegitimate children. In a table drawn out by Mr. Acton in his paper before referred to, the chance of death at this period amongst illegitimate children, such children being generally brought up by hand, is about one-third of all the deaths in the year: thus out of 326 children, 31 died under 1 week, 45 above 1 week and under 1 month, 110 under 3 months, 74 under 6 months, 27 under 9 months, 39 under 1 year.

Now I believe that no treatment can be safely recommended in these cases, which can bear any comparison with that which experience has proved to be most successful in other countries: I allude to the direct suckling of the child from the breast of some other animal, as for instance the goat, to which I have already referred (pp. 141 and 156). Besides, it is the most natural. This itself is no small advantage. But it also does away with the necessity of an experienced nurse to prepare the child's food *secundum artis*, so that it shall not disagree. Lastly, no improper practices of the animal are likely to endanger the safety of the child, which, after suckling a short time, it will come to love and protect as its own offspring. (See p. 329.)

Undoubtedly, therefore, the plan has experience to recommend it. But more than this; I have already shown that by properly feeding these animals we may obtain from them, as well as from cows, a milk which shall so closely resemble human milk as scarcely to be distinguishable from it even by chemical examination. The particular disadvantage which attaches to the employment of milk as it is usually obtained from cows, even when free from adulteration, is thus obviated. Very fresh milk undoubtedly agrees best with children. Now it has occurred to me more than once that the explanation may be possibly given, namely, that the milk when warm, precisely as it is with blood, loses by evaporation some vital volatile principle, and is thus rendered more difficult of digestion. In confirmation of this view it may be stated, that the existence of such volatile principles, as I have before stated (*vide supra*, p. 98), has been proved incontrovertibly by the experiments of Parmentier and Deyeux, although unfortunately their chemical composition has not been made out. With the intention of making this out, they distilled frequently several specimens of milk. Speaking of the distilled product, they remark: "It would be a mistake to condemn the distilled water of milk as simply water. Its smell, taste, and especially the ready manner in which it is changed by exposure, prove evidently that it

holds in solution one or many substances. But what are these substances? This is indeed a difficult problem to solve. All that is possible at present to say is, that these substances are easily decomposed, since we find their remains in the water which contained them; they are those remains which affect the transparency of this fluid, and give it that viscosity and putrid odour which it acquires after a time." Messrs. Parmentier and Deyeux believe this product to be analogous to those obtained by the distillation of muscle, urine, blood, lymph, and albumen, which also as readily decompose. These volatile principles are occasionally affected by the aliment previously taken; particularly by some, though not by all those of an aromatic character: but they are, nevertheless, always present, and obtainable from milk. Ferris proved that ammonia constituted no part of these principles, nor was it evolved during any period of its decomposition.

So far, however, it may be conceded, that there are some volatile principles which escape from milk during exposure to the air. We have an analogous example in the case of the blood. Where blood is first drawn it is perfectly fluid, and could be safely injected into the veins of another animal of the same species. If, however, it is allowed to remain for a few minutes aside, it coagulates, separating into clot and serum. Doctor B. W. Richardson has

shown that this change depends upon the escape of ammonia, which holds the fibrin in solution. Now it is a remarkable fact, that new milk has a much stronger odour *sui generis* when first drawn than after it has been kept for a time and is cool. Moreover, we are all aware (more particularly in reference to cow's milk, although the same truth applies in a lesser degree to other kinds of milk) that exposure to air causes it to become acid, from lactic acid fermentation; and this, as before seen, is one of the causes of the diarrhœa and other abdominal discomforts so commonly observed among children. On this supposition two popular customs may be explained. First, that boiled milk does not agree so well with children as milk which has not undergone this process, because the volatile principle, whatever it be, has been expelled by the boiling. Secondly, and no doubt, also, this is the reason why, when ass's milk is ordered, the animal is brought to the door and usually milked immediately before the milk is taken. As in the case of the blood, which when coagulated may be said to have lost its vitality, so it may be with the milk. It can, therefore, be no matter of wonder, that as milk is usually obtained in towns, even when it is perfectly unadulterated, yet by reason of the necessary exposure to which it must have been submitted, it so commonly disagrees with children; while in the

country, where it is usually given very soon after it has been drawn, it agrees so well.

There is another reason also why milk as usually obtained in towns should be unwholesome. It is a matter of common observation, that there is much difficulty in bringing milk by the railways into London, the very agitation of it causing it to be decomposed, and tending to the production of butter and buttermilk. To obviate this inconvenience, all sorts of methods (and some of these are very ingenious) to prevent agitation have been adopted. Still it must be obvious, that even the transport of cold milk in a cart some two or three miles only must be attended with this alteration of the intimate chemical union of its elements, and particularly so, as I have before stated, when the milk has been previously watered, which circumstance favours the separation of the cream. The objection is not a solid one which would deny that milk can be so deteriorated because it is nevertheless occasionally found to be *nutritious* to a child. The ordinary black pudding, and even meat, is nutritious; yet in both these cases change, by which all volatile products have been expelled, has taken place. But adults have powers which infants may not possess of *assimilating* these substances. The same is true of milk. Some children may also have a stronger digestion than others. But as a rule,—

and precisely as they have very little power of generating heat, while adults have a good deal,—so to children these volatile principles may be essential to the requirements of their organism, while to adults and to some stronger children they may be superfluous. Whatever be the cause, the fact is incontrovertible—the newer the milk is the better it is for the child; and it points most distinctly to the absolute necessity of allowing the milk to remain as short a time as possible exposed to the air before it is given to the child; and therefore is evidence of the immense advantage which would accrue by allowing all infants to take the milk directly from the nipple of the animal. Acting under the knowledge of these difficulties, whenever a child is being brought up by hand, and it is practicable, I always recommend that the cow, like the ass, should be brought to the door, and then and there milked, and the milk in its fresh state at once given to the child. It is remarkable how well some children will thrive under this mode of procedure, when other means have failed.

But more than this. If the conclusion come to above, that the milk should be directly taken from the nipple, be a legitimate one, it teaches us how erroneously all the means taken for the preservation of the life of infants are conceived. It points out in unmistakeable terms the importance of establishing our foundling hospitals upon a totally

different principle. What advantage would accrue to large towns, if foundling hospitals and other institutions in which children are brought up were to adopt these simple common-sense principles, and so bring up the children committed to their care! How many parents would thus have the comfort of rearing children instead the grief of laying them prematurely in their graves! How many thousands of infants, slowly and certainly, however unintentionally, are killed by injudicious feeding in workhouses! How many women—now writhing under the gnawing pangs of remorse, who might have sent their children to such institutions had they existed, at a cost quite commensurate with their small means—might have been still happy in the non-commission of infanticide! And in how many homes would the example of vice rewarded as an inducement to further crime have been obviated!

The question is, too, important as a means of saving the lives of thousands who might hereafter prove useful and ornamental members of society, and it ought to be taken up by the State.

The late Emperor Napoleon was a great friend to the establishment of foundling hospitals. He hoped in this manner to have a nursery for his future armies. But the Emperor Napoleon did not understand how to bring up the foundlings, and the result was that, like our own, his foundling hospitals (*vide supra*, p. 35) became charnel-houses

for the dead. Now, however, that we are better acquainted with the conditions of infant life, why should not his principle be borne in mind and acted upon for our armies?

It is an encouraging symptom in the opinions of the day, that the subject of bringing up children by hand, and that more judiciously, is beginning to occupy the particular attention of the public and the profession. Let us hope we are on the eve of better things, and that we may, please God, rid ourselves as a nation from bad customs and malpractices, which not only diminish our numbers, but are both cruel and unchristian.

CHAPTER VI.

ON THE NATURE OF DEFECTIVE ASSIMILATION, AND THE GENERAL PRINCIPLES OF ITS TREATMENT—PRIMARY ASSIMILATION ONLY DEFECTIVE—ALIMENTS; HOW TO BE GIVEN—ALBUMINOUS SUBSTANCES—FATTY MATTERS, WITH ARTIFICIAL PANCREATIC JUICE, AS FATTY ACID, OR WITH PHOSPHATE OF SODA—MINERAL ALIMENTS, LIME, SALTS, CARMINATIVES—ANIMAL MILKS.

To set aside a plan so full of hope and so encouraging in its results, to speak of other and less satisfactory modes of artificial feeding, is a source of disappointment, yet in the dilemma of present disadvantages it is necessary. Now there are two ways by which we can prove practically which is the best and most successful method of artificial feeding. 1st. The nature of this atrophy or disease which I have called defective assimilation, which has attacked an infant who has been injudiciously fed. 2nd. The treatment, chiefly alimentary, which is found necessary to arrest the progress of the disease when once it has appeared. The pre-

liminary inquiry illustrates the physiology of the disease, while in the latter investigation the principles of treatment may be deduced; and so in connexion indicate the course to be adopted in more ordinary cases in which it is wished to bring up children by hand exclusively.

Nature of the Disease.—It is the power of *primary assimilation* or digestion in the alimentary tract only which is lost, while *secondary assimilation*, or the absorption and appropriation of assimilable matters, if present, may still be effected. It is, therefore, manifest that ordinary dieting will never suffice to restore the child. Starchy matters, which are so generally prescribed and taken, should not be given. These substances, when digested, are first converted into sugar, and subsequently into fat. But in children affected with this disease they are not in any way convertible into this substance. That this is the fact was before shown (p. 213); M. Guillot, of Paris, having proved that the starchy matters of the aliments taken by infants whom it was wished to bring up by hand, and who died, were found unchanged throughout the alimentary tract. This was beautifully proved by the iodine test. How far *sugar* is or is not in any measure digested in such cases remains for future inquiry. It is probable, however, that *glucose* is so occasionally. The albuminous matters, particularly the casein and oily substances taken,

do not appear to be digested any better. The milk taken passes away by the bowels in many instances only curdled, but otherwise unchanged. Now this is a state of things which is peculiar to this disease. It does not occur in other analogous atrophies (in infants), at least, to the same extent. It comes, in fact, to resemble some cases of *senile atrophy* in cancerous subjects especially affected with pancreatic disease. It is true we often find among little children considerable gastric irritation and anæmia present. But in all assimilation or digestion is, to a certain extent, possible. In the cases, however, now under consideration it is not so. Even the attempt to feed them on breast-milk has been made and has failed. They do not seem either able or willing to take it. In Dr. Whitehead's cases the chief measures employed were improved diet and cleanliness, assisted by cod-liver oil and chalybeates. I confess, however, that for my part, except in the first stage and more rarely in the second, I have never seen any of these measures do good.

