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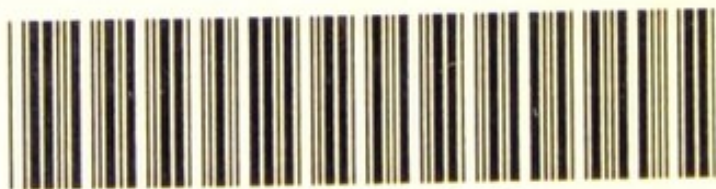


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S M E E  
ON  
GENERAL DEBILITY  
AND  
DEFECTIVE NUTRITION.

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GENERAL DEBILITY

AND

DEFECTIVE NUTRITION.

1883





GENERAL DEBILITY  
AND  
DEFECTIVE NUTRITION:

THEIR  
CAUSES, CONSEQUENCES, AND TREATMENT.

BY  
ALFRED SMEE, F.R.S.,

SENIOR SURGEON TO THE ROYAL GENERAL DISPENSARY, SURGEON TO THE BANK  
OF ENGLAND, SURGEON TO THE CENTRAL LONDON OPHTHALMIC  
HOSPITAL, LATE LECTURER ON SURGERY.

*Second Edition.*

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JOHN CHURCHILL, NEW BURLINGTON STREET.

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TO THE MEMBERS  
OF THE  
HUNTERIAN SOCIETY OF LONDON,  
THIS BOOK,

BEING THE  
*Substance of the Oration*

DELIVERED BEFORE THE SOCIETY, FEBRUARY 9, 1859.

IS RESPECTFULLY DEDICATED,

BY

THE AUTHOR.





## P R E F A C E.

---

I AM truly grateful for the honour which the Hunterian Society has conferred in assigning to me the task of giving the oration on this occasion ; but I fear that the desire of satisfactorily performing my duty far exceeds my power of performance. For my subject, I at first hesitated whether I should submit to the Society a continuation of my studies of man and mental phenomena, or whether I should endeavour to submit to the notice of the members the peculiar experience which I have obtained whilst discharging the duties of Medical Officer to very large Institutions ; and ask their criticism of that train of thought which passes through my mind, and guides my treatment, in an important range of cases requiring medical aid. Considering, however, the eminently practical cha-



racter of this Society at our evening meetings, it seemed more consistent to confine my observations to questions immediately bearing upon the prolongation of human life, and the alleviation or cure of disease; I have therefore taken for my theme, "Debility and Defective Nutrition: their Causes, Consequences, and Treatment." In choosing these subjects, I will dare venture to affirm that they are more important in regulating our actual treatment, cover a greater range of cases, and, if rightly understood, are calculated to prolong life, and benefit a larger proportion of mankind, than any other single question which could have been selected.

In the present edition, I have added some matter to the Appendix, but have not thought it desirable to interfere with the subject-matter of the text.

7, FINSBURY CIRCUS,

*June 2, 1862.*

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CHAPTER I

OF THE NATURE AND EXTENT OF THE SUBJECT

THE FIRST PART OF THIS WORK IS DEVOTED TO A GENERAL CONSIDERATION OF THE NATURE AND EXTENT OF THE SUBJECT.

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# DEBILITY AND DEFECTIVE NUTRITION.

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## CHAPTER I.

Primary powers of matter, 1—Comparison between the human body and fire, 2—Normal action of fire, 3—Abnormal action, 4—Analogous changes of man to that of fire, 5, 6—States of man, 7, 8—Changes of man, 9, 10—Combinations of elements, 11—Proximate elements, 12—Equivalents of food, 13, 14—Equivalents of waste, 15—Intermediate changes, 16—Structure of man, 17—Double voltaic circuit, 18—Functions of blood, 19—Endosmotic action, 20—Different effects in different tissues, 21—Sleep, 22—Necessity for rest, 23—Blood corpuscles, 24—Nutrition of the body, 25—Changes in the body, 26—Relation of change to fuel, 27—General remarks, 28.

1. To be a successful practitioner of the healing art, the medical man needs at every step a knowledge of the primary powers of matter, so that by his familiar acquaintance with the more simple properties of inanimate substances, he may more correctly understand the complex phenomena which are presented by organic bodies.

2. We may liken a human being to a lamp or fire, as in both strictly analogous changes occur. A fire requires a continual supply of fuel, and a continual accession of air. The carbon and oxygen enter into combination to form a new product, carbonic acid; and whilst, on the one hand, it is essential that this should be removed, as rapidly as formed, from the sphere of action, so on the other, any incombustible residue must not remain to interfere with the fresh fuel and further combustion. We observe that the essential character of combustion consists of new attractions, and according to the intensity of these attractions, and their amount, force arises capable of evincing light, heat, electricity, chemical decompositions, disintegrations, or mechanical power.

3. If we examine the action of this fire under different circumstances, we cannot fail to be struck that it burns in various ways. When it burns according to our usual desires, it may be said to burn in a normal manner. Then the fuel combines freely with oxygen, and forms carbonic acid, which is diffused through the atmosphere, and the ash which is left drops through the bars of the grate.

4. Combustion does not invariably occur in this regular manner; sooty naphtha compounds, or clinkers, may be formed, and carbonic oxyde, in-



stead of carbonic acid, may be generated, and the changes which ought to occur may be perverted. In this case we do not obtain the result we expect; and whether by the combustion we seek to obtain heat, light, electricity, or mechanical power, we are disappointed at the result. These irregular actions of the burning of the oil in our lamps, or the fuel in our grates, may be called the diseases of combustion, and may be likened to the irregular actions of man, which we also call diseases, and, like them, are manifold in number and various in kind. It is not my intention this evening further to consider their analogies or describe their peculiarities, as on this occasion it is our province simply to study the varieties of regular or normal combustion, which present several distinct varieties. In the first place, fire may burn slow and be feeble, or quick and be powerful, or the flame may be oppressed by the non-removal of the gaseous products into the atmosphere, or the solid through the bars of the grate.

5. The changes taking place in the economy of man differ from the action of fire, simply in the changes being more complex. Man requires fuel in the form of food, and oxygen, with which it is to combine. The food passes into new combinations, and enters into new attractions, to give to man his warmth and physical strength, whilst the new pro-



ducts are removed from the system to make way for new food to enter into new combinations. As in the fire, so in man, these actions sometimes take place normally, when a man is said to enjoy a state of health; at other times they occur abnormally, as in the case of many of the diseases to which flesh is heir.

6. Even in the abnormal state the analogy still holds; for in man the combinations occur at one time too feebly, at another time redundantly, occasionally the whole system is choked or oppressed, either by too much material being absorbed, or by the final products of the organic combinations, which are not properly removed from the sphere of action, but are retained, to the great hindrance of further actions. Then the entire economy is as much oppressed as though a fire were embarrassed by the presence of carbonic acid, or choked by clinkers or ash remaining amongst the fuel.

7. When we observe the human subject, or even if we extend our observation to any organic being, it can only be presented to our notice in a few ways. Either the organic combinations are taking place properly and regularly, as in health, or improperly and irregularly, as in disease. Either the combinations occur violently, as in redundancy, or feebly, as in debility; and lastly, the system may be choked when oppression exists, from the reten-

tion of changed matter or excess of material. Every man may be therefore found, at every time and under every circumstance, either in the state of health, disease, debility, redundancy, or oppression.

8. Debility is now our theme; and as a preliminary step to its study, it is desirable to take a glance at the fuel or food which man uses, the changes which that food undergoes to produce heat, physical strength, and nervous action, and to notice the final products of these changes, with the mode in which they are cast off from the system.

9. Every part of this obviously necessary inquiry to the medical practitioner is beset with overwhelming difficulties; of some parts of the subject we are almost in total ignorance. We are actually, at the bedside of the patient, obliged to form our conclusion by a review of all the general features, as we are quite unable to follow the various changes of the organism, and trace their irregularities, from the taking of food to the excretion of the wasted products.

10. The food of man is compounded of twelve elements: hydrogen, carbon, nitrogen, oxygen, sulphur, phosphorus, iron, potassium, sodium, chlorine, magnesium, and calcium; and though no philosopher doubts the possibility of these undecomposed bodies consisting of others, yet chemistry



has failed to prove that animal or vegetable bodies can change one element to another. It is true that Dr. Prout thought that eggs, during the process of incubation, generated lime; yet a careful perusal of his paper in the "Philosophical Transactions" will show that he did not give due weight to the consideration of the membranes of the shell, which is so great an oversight of this philosopher, that I have not thought it necessary to repeat the experiment.

11. These twelve elements are used for food only in particular combinations, which we may group into four classes. First, we take in food in the state of gaseous bodies, as atmospheric air; secondly, as earthy substances, such as common salt; thirdly, as compounds of hydrogen, carbon and oxygen, as sugar or oil; and lastly, as compounds of hydrogen, carbon, nitrogen and oxygen, as albumen.

12. All the four classes of compounds are absolutely required for food; all must be employed, and the sum total must contain the twelve elementary bodies before mentioned; and from this it appears that man has not the power of using the elements direct, or of compounding them in his system, but they must have been specially prepared for him, either in the organism of vegetables, or even, in some cases, further changed by undergoing a further metamorphosis in an animal,

with the exception of salts and some mineral substances, which may be taken at once with the organic food.

13. As it is essential for man to take each day these elements, we might naturally be led to suppose that a medical man would ascertain, as a primary study, the amount of these several kinds of matter, and of the elements of which they are composed, as a basis of operation ; and yet, up to the present moment, this has not been determined with anything like accuracy. The daily amount of food may be regarded by the medical man as the daily equivalent to compensate the daily waste. This is an ever-varying line between two boundary limits ; but perhaps it would be more convenient for the medical man to assume a mean between these limits, and assume it to increase or decrease either in the total food or in the relative proportions, according to the bulk of the individual, or the absolute work which is performed.

14. The determination of the equivalent of food is, in my mind, the first step in medical knowledge. Its importance can never be overrated. It is not without significance in health or disease ; and whenever the medical man is called upon to advise there it comes into play as a fact of fundamental importance. And yet all is vague, and our limits are most imperfectly determined. The total quantity



of solid and fluid taken varies from the  $\frac{1}{2}$  to the  $\frac{1}{3}$  of the weight of the body, and the oxygen in addition to about  $\frac{1}{5}$  of the weight. In this country I find that the average consumption of meat in the middle class, where they take what they please without reference to cost, is about three quarters of a pound per person—men, women, and youths together. The bread amounts to a little above half a pound; milk, sugar, tea, coffee, wine, beer, fish, poultry, and vegetables, are taken in addition. Where the means are deficient, the meat decreases, and the bread increases; but where excessive muscular labour is performed, as in the navigator, the consumption of meat is perfectly enormous. For medical purposes, the practitioner should be apt and quick in estimating the necessity for food, that he may discover when any deviation from the rules of health occurs.

15. As in the fire-place the coals are changed, by burning into new forms of matter, so in the human body the food is changed, and new substances are produced. These are thrust from the system, to make room for new food, to undergo, in its turn, the transformations for the production of heat and force.