But, secondly, if the power of digestion in primary assimilation is lost, that of the appropriation of, or the absorption of, digested matters, or *secondary* assimilation, appears to be present. The faculty remains only in abeyance from want of digested matters to take up; because, first, many poisons are capable of absorption; and, secondly,

because from the continued absorption of the child's own fat and cellular tissue it is manifest secondary assimilation is carried on.

Principles of Treatment.—The foregoing remarks necessarily lead to the modes of treatment to be adopted; and this may be considered under three heads.—1st. How are the albuminous matters to be digested? 2nd. How are the fatty (perhaps saccharine) matters to be digested? 3rd. What other principles or medicines are to be combined with the aliments given to ensure their complete adaptation to the requirements of a child?

1st. *Albuminous Substances.*—As primary assimilation only is defective, it is clear that if we could supply a child with food which has already undergone this process, *i. e.* food already digested, we should be giving that most fitted for its wants. The food would have simply to pass through the alimentary canal, not for digestion, but for simple absorption. The child's powers until it is stronger would not be overtaxed, while secondary assimilation would go on under the most favourable circumstances. We have already shown, when speaking of animal substitutes for human milk (*vide supra*), that this can be done by *artificial gastric juice.* In this manner milk or meat already digested may be given. In the first case the *casein,* and in the second the *albumen,* are supplied to the

child in a condition in which either can be readily assimilated.

With the same intention, the essence of rennet, as it is called, which is merely a concentrated solution of the mucous membrane of the calf, may be used as an adjunct in the food given. The "*liquor pepsinis*" fulfils the same indication. Both contain in a concentrated state the active principle of gastric juice, and so will facilitate primary assimilation where it would not be possible by reason of want of power in the juices secreted.

2nd. *Fatty Matters.*—In the case of oily matters a different artificial juice is required. But this may be effected in three ways. 1st. By an artificial pancreatic juice. 2ndly, by supplying fatty matters as fatty acids. 3rdly, by the admixture of phosphate of soda with the food. By any of these processes we may supply the child with a fatty aliment, which (like the albuminous matters already digested in gastric juice) may be taken up by the lacteals and absorbed into the system.

(1.) *By an artificial Pancreatic Juice.*—Bernard showed that if fatty matters are taken by animals in whom the pancreas or sweet-bread is diseased, they will pass through the bowels unchanged. The same is observed when this organ is cancerous, or so diseased even in man, that the

secretion from it does not reach the intestines. The fatty matters are not assimilated. It would hence appear probable upon the same principle, as in the former case, that if an artificial pancreatic juice could be prepared, we should place the child in the position most favourable for the absorption and secondary assimilation of fatty matters. The experiments of Bernard, however, are too exclusive. It cannot be denied that one of the uses of pancreatic fluid is to emulsify fats so as to permit of their absorption and assimilation in the blood. But Frerichs, Lehmann, Leng,* and others, have shown that this transformation will occur in cases where the pancreatic secretion is artificially kept away from the intestines. Again, a mixture of the pancreatic fluid with bile and the ordinary intestinal juices effects this change far more readily. All this proves that the artificial juice to be prepared is something more than purely artificial pancreatic juice; but practically this would be very difficult to obtain, and if obtained, to keep fresh for use. The advantages to be derived from the use of such a juice appear to be still more important when we come to consider some of its other properties upon alimentary and primary digestion. First, it is not only a solvent of fatty matter, but also as powerful an agent in converting *starchy* matters

* Carpenter's *Physiology*, p. 431.

into *sugar;* although, as in the former case, it does so more readily when in connexion with the *intestinal juice* and *bile.* Secondly, it would appear to be especially necessary in the case of very young infants (and particularly in those to whom starchy matters are given); as in infants under two months there is actually no saliva secreted to compensate for any defect in the pancreatic juice. And, lastly, because it is now evident from the experiments of Drs. Corvisart, Brinton, and Harley, that under particular circumstances the pancreatic juice does exert a solvent or digestive influence even upon albuminous matters. Unfortunately, however, we have not yet accurate knowledge enough to prepare this artificial juice; nor has any chemist prepared compounds analogous to the *essence of rennet,* or *liquor pepsinis,* for convenient use. The price also of sweetbread in large towns is an additional difficulty in the way. It is to be hoped, however, the desideratum being known, some means may be devised by which it may be procured, so as to admit of convenient employment in cases like those under consideration. Dr. Harley* has indeed recommended pancreatine, the active principle of the pancreatic fluid, as a remedy in weak digestion, and he believed he had been able to procure it

* *British Medical Journal,* Oct., 1858.

sufficiently pure; but it is not to be had as yet in the London markets.

(2.) Another way in which this emulsion of fat can be accomplished, is by giving our patients, not fat properly so called, but the *fatty acids* of which they are composed, and which are very readily absorbed into the system. The good effects of cod-liver oil are probably in some measure due to the excess of fatty acid present. So, also, those of butter. Many children, indeed, as is a matter of popular observation, grow fat upon bread and butter. They appear to thrive on it when other means fail. This good effect cannot be due singly to the bread, for reasons before stated (*vide supra,* p. 216 *et seq.*), but to the free acid which is also in excess in butter. The same explanation will apply to the good effects of cream on some children. Except, however, in the three instances here mentioned, fatty acids, as such, in anything like a reasonable quantity and at moderate prices, cannot be procured. There are, of course, difficulties which prevent their employment on a large scale, and limit experience.

(3.) The third method, upon the whole, is at present the most practicable. I have already alluded to the peculiar property which phosphate of soda has in emulsifying fats (*vide supra,* p. 185). This is a salt which is readily obtained, and therefore very readily mixed with the food supplied to children.

3rd. The mineral alimentary matters or medicaments essential to the proper assimilation of the constituents of the class of aliment before mentioned, should be also given.

We have before seen that in many of these cases of defective assimilation there appears to be an excess of acid in the alimentary canal. This is in great measure evidenced by the constant craving appetite of these little ones; also by the post-mortem appearances before referred to; and it, therefore, forms an essential part in the treatment of these cases to administer alkalies to neutralise this excess. It is for this reason that *lime water* is oftentimes so efficacious. But *lime* has other peculiarities, to which I have also before alluded: *carbonate* of *lime* is insoluble in the blood except there be excess of carbonic acid; and phosphate of lime increases the power of the blood to contain carbonic acid in excess. On the other hand, an excess of lime is also useful to allow of the formation of biphosphate of lime, which, from the experiments of Blondlet before referred to, appears to be the acid principle of the gastric juice.* The great use of lime salts in providing material for the muscular and bony structures are strong reasons for giving them in combination with the alimentary matters supplied. The uses of chloride of

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* *Journal de Phys.*, April, 1858.

potassium as a solvent of carbonate of lime have been already insisted upon, and need not be again referred to.

The coexistence of flatus with considerable abdominal pain, although in part relieved by the lime water, still points to the necessity of administering some carminative; and the experience of practice proves the propriety of the popular custom of giving dill water in doses of half a drachm to a drachm in as much warm water, either with or after the food taken. It is one of the great advantages which Mrs. Wells' vegeto-animal food possesses over most of those ingredients usually given to children, that it contains in its composition some kind of carminative to supply this desideratum.

Another excellent carminative is wine. It is a remarkable fact, that many children who have by injudicious artificial food been brought to that state that they cannot digest fatty, albuminous, or starchy matters, or at least do so very imperfectly, appear to be capable of digesting alcoholic substances. Wine whey, made by taking two wine-glasses of milk, into which when boiling a wine-glass of good sherry or port is put, is a convenient form. The little creatures will suck it with great glee, and under its influence you will see them thrive visibly. As they take it the pain from flatus disappears. The wind breaks upwards

at once, and the child previously in great pain is quiet, and soon falls into a quiet sleep. I shall, however, again have to refer to the use of wine.

In the great majority of cases, the readiest method of giving children the required alimentary principles is by using fresh milk, which has the advantage, before spoken of, of not only supplying the proper azotized and combustible, but the mineral ingredients in requisite quantities, and particularly the volatile principles. An exclusive restriction to fresh milk, however, will not suffice, except in cases where we have to deal with partial defective assimilation only. The other means of treatment previously recommended must be combined.

I have before alluded to the popular prejudice that it is dangerous to combine two milks, as founded on erroneous conclusions. And looking to the immediate preservative influence of breast-milk in preventing the mortality of infants, it is at once obvious that wherever it can be done it should be supplied, if not exclusively, at least in as large a measure as possible. If the child has not lost the faculty of *sucking*, the difficulty is comparatively small, because all children prefer the sweet taste of human milk to that of milk from any other animal; and when a wet nurse for the exclusive use of such a child cannot be provided (and I have already strongly protested against

hired wet nurses), a married woman suckling another child may often be found to give it a morning and an evening meal, and this without detriment to her own child. But if the measures and precautions given above, when speaking of defective lactation (Part IV., Ch. II. & III.), be taken, nearly all mothers may be so acted upon by galactagogues as to supply a very fair quantum of milk, thus obviating most, if not all, the disadvantages of exclusive hand-feeding. This is one of the reasons why it is so wrong in those who take charge of children to attempt to bring them up by the *spoon,* and not by the *bottle* with an artificial nipple attached. The faculty of sucking once lost in a child is seldom, if ever, regained; and thus if an emergency occur, when, from the child's state of health, breast-milk would be desirable, the difficulties in its administration are materially increased. For the same reason it is that the employment of the breast-shaped bottle, to be placed in the usual position of a woman's breast, by whatsoever nurse the child may be fed, is to be preferred. When, however, the child has lost the faculty of sucking, there is great difficulty in giving it the breast-milk. It may be milked into the child's mouth, but this process often fatigues both child and mother. The woman has to acquire the faculty of being milked just as any other milch animal. But when this has been done, the milk being col-

lected in a cup may be subsequently given by the spoon to the child whose natural instincts have been so completely perverted.