In exact medical science, we should be led to study the changed matter which must be thrown off the system by the lungs, skin, kidneys, and

alimentary canal, after it has done its work, and become useless to the body. The equivalent of changed matter, again, is subject to variation between certain limits ; although it would be more convenient to the surgeon to take a mean between the two limits for consideration, but more generally he must rely upon his skill and tact in detecting generally a deviation from health, in the variable state of human economy, more than in attempting to assign it to definite amounts.

According to Valentine, the alimentary canal passes off daily about 7 ounces ; the kidneys about  $4\frac{1}{2}$  lb., and the skin about 2 lb. Bernal, however, assigns a much greater loss by the skin and less by the kidneys ; and by his experiments, he found that about 66 per cent. passes off through the skin and lungs, and only 34 by the alimentary canal and kidneys. The principal final products of the changes of the body are carbonic acid, water, urea, and salts.

At the present time our knowledge is extremely imperfect upon these matters, but we are progressing to a period when we may hope to obtain far more exact knowledge, as chemical science is improved and extended. Chemists require to be educated by hundreds and thousands, to take the mechanical labour, as working cooks, gardeners and engineers do in their respective callings. At



present, as fast as educated they are employed by the manufacturer, and take a place in society which is beyond the means of the medical man to employ. As an ardent lover of physical and chemical research, and one whose chemical treatises are more or less found wherever civilization extends, I trust that I may be pardoned for stating my decided conviction that it is impossible for any medical man, in large practice, to give continual labour in the laboratory. Now and then I cannot refrain from entering my laboratory to perform some experiments in which I take especial interest, but the absence of a competent assistant utterly precludes me, and I may say the medical profession generally, from continuous chemical research, such as the phenomena of organic bodies require.

16. If the equivalents of food and equivalents of waste are unsatisfactorily determined, the changes which occur between the ingesta of food and egesta of waste, are still more difficult to understand; and perhaps it will not altogether fall to the lot of man to unravel this mysterious change in the animal economy. We know that the food is converted into a liquid state, because we can see the dissolved material passing by the absorbent vessels from the intestines, to be poured into the blood-vessels; but even then we are ignorant of the precise chemical state in which it exists, and of the

manner in which it breaks up into various compounds before it finally is changed into the material which is thrown from the system as inert and useless, to be again absorbed by plants, and reconverted to substances fit for human aliment, in the ever endless chain of nature's circle.

17. In my "Elements of Electro-Biology," and in the more popular deduction from it, the treatise on "Instinct and Reason," my general views of the structure of man are detailed; and, according to those views, the human frame essentially consists of a double set of nervous fibres, terminating centrally in a highly vascular tissue in the brain and spinal chord; and peripherally, either in a highly vascular tissue in the skin, eye, ear, nose, tongue, as the organs of sensation; or in a highly vascular tissue in the muscles, as the organs of motion. From my experiments, I am of opinion, that this double nervous apparatus is a double voltaic circuit.

18. This double voltaic nervous circuit I regard as the essential structure, to which the rest of the body may be regarded as a mere appendage. The stomach may be considered as a receptacle of matter, the heart as a distributor, whilst the lungs, skin, and kidneys, are eliminators of changed matter, to perform the same functions in man as the chimney does in the stove.

19. In this arrangement the blood contains the



matter to charge the nervous system. It also absorbs the effete matter, to be carried to the organs of excretion. This deposition and removal of new matter is effected through the walls of the vessels by the law of endosmose and exosmose, each tissue taking its own proper substance, and parting with it again when it has done its work.

20. The contemplation of this endosmotic action always fills my mind with wonder and admiration ; and when we observe the passage of fat into the fat cells of the adipose tissue, of flesh into the tubes of the sarcous tissue, with the re-passage of the wasted products into the blood-vessels ; when we further consider the long distances which the nutritive material traverses in many instances, such as in the cornea of the eye, or the cartilage of the joints, we obtain a faint glimmer of the exquisite physical laws to which our frame is wonderfully obedient.

21. I have ascertained, by experiments made on the dead body, that the blood-vessels transude different fluids to various tissues of the body, and in a different way. Thus a weak ammoniacal solution of carmine is poured out freely to the cellular tissue and to the cornea of the eye, whilst to the brain none is yielded, it not being adapted for the structures of which the brain is built up.\*

\* The doctrine of dialysis, as propounded by Graham, has an important bearing upon the diffusion. He finds that salts

22. Transudation is not a momentary process. Time is required, which exceeds, probably, the time which any organ is capable of being in action. Hence the necessity and utility of sleep, a state of rest of brain and body, which allows restoration and reparation, producing an increased capacity for renewed action. The time necessary for repose is greater than our legislators allow for themselves, and far more than those who delight in mental studies would prefer. Nevertheless, nature is inexorable; and, upon the average, one-third of our lives is spent in a state of unconsciousness, wherein we are lost to the external world, and dead to every external impression and action, for no other purpose than to allow the restoration of the wasted body.

23. The necessity for rest is a wide organic law. Plants, no less than animals, demand it, as any plant may be grown to death by cutting off the period of rest; hence the winter blasts and summer droughts have their use, as much as the genial warmth and the refreshing shower. By means, then, of proper food the waste is continually renewed, and new matter is deposited of the same kind as that which has been changed. In health,

pass freely through animal membranes, parchment, paper, &c., while certain neutral bodies, as gelatine and gum, do not penetrate at all, and which he terms colloidal substances.



the process is so perfectly adjusted, that the body is kept in the same state, and neither becomes more redundant in muscle, nor covered with fat to an undue extent.

24. Besides the nervous apparatus, with its appendages, there is yet to be noticed the little bodies, rich in iron, which exist in the blood, which have a remarkable power of readily taking further oxygen from the air, or of yielding oxygen under a change of circumstances. These appear to have an important connexion with the nervous system; and I discovered the very curious fact, in prosecuting my electro-biological researches, that an electric current stopped instantly their progression in the capillaries; and there is very little doubt, in my mind, that they are essential to the action of the nervous apparatus.

25. The proper nutrition of the body appears to be influenced by a proper change of matter, with its due production of heat and muscular force; for the state of health is very difficult to be maintained when the employment of the nervous system, the due generation of heat, and proper muscular exercise, is not regularly and steadily maintained.

26. In the present state of our knowledge, it is in vain to attempt to explain the absolute changes which occur in the animal economy; but generally we may observe that the compounds of hydrogen,



carbon, and phosphorus, take an additional quantity of oxygen; and the compounds of nitrogen a further amount of carbon, hydrogen, and oxygen. It is not exactly known where these changes occur, and in what manner the highly oxydized blood corpuscle favours the change; but upon a consideration of the whole facts of the case, I should abjure the doctrine propounded by some philosophers, that the hydrogen and carbon are changed to produce heat, and the changes of nitrogenized material for muscular power; but, on the contrary, I firmly believe that the compounds of all these elements are brought into play at once, and the whole are required to undergo these changes which take place in the system.

27. If we do not know the exact changes of matter which occur to cause animal heat, or muscular force, we are quite certain that the heat and force can only be in relation to the amount of matter changed in the system; for whether the hydrogen and oxygen be combined in the grate, in the voltaic battery, or whether they be united in the human body, a certain amount of heat and force can alone result. Organic life can no more produce unlimited power, than the engineer can obtain perpetual motion; and thus, the work done can only be proportionate to the food taken.

28. We thus find, by studying man through the

medium of physical science, that the medical practitioner obtains four bases for the practical estimation and treatment of disease. 1st. The limits of variation of food required for daily sustenance. 2nd. The limits of variation of the egesta which must be daily removed. 3rd. The limits of variation of sleep. 4th. The limits of variation of nervous power, heat, and muscular force which can daily be produced. A study of these gives to the mind fixed points for estimation and action: for whenever any deviation occurs, it is as important for the medical man to observe and determine its value, as though the engineer detected any such deviation in the burning of his fire, or in the performance of his mechanism.



## CHAPTER II.

## ON THE VARIETIES AND SYMPTOMS OF DEBILITY.

Debility, 29, 30—Complications of, 31—State of health, 32—Sufficient food, 33, 34—Incapacity for sensation, 35—Incapacity for thought, 36—Incapacity for rest, 37—Other failures of performance, 38—Capricious appetite, 39—Failure of nutrition, 40—Feebleness of the heart, 41—Debility mistaken for disease, or incubation of disease, 42.

29. It is not my purpose to consider any other state of the human economy but debility on the present occasion, as it appears to me that it has hardly had that share of attention which the magnitude of its importance demands.

30. By debility, that state of man is meant wherein the ordinary actions of health are performed feebly, or below the usual limit. By it, must be understood a variation of amount, and not of kind; though there are varieties which are presented to our notice.

31. Debility may be observed by itself, and it may be accompanied with disease, or associated



with oppression. Lastly, in some complicated cases, it may be present in some of the normal actions when others are redundant.

32. In the full enjoyment of health, the well-nourished man is neither thin nor is he fat; and the muscular substance is neither attenuated nor is it wasted; and the brightness of the eye, the scarlet blood in the capillaries, the well-coloured skin, and general beauty of form, with quickness of thought, aptitude for action, and ability for rest, indicate, to the practised eye, normal health and absence of debility.

33. Regarding the body as an organ for changing food and producing power, the estimation of the food taken, or power produced, may be taken as the test of health; for over a considerable period the food and the power must be in mutual relation; and where the power is less than the food taken, then some intervening disease, or irregularity of nutrition, is indicated.

34. One of the first symptoms which is frequently noticed in connexion with debility, is a loss of muscular power, a sense of intense fatigue after ordinary exertion. Our patient comes to us and complains, that after he has done his work he feels excessively tired, which is a symptom not to be neglected, as it is often the beginning of a train of circumstances which end in death.

35. Another symptom is a failure of the faculties of sensation. In some cases the vision is impaired, or power of adjustment to distances lessened. In others, a tendency to deafness exists, and frequently the palate is so far injured, that the person has not the same keen appreciation of the quality of the food at the well-supplied table.

36. Again, we find the capacity for long-continued thought is materially lessened. The active imagination, so necessary for human progression, is diminished; the memory for certain circumstances and objects is impaired; and, at other times, with the full possession of mental faculties, there is an unwillingness of action, and difficulty of being aroused, not at all consistent with the healthy man. In this estimate, it is by no means necessary to examine the higher powers of thought; for, as a matter of experience, I have known a failure in the power of adding correctly, or even an incorrectness in the skilled arithmetician, to be occasionally a symptom of grave and serious import.

37. Inability to rest and take sleep sufficient for the restoration of the body, is another symptom to be noted. Where it exists, the body cannot be sufficiently refreshed to take on its usual state, and we can only expect mischief. An absence of sound sleep is an important symptom, which cannot continue with impunity.



38. All the above symptoms are failures in the powers of performance, to which my experience leads me to attach the highest importance. I frequently trace from them the commencement of the most serious ailments; and when they occur, and remain for any period, they require our most serious attention, to ward off, before a very distant period, a fatal termination. To my mind, the symptoms are to the doctor what the breaker is to the captain; as both cases require attention, skill, and care, to avert the great and pressing danger.

39. The physician not only notes the failure of performance; there are yet other symptoms of debility which come before us, of similar import. Sometimes we find the appetite is capricious, or flags. If we are careful to make our inquiries in the most perfect manner, it is remarkable how frequently it may be found that a patient in affluence, and apparently surrounded with everything which a refinement of taste might require, is nevertheless taking too slender a pittance for human sustenance. It is true, he goes to the well-plied table, but on casting up the sum of what he actually takes, it is often found insufficient to maintain the healthy man, with all his bodily functions.

40. Besides the diminution in the power of taking food, there is yet one other symptom to be



noted ; namely, the failure of the power of nutrition when food sufficient for the object is taken ; a state which cannot exist for any length of time without a failure of the powers of performing the usual actions. Sometimes the failure of nutrition takes place in the muscular system ; at others, the adipose tissue passes away ; and, lastly, we observe certain specific parts to be unnourished, as the cornea of the eye, or the substance of the teeth.

41. In many cases of debility, the action of the heart and pulse give signs known to every practitioner. The feebleness of the heart's action, and want of decided stroke to the ear, are symptoms of direst import. The pulsations of the pulse, which feel as though the vessels were only half full, and give a shorter impulse and longer intervals, are also signs characteristic to the skilled practitioner.

42. In our estimate of debility, it is possible to confound it with the incubation of disease, or the actual existence of disease ; or we may mistake a naturally lower state of physical organization for debility. It is extremely difficult to tell when a malady, as a fever or small-pox, is incubating. During the process, the party feels many uneasy sensations, which we cannot refer to any definite cause. An undue sense of fatigue may lead to

the supposition that the person suffers from debility. When disease actually exists, it may be sometimes mistaken for debility ; but in this case it may be the fault of the surgeon, whose diagnosis is imperfect. With regard to the state of each individual man, some are stronger, some are endowed with more active functions than others. In cases where a lower development exists, it would be as vain to expect that medicine can change the natural man, as to hope that a dog can be taught to fly like a bird, or the bird to reason like a man.



## CHAPTER III.

## ON THE CAUSES OF DEBILITY.

Causes of debility, 43—Irregularities of food, 44—Diminution of food, 45—Excess of drink, 46—Brewers' employés, 47—Signs of intemperance, 48—Value of intemperate lives, 49—Signs of intemperance permanent, 50—Opium eating, 51—Smoking, 52—Mind diverted from food, 53—Debility from egesta, 54—Debility from acute disease, 55—From chronic disease, 56—From external influences, 57, 58—Debility from a want of rest, 59—Debility from exertion, 60—From anxiety, 61—From deficiency of work, 62—From constitutional causes, 63, 64—From injuries, 65—From railroad travelling, 66.

43. As manifold are the conditions of vigour and health, so complex are the causes of debility and want of strength; but they may be classed generally under seven great heads. 1. Causes emanating from irregularities of food. 2. Causes emanating from irregularities of the egesta. 3. Causes emanating from diseases. 4. Causes emanating from external influences. 5. Causes emanating from irregularities of rest and sleep. 6.



Causes emanating from irregularities of the work performed. 7. Causes emanating from hereditary defect.

44. I have always found by experience that there is some difficulty in satisfactorily determining irregularities of food. If the question be asked directly, I have observed both rich and poor deny any irregularity, and it can only be learnt by questioning and cross-questioning our patient most elaborately. First, to learn that there is sufficient in total quantity taken during the day; secondly, that it is taken at proper intervals; and lastly, that it is proper in quality. And in all cases of debility, except where the cause is obviously from some other source, the question of food should be most fully considered.

45. Upon pressing our questions, however, we often discover at our public charities, that the food has been lessened because an absence of work has deprived them of the means of procuring it; and amongst the rich, we often find, upon a rigid investigation, that amidst the greatest luxury, and apparently wasteful profusion, the patient, from absence of desire, or from a whimsical longing for particular food, is not taking the necessary amount of aliment required for his system; and the king upon the throne might starve surrounded with every dainty that a Soyer and Francatelli could

prepare, no less than the pauper upon the imperfect food which parsimonious guardians may provide.

46. Those who indulge to excess in alcoholic drinks are practically starved in this way, by taking an insufficiency of one kind of food, and excess of others. Occasionally cases of the most frightful and revolting description have come before me, where persons of the highest stations of life have given themselves over to drink, beginning with rum and milk in the bedroom, continuing all day with vast potations of beer and wine, and perhaps finishing at night with a corresponding quantity of spirits. In one case, I can call to mind a gentleman who reached such a state, step by step, destroyed himself, and thus cut off the succession of a noble family. In another case, the inhabitant of a mansion, in one of the lovely parks which characterize our beautiful and happy country, converted the abode into a perfect pandemonium, and added to this frightful drunkenness the most disgusting debaucheries.

47. Many employés at breweries are injured by the quantity of ale and porter which they are tempted to drink. I remember visiting one of the great London breweries, where the keeper of the porter stores told us, that it was not from taking porter that the people died, or he would



have died long ago. He took it morning, noon, and night; he kept a barrel in his bedroom, to take if he awoke in the night; but then, what he took was good and unadulterated, and as he had never been ill, he strongly recommended everybody to follow his example. I preached a medical discourse, to as little purpose as fashionable parsons who declaim against the evils of immoderate dress. But, three weeks after my visit, he had some trifling ailment, from which other persons might have readily rallied, yet which cut off his existence in a few hours.

48. Although my experience in examining for health has been, for the last ten years, of the most extensive description, yet I feel that the detection of debility and injury from drink is most difficult, and not always certain. As a result of multitudinous observations, I have noticed that the answer of persons so injured (as it were) hangs fire. When a question is asked, the answer generally is given quick and sharp; but when the nervous system is damaged by alcohol, there is a little pause, some trifling delay. The murdered Palmer was in this condition, and upon examination in the presence of the murderer at the Gresham Life Assurance Society, was rejected by me partly upon that ground, and partly because, in my opinion, the murderer would make use of that infirmity to

hasten his brother's death. At the time I knew him, he was said to be living regularly, and certainly did not present very great signs of drunkenness, as he was insured immediately afterwards by another company.

49. This delay, or hanging fire, is by no means an infallible guide, for some persons are by nature slow to answer; and I have yet to see the Scotchman who ever gives, under any circumstances, an unqualified answer to any direct question, and it seems to be a universal defect of the race. Upon the whole, however, it is a valuable test, to suggest further inquiries as to habits; and in a majority of cases, where I have suggested such additional information, it has turned out extremely unsatisfactory.

50. It cannot be too widely known through the length and breadth of the land, that though, during the last few years, the most severe competition has taken place between different life assurance companies for business, not one has dared to insure intemperate lives, or lives which have been intemperate, at any increased rate. No reasonable rate meets the case. It is in vain that the drunkard returns to propriety, he can never altogether erase the mischief; and although much may be done by great perseverance and skill, he never can altogether bring himself into a healthy



state, or be regarded as a thoroughly healthy life. The frame of the drunkard is debilitated throughout, and he sinks by pneumonia, disease of the liver, or other malady depending upon debility, which cuts off his career prematurely. Insurance companies abhor the drunkard as a risk far too great and uncertain to be estimated and safely considered. If the career of a drunkard be watched, it is astonishing how soon he passes away, as if the voice of nature exclaimed, "Cut it down! why cumberst it the ground!"

51. Fortunately, in this country, if we continually meet the being who eschews the man and becomes the beast of liquor, yet it is but rare to see those whose vice is the taking of opium. In my own private practice, I have only met with one such case, which ran its course, as the Chinese have so graphically painted, till the patient was attenuated to an extent that was marvellous to behold, and sank gradually to death. In this case, as in drunkards, the appetite was diminished, the food taken was lowered to the utmost minimum, and the debility gradually increased to death. These cases are very difficult to discover, and during the ailment of this gentleman, having occasion to give opium for diarrhœa on one or two occasions, I thought he was preternaturally sensitive to that drug, and lessened the dose. The patient

had been educated for the medical profession, and so, perhaps, was the better enabled to baffle my inquiries as to the cause of his gradual sinking ; but the nature of the ailment was not known to me till a few weeks of his death. I then daily stole some of the poisonous drug which he kept under his pillow. He never noticed the circumstance, and never knew that I was acquainted with it, so pertinaciously and secretly do opium eaters conceal their infirmity.

52. Excessive smoking appears to me to have a similar effect in producing debility as opium and alcohol, for when mischief is being done, the desire for food is lessened, and debility results. The enormous extent to which some persons indulge in this drug, without apparent injury, or without inconvenience, is a circumstance to be wondered at rather than admired. Tobacco smoking seems greatly on the increase in this country ; every first-class railway carriage now retains the fumes of some previous occupant. Like all these animal vices, the smoker not only has a tendency to conceal its extent, but stoutly denies its injurious influence. One private patient whom I told was smoking too much, and was in a state of debility therefrom, simply, in derision, replied, "What do you charge for that ere bit of advice?" And when I replied, "One pound one," he put the



fee upon the table, and walked out, neither saying one word more to me, nor I to him. Another rich merchant whom I used to joke about his excessive smoking, and used to recommend him to lessen the amount, told me the advice was very good, and he had so far acted upon it that he had lately imported a case of cigars for his own private use, which cost, without duty, 250 guineas, and he had no doubt that he should be no great time in consuming them.\*

In attempting to estimate our irregularities of food, it is not difficult to form something like a judgment when a deficiency exists. In London, for instance, we should never dream of insufficiency of salt as a cause of disease, yet Livingstone, in the interior of Africa, cured his patients by its administration. Here, on the contrary, there is an absence of the potash salts, an essential constituent of vegetable diet. In the examination of a butcher, you would hardly expect to find a deficiency of nitrogenous materials; and in the person with limited means, you would, on the contrary, look for a defi-

\* On a recent visit to Vienna, I inquired from the medical men how they found their patients to bear inveterate smoking, and they told me that the smoker, when taken with any serious illness, had his vital powers so much depressed that he rarely rallied; an experience which accords with the observation of the medical men of this country.

ciency of these substances, because they are more costly to procure. By running through the general diet, the surgeon can learn approximately, what kind of food is defective. My experience leads me to infer, that in a humble sphere, potash and iron are greatly deficient, but amongst those in better circumstances, iron alone is pretty constantly defective.

53. In some cases we find that the mind is diverted from food. The patient does not care for it. It is a trouble for him to eat; and at meals he does it because he knows he must, and not to gratify a natural appetite. We may infer that all animal enjoyments are given for our benefit, and that the performance of every duty, the taking of food included, should be pleasurable to the patient.

54. Debility emanating from irregularity of the egesta, are generally sufficiently obvious. Excessive eliminations, by either the kidneys, skin, alimentary canal, menstrual flux, milk, or adventitious discharges, are not generally difficult to detect, because the patient himself generally indicates to the medical man the source of the mischief.

55. In like manner, all acute diseases are accompanied by debility, and the presence of a positive abnormal action in the brain, is easily detected by the surgeon, and marks the cause. During most active diseases, food is not sufficiently taken, nor



is that which is taken properly assimilated. After most diseases, as small-pox, measles, typhus, scarlet fever, influenza, erysipelas, abscess, great prostration exists, which will continue for a very considerable period, and require the highest skill of the surgeon to overcome.

56. Various chronic changes of structure may lead to debility ; such as change of structure in the valves of the heart. Generally, an abnormal state of any part of the human economy which is employed for the digestion or assimilation of food, the purification of the blood, or of its proper distribution throughout all parts of the animal economy, leads to debility.