I might, however, remark *en passant*, that although it is undeniable that infants do lose the power of suction, and that once lost it is not again acquired at that early age, yet we should be cautious before we conclude that a child does not suck. A babe exhausted by defective assimilation has but little muscular power. Now that india-rubber nipples are so commonly used, many are made so stiff and resistant that the child cannot suck with them. After a very ineffective attempt it falls back, and the conclusion is at once come to that the child cannot suck. But it is not so. Better by far use the old-fashioned cowteat with all its disadvantages than one of these unyielding nipples. There is another disadvantage even if the child be strong enough to use it. In the effort required he sucks in a quantity of air with the milk, and hence suffers subsequently from flatulence. That this is the case we can very readily convince ourselves. If a closed bottle be examined as a child sucks, it will be found that bubbles of air enter into the bottle, apparently from the child's mouth, as the milk is sucked in, in rapid succession. The nipple then may be said to act properly. It is not so if it be too stiff: the bubbles are few and far between, but it sucks air. The

best nipple I have seen in use is that invented by Mr. Cooper, of Oxford-street, before referred to (p. 130), which is very yielding, and, moreover, enables a proper regulation of a copious or smaller flow of milk into the child's mouth, according to its age, by a stop-cock provided at the inner end, which drops down to the bottom of the bottle; and so, if the artificial nipple plays well, no air can be taken in.

When human milk cannot be procured, however, or, if obtained, does not agree, it often happens that another animal's milk, whether taken simply or combined with the food, will effect a complete recovery. Thus ass's, goat's, or mare's milk may be given; care, however, being always taken, that, as in the case of human milk, these milks should be perfectly fresh. Indeed, in defective assimilation we frequently find, that when the milk of one of these animals is given, it seems to supply some ingredient which was needed in the child's organism, although we are unable to define the principle more exactly, and which the human milk before given did not contain. The following examples will illustrate my meaning:—

Mrs. P——, being much annoyed with a wet nurse whom she had in her employ, was at last compelled to part with her. Being aware that a friend in the neighbourhood was possessed of a goat, it was formally asked for to supply the wet

nurse's place. The child took to the goat at once, and the poor thing after a short time would run up the stairs when she was loosed for the purpose of supplying a meal, and the child would suck the goat like a young kid. Mrs. P——, in reference to this case of her own child, makes the following very pertinent remarks:—"I had no particular reason for selecting this mode of nourishment, but that it presented itself at the time, and I considered it approached nearer cow's milk than that of any other animal, and therefore contained more of the elements of nutrition than human or ass's milk." The little boy did at any rate exceedingly well under this treatment.

The husband of this lady, a medical man at Gravesend, had under his care a child who was treated by mare's milk, and cured in like manner. "The little babe was six weeks old when he was sent for. It was reduced to a shadow by diarrhœa. Ass's milk had been tried, as also that of one of the father's best cows. As the father was himself a farmer, we cannot doubt that this cow's milk was the best of its kind; still the child wasted away. One day, when putting up his horse in the stable, he saw a foal sucking its mother, when it occurred to him to recommend the foal to be weaned, and the mare's milk to be given to the child. The effect was magical. The child completely recovered, and is now five years old, and as fine a

boy as the most difficult to please could desire to see."

A child under my care, although suckled by a wet nurse, whose milk on examination appeared to be good, was seized with diarrhœa. Nothing could control this. Ass's milk was now given. It perfectly succeeded for a few days. However, as the good effect did not persist, another wet nurse was procured, and the child did well.

A medical man of eminence in this town informed me he had brought up, almost exclusively upon ass's milk, his own sickly child, this milk restoring it completely to health. It was not done, however, at a cost under forty pounds. Thus the expense of this remedy in town is a serious objection to its employment. Except this last example, however, I have never heard of ass's milk sufficing of itself to restore a child, its good effects soon wearing away, and rendering, as in the former case, the employment of other food necessary. The question must be looked upon as still open to further experiment.

The above few examples, however, are numerous enough to show that in some cases of defective assimilation we may occasionally employ very unusual modes of alimentation with perfect success.

CHAPTER VII.

OF THE NATURE OF ALIMENTS TO BE GIVEN, AND THE MODE OF THEIR ADMINISTRATION—COW'S MILK, ADJUNCTS TO—NECESSITY OF USING TEST-PAPER—HOW SOME KINDS OF DIARRHŒA WHICH SUPERVENE ARE TO BE TREATED—THE EXHIBITION OF SOUPS—RAW MEAT—DR. LEVERETT'S CASES—EXAMPLES OCCURRING IN DR. MORRIS'S PRACTICE—ANALOGOUS EXPERIMENTS WITH ADULTS—UNDERDONE MEAT—CASES—VEGETABLE REMEDIES TO BE CONJOINED.

It remains only for me to speak as to the kind of artificial food to be given. In early months, for the reasons before assigned, it should be exclusively animal. We should always endeavour to obtain milk from a cow at grass, because it is more likely to be wholesome, and the disposition to fermentation is less. This milk should be given to the child in a diluted state, *i. e.* in the proportion of one or two pints of water to one of milk, according to the age of the child, diminishing of course the amount of water as the child becomes older. If the cow's milk be already diluted to the extent of two parts of water, sugar also should be added in the proportion of one to

two drachms to every pint. If, however, there be only one part of water, and the milk is pure, the amount of sugar contained is already about 24 per 1000, the normal proportion of human milk, and it need not be therefore increased. This calculation is founded on the latest analysis, and will in practice be found to agree very well with most children. Some practitioners have told me that one of the objections to such a mixture is, that it keeps the child's bowels too constipated. I have not found it so; but if it were, sugar of milk, which, as it is usually sold, contains all the salts of milk in solution, may be substituted for the ordinary white sugar, and often proves in this way aperient. This constipative effect is removed if we add a little carbonate of magnesia, in the same way as is done in that variety of baked flour food to which I have before referred (p. 224). Carbonate of magnesia has been also recommended as a substitute for lime-water in cases of constipation for a very long period, by most writers on the subject. Lastly, to every pint of artificial food prepared, from one to one and a-half ounces of lime-water should be added to neutralise the amount of acidity present. This amount may be generally determined either by testing the milk with litmus paper, or more accurately by the symptoms observed in the child.

To ensure the proper examination of the milk, I

think in every nursery where children are brought up by hand there should be *test-paper* kept, very slightly reddened, and some slightly made blue. If the former is turned blue when dipped in the milk, very little lime-water is needed; but if not affected, or if it be more intensely reddened, then the blue litmus paper should be dipped into the milk. The paper will of necessity become reddened. In these cases therefore lime-water should be added in larger quantities to neutralise the excess of acid present. The moment the litmus that was reddened has resumed its natural blue colour enough lime-water has been added. In practice it will be found that two to three tablespoonfuls of lime-water will suffice, and even be more than sufficient; but this excess, for the purposes of the growth of the child's bones and teeth, is desirable.

But I have said the presence of excess of acid may be more accurately determined by the symptoms. These are frequent hiccough, and apparent griping, especially after food, as evinced by an occasional cry, and it may be drawing up of the legs. A loose motion generally follows, the colour tending to green. There is also very generally vomiting present, and the ejected matters have an intensely acid odour. These are premonitory symptoms, which, if not attended to, will often pass on to diarrhœa. In these cases lime-water in excess is indicated.

All admixture of vegetable matters in early periods, as contrary to nature, except in disease, should be avoided, or given only as correctives of bad milk. I have already alluded to the manner of estimating and correcting inferior kinds of milk (p. 205), by arrowroot and cream. Occasionally, where the diarrhœa is very obstinate, rice-water should be substituted for ordinary water, as the diluting medium, together with the proper medicinal remedies to be just now mentioned. These are circumstances which, when they occur, are very apt to dishearten a parent, and the difficulty is usually met by at once flying to a wet nurse. But I am certain this is often done prematurely. It is rare that a judicious treatment will be found to fail. The most distressing symptoms present besides the diarrhœa are the great apparent weakness, and the pain, accompanied with sleeplessness, observed in the child. If a case is taken in time, these will seldom attain to any very great amount; and in no case is the old adage more truly verified than in this affection, "One stitch in time saves nine." Unfortunately, however, these cases are often neglected. In the better classes of life the child is usually at once given to a wet nurse. Too often, however, it cannot suck the breast from sheer weakness, and except the milk is milked into its mouth, even with a wet nurse no good can be expected. Where

a wet nurse cannot be got, the child usually dies, as much from want of judgment as from exhaustion. Food of various kinds, which it cannot digest, is forced, and that very frequently and in large quantities, into the child's stomach. The diarrhœa is increased, and death usually follows.

Now the secret in these cases is wine, little and often, and in comparatively large quantities. Half a teaspoonful of milk, prepared and corrected as before said, given every quarter or half an hour; wine and water, or better still, wine whey (made with one part of wine to two of boiled milk), will often do marvels. I have seen a child so weakened and reduced by diarrhœa, in this case induced, however, by a wet nurse's milk, that it could only take its food by a feather, for nearly eight hours, all the while looking more dead than alive, blanched, and pallid to a degree, and yet make a perfect recovery. Wine whey, indeed, is here our sheet anchor. Where children are older, the same good results follow the use of Hogarth's essence of beef, given almost undiluted. I have now seen so many similar cases, and apparently quite hopeless, recover, that I never give up a child, and I am thankful to say that, under Providence, I have been the means of saving life upon more than one occasion by adopting this plan.

These extreme examples are, however, compara-

tively rare. If due attention be paid to providing a child with a proper quantum of good food, fresh air, and exercise, particularly if it be fed at regular hours—when very young, say every two or three hours; and three times a-day and once at night only, after it is four years old—we may then safely hope serious complications will be avoided.