57. We find that the human being can only thoroughly preserve health under certain external conditions, although the range is very extensive, when all the races which inhabit the earth are taken into consideration. A certain range of temperature is absolutely necessary to vitality. A proper amount of hygrometric moisture in the atmosphere is of great consequence, and there is a something which we note, but cannot define chemically, which is called freshness of atmosphere, which has its influence upon health. Besides these conditions, barometric pressure and electricity may have their influence, although I am bound to confess, that from my experiments, I have not found that the latter

has so much effect as, *a priori*, we may have imagined. The importance, however, of the action of the sun upon the human economy can hardly be overrated.

58. Of these external influences, temperature, light, the purity, and perhaps the presence or absence of ozone, and the dampness or dryness of the atmosphere, are most important; and it is not too much to say, that by a proper regulation of darkness, dampness, cold, and vitiated atmosphere, any animal may be so affected with debility, that death will ultimately ensue.

59. The importance of rest and sleep for due nutrition, may lead us to infer that any irregularities on this head may lead to debility. Deprivation of rest acts seriously in preventing the body from being duly nourished; and when debility exists, we must carefully learn the history of our patient, to ascertain whether there is sufficient sleep and rest to allow the exhausted parts of the frame to be duly replenished. Sometimes, contrariwise, an excess of sleep and indolence causes debility; and as a rule, what is not necessary for man's benefit is taken to his detriment.

60. Debility arising from causes depending upon irregularities of the work performed, require great care in their estimate. Muscular exertion may be carried on to absolute exhaustion, so that the party



drops from fatigue, but unless immoderately used, is very rarely a source of debility, because the muscles grow under exercise. I always find that monotonous mental occupation has the most debilitating influence upon the body. I find that all men require to be brought into monotonous work by degrees, and that no one suffers more than a strong, healthy, well-nourished person, when suddenly subjected to such a course of life. This latter fact is of importance to regulate the choice of a profession, for a man of strong frame, powerful in muscle, active in mind, cannot bear monotonous work, and frequently sinks from debility, leading to fatal disease.

61. Of all causes of debility, none equals in power anxiety and harass of mind. It is really quite surprising to find how a man, liable to debility, does well when his circumstances are easy, everything prospers, and all his thoughts are pleasant and satisfactory; but contrariwise, difficulties, troubles, and anxieties, cause death, sometimes in the most speedy manner. In estimating our value of life and duration of cure of the debilitated, we must consider the probability of prosperity or adversity; for the one, in such case, leads to health and strength and preserves him; the other leads to disease, weakness, which often ends in death.

62. A deficiency of work is as bad as over work,

and produces similar mischief. The labourer suffers from a deficiency of the work of the brain ; and those professions who live by thought, suffer from a deficiency of muscular labour. A deficiency of muscular exercise is highly injurious, because growth and nutrition greatly depend upon exercise. The higher classes of this country, in hunting, shooting, fishing, and in their agricultural pursuits, for which they are so renowned, take the necessary muscular exercise ; the lower have it in excess ; whilst the middle, who pride themselves upon being the power of the country, neglect muscular exertion and the exercise of the mind far too much, for the one absorbing passion of getting money from those with whom they trade, to make a show amongst those with whom they live. Debility ensues if all the functions of the body and brain are not normally exercised, for their neglect cannot be practised with impunity.

63. An absence of constitutional strength and vigour depends, in all the above cases, upon circumstances connected with the individual ; but there are too many instances where the cause is far more remote, and where the debility has been inherited from the parents, and the individual is a sufferer from the vices or the follies of a generation which has passed away.

64. It must not be regarded as by any means



certain, because a large amount of disease existed in any person's progenitors, that he himself will be afflicted, yet we must notice that the probability of such a circumstance is considerably increased by such an event, according to the number of the individuals of the family who have before suffered from the disease. Supposing father and mother died of consumption, the tendency is greater than if father alone, but less than if grandfather, grandmother, and uncles and aunts died of the same disease. In one instance I attended the sixteenth child of consumption, all the others having died of that malady. In the same family, with a high liability to disease, it not unfrequently happens that one may be most perfectly healthy, and though an increased liability hangs over him, he may attain to the most advanced old age, though the disease may break out with all its former intensity in the children. The doctor should always view family proneness to disease as a mere increased liability in each individual, which may be retarded by an absence of debilitating causes, and increased with their concurrence.

The medical practitioner should attach due weight to family history; for where antecedent debility has existed, the causes would tend far more powerfully to produce these effects, and want of food, over work, deprivation of rest, or anxiety, would be

much more serious in their results. I have often found it my duty to warn particular individuals that they are not fit to bear against any great harass or trouble, but that they should carry on the plan of life upon a more moderate scale than that of the pioneers of science, manufactures, and civilization, to whom the wealth of this great country is in great measure owing.

65. Mechanical injuries, or bleeding, may give such a permanent shock to the system as to cause lasting debility. Of late years the surgeon continually sees great mischief from railroad collisions. They appear to be far more serious and lasting in their effects than injuries from other sources. In estimating debility from this cause, we have to be very careful of sham, for I have seen cases where the hope of £10,000 compensation, under Lord Campbell's Act, and an allowance per week, produced more continued and lasting debility in needy persons than any accident without those accessories.\*

\* It is difficult to estimate the amount of fraud and consequent demoralisation which this act has produced. Every surgeon of experience can testify to the scandalous claims which adventurers make wherever the slightest accident happens to them in a railroad train. A careful revision of the statute would, with our present experience, be highly desirable, as the mode of manufacturing claims against companies has become quite an art. The surgeon in these cases, should never rely



66. The effects of continuous railroad travelling appear to have the property of a series of small concussions, which damage the system and produce debility. As far as I can judge, travelling by moderate distances produces no manner of hurt or injury, but contrariwise, benefit. The same result attends occasional long journeys, but daily long journeys for any length of time appear decidedly injurious. I find that I can never travel above a hundred miles a day for two or three months, without suffering inconvenience, which I am inclined to attribute to a series of little jerks in the passage of the train.

upon the statement of individuals without corroboration, and without a knowledge of the character of the claimant, as actions are frequently brought upon the idea that all juries decide against companies whatever may be the merit of the case.

## CHAPTER IV.

## ON THE CONSEQUENCES OF DEBILITY.

Debility, 67—Extensive source of disease, 68—Its relation to the eye, 69—Proportion of debility in eye disease, 70—Its relation to various causes, 71—Nature of cases exhibiting debility, 72—Value of statistics, 73—Prevalence of disease of the cornea, 74, 75, 76—Analysis of results, 77—Imperfection of the analysis, 78—True value of the results, 79—Debility leads to diseases of the ear, 80—To diseases of the brain, 81—General paralysis, 82—Hysteria, 83—St. Vitus's dance, Epilepsy, 84—Paralysis, 85—Diseases of the lungs, 86—Influenza and asthma, 87—Diseases of the joints, 88—Fever, Results of Fever, 89, 90—Inflammation, 91—Gout, 92—Cancer, 93—Parasitic fungi, 94, 95—Diseases of the skin, 96—Surgical injuries, 97—Debility produces debility, 98—Its influence upon comfort, 99—Chossat's experiments, 100—Value of life, 101, 102.

67. Debility by itself, if it were only ephemeral, and lasted for a day and passed away, need not be regarded with much solicitude, either by the surgeon or the medical practitioner; but, unfortunately, this is not the case, for debility cannot exist for any duration of time without the most serious in-



conveniences, and without, in many cases, leading to the most important consequences.

68. As far as we can judge, a very large proportion of the ills of mankind have their origin or their immediate source in debility; and if in the first instance, weakness is warded off, by care and good treatment, the disease is prevented, and if subsequently, the disease, by the natural powers of the body, comes to an end.

69. For the purpose of studying the effects of debility, I selected in the first instance the eye; because, from the numerous tissues of which it is built up, and from its transparency and accessibility we can make ourselves better acquainted with its state, and see more accurately what is taking place, than in other organs which are more hidden from view.

70. Upon examining 300 consecutive cases as they applied to me for advice, I found that no less than 221 exhibited signs of debility, or had to be treated by tonics; but when 39 cases of injuries, and specific diseases, which had no relation to the question at issue, were eliminated from the calculation, the proportion in which debility was present amounted to no less than 83 per cent. of the whole of persons who applied for medical treatment.

71. The cases which exhibited debility, in which

the cause could be with any probability traced, I found had their origin in the following manner. Twenty-three cases arose from causes emanating from irregularities of food ; five from irregularities of the egesta ; nineteen from causes emanating from disease ; four from causes emanating from external influences, and doubtless many more from the vitiated air of this metropolis ; one from causes emanating from irregularities of rest ; twenty-six from causes emanating from irregularities of the work performed ; three from hereditary causes ; but it must be borne in mind that a complete history of each individual would be hardly possible to be obtained at a public institution, with any chance of accuracy.

72. On analyzing these various heads more minutely, I found them to be distributed in the following manner :—

Causes emanating from irregularity of food . . .	23
Deficient Diet . . . . .	16
Deficient Meat . . . . .	3
Excess of Alcoholic Drink . . .	3
Tobacco Smoking . . . . .	1
Causes emanating from irregularities of the	
egesta . . . . .	5
Excess of Menses . . . . .	2
Hemorrhage . . . . .	1
Deficiency of Menses . . . . .	2
Carried forward . . . . .	82



Brought forward . . . .	28
Causes emanating from external influence . . .	4
Exposure to cold . . . . .	1
Worms . . . . .	2
Exposure to Quicksilver . . . .	1
Causes emanating from irregularities of rest . .	1
Deficiency . . . . .	1
Causes emanating from irregularities of work performed . . . . .	26
Overgrowth . . . . .	1
Over fatness . . . . .	4
Teething . . . . .	4
Overwork . . . . .	5
Childbirth . . . . .	4
Excess of Suckling . . . . .	8
Causes emanating from disease . . . . .	19
Measles . . . . .	5
Hooping Cough . . . . .	3
Abscess . . . . .	1
Fever . . . . .	1
Disease of Lungs . . . . .	4
„ Heart . . . . .	1
Scarlet Fever . . . . .	1
Rheumatic Fever . . . . .	2
Piles . . . . .	1
Causes emanating from hereditary influences .	3
Total . . . . .	81

73. It thus appears that of the 221 cases in which debility was noted it was only assigned to a very definite cause in 81 instances, though there was a general ill-health in many others of which the history did not show a sufficiently clear description

to be brought into a statistical account. In medical science nothing can be more dangerous than imperfect or careless statistics, for unless the circumstances of every unit are duly weighed, the larger the number of figures the more dangerous and untrustworthy is the result.