Now and then, however, not only is diarrhœa present, and intense debility, but the stomach is very irritable; no kind of food can be kept down, particularly milk, not even wine whey; and those substances, perhaps, which have hitherto best agreed with the child, cannot now be borne. The aliment to be given in these cases is *raw meat*. I have already alluded to it. Raw meat contains in its composition, besides the nitrogenous fibrin, also an abundance of phosphoric acid and chloride of potassium; and as such, for the reasons before stated, it contains two elements of great importance to a growing infant. The small bulk which it occupies also renders it, because at the same time intensely nutritious and exceedingly digestible, of the greatest value. Dr. Leverett tells us one or two mouthfuls are enough for a repast. It has the same advantage over cooked meat which raw albumen of egg has over that which is boiled hard. The juice of flesh contains, among its other ingredients, albumen, and the colouring matter of the blood; the former coagulates at a temperature of

133° Fahr., the latter at a temperature of between 158° and 165°. When these principles are coagulated, they are very much more difficult of digestion. Indeed, many persons, even among adults, cannot digest them at all; and suffer intense pain after food, particularly after eating cooked meat. Hence the advantage of giving raw meat to weak persons and to dyspeptic individuals. But this is not all. Raw meat often settles the stomach and alimentary canal, when all else which is taken is rejected by vomiting. Indeed, so general is its utility, that after some years of experience I have come to regard it as one of the best and surest remedies which we possess in such cases.

I prefer, however, giving the experience of Dr. Morris to my own, lest I should be regarded as too much of an enthusiast in its favour. "The first cases to which Dr. Morris [before referred to, p. 176] gave the raw meat, were two little German brothers, five and six years of age, who had been much reduced by long neglected intermittent fever. Soon after their admission to the hospital the fever had yielded to quinine, but an obstinate diarrhœa had resisted all the ordinary modes of treatment, and they had been reduced almost to skeletons. Just then Dr. Morris came on duty, and commenced at once the use of *raw meat*. The children soon began to im-

prove, and in less than a fortnight the little fellows who had been so recently too weak to sit up in bed, were playing in the wards with the other convalescents. About this time *cancrum oris* made its appearance in the hospital. Many were attacked, and amongst others the younger of our little Germans; yet, notwithstanding the unfavourable state arising from his previously reduced condition, he recovered under the use of raw beef and the topical application of nitrate of silver.

"Dr. Morris's next case was a child two years old, suffering from hereditary syphilis. He was a miserable-looking object. Death, which seemed of all things the most desirable for him, had been warded off for some days by the free use of brandy. Raw beef was prescribed, but almost without hopes of benefit. It was given in brandy, for which he had a greater relish than for anything else. In a week there was a change for the better. As soon as possible iodide of potassium was administered, in order to eradicate, if possible, the constitutional taint. The brandy, of which it was positively said he took two ounces daily, was gradually decreased in amount; and when we last saw him, after the treatment had been continued for some two or three months, he was fat and hearty."*

I select these cases from many others to which

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* *Dublin Medical Press*, May 9, 1860.

Dr. Morris gave raw beef, because they show, in the most convincing manner, the beneficial effects of this remedy. Dr. Morris prescribed it whenever the system was exhausted by previous disease or inanition. Generally he used it with marked benefit.

I shall content myself by relating two cases of my own. A little child, aged about eight months, was reduced, while yet sucking its mother, to a state of extreme debility. Bronchitis was present. It lay on its back unable to sit up, much emaciated, and in a semi-conscious state, moaning occasionally, but otherwise showing but faint indications of life. The mother's breast was milked into its mouth, and wine given. The child rallied a little, but still not to any great degree. Raw beef was now given. In two or three days it was able to sit up, and was convalescent in a week. A second case was that of a young babe, who had been brought up by hand, and was affected with jaundice, and excessively weak. Mercury and wine were given, but the latter seemed only to have a partial effect, and the former seemed to produce so much weakness that it could not be persisted in, except in excessively minute doses. Raw meat was now given. The child did not appear to relish it, but it was persisted in for two days. This period, however, sufficed. The child was enabled on the second day to sit up for several hours, and gradually

recovered. These cases, together with others, are sufficient to show what a valuable remedy we have in raw meat in cases of debility and inanition.

The occasional employment of this remedy with adults, if we notice its operation in them, is very instructive when applied to infants. As such, the mention of a few cases may prove interesting. There is at first a difficulty in giving it to an adult, which, judging from my experience, does not apply to children. In the former, Dr. Leverett says, "The difficulty is to overcome the natural repugnance at eating raw flesh. M. Trousseau, however, declares the disgust may be overcome even in the case of the most fastidious and delicate ladies. He told us of one to whom he gave it. At first she took it, he said, with loathsomeness and aversion, soon with ease, and before long she ate it voraciously."*

I have noticed this last effect myself among adults. A grown girl actually assured me that she had been taught by her father to eat a raw steak, and the idea seemed in itself to give her a relish. With her it amounted quite to an unnatural fondness.

And after all, reasoning without prejudice, this predilection for raw food is not so unusual as we believe. It is traceable among those who eat even *cooked* meat. Some persons very much prefer *under-done* meat. They, moreover, find by

* *Dublin Medical Press*, May 9, 1860.

experience it agrees best with them. This preference is so little exceptional, that where it occurs we may fairly conclude it is instinctive. The absolute difference, therefore, between persons who take *very under-done* meat, and those who take *raw* food, is more one of degree, than of kind.

In another case, where a girl had gastrodynia, and could retain nothing upon her stomach, so that anæmia and intense debility were present, raw beef scraped and spread between two pieces of thin bread-and-butter effected a cure. The idea of eating raw meat at first was very repugnant to her feelings, but it wore off very soon. Dr. Leverett, before quoted, tells us, "Dr. Morris was equally successful with raw meat among adults. In an adjoining ward was a man suffering from chronic diarrhœa. He had *run the gauntlet of treatment* for diarrhœa without relief; for if better under one plan of treatment one day, he was worse the next. There was no physical sign of consumption, though the obstinate diarrhœa gave ground for suspecting such a condition. Raw beef was working wonders in the children's department—why should it not be tried for him? It was given, and in less than two months the man left the hospital cured. Raw beef had saved his life. Two summers since, while in Paris, Dr. L. saw a precisely similar case of supposed tuberculosis of the mesenteric glands, in the service of M. Trous-

seau at the Hôtel Dieu. The result was, however, different, for the patient died. The autopsy showed no trace of tuberculosis; and M. Trousseau, in lecturing afterwards on the case to the class, expressed great regret at not having given raw beef. He had done, he said, everything else; and added, that he would never let such another case die in his hands without giving raw beef. He believes the remedy invaluable."

"In 1856," continues Dr. L., "while Resident Physician in the Episcopal Hospital, Philadelphia, the various visiting physicians allowed me to administer raw beef in a number of cases, in many with a decided benefit. In one case of chronic dyspepsia, with great irritability of the stomach, it was retained, when almost everything else was rejected. In the latter cases of typhoid fever it proved a valuable article of diet, as I should have mentioned that it did at the Philadelphia Hospital. I found that it could be rendered palatable to adults if sprinkled with salt and allspice, and spread on a thin slice of bread, or between two slices, as a sandwich. I recollect none to whom it was given who did not soon learn to take it at least without dislike. Of the cases to which it was then given I will give an account of but one. It was that of a little girl to which my colleague, Dr. Hopkins, and myself, were called. We found her suffering from the

sequelæ of scarlatina. Her parents had a few days previously laid two of their children in the grave from the same complaint. The life of this their last was despaired of. We found her a pitiful-looking object. She was only one year old, but appeared an old woman. She was extremely emaciated, her skin hanging on her bones. She had large bed sores, a hard tumour of the right parotid, and a fluctuating tumour on the left wrist. She was moaning or crying almost incessantly with pain. The case seemed, as it had been decided, desperate. We determined to give quinine in small doses as a tonic, and raw beef as an article of diet. We made anodyne applications to the tumour of the wrist, the principal source of pain, and painted the tumour of the parotid with tincture of iodine. She soon showed some improvement. When she became tired of raw beef we had it boiled, but so slightly as to cook merely the surface; then we changed to mutton, and soon returned to raw beef. She gradually recovered, and was eventually restored to perfect health."*

When everything else has failed, I have given raw meat to little sucklings—infants so young that I could not put the pulp of the raw beef even in small pieces upon the tongue, because they had

* *Dublin Medical Press*, May 9, 1860.

not the sense to swallow it down. However, a piece of raw beef, thinnish, of a certain length, was put in the child's mouth. The suction at once was induced, till it became diminished in size, and colourless as fish. It is remarkable how soon the diarrhœa and gastric symptoms ameliorated in character, and how the strength of the little invalid improved. Remedies previously inert now began to take effect, and in a short time the natural food might be resumed.

In all examples of this kind it is manifest there must be great disadvantage if the meat supplied be in any way tainted, or affected with parasites, as instanced at p. 178 *et seq.* We have in raw meat a first-rate remedy, but it must be good meat of its kind to act well.

If, however, a child has teeth, which, as I have before stated, is an indication that those physiological changes which are essential to the digestion of vegetable matters have taken place, then vegetable matter may be usefully combined with the food which is given to the child. Of these several preparations have been from time to time recommended, and used with advantage. Thus we hear of "Hards' farinaceous food," of baked flour, tops and bottoms, biscuit-powder, and a variety of other aliments of that kind. In my own practice, without necessarily denying that with some children these sub-

stances will prove occasionally very useful, I have generally limited myself to the employment of three substances: "Mrs. Wells' Vegeto-Animal Food," "Robb's Biscuits," and "lentil powder." I have already spoken of these several substances in a former chapter (p. 222 *et seq.*). In the first, we have many of the ingredients which exist normally in milk; namely, the sugar of milk and the salts. In the latter, we have the nitrogenous principle present identical with the *casein* of milk; and so the change from purely animal milks to these compounds is more gradual, and more likely to agree with the child. In the success which obtains after the employment of Robb's biscuits the same analogy cannot be traced, but there certainly is something in their composition which proves particularly fattening and wholesome to children. If the meals given be properly regulated, and due attention be especially paid to the state of the bowels, we have every reason to anticipate that the plan followed will be attended with success. Dill or cinnamon water, as occasional carminatives, should be given, particularly with Robb's biscuits and lentil powder, &c.; and it should not be forgotten that lentil powder is occasionally purgative, for which reason it should be watched, and not continued too long if it be too active in this respect.