I have selected the eye, in the first instance to illustrate my subject, because it is not only built up of various tissues, but it is also accessible to view, so that we are enabled to make ourselves better acquainted with its state than with other organs which are more hidden from view. The following tissues were affected in the 221 cases of debility, which I thought it desirable to treat by tonics, principally iron, out of the 300 instances which presented themselves for medical treatment:—

The Eyelids . . . . .	61
Hordeola . . . . .	12
Tinea Tarsi . . . . .	15
Ulceration of Edges, &c. . . . .	34
The Conjunctiva . . . . .	53
Inflammation or Obstruction of the Duct . . . . .	9
Diseases of the Cornea . . . . .	36
Strumous Disease . . . . .	11
Pustular Ophthalmia . . . . .	35
Diseases of Vision . . . . .	16
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Total . . . . .	221
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74. The diseases of the cornea have always appeared to me the most interesting, as connected with debility, because defective nutrition of any kind, whether of food or work, will lead to this most formidable class of diseases. I have seen them amongst animals, and have cured, for instance, high-bred dogs when so affected, by iron and quinine and full meat diet. The psychological experiments of Majendie show that dogs fed upon sugar and gum always exhibit disease of the cornea; and I have observed, over and over again, that dace, kept for live-bait in dark cellars at the fishing tackle shops, are liable to have the cornea turn opaque.

75. Even amongst modern surgeons, instances are occasionally seen where this class of cases are treated by leeches and blisters. When the case progresses unfavourably, which is an inevitable consequence of such malpractice, more leeches and more blisters are ordered, and perhaps even a little mercury is added, to the further discomfiture of the sufferer, who would inevitably be sacrificed to Esculapius, if the surgeon does not at last awake, and reason, that his patient having had an excess of active treatment, tonics are required to restore the strength.

76. No disease of the eye shows the serious character of debility so much as the cornea. The

rapidity with which it sloughs, after the exhausting influence of small-pox, is perfectly marvellous; most other maladies of the eye are mild compared with it, although the chronic diseases of the eyelids, the pustular diseases, together with inflammation of the conjuction, the affections of the duct, and a vast number of diseases of vision, have their origin in debility. With respect to cataract, it may or may not be the concomitant of debility, but it is a vice of nutrition often supervening upon failing powers of the body.

77. The value of the tables before given is not to exhibit by figures an absolute result, by which to calculate, after the modern fashion of some statisticians, what fractional proportion of a man is to suffer from debility under each circumstance; but it should be regarded as a general indication of the causes which lead to debility, and the general order of their frequency, so that our judgment may be helped as to the probability in any particular case. Irregularity of work performed constituted the largest source of debility. Next in order is irregularity of food. Then we find disease about equal to the other two classes, and contrary to the purging, bleeding, blistering, and hot-water school of physic, we observe, that the errors of the egesta are less than the other classes.

78. It is quite apparent that this relation would



have been varied, had we selected our cases from a wider range of observation. In the list no case of small-pox is present, no error of the kidneys was specially noticed ; and I have not brought into relation instances where purgatives to a moderate extent were exhibited. I trust that the Society will not attribute it to disrespect that a wider and more complete range of observations has not been taken. We are not always masters of our own actions ; and family circumstances, during the past year, prevented me from rendering this part of my subject as perfect as its importance demands.

79. When we regard that disease leads to debility, and that debility leads to disease, the primary cause may in some cases be confounded, and we must form our judgment upon all the facts of the case before we venture to affirm that debility is the antecedent of all the eye cases recorded ; but, having watched them with great care, I have no hesitation in passing a very decided opinion that the debility is not only the antecedent but the cause of the malady, and that if the parties had not had the debility, they would not have had the maladies ; and we find that when we cure the debility, the disease spontaneously abates.

80. Passing from the study of the eye, we may take the ear, another organ of sensation ; which, although as hidden from view as the eye is exposed,

yet, nevertheless, affords in its diseases unmistakable proofs of the effects of debility as tending to disease. If we regard the strumous affections of the ear, and the multiplicity of cases in which, more or less, deafness exists from debilitating causes, there can be but little question that the proportion of cases of ear disease, requiring tonic treatment, is relatively as great as those of the eye.

81. The brain suffers under debilitating influences as much as any organ. We can always make a case of delirium tremens by exhausting the nervous system, and by employing stimulants. The strongest and healthiest sailor, in the full possession of manly strength, yields under such influences.

82. Under the influence of monotonous work, the brain also gives way, and frequently general paralysis supervenes. Even apoplexy, which, up to this time, is too frequently supposed to arise from plethoric causes, has its more frequent origin in a weakened tissue of the brain; and, in the majority of cases which I have observed, has arisen from states of great debility.

83. Hysteria is another disease wherein more or less debility exists, but I am not clear that it alone depends upon debility. When occurring in man, it is too often apt to be combined with a generally weakened and imperfect mind, which is apt to go very wrong from excess of emotional



feeling. In my experience, the malady generally occurs in weak, effeminate men, and requires great tact in the management. Many cases have come before me at times, and in some instances I have bestowed the utmost care and thought upon their treatment. Several have done badly; and one case terminated so painfully, that I can hardly think of it without a shudder.

84. St. Vitus's dance is another malady yielding to quinine and iron more frequently than other treatment; and amongst the multitudinous cases of epilepsy there is a fair share depending upon debility, and curable by a restoration to strength. Amongst the curiosities of my experience of epilepsy was a patient who was overworked by special duties for a public purpose. On one Sunday, a person called and asked if he was my patient. Upon declining to give any information without having the reason, he stated that my patient was then at the station-house, upon a charge of attempting to murder a child. The father, hearing the child at his own door in the struggle for life, rescued it from its perilous position, and the party was quickly secured and removed by the police. His defence was, a want of knowledge of the whole affair; and he stated that he had been under my care for epileptic fits, and gave his name, occupation, and position.

The father was so struck with the general demeanour of the prisoner, and the absence of any possible motive to injure his child, that he came at once to me to ask if it was possible that he could have attacked the child unconsciously. My reply was, that I considered that the culprit had fallen momentarily before his door, and had seized the child convulsively on dropping, and thereby had very nearly effected its destruction. The father said that my explanation so exactly tallied with the facts, that he should immediately have him liberated. In this very remarkable case, I was well aware that the disease was owing to debility of the nervous system, from over work and other causes which I need not here specify.

85. Many cases of paralysis depend upon debility. The brain becomes unnourished, and is partially destroyed; and when we add to this hydrocephalus and cases of insanity, we have relatively a high proportion of diseases of the brain which are produced or influenced by a state of debility.

86. The effect of debility in producing diseases of the lungs is so well known that it hardly requires a passing comment. It is a very great object to discover the earliest symptom of so important a disease as consumption, which cuts off so large a proportion of our race in this climate.



I have watched very carefully these cases, at the Bank of England and elsewhere; and the antecedent symptom, which is prior to any other, is frequently a sense of inability to perform work; a sense of weariness and lassitude, which is followed by cough, and the well-known physical signs of that fatal malady.

87. In influenza and asthma, a large majority of cases present a debility of so formidable a character that the treatment of the debility is our immediate aim. In these cases we require the instant relief of ammonia and æther, and subsequently the most permanent benefit is obtained by a careful attention to the general health and development of strength.

88. Diseases of the joints, which confine the unhappy patient from day to day, and sometimes from year to year, generally have their origin in debility. When blistered, and leeches, and otherwise treated on the antiphlogistic plan, the patient usually gets worse, and is compelled to be the miserable victim of an operation to save life. In these cases I find that a tonic treatment, from the very earliest period, is that most conducive to recovery; and by the most careful attention to the general health, which the necessity for rest allows, many limbs may be spared, and lives saved. To give vigour and strength is to give that by

which the cure may be effected ; to depress, on the contrary, is to give way to the disease. In these cases the skill of the surgeon is shown by the tact with which he can develop the strength of the patient, and allow nature to perform the cure.

89. Debility has its influence in producing fever, and, contrariwise, fever produces debility. The potato famine produced a terrible fever, which, as far as could be learnt, arose from the deprivation of food, and not from any poisonous influence of the potatoes. It was curious, in these cases, to observe that those who perished often had money, which they hoarded against the time of emergency ; and I myself saw bank-notes which were taken from the rags of the starved, as though they were unaware that the rainy day had arrived, and there was a necessity for their use. Whilst, however, fever is produced by debilitating causes, it will attack the strongest man exposed to contagion, without, as far as I can judge, the intervention of debility. The incubation of typhus and scarlatina is highly curious. I have watched carefully cases where, from exposure to contagion, I have had reason to anticipate that fever was incubating. The quack recipe of belladonna to avert incubation may be classed amongst touch-pieces, and other mysteries of that character, as utterly worthless.



90. After fever the system is in a state of great debility, in which it is unsafe to work. I have astonished many gentlemen, when I have told those who have been afflicted with a very slight attack of scarlet fever that it would be unsafe to resume their duties for six or eight weeks; but several have told me afterwards how true they found the prophecy, which, although well known to many medical practitioners, is by no means known to all.

The exhausting effect of fever is attended with the most complete recovery. A typhus which deprives a man of all his faculties for days and days, does not appear permanently to damage him. At any rate, I cannot detect, by the most rigorous watching and careful examination, any permanent damage after the subsequent debility has passed away. Nevertheless, I cannot hold with the Scotch Insurance Directors that this malady is inevitable, and that the probability of life is improved by having had the disease; but then, with the habits of the inhabitants of Athens modernised, it is not impossible that the directors are more true in their views than in other towns of Europe.

91. Purely inflammatory diseases rather depend upon other influences than debility. Take, for instance, the instance of that form of inflamma-

tion of the lungs which we occasionally see in otherwise most healthy persons after a check, and which are far more frequently found amongst the inhabitants of Italy, after the perspiration of the whole skin is suddenly stopped. Nevertheless, in debilitated states, local inflammations are more common, and we are justified in assuming that the body is less able to resist external influences.

92. In gout, debility has an important bearing. It is almost impossible to cure the disease during its existence, which then runs a chronic course, and the surgeon has the double duty of restoring the strength and attacking the disease.

93. The degeneration of cancer is highly mysterious. It produces in itself great debility. In my experience some good is done by acting upon the general health; and as these cases run a lengthened career, the patients are, with great difficulty, kept upon one plan of treatment. They like to try different medical men, and thus we are enabled to make comparison between different plans. I have observed that the case is most retarded by a decidedly tonic treatment, such as by the administration of iron and quinine, and good meat diet. In my own practice, I entirely rely upon this system, and utterly eschew the execrable treatment of blood-letting, which



is still adopted, in these instances, most unadvisedly.

94. Where debility exists, parasitic fungi and entozoa are apt to make their appearance in a marvellous manner. In the human being, as far as I can judge, the various forms of entozoa are mostly secondary to debility, and so also are the fungi. Fungi appear to be the antecedent in some cases of diseases of organic bodies. The grapevine disease, as far as my observations go, depends upon an antecedent fungus, and I have failed to detect any other prior cause or source of debility, notwithstanding that I have examined roots, stems, leaves, and all parts of the plant. Some, in like manner, have attributed the potato disease to an antecedent fungus; but in this case I have observed that the tissues of the plant are first injured by the punctures of an Aphis.

95. Fungi and parasitic animals, when existing in the human economy, increase debility, and it is very difficult to destroy them altogether without local means. In my study of plants, I could, by care, restore the plant to health; yet local applications are easier and more certain. I learnt in experiments for another purpose, foreign to this essay, that pyrolignous acid was a wonderful preventive against fungus growth. I extended this knowledge to practice, and I confidently recommend a lotion

composed of one part of pyrolignous acid to seven of water, as almost a specific in the fungous diseases which attack the scalp. The preparations of mercury are, in like manner, extremely fatal to fungi. They prevent their growth under the most favourable circumstances; but, as a whole, the pyrolignous acid is unobjectionable, and should be universally adopted. The restoration to health also does much to ward off the attacks.\*

96. Multitudinous cases of diseases of the skin have their origin in debility. Erysipelas generally visits a feeble constitution or feeble state of health. In many cases diseases of the skin have their origin in an ill-advised diet, and frequently an inadequate diet, and a deficiency of potash salts and vegetable food contribute to these maladies.

97. The state of debility has a remarkable influence on surgical injuries, which do not repair in a state of weakness. In very severe cases the exhausting influence on the nervous system leaves a debility of the most formidable character, under which reparation is stopped. In the worst case, nature attempts no reparation, and the patient simply dies. In a somewhat less state of injury, restoration is so far retarded, that I have seen

\* My own experience leads me most strongly to condemn the administration of arsenic for these maladies, as not only unnecessary, but dangerous.



a broken bone which, after many weeks, had not commenced the process of cure. In these cases we have to treat the debility, the act of reparation will take care of itself.

98. As debility is the state in which the powers of man are lessened, the consequence of the diminution further acts upon the system to his detriment. In a state of nature our muscles are given to us to procure our food; but when debilitated, labour cannot be given, food cannot be procured, and death ensues. This practically happens in the labouring population, even in this country. When food is procured, the system has to perform very hard work to digest and adapt it to the use of the body. In debility, this necessary work cannot be given; the stomach does not perform its labour, and there is not sufficient nervous power to carry on this necessary work. The blood thus becomes enfeebled, the heart is unable to drive the blood perfectly over the system, and thus debility engenders more and more debility, till disease ensues.

99. The influence of debility upon the comfort and happiness of individuals presents a wide range for observation. There are but few persons who, at some period of their life, do not suffer from that cause, and are not exposed to all its consequent perils. During its continuance, it interferes with

the enjoyment of life. The senses are impaired, the mental faculties are stunted, and the world appears in a different phase, shorn of a great part of its natural beauty.

100. A valuable set of experiments connected with deprivation of food, were made by Chossat, and he found that animals invariably died upon deprivation of food, when they lost in substance from one-third to two-fifths of their original weight. If this law holds good for all states, which I very much suspect is the case, it would indeed bring our prognosis to a fearful accuracy, if we estimated the loss per day our patient made; because we could then predict, with tolerable accuracy, the day he would die. For myself, I have no hesitation in stating that I should shrink from so terrible a prophecy, and should content myself with observing generally the state of the party, bearing the great fact in mind, that death ensues when debility and defective nutrition cause the waste of the body.

101. If we consider the influence of debility upon mortality, we find how important the subject becomes, as probably one-third of all deaths arise from antecedent debility, either leading to the production of disease, or increasing the effects of disease. The tubercular diseases may be said to have their origin in antecedent debility; and it



is found that 16 per cent. of all deaths directly arise, in England, from these maladies. If we further add a third of zymotic diseases, which we may assume would not have caused death but from the debilitated state of the system, we shall increase the amount by 8 per cent. We may finally add one-fourth of the deaths from diseases of the respiratory organs, or 3 per cent. on the whole amount—one-fifth of the diseases of the digestive organs, or 1 per cent., and 1 per cent. for the proportion of diseases of liver, dropsy, urinary organs, and other maladies, which give a grand total of 29 per cent., which perhaps is the very minimum of deaths which take place from the system being allowed to fall into a state of debility, and where human life would have been prolonged but for that debility.

102. In estimating the duration of life in debilitated persons, we have to judge whether the state is temporary or permanent, whether it is likely to pass away or remain. I have observed at the Bank that some persons have debility for two or three years, and then so far recover as to be enabled to take important situations. Many persons of high standing in the state have caused great anxiety to their families, in their earlier years, from the debility which they exhibited. While this state exists, the value of life is vastly diminished; and,

as a mere commercial value, even in young lives, it is frequently halved, in some instances quartered; and in the debility arising from intemperance, it is even decimated; for if debility continues, there is a very high probability that fatal disease will sooner or later occur.



## CHAPTER V.

## ON THE TREATMENT OF DEBILITY.

Debility requires various treatment, 103—Removal of disease, 104—Nursing, 105—Food, 106—Food acts differently in different persons, 107—Liquid food, 108—Semi-fluid, 109—Eggs, 110—Gelatine, 111—Solid food, 112—Fish, 113—General diet, 114—Frequency of food, 115—Preparation of food, 116—Water, 117—Excessive water drinking, 118—Tea, 119—Wine, 120—Hock, 121—Claret, 122—Burgundy, 123—Champagne, 124—Roussillon, 125—Sherry, 126—Port, 127—Raisin wine, 128, 129—Ale and stout, 130—Brandy, 131—Remedies, 132—Æther and ammonia, 133—Bark and quinine, 134—Iron, 135—Iron and quinine, 136—Iron at different ages, 137—Pepsyne, 138—Debility and Disease, 139—Debility and oppression, 140—Various plans of treatment, 141—Infinite methods, 142—Debility and redundancy, 143—Pure air, 144—Moisture of atmosphere, 145—Light, 146—Mental impressions, 147—Exercise, 148—Debility of medical men, 149—152.

103. A deviation from health, showing itself over the different periods of life, and arising from so many distinct and opposite causes, requires a

considerable diversity of treatment, in the various cases submitted to our care, to restore the strength and vigour of the system ; and there is no doubt but that considerable tact and skill are frequently required over a very long period.

104. Of course, the first thing to be effected is the removal, as far as possible, of the causes and external influences which have produced the result ; and this being accomplished, the human frame will frequently spontaneously return to health and strength. When actual disease exists, we must wait till it has abated, and therefore we should always seek the removal of the disease before we can hope altogether to remove the debility. In like manner, we must regard the character of the egesta ; for if the urine, which is one of the most important eliminating organs, is not natural, it is vain to attempt to restore the patient to perfect health. One lady who has been under my care, has been compelled to take, over a series of years, pounds and pounds of the various salts of potash, such as the bicarbonate, the acetate, the nitrate, the citrate, the bitartrate, the hypophosphate. I could do nothing with the case without the use of these salts ; and though she had consulted the very highest of our profession, she never derived any benefit until the lithates were removed, when tonics could be successfully employed. As a rule,



no permanent benefit can be effected unless all deposits are removed.\*

The proper action of the kidney is so important that medical men should impress upon all patients the absolute necessity of watching it, for medical treatment should be always sought where any deposits exist, or even if any variation of quantity is noticed for any length of time.

105. In all cases of debility, most careful nursing is requisite, and care should be taken that the patient is not exposed to cold, excessive exercise, or any other violent remedy. In these respects we should take our experience from the gardener, who by degrees, and step by step, hardens off the plant which is etiolated or enfeebled, and gradually brings it into its normal condition. In practice I have seen as great mischief done by improperly exposing the feeble patient, as by sudden exposure of weakly plants to influences which they are not calculated to withstand.

106. In all ages, and under all circumstances of debility, the food is the matter of primary importance. In the first place, it is necessary that it should be proper in quantity ; in the second, that

\* The use of lithia has been brought into use by Dr. Garrod for the elimination of lithates. It is decidedly an addition to our materia medica, but is not so generally useful as the potash salts.

it is proper in quality ; thirdly, that it should be properly divided ; and lastly, that it should deviate as little as the medical man finds to be necessary from the food taken in ordinary health.

107. In adjusting the food, the medical man should begin by asking the patient as to his own peculiar experiences as to food ; and having heard all he has to say, judge as to whether his particular case requires special treatment, and whether he is daily taking all the elements of nutrition. The necessity for this is obvious ; for the food that is most proper for the majority of persons, is absolute poison to some. An instance of this may be noticed in mutton, which is, perhaps, the best and lightest of all animal food ; yet cases have been recorded, and I myself have seen such cases, where that meat cannot be taken without immediately producing poisonous symptoms.

108. When great debility exists, under circumstances of great prostration, food in a liquid form is preferable for the moment. In such cases, beef tea is perhaps the best, which should be made according to the plan of Liebig, by scraping and pounding the lean parts of the meat, with a small quantity of water. The liquid is then placed upon the fire, and boiled for a minute, when it is ready for use, with the addition of a small quantity of salt. In cases of excessive prostration after bleed-



ing and severe accidents, I have seen a valuable life saved by the medical man sitting for hours by the bed side and watching the administration of a teaspoonful of such a fluid every three or four minutes.

109. Next in order to beef tea for the invalid, turtle and rice milk are to be preferred ; but in my judgment, all forms of slops should be abandoned at the earliest moment, as not well calculated for the organs of digestion, and solid food should be substituted, even in small quantities, as soon as the stomach will bear it. The perfection of milk, as being a food of nature's production, might lead us to form too high an estimate of its value. When taken from the cow direct, it is so rich, and contains in its pure state so much butter, that large cow farmers tell me that they never found a man who could take a glass of pure raw milk many mornings following without sickness. For this reason, when used, it should always be diluted with water, which, indeed, it is already too much as we buy it in large towns. Asses' milk is lighter than cow's milk, but as it cannot be procured to any great extent, it may be discarded, except under very special circumstances.

110. Akin to milk, we have the egg as a food of nature's production, and containing all the proper elements of nutrition. Lightly boiled, or mixed

with wine, the yelk especially is suited for the invalid, as it contains all the elementary substances required for aliment by the human frame.

111. The best authorities suppose that all forms of gelatine, isinglass, cows' heel, calves' foot jelly, have but little nutritious value, and may be dispensed with altogether, except so far as they are agreeable to the palate when the appetite and desire for food is capricious.

112. Passing in order from the partially fluid articles of diet, we come upon that food which is required when the system will bear but little, and yet that little must be of the lightest and most nutritious description. In this department the surgeon requires but few articles; rice thoroughly baked, pure bread, toast, game, poultry, mutton, with the addition of mealy potatoes, will suffice as long as the patient is a valetudinarian, as they contain all elements necessary for nutrition, and are generally most easy for the stomach to digest.

113. The administration of fish at this stage, although frequently ordered, is objectionable, as probably it is far more difficult of digestion than game and mutton. Beef may be regarded as too heavy where much debility exists, and pork; under such circumstances, should be absolutely forbidden. In foreign countries veal has high repute for invalids, though in England its use is contrary to



the experience of medical men. In all cases the meat should not be tainted; and the growing taste for the use of fresh game, instead of that which is putrid, is a great gain to the convalescent.

114. As soon as possible, however, the patient should discard all limited diet, and take all the ordinary articles of food which the general experience of mankind finds adapted for food; for, in my experience, the sooner we leave strict rules and use ordinary diet, it is better for our patient, although we occasionally see attempts to diet on mysterious principles, which ignorance, assuming knowledge, would fain pass off for medical wisdom.

115. In taking food, an inviolable rule should be observed, never to give the stomach more at one time than it can completely digest, and then to let the organ rest before it is irritated again. In great debility, food should be taken more often than in health, but generally a certain bulk is good, as assisting the stomach to action. I have often seen a dyspeptic who is made ill by a small quantity of food, yet who can take a full meal with impunity. A period of perfect rest for the stomach is of much consequence, and, except in extraordinary cases, food should not be taken too often. In perfect health, many persons take but one full meal per day, and perhaps one or two subordinate or lesser meals. These matters, however,

admit of much variation, according to the peculiarities of each patient, which the medical man must be quick and apt in discovering.