CHAPTER VIII.

ON THE MEDICINAL TREATMENT OF DEFECTIVE ASSIMILATION —CARMINATIVES, PURGATIVES, COD-LIVER OIL — OF THE DIARRHŒA, BY NITRATE OF SILVER AND SULPHATE OF COPPER —OPIUM—FEBRILE EXCITEMENT BEST QUIETED BY INUNCTIONS—RATIONALE OF THEIR OPERATION—NUTRITIVE INJECTIONS—APHTHÆ, SIMPLE AND MALIGNANT—CONCLUSION.

A FEW words now upon the medicinal remedies to be given in cases of defective assimilation. In the milder cases, simple attention to the food is the best means of overcoming the disease. The occasional use of carminatives, and a half teaspoonful of castor oil, if needed, with small doses of alkalies, will often remove all irritability of the alimentary canal. Cod-liver oil, in teaspoon doses, is almost always beneficial: if there be much acidity, one or two drops of liquor potassæ mixed with it, or more according to the age of the child, is readily taken. This oily mixture should always be given after meals. Sometimes, where there was reason to suspect indigestion, I have combined the oil in these cases with half to one teaspoonful of the essence of rennet, and with much advantage. In

more severe cases, however, and if diarrhœa be present, the best remedy is, without doubt, the *nitrate of silver*, in doses from 1-16th to 1-8th of a grain: sometimes the sulphate of copper in similar doses proves effective. I cannot say that I have found that much dependence can be placed in most of the usual remedies recommended, such as catechu, logwood, chalk mixture, or opium, except as adjuncts, in the same way as rice-water or arrowroot: singly they do little good; opium is chiefly beneficial in checking pain: yet anodynes are certainly sometimes useful. I know that as a rule they are condemned, but where a child cannot have sleep, and cannot rest without them, they are imperatively called for. The nervous child is over-excited—it needs to be calmed; but two to five drops of tincture of henbane, in about a teaspoonful of dill water, at night, will suffice. It is remarkable how, after a week or ten days, the child sleeps normally, and no longer needs it. As a temporary remedy anodynes, therefore, must be deemed very useful. Opium is more certain, but it is also a much more dangerous remedy to give to children. I have seen two children killed by it. In one case, one drop of laudanum was sufficient. But in quarter-drop doses, gradually increased and carefully watched, these unfortunate results can be usually avoided.

Defective assimilation is, however, sometimes accompanied by feverish excitement, which usually comes on at night, and is no doubt due in great measure to the gastric irritation. It is in such cases that external inunctions of oily or lardaceous substances are so effective. The *rationale* of the operation of these substances is not yet entirely explained, but of the fact there can be no doubt.

If a child's skin be burning from fever, so as to be actually unpleasant to touch from its heat, the other ordinary symptoms of anorexia—viz., restlessness, sleeplessness, rapid pulse, thirst, debility—will also be surely present, and the emaciation induced will be extreme. Debility will soon come on to an alarming degree, particularly if diarrhœa be present, and death will soon close the child's sufferings. In such an exhausted state the use of antiphlogistic remedies, such as calomel or antimony, are clearly contra-indicated. Now these are precisely the cases in which external inunctions with oily matters, as first recommended by Mr. William Taylor, of St. John-street Road,* do so much good. If a child so affected be completely rubbed over with a mixture of suet and sweet oil (a certain amount of consistency being necessary to allow it to remain upon the body), in about three hours' time, or even before, the skin

* In a paper read before the Medical Society of London.

will be found to have cooled and become soft; the anorexia present will have disappeared, and often a quiet, comfortable sleep will follow. The child is left in this state, and the next morning may be washed in a warm bath. Two or three applications of these inunctions generally effect a cure of the feverish excitement, and the irritation of the alimentary canal is usually at the same time greatly benefited. I have said the *rationale* of this mode of cure is not so clear; it may, however, be the following, to which I have also elsewhere referred. There is probably in all animals, particularly young animals, a certain amount of cutaneous respiration, *i. e.* some action between the oxygen of the atmosphere and the capillaries of the skin. The way in which this process is carried on I do not presume to explain.* If, however, this external communication with the oxygen of the air be cut off—which may be done by rubbing over the body with an impervious varnish, as has been done by experiment upon animals—the temperature falls several degrees. Thus Becquerel and Breschet† found the temperature of rabbits, first shaved and then covered with a varnish, fall in an hour from 100° to 76°; in another rabbit to 69½°. The experiments of Dr.

* Vide *Essay on Pneumonia*, by the Author, p. 38.

† *Comptes Rendus*, Oct., 1841. Carpenter's *Physiology*. 646.

Fourcault prove that the application of this varnish produces what he calls "cutaneous asphyxia, which is marked by imperfect arterialization of the blood, and a considerable fall of temperature, and which, as it produces death in the lower animals, would probably do so in man."* Certainly fish absorb oxygen and exhale carbonic acid, not merely with their gills, but the whole surface of their body, so long as surrounded with water impregnated with air. Embryos of birds and insects do the same. So also the development of the egg is stopped, in warm water (which is necessarily deprived of air), and in irrespirable gases. This has been proved by Viborg's experiments, and confirmed by Schwann. These experiments, we may say with Carpenter (p. 646), "place in a very striking point of view the importance of the cutaneous surface as a respiratory organ, even in the higher animals." The fall of temperature during perspiration is usually attributed to the cold produced by evaporation. But looking to the oily character of the sebaceous exudation on the skin, and the greasy character of the perspiration in some persons, it may be a question whether this natural oily covering does not contribute equally with the evaporation of the watery matters of the perspiration, to produce the cool-

* Carpenter's *Physiology*, p. 632.

ness of the skin observed under these circumstances.

There is another way, however (and this is especially true for chronic cases), in which inunctions do good. Dr. Simpson, of Edinburgh, has shown the good results of external inunction of cod-liver oil in those cases where the remedy could not be taken in the ordinary way. In some cases of defective assimilation, there is, together with the emaciation present, occasionally hectic fever. If children affected be rubbed with the cod-liver oil, both symptoms often disappear, and there is much amendment in the symptoms.

My friend Dr. H. Wright has informed me of a case of a little girl in whom dyspepsia, with emaciation to a great extent, was present, and in which he effected a cure by *milk baths*. I presume in this case, as in the former instance, there was absorption of the nutritive and fatty matters through the skin, which could not be digested in the ordinary manner when taken by the mouth, and so recovery resulted.

This same advantage may be sometimes gained by nutritive injections. Aliment in a fluid state is often readily absorbed in this way; adult persons, intent on suicide, and who have cut their throats, in whom, therefore, swallowing in the ordinary way has become impossible, have been kept alive for six weeks in this way. The same

is true for cases where, from disease of the stomach, food could not be swallowed without provoking vomiting. Life in this manner has been prolonged till the irritation of the stomach has subsided, and food could be again taken in the ordinary way. Even cod-liver oil may be absorbed if given in an injection. Persons who have so taken it have complained to me of feeling the taste of it in their mouth for hours after. This is equally true as regards young children.

Lastly, I may notice the treatment of those aphthous exudations which so often accompany defective assimilation. The *mild form* will generally yield to borax and honey, weak solutions of alum, and the other remedies employed ordinarily in thrush. The other variety, the *malignant* or *contagious*, is a much more serious affection. It more closely resembles *diphtheria*, and requires an analogous treatment. Generally wine whey or wine, should be freely given. As local application, the only remedies which in my hands have cured have been, first, a weak solution of nitrate of silver, applied by means of a sponge all over the affected parts, twice or three times a day. Secondly, the tincture of sesquichloride of iron, in strength varying from one part of the tincture in from seven parts to an equal quantity of water. In cases where the throat or nasal mucous membranes are covered with these aphthæ, I have

used a fine syringe, and injected sparingly, either down the throat or up the nasal cavity, the weaker solution. Whether the cure be due to the presence of *free chlorine*, or to the *astringent local effect*, I know not, but the aphthous exudation has got well. Such local and general treatment, however, must not supersede the hygienic. Pure air, isolation, the free use of disinfectants, and scrupulous cleanliness, are also needed; in fact, every measure is to be taken which will in any way prevent the development of that infantile hospital atmosphere of which I have already spoken, and which is always observed wheresoever many children are congregated together, and proves invariably deadly in its effects (p. 28).

I have dwelt thus long upon the subject of defective assimilation, because I believe this morbid condition is, so to speak, the parent of those several rachitic, tubercular, developmental, and other fatal disorders which so commonly occur among older children. A due attention, therefore, to it, in its causes and prevention as well as treatment, will be the means of saving life and preserving health. If due regard be had, not only to the condition of the child, but also to that of the mother, I think we may safely hope for the most fortunate results.

In conclusion, if by what I have said I may, under Providence, be the means of saving the life it

may be but that of a single child, and making, as it were, but one sorrowing mother, or one grieving father, happy again, I shall be thankful, and shall consider I have not written in vain. Yet this is not all I have desired to accomplish. I have wished to call the attention of the community to this subject as one fraught with social evils of no ordinary kind, and calling loudly for legislative enactments. The food of our little ones must not be adulterated or poisoned. Our foundling hospitals must be regulated by wiser laws; the encouragements now given to crime must be repressed; and parents who by their ignorance prove themselves unworthy to care for their children, must be taught their responsibility. This is a noble work for philanthropists of both sexes; it is a Christian work, moreover, to its full extent; and blessed shall they be who perform it. "Inasmuch as ye have done it unto one of the least of these my brethren, ye have done it unto Me."

APPENDIX.

ON THE POSSIBILITY OF MENTAL INFLUENCES BEING TRANSMITTED THROUGH THE MILK OF A WET NURSE.

In the present day it is a very curious question to consider how far crime is or is not hereditary. The truth that the sins of the fathers are visited on the children to the third and fourth generation may admit of partial explanation from investigations of disease. That some diseases of body are hereditary is certain; that some diseases of mind and temperament—as, for instance, mania and epilepsy—are carried on throughout generations, is also indisputable. Now, how is this tendency thus transmitted from parent to child? There can be no doubt as to the reply,—through the community of blood. When a woman suckles a child she undoubtedly communicates to it milk secreted from her blood, which must, therefore, more or less in its employment in her organism, allow of the development of her peculiarities, bodily or mental. Hence, if a nurse of confirmed vicious or immoral habits suckle a child, it may be that the same *tendencies*, or liabilities to the same peculiarities, are transmitted to the child. Now I do not positively affirm it is so, but I think

quite enough on this point is known to make us very careful in our selection of wet nurses with whose *vices* as well as diseases we are not well acquainted. This point I now propose discussing in the following links of argument:—

I.—1st. Opinions of ancient authors, and of a few more modern writers.

2nd. Reasons why moderns have in great measure lost sight of this opinion of antiquity.

3rd. And yet, after all, that in great measure it is the opinion which regulates the selection of wet nurses.

II.—1st. General facts showing that such a transmission is not in opposition with known facts in physiology and pathology.

2nd. These tendencies develop with growth, and growth is very rapid in infants.

III.—Analogy observed in animals and adults.

IV.—Objections of effects of education, conversion, &c., answered.

I.—1st. Opinions of ancient authors, and of a few more modern writers. Older authors were unanimous in their belief upon this point. I may quote the opinion of Julius Cæsar Baricellus, in his work on the Faculty and Uses of Milk. "Hence," he says, "by reason of the received nutriment, children will be affected by the natures of their parents, and will partake of an inclination to the faults and virtues of their wet nurses. As has been already recorded of Nero, in the 'Hortulo Geniali,' I have proved that his parents were most benevolent, but that he was suckled by a most cruel nurse; and he killed his own mother. For like reasons, learned men are in the habit of

saying, whether truly or purposely, that Romulus was suckled by a she-wolf; and Romulus was certainly of very cruel habits, most passionate, most strong, and most patient of discomfort, as a wolf. It is said, also, that Cyrus was suckled by a dog; the son of Hercules, Telephus, by a stag; Pellia, the son of Neptune, by a mare; Alexander, the son of Priam, by a fox; Agista, by a goat, the peculiar manners of which are known. So we know that infants receive their mental inclinations and their temperaments from their nurses, although all these may be modified by the strength of the mind."

Among the more modern writers I may quote Ferris, Werdig, and Burdach. Dr. Ferris, in his Treatise on Milk, published 1785, after alluding to examples of death in infants from sudden emotions in mothers, says (p. 21): "Nor are these accidental circumstances in nursing women the only sources of disorder in their little and innocent charges; for they often derive from the breast the seeds of the worst disorders (Gregori's 'Comp. View,' pp. 22-40), and carry with them through life the direful effects of the depraved and vicious habits of those who nursed them. Many have held an opinion that not only the diseases of the body, but that the disposition of the mind is also derived in a great measure through the medium of the milk from the mother and nurse. Thus Hoffman asserted that he knew infants particularly inclined to drinking that had been fostered by a drunken nurse;" and he then proceeds to give a case. "Werdig," continues Dr. Ferris, "was so strenuous an advocate for this opinion, that he

contended that those infants which are nourished at the breast of a stranger for the most part degenerate; that they are naturalized to the nature of the nurse; that they derive their constitution from the nourishment which they take from her breast, and, through that medium, their disposition from her temper of mind, &c. &c. Whatever objections may be urged against these opinions taken in their full extent, still it must be allowed that they are not entirely without foundation." I myself have known two cases: one of a lady suckled by a bad woman, who in youth was full of like bad passions, till changed by the power of Gospel truth; and another of a gentleman suckled by a nurse of strong sexual passions, who has inherited all her propensities.

Upon this point Burdach states: "The organism of a child is not passive to the impressions that act upon him. He develops in the direction of the first influence submitted to him, and hence does not suck out in consequence a character opposed to that of the milk on which he feeds. The thing is manifest in itself, and, moreover, well exemplified by the thousands of infants which are fed on cow's or goat's milk. If the popular opinion leads us to believe in a moral assimilation of character; if it be permitted, in speaking figuratively, to say of a cruel man that he was suckled by a tigress,—all that is true at the bottom is, that the mode of animal life of those beings who are suckled determines the quality of the milk; and that this in like manner influences on the mode of animal life of the suckling child."—*Burdach*, iv. 384.

These opinions are sufficiently positive if not numerous.

2nd. The reasons why later authors have not given their attention to this inquiry are obvious. First, there is, perhaps, more general charity as nations become more civilized. Physiological science is too often made subservient to a pseudo-called liberality. He must be ultra *mad* indeed whom an English jury now-a-days will acknowledge to be insane. Again, it is really very difficult to collect facts of the nature required. Many persons have been brought up by wet nurses who are not aware of it themselves. Others have not known the good or bad qualities of those wet nurses they have suckled, and in after life have lost sight of them. It must always be so as communities enlarge. In the mass the history which attaches to particular individuals is lost. It is only when in such cases general attention is called, that any number of facts can be collected. This neglect, however, does not disprove the probable truth of the propositions.

3rd. And yet the selection of a wet nurse is in a measure founded on a belief that diseases mental and bodily are transmissible through the milk of a wet nurse to a child. Those who disbelieve this circumstance as a dogma are strangely, therefore, but surely very inconsistent.

It is admitted that many diseases are hereditary. Cancer, rheumatism, phthisis, scrofula, syphilis, asthma, are admitted everywhere to be so. But peculiar mental diseases, *mania* in its varied forms, epilepsy, peculiar *temperaments* of body, accompanied with peculiar dispositions of mind,

are also hereditary. These often predispose to peculiar diseases, which pass to individuals or nations. Excessive pride, courage, bad tempers, strong sexual passions, are often traced in families through successive generations. Dr. Forbes Winslow, the distinguished psychologist, has shown that *criminal* children are often the offspring of parents who have been during some time of their lives *insane*. These points, I presume, will be disputed by no member of the profession. So, though not as openly stated, the milk of the wet nurse is supposed to exert the same influence for good or evil as that of the parent herself. If it were not so, why in the selection of wet nurses do we act upon precisely that belief?—else why avoid a cancerous, scrofulous, phthisical, or *mad* wet nurse?—why prefer as a rule a bilious temperament to a sanguine or nervous temperament, particularly with an excitable child? Simply and only because it is feared the said diseases or peculiarities, bodily or mental, will be transmitted to the child through the milk.

II. These preliminary observations lead us to the second inquiry, or investigations of such general facts which prove that such a transmission is *possible* according to known rules of physiology or pathology.

1st. That certain mental diseases, such as mania, are hereditary, is undeniable. Dr. Forbes Winslow's opinion, recorded in the above paragraph, that criminal children are usually the offspring of parents who either become or have been insane, is an extension of a similar opinion in the same direction. It is also a question, how far druuk-

ards for the time being may be considered as mad, and may not beget children who in after life become insane. Dr. Camps has mentioned a remarkable case of this kind in a man, whose children all became deranged in after life, although no evidence of mania could be traced in his or his wife's family; and who in the day-time was equally sane himself, but who never went to bed sober. Now how can we conceive that this madness is transmitted? This inquiry is answered by the following,—How are family likenesses transmitted or communicated? First, between parent and child; second, between husband and wife.

There can be no doubt that likenesses are transmitted from parent to child; upon this point none will disagree: and the question is, How is this effected? We cannot conceive it to be otherwise than that from the community of blood present there are deposited in the process of development certain *particles*, which, as in the development of the ordinary seed, will in growth come to resemble the original. This likeness at any rate must be made up of *component parts*. Now if this be admitted for *face, form, hair, teeth*, &c., it is surely not so improbable to suppose that likenesses of more internal though unseen parts may also exist, and so parts of the brain of a child may resemble parts of the brain of the parent in obedience to the same general law. Then, without necessarily believing in a phrenological map of the brain, it cannot be denied, that as the organ of the mind, it must, if its internal particular and general conformation be like the parent's, have a tendency to develop ideas in a similar

manner to those of the said parent, and so, *cæteris paribus*, the thoughts of the offspring will have a tendency to take the same direction as those of the parent. But, secondly, let us carry this argument one link further. It is a matter of popular observation, that after a time husband and wife come to resemble each other: here, also, we may conceive that one of the elements in operation is the blood, through the closeness of conjugal union; and so after a time the resemblance in the process of development is brought about. It has been attempted to attribute this change to the power of imitation, it being assumed that when two people live together for a long time, having the same common interests, and seeking to please one another, as a matter of course they will come to resemble each other. Even on this supposition, however, it is only removing the difficulty one step backward; and for this reason—any habitude long continued in the same direction will lead to the increased development of the parts employed. The blacksmith's arm becomes more muscular by exercise, or people acquire bad or good habits of gait, movement, or position of body, which grow upon them and become permanent. So this direction can only be communicated if the ultimate particles which make up the whole of the imitating parties assume a development favourable to the production of imitative acts. This, after all, comes to be the same thing as if the tendencies were communicated by hereditary taint; in both cases it is the blood, or the parts concerned in the nutrition of the body or the ultimate cell-growth, to which this specific direction is given. But inas-

much as we do not find that these extraordinary likenesses usually if ever occur except amongst those in whom there is intimate blood union, it follows that the powers of imitation cannot be so powerful as those inherent or consequent upon blood relations. That such mental likenesses are conveyed from parent to offspring is doubtless the case in some of the lower animals. In no instance is this more evident than in the dog, particular breeds of the same species generally presenting peculiar aptitudes and characters, as in the case of blood-hounds, setters, pointers, &c.; although, so far as evidence is concerned, it would appear that many of these, if not all, originally sprung from the same species. Without calling these manifested aptitudes actually *mental peculiarities*, they are clearly not wholly instinctive, but evidently *allied to the intellectual*, since a sort of education is needed to bring them out. Thus we have clear proof from analogy, that intellectual peculiarities may be conveyed from parent to offspring, and that this arises from a blood relation or communion. Now this same blood communion exists after a time between any nurse and her suckling. The milk is also a secretion of the nurse's blood. This milk becomes transformed in the child's economy into blood, and as the great fount of nutrition, it necessarily gives a certain direction and character to his being, which closely resembles that of his nurse, morally as well as physically.