116. The careful preparation of food for the sick is a matter of consequence, to render it palatable and agreeable to the patient. In England, the mass of the people are noted for an imperfect knowledge of the culinary art, however high the art has attained in the more skilled *artistes*. A good cook is a great aid to the surgeon, and frequently, by the trifling addition of a little celery, chervil, or other herb, may make food delicious to the palate, when the absence of such trifles leaves it so flavourless and mawkish, that the palate turns with disgust from its use.

117. In all cases where debility exists, the surgeon must be as careful of the fluid as he is of the solid food. Large potations of pure water should be avoided, except in certain cases where disease exists, and where it helps to eliminate peccant matter. A modern practice amongst certain quacks, of what they call the cold water cure, is tolerably well known to all doctors as the cold water kill, from the singularly fatal influence of this form of quackery. The members of the upper classes, especially, appear to be led away and delight in irrational methods of treatment; and frequently we find, the more outrageous the plan, the more



violently do such morbid-minded persons embrace it. As a consequence, we seldom meet a family of distinction which does not bitterly mourn over some member who has perished under the hands of some designing and ignorant rogue, who has acted upon his credulity and want of common sense. The poor, on the contrary, generally have the good sense to prefer medical skill to quackery and ignorance; and I really believe that the poor get the best medical skill and treatment of any class in this country.

118. By the universal experience of mankind, a fluid is taken which is absorbed more slowly into the system than water. In Italy, under bright skies and burning suns, the inhabitants drink large quantities of water; but this brings with it peculiar diseases. Of late years, perhaps, no medical man has had the opportunity of investigating so many personal histories as my duties have imposed upon me; and I have been exceedingly struck by observing how prone the inhabitants of these water-drinking countries are to rapid and sudden inflammatory diseases. The reason appears obvious: water taken in quantities stimulates the skin to act, which pours off the superfluity; but any chill or condition of atmosphere which stops that perspiration causes engorgement, inflammation, and frequently premature death. In this country, exposed

as we are frequently to cold, damp, and a saturated atmosphere, excessive water drinking is comparatively rare, as individual experience indicates that it cannot be enjoyed with impunity, or even with safety. Henceforward, then, when a person visits a water-killing establishment, and suddenly takes inflammation, carbuncles, paralysis, or other malady, and dies, let it not be attributed to an accidental cold, but to a probable result ; and let it be called by its right name—a “quack manslaughter.”\*

119. Where the case does not require direct stimulus, tea and coffee, with milk, containing as they do a nitrogenized material in them, or caffeine, and a hydro-carbon material, or sugar, answers extremely well to take the great part of the bulk of the necessary fluid ; though in most instances where debility exists, an alcoholic stimulus, in the form of wine, beer, or spirits, is required. Very important and curious experiments have lately been tried by Dr. Smith, and it appears that tea very largely

\* On a recent visit to Italy, I made inquiries as to the general practice, and found that the medical men differ from those of Germany, France, and England by assigning everything to inflammation, and having recourse to bleeding and the antiphlogistic treatment. Great fatality attends their practice ; and I strongly advise every person who goes to Italy to resist this violent treatment, if unfortunately they are taken with some slight disorder.



increases the exhalation of carbonic acid from the lungs.

120. We have the choice of several varieties of wine, where we desire a stimulus ; we may choose between the Rhine wines, or Hocks, Clarets, or Bordeaux wines, Champagnes, and the wines of the South of France, all of which are very distinct in their properties. We have further, Bucellas, Sherry, Madeira, Canary, Port, the home-made wines of England, and English wines made of foreign grapes, which is a novel and greatly increasing manufacture in this country.

121. For many persons of delicate stomachs who require some gentle stimulant with their dinners, Hock stands forth as a valuable remedy. In such cases, a quarter to half a bottle may be prescribed, with the best advantage, with the principal meal. The quality of Hocks varies materially ; white Hock is more ordinarily imported into this country than red. It may be regarded as containing about 10 per cent. of spirit, and rather a large quantity of tartaric acid, with a small quantity of sugar ; but in every case where prescribed, it should be a genuine, sound wine.

122. I have not observed any very material difference between the use of Hock and genuine Bordeaux wines. They contain about the same quantity of spirit, but less tartaric acid than Hock.

That which is usually imported into England appears mixed, and is very different from that which is actually produced at Bordeaux. When used medicinally, from a quarter to half a bottle of Medoc may be taken as a type of Bordeaux wine, the penetrating flavour of which distinguishes it from other wines.

123. The Burgundies, delicious as they are in flavour, should be eschewed for medical purposes, on account of their heating character. I have observed in France, that the Parisians give the preference to the Bordeaux wines. The extent to which Burgundies affect the head must be due to some æther, as they contain no more alcohol than Hocks or Bordeaux wines.

124. Where we desire a rapid stimulus to the nervous system, Champagne comes to our aid. If administered, it should be Champagne, and not that London-made stuff concocted of rhubarb juice and sugar, into which carbonic acid is pumped. This latter is frequently used at balls, and to delicate persons is little better than poison, because the rhubarb contains so much oxalate of potash, which causes the mixture to be highly indigestible.

125. When we require the stimulus of a more generous wine, we go to the wines of the South of France, and Roussillon is a good example of this class. I observed in the French hospitals that



Roussillion is very much recommended, and even in some cases for external applications. I have ordered it with good effect, but it is very difficult to obtain in this country, and, unless imported direct, cannot be depended upon. This wine is intermediate between Claret and Port. With regard to the other wines of the South, those remarkable for their sweetness, as Lunel and Frontignac, should be discarded.

126. When we desire further alcohol, we must cross the Pyrenees into Spain and Portugal, to obtain the more potent wines of Bucellas and Sherry, which are of daily medical use; but, as a rule, the sweet delicious wines of Portugal, called Lisbon and Chamouski, should be avoided by invalids.

127. Last of all we have Port, a wine of surpassing excellence, which contains as much as 20 per cent. of spirit, and which is invaluable for certain cases of debility, such as that which accompanies influenza, mortification, abscesses, erysipelas. Port is peculiarly applicable to this variable climate; but when taken, we must remember its potency, for one glass is equal in strength of alcohol to two glasses of Hock, Claret, and Champagne, a glass and a half of Roussillion, a glass and three-quarters of Sherry.

128. All the above wines are suitable for the rich, to whom money is no object, and who will

take the pains to procure them of good quality ; but those of more moderate means should be especially careful of spurious imitations made in this country. For those unable to procure genuine foreign wines, it is a question what should be ordered. Recently a medical man informed me that he had used raisin wine, and found it answer most effectually. I am aware there are some very great makers of this wine in London, who make it with great care, keep immense stocks for a long period, to have the advantage of age, and altogether prepare a wine which, as made entirely from dried grapes in the form of raisins and currants, contains all the ingredients, and probably possesses all the properties of other wines. I cannot speak positively, from my own experience, upon the value of raisin wine, but I think it deserves careful investigation.

129. In the treatment of the sick, real skill is shown by those who are most apt at using the appliances immediately within their reach. For this reason the medical man should, at a glance, appreciate the circumstances of the patient ; for nothing can be more heartless and cruel than to recommend a mode of cure not within the reach of the patient's friends, especially when the additional benefit of the costly article is generally inappreciable.

130. Next in order to wine, but yet having differences from it, we have the varieties of malt



liquor, which is a most excellent stimulant when carefully fermented. For the surgeon three kinds suffice—table beer; a thin beer, of which Bass's pale ale may be taken as an example; and porter, of which Guinness's stout may be regarded as a type. In cases where malt liquor is applied, the kidneys ought to be freely acting, the lungs sound, and the brain not easily excited. Where applicable, malt liquor acts as both meat and drink, having a sustaining power far beyond wine or alcoholic stimulants. Bottled stout I have used in convalescent cholera and choleraic diarrhœa, in preference to any other liquor; and I have seen more speedy restoration after its use than by any other remedy whatsoever. The highly dried malt, which gives colour and flavour, is grateful to the stomach; we enjoy the same principle in our well-baked bread; we relish it in our brown gravies; we like it in toast-and-water. When there is any irritability of stomach, I find that stout is preferable to any form of malt liquor; otherwise, any light sound ale may be used in debility, according to the fancy of the patient.

Some beers stimulate the kidneys and excite thirst, at times, and thus act perniciously; for this reason, I believe the free introduction of French wines into England would do more to stop drunkenness than any other plan.

131. In many cases, however, we desire the pure stimulus of alcohol, and then we may have recourse to brandy; and in cases where a stimulus to the kidneys is required, gin may be employed. In the employment of brandy we should be careful to use spirit of which all the essential oils have been carefully removed; and hence French brandy is largely employed. I have seen, however, in Paris, waggons filled with barrels stamped with the names of the London distillers, the contents of which is imported into England as French brandy. Spirit is particularly applicable in cases of sudden or great prostration.

132. As for the treatment of debility, we do not require many kinds of food or of drinks; so our pharmacopœia for this purpose may be restricted. We may require ammonia and æther in cases of great prostration, bark and quinine to restore the tone of the system, and the preparations of iron to renovate the blood corpuscles. With these remedies we may be said to have all we can desire; for I have no hesitation in stating my belief that debility which can be treated by other agents, could be treated as successfully without any physic at all, by careful diet and nursing.

133. The particular value of æther and ammonia is to maintain the action of the heart for the time being. The first is particularly valuable, where it



requires rousing ; the latter, when the heart is too feeble and too frequent. Perhaps the quickness of the pulse is the best guide for the use of ammonia ; for, as a rule, the quicker and more feeble the pulse is above a hundred, the more frequently may ammonia be administered. Four grains of the sesqui-carbonate of ammonia is an average dose, which should rather be increased in frequency than in quantity. When the pulse is above 120 or 130, I give it every two or three hours ; when slower, every four, six, or eight hours : but continue it no longer than it has served its purpose. It is interesting to watch its power and efficiency. It lowers the frequency of the heart's action ; it acts upon the skin, and distributes the blood equally over the system. In noticing its remarkable powers, we must regard it as a mere temporary benefit, whereby time is gained to allow the system to revive, rather than acting directly to restore vigour.

134. Bark and quinine come to our aid as restoratives of strength. They do not act exactly alike. The tincture of bark, or concentrated decoction, is invaluable in many instances, whilst quinine is as preferable in others. In that form of debility which is seen in phthisical patients, I have seen more benefit from the long-continued use of quinine, either with or without the occasional use of cod liver oil, than from the use of any

other single remedy. I have used quinine in these cases for weeks, months, and years; so that patients have taken ounces and ounces, and it appears to me not to act as medicine, but food. Many apparently hopeless cases have been restored by this long administration, and have retained health for years. Formerly, medical men regarded with contempt any person who stated he had seen consumption cured. Even now, many who know the fact, speak very gently, for fear of incurring ridicule; but from what I see, there is no doubt that it is frequently cured; and cases which I have had the opportunity of watching for years, are often presented with decided injury at one time, and yet are found with no traces at another; and in the same individual the disease may recur again and again, and either ultimately pass away, or kill the patient.