It has been, however, contended here that experience among animals is opposed to this conclusion. Thus it has been objected, that in animals of one

species brought up upon the milk of another species, no change could be traced which could be referred to the animal's milk; for instance, Mr. Acton has given the following illustration, upon the authority of a veterinary surgeon. It is very common with setter or pointer bitches to have a large number of puppies, say 10: the animal is not strong enough to suckle all these; it is therefore customary to transfer to some other bitch the superfluous number of puppies; and it is found in after experience, that the puppies who have been so suckled by the strange animal become quite as good pointers or setters as those who have been suckled by the mother. Again: this same veterinary surgeon had three children, two of which were suckled exclusively by the mother, and the third was fed upon ass's milk during its extreme infancy; this last was the healthiest. Again: the question is asked, whether, in the case of children brought up upon ass's or goat's milk, the peculiarities,—*obstinacy*, which applies to the former, and *lasciviousness* to the latter,—had been observed in those children in after life.

Mr. Acton's first objection proves only the converse proposition; namely, that if a parental influence is communicated to the offspring it cannot be wholly overcome by the suckling of a strange animal, particularly if education is brought to play in the matter. The proper experiment should have been, to find out whether a puppy suckled by a setter or pointer bitch whose parents had no especial peculiarity, would have acquired in after life the peculiarities of a setter or pointer. Moreover, in the second objection, health is no

evidence of a suckled animal not possessing the peculiarities of the animal it suckled. Lastly, it remains to be proved whether the peculiarities of the goat and ass are those that have been previously mentioned. Certainly if we are to judge of the character of the Swiss mountaineers, who in great measure feed upon goat's milk, their mountainous habits are not unlike those of the goats: whether the vice alluded to prevails among them I have no knowledge.

The conclusion come to above—namely, that because of a community of blood brought about through the milk taken, a mental peculiarity would be transmitted—might be here adopted; but it is not wished to aver more than this, viz., that a disposition may be acquired by the child through its wet nurse to a peculiar mental or intellectual peculiarity.

But again: a tendency originating during infancy may need development in the child's body to be brought into action. We cannot forbear to apply here in illustration some remarks made by Dr. C. J. B. Williams, in his "Principles of Medicine," in regard to hereditary predisposition:—"It must not be supposed that hereditary proclivity to disease *commences* at birth. In a few instances it is congenital, but in the greater number it is *developed by growth* or some other circumstances of life. Gout, for example, is acknowledged to be hereditary.

"A parent has it in middle or advanced life; his son does not get it until about the same period—sooner or later, according to whether he lives freely or not. Here is something transmitted

from father to son, yet not manifest in the son for forty or fifty years." This peculiar tendency, therefore, sown in infancy, is developed only by growth.

Now, when have we growth so rapid as in infancy? At the end of the first three years the child has generally attained half his future height. This height will be progressive up to 21 years, so that in three years after birth he grows as quickly as he will in 18 years. But of these three years, it is in the first that the growth is most rapid, and precisely, in the first nine months, when the child is suckling. From 18 to 20 inches, its average length at birth, and from 6 to 7lbs., its average weight, it increases to 24 or 26 inches in height, and to 18 or 20lbs. in weight.

During the period it is suckling, the foundation is being laid upon which the future manhood will be built. To illustrate my meaning, let us take the example of a seed, for instance, of the *wild apple*. Plant it in well manured and fertile ground; tend and water it—it will develop the sweet apple. Reverse the case. Take the seed of the cultivated apple, and sow it in a wild and arid land, exposed to all changes of weather. It will change almost entirely its character, becoming small and bitter, often poisonous. So with the suckled infant; however healthy and strong when born, you may make it weak and diseased, mentally and bodily, by selecting an unfit nurse; and the converse proposition is true. Therefore it is reasonable to conclude, that as breast-milk is the food of the child, the good or bad qualities of its wet nurse's milk enter into

the formation of its very vitals. The peculiar character of the ultimate particles of the child's composition usually called the *cell-growth,* which will henceforth be multiplied in its organism, must become modified in its nature from the food given especially at this period to it, and so *fixedly* that no after treatment will be able to change it. Precisely as by transplanting the wild tree, once full grown to a certain size, into manured and good ground, you can never get the good and sweet fruit from it, as you could have done had you taken the seed and cared for it from its growth into a tree; so, when once the foundation is laid in a child, in the early months of infancy, you can never expect to be as successful with it in after life. During the suckling period, therefore, (which, upon an average, may extend over a year,) when its growth is most rapid, and when, if I may use the expression, the fundamental cells, the foundations of its future existence, are laid down, *then* it is that any poison or defective construction in these will take its rise; and no care, however great, humanly speaking, taken in the putting together of the superstructure, can be expected in anywise to do away with the original evil. Like a carcinomatous growth, when once the morbid cell has been developed, it will impart its nature to surrounding parts, and poison the whole blood, so will these fundamental cells impart their nature, in whatever way modified, to the child's organism. It is of little avail to argue, that because the peculiarities of cell-growths so modified may not be detectable in the milk it is not there; a certain something which will lead to its

production may yet exist. We may not always be able to recognise its form: the seed or sporule often gives us no idea of the future plant. So it may be here; but if madness, epilepsy, scrofula, syphilis, rheumatism, cancer, gout, and a host of other diseases are hereditary, and yet we cannot trace in the original blood or milk of a parent any evidence of their presence, we must not therefore argue against their existence.

Again: many of these diseases—scrofula, madness, &c.—are characterised in after life by peculiar mental manifestations well known to go with them, everywhere recognised as specific symptoms. So far, therefore, the whole analogy of nature proves that it is possible to put that in the infant which shall contaminate the life of the man, taint his whole constitution, and influence his psychical power.

Again, there can be no doubt that the instinctive or mental manifestations, as well as the physical or brute force, will be materially affected by the quality and quantity of food taken by different animals. It is notorious that the pig, if fed upon animal food, will become exceedingly ferocious—a peculiarity which will not obtain when the animal is fed upon vegetable food. "A bear, kept in the anatomical department of the Giessen University, exhibited a very gentle character so long as he was fed exclusively on bread. A few days after feeding upon flesh he became prone to bite, and was even dangerous to his keeper. Hounds kept for hunting wild and ferocious animals are fed exclusively on animal food, usually raw, which last condition has been stated by some to increase ferocity to a greater

degree than cooked meat." Other instances are given. One well known, recorded, I believe, by Parent Duchâtelet, is that of two pigs, which having fed on some animal carcase, attacked two children the next day, and devoured them. Wild cats, whose food is essentially if not entirely carnivorous, are very different as to ferocity from the domestic cat; yet it is proverbial how often a domestic cat on a farm, if allowed to feed exclusively upon birds, rats, and other animal food, becomes wild and ferocious, so as to be no longer accessible. Many granivorous birds become during the breeding season carnivorous, this peculiarity appearing to be necessary fully to develop not only their specific procreating propensity, but their courage to enable them to defend their young.

Again, the peculiarities of the breed of our game cocks of old was supposed to be, and doubtless was, maintained by the highly azotised food supplied to the birds, strong grains and animal food being chiefly given. Sir George Sinclair, a great authority in such matters, gives us a description of the best kind of food to be given to cocks about to fight. Three weeks or a month before, he fed them by rule; the first week on fine barley, the second on wheat. Another observer gave wheat and barley, bread and milk. If we turn to Scripture, we there find, that in speaking of the millennial ages, when peace and innocence shall again prevail throughout the creation, the lion is said to eat grass as the ox. Moreover, in the antediluvian age, Adam is described as at peace with those very animals which experience proves now-a-days to be most ferocious, but which in Noah's time, being

still herbivorous, were so comparatively tame, gentle in their habits, and obedient, that he could take them into his ark with impunity. This change of character is surely not purely accidental, but rather, I think, evidently implies, that with the quality of the food, the external manifestations are influenced. But this is also observed in the case of *man*. Liebig exemplifies the fact by adducing the examples of three men, one fed on beef and bread, another on cheese and salt fish, a third on potatoes, each of whom would contend against a presenting difficulty in very different ways. I am sure, also, from experience, that a long persistence in blood food (as, for example, black pudding) not only gives rise to increased bodily energy, but also develops the quarrelsome and passionate (it may be ferocious) tendencies in the mental powers.

It is commonly said a good deal is due to race. The upper and lower classes of society seem to occupy, as it were, a relative position one to another, not very different from that which exists between game and dunghill cocks. The lower class of ill-fed Irish, as Ribandmen and White boys, are idle, treacherous, and cowardly in their murders, yet as the well-fed soldiers of our armies there are not to be found on the field of battle braver heroes. Where, again, among the upper classes shall we find more talent, or more brilliant achievements, political as well as social, than among the Irish gentry? This difference is, doubtless, in measure due to the removal of pernicious advisers; but, also, to the *better food* supplied. In the former case, as soldiers, they receive good bread and

wholesome meat, which as poor labourers of Ireland they never tasted. In the latter case, as a wealthier class, having had from childhood and still continuing to have the nutriment required in sufficient quantity, their sinews, bones, and brain have a good animal foundation. Except, therefore, where weakened by disease and vice, they are better able to cope with difficulties, and their courage is less likely to give way. In no other manner can we explain the superiority of many a young officer over the older common soldiers; and yet the former has often been bred up in the lap of luxury, while the latter may have had to cope with difficulties all his life. The former, in competition with the latter, will lead them unflinchingly, and surpass them in deeds of heroism. In defeat he will not be so readily cast down. "As to the way in which some of our ensigns and lieutenants braved danger," said Wellington, "the boys just come from school—it exceeds all belief. They ran as at cricket." And so experience will prove, if ever young officers are put to the test. Our volunteers, after a very little training, will excel in endurance and deeds of valour even our noble and far-famed British troops. Verily there is something in blood.

But this superiority is not *wholly* due to race. Take the case of the game cock again as an illustration. Breeding cocks in and in, or having stale breed, as it is called, (*i. e.* keeping uniformly the same stock), is a very bad system. It reduces their size, and takes away their vigour to so great a degree that they can hardly propagate their species; and the same is remarked of horses. If

game cocks are bred in and in, they will stand to be killed without flinching, but they have not spirit and activity enough to attack their foes with any effect. The laws of morality must not be outraged. Even among men, marriages between relatives of close affinity, deteriorate *mind* as well as body.

Again, looking to *workmen*, there cannot be a doubt but that they are remarkably influenced by the quality of food they take. Before the French Revolution, we have it stated by Villermé "that the condition of the working man was most lamentable —poor to a degree—the work done by him was comparatively contemptible." This was owing to the bad food he partook of, which consisted of barley and oat bread. Since the Revolution his condition is improved. More wheat and meat are taken. "In France," he adds, "we do not appear to appreciate fully how much *meat* is essential to a working man. Yet everywhere those who are engaged in hard work make it an habitual aliment, and add to it some fermented drink, such as wine, cider, or beer. This fact is too general not to be a result of necessity. If the workmen of England work more than others, it is owing to the larger quantity of meat which they consume. All those who eat it, as well as wheaten bread, say they are better able to work under its influence. An experiment was made at Charenton, near Paris, by some foundry proprietors, who could not get as much work from the French workmen as they obtained from English operatives, until they obliged them to live in the same way. An analogous experiment was made in the central House of

Detention at Riom; on giving meat in an increased ration, the amount of work obtained from the glass polishers was immediately increased; and the plan proved to be economical."*

A similar result proving the influence of food in France, on comparison of the work done by English and French navvies, was observed. "The English navvy would continuously run out a barrow containing from three to four cwt. of stuff, whereas a French labourer was content with half that load. When an English contractor undertook the works of the Paris and Rouen Railway, he sent over the requisite plant; among which was a quantity of the usual English navvy wheelbarrows. The French labourers tried them, and struck work. The result was a dangerous *émeute* which rendered it necessary to call in the military, and eventually the only workmen who used the big barrows were the English navvies. The consequence was, the English labourer received five shillings a day, while the wages of the ordinary French labourer were only two and a half francs; and even then the English labourer was considered the cheapest of the two."†

This superior strength cannot be considered as purely physical, because a sane man, with his freedom to think, cannot be in any way considered as a beast of burden: and because, as the Reviewer proceeds, the power of mind over the body was in full play. "Their union and *esprit de corps* was equally remarkable. The contract taken, every man put himself to his mettle. If any one was

* *Villermé, L'Etat Physique des Ouvriers*, ii. p. 6, *et seq.*

† *Quarterly Review*, for January 1858, p. 7.

found skulking, he was ejected from the gang. In times of emergency, they would work for sixteen hours with only short intervals for meals. The quantity of *flesh meat* which they consumed was something enormous. A shrewd Yorkshireman, when work became slack, and a portion of his labourers had to be sacked, went round amongst his men at their dinners, and observed what they had upon their platters. The men of small appetites were discharged."*

The same fact is brought out by naturalists. Carnivorous nations are always bolder and stronger than the herbivorous. The vegetable eaters have not the *endurance* of the meat eaters. They may display courage, but it is evanescent. *Treachery* is much more their characteristic. Herein the double-faced guerilla of Spain, the trustless Italian bravo, the perfidious Ribandman of Ireland, and the brutal Hindoo, agree. On the other hand, again, it is well known among our Roman Catholic brethren, in monasteries and elsewhere, how completely fasting and low diet will reduce the most contumacious to obedience. In fact, it is manifest that our physical peculiarities in adult life are greatly dependent upon the quality of food taken.

While, however, these facts will be admitted as true for adults, it may be denied that they are equally applicable to infants: first, because they have no thinking powers at the time, their minds being quiescent, so to say; and secondly, because it cannot be said of the milk of one woman as

* *Quarterly Review*, for January 1858, p. 7.

compared with that of another, that one is animal while the other is vegetable food.

My reply to the first objection is simply this. Do not children think? Are they mere *automatons?* Have they not slight power of memory? Are the evidences of pain, fear, joy, under varied circumstances, purely fictitious? We may not remember what our experience taught us as infants, though we may have learnt by it notwithstanding. But, even if an infant does not think, his *emotional power* is doubtless in full vigour.

But the question presents itself, Whence do these emotional powers proceed? Are they merely material? Few could admit this absurdity: then must they needs be the *result of soul upon matter.* That matter, however, in the case of an infant has not attained maturity. It is still in the course of development; but as the stimulus is applied, so will the direction of its future development be made.

It may be inferred from the foregoing remarks, that I argue too much as a materialist, and conceive that the analogy between mind and matter is closer than it is; but I wish here distinctly to be understood as entirely disclaiming anything like materiality in the soul. Yet, in order that the manifestations of any soul should be intelligibly conveyed to the external world, it is essential that the conveying medium—*the brain*—be functionally and organically whole in all its constituent parts. Take, for instance, the case of the eye. There may be *long* or *short*-sightedness,—there may be *double vision*,—there may be *partial* or

entire blindness; but, in all these cases, the soul is not necessarily diseased because the sight is affected. Again, in some cases of mania there may be illusions on one or two points, and yet perfect integrity in all other mental actions. A want of *phosphorus* in the brain—a deficiency of the blood-globules—a poison circulating in the blood, will frequently produce mental incongruities, and yet the soul is intact. What is true then of a whole must be true of individual parts, which by combination constitute the whole, and so there may be in the minutest *cell-growths* peculiar deficiencies or characteristics, which (although not to be detected by the best known tests or microscopic glasses) may yet exist in the brain, and so far vitiate externally its manifestations, be they physical or psychical.

Thus to this susceptibility and keenness of perception in the emotional powers may be indirectly due in great measure the rapid effect of sudden mental emotions of the wet nurse on the child she suckles, so universally admitted, such as diarrhœa, convulsions, even death; or of mental influences of a more chronic character in the former, which will lead to the atrophy, debility, imbecility, and also death of the latter.

It is remarkable how those who are opposed to the idea that mental impressions can be conveyed from a nurse to a suckling, seize upon this same emotional power to explain such transmission when it occurs, only that they consider it is acted upon by the power of *imitation.* Dr. B. W. Richardson mentioned a case to me of a child, of about two months old, who on suddenly seeing a

woman with a squint, instantly began to squint likewise; and the peculiarity became permanent. In like manner some believe likenesses between parent and child, or husband and wife, are communicated by the power of imitation. This opinion, however, certainly as regards likenesses in families, is not always a valid one; because likenesses are known to descend to second and third generations, which have nevertheless had no social relations with the first,—or when the child had been separated from its parents from the earliest infancy. The only connexion between the two has been a community of blood.

The second objection, that the milk of one woman cannot be looked upon as animal, and that of another in the light of vegetable food, is more to the purpose; but the assumption is not necessary. As before said, many animal as well as vegetable poisons excite narcotism, temporary insanity, illusions, and the like. Their number is legion. The absence or excess of a simple ingredient in the chemical composition of a part of the brain, or in the circulating blood, will produce mental aberration. This is also true for excess or perversion of one or more constituents in either. It is a poison in the blood which produces puerperal mania; probably also the delirium of pericarditis: the same cause, doubtless, originates the delirium of fever. How otherwise can we explain the hereditary character of mania? Something is either wanting, or excessive, or in a perverted state in the child, in the brain or blood, which in time will end in mania. Is it not probable that a like imperfection may exist in one

wet nurse's milk which does not exist in that of another? And while I cannot believe that an accurate phrenological map of the brain can be drawn, still it is true that special parts of it are concerned and employed in the development of particular ideas. Then, in the same way as errors of constitution and likenesses of faces are handed down through generations, so may errors in blood composition, and likenesses dependent upon them, be transmitted respectively to similar brain parts; and these brain parts when in action will develop similar mental peculiarities, be they vicious or virtuous.

One more remark, and I must conclude this subject. It is objected that many parents of known excellent and moral character have had children with the vilest propensities; if the good qualities of the parent have not been transmitted to his own offspring, why should evil qualities be transmitted by the milk of a wet nurse? The answer is not always clear, but in many of these cases we have to deal perhaps with a *reformed* parent, while the son is not so. Who is to say what the parental tendencies may have been, or how far circumstances have kept back the one, while free scope has been given to the other? John Bradford might have been a murderer but for the grace of God. He believed this. With God all things are possible. The new nature has overpowered the old, and his materialism, now energized by a new power, assumes a development in an opposite direction. We know how lovely is the look of happy resignation and contentment in the expression often seen in a Christian's face.

The new birth has produced a likeness of the Saviour Master's love. But with fallen man the tendency is to evil, and in an argument like the present we have to do with men and women in their purely animal and unconverted relations. In the case of a fallen woman so circumstanced, and likely again to fall under temptation, if we admit her in a superior position in our household, we know we are putting a stumbling-block before others. We may be communicating a dangerous tendency to our child if we employ her as its wet nurse. It is incontrovertible that we have derived our tendencies to evil by virtue of our descent from Adam. The taint, both moral and physical, is an hereditary reality. "The sins of the father are visited upon the children to the third and fourth generation." So far as we can comprehend, this is effected through our materiality. "The first man was of the earth, earthy." Again, "The blood is the life;" through a community of this we, therefore, so to speak, derive our nature. Is it altogether improbable, that through a similar materiality, namely, the milk of one eminently criminal, a criminal tendency might be communicated? I do not say it is so, but if it be the least doubtful, it is better not to select a fallen woman for a wet nurse if any other course be practicable.

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