135. With the exception of phthisical debility, where quinine is so useful, iron, as a medicament, takes the first rank in the cure of debility. I must confess I am not very particular as to the preparation—sometimes ordering one, sometimes the other. Amongst the poor the sulphate may be employed, as it is very little less active than other more costly preparations. The tinct. ferri sesquichloridi is a very favourite remedy with me; occasionally I order the Prussian preparation, the tinctura



ferri acetatis ætherialis; and sometimes I have suddenly changed a large number of patients from one preparation to the other, without, however, noticing any corresponding advantages. In my experience, the tinct. ferri or sulphate are greatly preferable to the ammonia per tartrate, the ammonia per citrates, and other similar preparations, which of late years have been employed by those who love novelties. The union of quinine and iron is very valuable over large ranges of cases, and for very long periods.

136. In my own individual practice, I have often been struck at the large number of patients whom I often find are at one time under an iron, or an iron and quinine treatment. I have often asked myself how it is; and I am inclined to believe that either in this huge metropolis, where my experience chiefly lies, iron is not sufficiently taken into the system, or that there is an undue waste of that element, from some unexplained cause. However we may theorise upon the subject, I entertain no question that the right administration of iron, in the cases for which it is legitimately applicable, effects more permanent cures, restores more persons to health and strength, and prolongs life more than any one single article in the whole range of the pharmacopœa.

137. In the debility attending scrofulous joints,

maladies of the eyes, all forms of tubercular diseases (except those of the lungs, where it is apt to produce cough), it may be safely given for weeks, months, and even, in some cases, for one or more years, with great advantage. In all these cases it is better to use it in small quantities, over a long period, than to give it in large quantities over a shorter period. However, it is preferable to administer it immediately before food, to mix with it, and thus be absorbed, than to give it upon an empty stomach. I always order it before the two principal meals; and believe that there are very few persons in London indeed to whom the occasional use of the material is not advantageous. It gives tone to the child, strength to the man, and vigour to the aged.

Debility depending upon, or attending want of rest, doubtless requires narcotics. When opium or hyosyamus are inadmissible, the application of cold must be our chief reliance; and there are very few cases which do not yield to the proper use of cold to the head. Sometimes warmth may be also applied to the feet. In the terribly painful scenes which medical men occasionally witness, of deep affliction from some serious trouble too grievous to be borne, the continued application of cold to the head calms, in a short time, the excited nervous system, and dispels the painful grief, by



procuring sleep for the over-exhausted nervous system. In these cases, my own experience makes me rely implicitly upon the careful use of cold, though at times I have had to wait with the patient for hours.

The addition of phosphorus to the system has attracted the attention of physicians. In Paris, last year, I found the physicians were using the hypophosphate of potash with that view, and its administration was said to be attended with the best results. I have used it in my own practice to some extent, but have not assigned, at present, a definite value to this agent. Nevertheless, I am inclined to think that at times it is decidedly useful, and deserves a repeated and careful trial to assign its exact place in the cure of disease. I have generally ordered it in doses of from 5 to 10 grains.

138. In cases where the digestion is feeble, pepsyne has been employed. It is best prepared by taking the stomach of the pig, and thoroughly washing under a current of water, to remove the adherent mucus. The stomach is then pressed with the back of a knife, when the material is dried over a water-bath or a plate of glass. Under certain circumstances it may be employed, but as a general rule it is erroneous in principle, because the stomach itself ought to be capable of performing

all its normal operations ; and it is the province of the physician to endeavour to restore it to a healthy state.

139. Where debility is combined with disease, it is of paramount consequence that it should have the first share of attention ; for if the disease be violent and the debility severe, death may inevitably be expected. As a rule, all diseases have a tendency to run their course, to abate, and then for the system to be restored to health. In most cases the medical man does not even hope to cut short the career of disease ; for what would he think of the practitioner who pretended to cut short the period of small-pox, to stop fevers, or to bring other diseases to a sudden termination ? In all cases, it is of great importance so to support the organism that it is enabled to allow the disease to run till its natural termination ; and hence debility, in these cases, comes before us as a matter of the highest importance.

In cases where the pulse is intensely rapid, wine and ammonia are the most reliable medicaments. As improvement takes place, the kind of support which is most applicable is that which is derived from good food and quinine.

The support of the system during disease probably saves more lives than any other exercise of the medical art ; and the success of the practi-



tioner in a great measure depends upon the skill with which this support in each case is effected.

140. Debility, combined with oppression, cannot be remedied without the removal of the matter which oppresses the system; and sometimes the oppression cannot be remedied without removal of the debility. In this case, two operations have to be carried on by the medical man at one time—the excretion of the offending matter, and the support of the body. We often see this in gout, where we actively treat the disease, and yet support the system. In females suffering from a suppression of their periodical discharge, unless its excretion be reinstated, it is vain for us to attempt altogether to restore the strength. In all cases of debility with oppression, the two systems must be carried on at once—the first to restore the strength, the second to remove the debility.

141. Here we may pause to consider an unjust opprobrium which is cast by non-professional persons upon the medical profession, because two men of equal standing treat the same patient, under the same circumstances, by a totally opposite process. Now this apparent paradox never even had the charm, to my mind, of being either strange or singular; for, if regarded as a matter of algebraic formula, such a result is a natural consequence of the complex materials of which the

body is formed. To illustrate this proposition, we will assume that the blood is composed of 3 A with 3 B and 3 C in the state of health, and has the power of adding to itself other portions with that relation. If, by disease, this relation is disturbed, and it then is composed of 3 A, 2 B, and 3 C, it follows that the normal relation may be re-established; first, by adding directly B; secondly, by subtracting A C; thirdly, by adding A B C with B in excess; fourthly, by adding A B C, and at the same time eliminating A C; fifthly, by adding A B and excreting A; sixthly, by adding B C, and at the same time eliminating C. And, besides these multiple plans, we have the infinite combinations of treatment which would arise by introducing other elements, and using the compound plan of adding and eliminating.

142. In the above hypothesis a compound of three elements is assumed with but one error; but the body is composed of twelve elements, and has multitudinous errors, which denotes forcibly how infinite are the means which may be taken to restore a more rational balance. For ever, then, let each of us respect our brother practitioner's treatment, and let us all eschew the doctrine that men can alone be successfully treated by one plan, when the body is so complex, and we have so many appliances at our command.



143. Occasionally we have to treat debility of one part of the frame with redundancy of another. The prize ox is an example of the highest debility with the utmost redundancy of the appetite and excessive nutrition of the fatty tissue. The state of the poor brutes shown is a disgrace and scandal to the age; and probably no skill could restore them to health. Women are said to be fatted in this way in certain parts of Africa; and continually cases come before the doctor, several every year, who would be as much entitled to a prize as the noble proprietors of the oxen. In these unfortunate cases the restoration to health is always difficult, sometimes impossible; pure air, the flesh of meat, and gradually increasing exercise, are the most reliable influences to effect the cure.

144. In all forms of debility, or its complications, the conditions of health must be carefully regulated as the patient regains his strength. Fresh air—for there are qualities of air apparent to our senses, though not cognisable to our tests—is highly useful. It used to be the fashion to say that all airs were chemically the same; the discovery of ozone, and the effect of air upon the permanganate of potash, lately discovered by Dr. Angus Smith, sufficiently dispel this fallacy.

145. The hygrometric state of the air, as to its wetness and dryness, is of consequence; and

I have great pleasure in stating that I have contrived a household instrument, which I trust will be brought into immediate application, which will show by inspection, with sufficient accuracy, the state of any room, bed, or other situation. The hygrometric properties are due to the use of the vegetable parchment, invented by Mr. Gaines, and perfected by Mr. De la Rue. It is made by immersing blotting-paper into sulphuric acid of definite strength, by which it is immediately converted into a new material, to which I have given the name of Ametastine, because it is highly unchangeable by chemical agents. This curious material contracts in a dry, and expands in a moist atmosphere. By taking advantage of this property, I have constructed many forms of hygrometers, the most simple of which I shall endeavour to bring into general use; and, if I am not greatly mistaken, will be hereafter the concomitant of the thermometer in every home, and prevent many a traveller from catching severe rheumatism in a damp bed.\*

Time, and the combined observation of many, can only prove the exact value and place which it will hereafter take in the sick room.

\* I have had many applications for the instrument, but there has been a difficulty in issuing them to the public on account of a gradual stretching of the paper.



146. Light is another powerful agent in the cure of the debilitated. Heretofore, the intensity of light has not been recorded ; but I trust that the form of instrument which I employed for measuring the effects of the great eclipse of the sun last year, will ultimately be made to register its power.

147. We must not only employ physical agents, but we must carefully consider mental impressions, and study how we can affect our patients with cheerful associations and happy ideas. In this matter every man must be treated according to his preconceived ideas. The man who abominates harmony need not be troubled with an opera or an oratorio ; and one who loves society would not thrive in a sequestered villa. Music, society, country sports, and change of scene, are our great adjuvants to health. The medical man, by studying them in the fullest degree, according to the peculiarity of each individual, can materially promote restoration to health ; and sometimes fun and frolic are more active than pills and draughts.

148. The appropriate exercise of the powers of the body is another important feature in the treatment of debility. I find that it is generally preferable not to enjoin too much rest ; for whilst we should carefully avoid overwork in any part of the

economy, a moderate exercise is of great value in promoting health. Moderate exercise, moderate thought, and even a moderate attention to ordinary business, is conducive to the restoration of health. Moderate attention to business promotes cheerfulness, and stimulates the mind with the very best results. All the functions of the healthy body should be exercised in a similar moderate manner. As a rule, the extent of the exercise should be proportionate to the strength and diminution of the debility.

When the extremely debilitated require at first out-door exercise, I have found the easiest motion, in extreme cases, is obtained by a sailing-boat or yacht. I have seen excellent results from having recourse to their aid. The easiest of all forms of carriage exercise is the Hansom's cab, when jolting cannot be borne. In other instances, the hand-chaise or donkey-chaise, as used at all places to which invalids resort, answers the purpose before invalids are strong enough to have recourse to the ordinary vehicles.

149. And now a few words upon the debility which is observed in the medical profession, which so often cuts off its more gifted members at a premature age. Beginning as students, they have to give the most intense study to the largest range of subjects that can possibly fall to the lot of the



educated man. The burden of memory in anatomy—the debilitating effects of the dissecting-room—the exercise of high mental thought in the study of physiology and psychology—the complicated and widespread range of chemical and physical knowledge—the exposure to bad air, and anxiety in the wards of the hospital—the fear of passing the examinations necessary to become legally-qualified practitioners; and, when the diploma is obtained, the harass of maintaining a position, without adequate means, in the first years of practice, exhaust the nervous system, and draw off the power of nutrition before the period of success arrives.

In the prime of life, overworked and unnourished, he follows his extensive business with a mockery of state; and got up, in manner and dress, with orthodox punctiliousness, he is compelled to roll incessantly all day long, and every day, over the London stones, in a carriage with fancy-coloured wheels, to let everybody know when the doctor passes by; and at the close of his day's labour he too often finishes at a banquet at one of his patient's, to which he is sure to be welcome from the respect which he commands from his standing and knowledge.

150. Such a career, sooner or later, is apt to bring on debility, which leads to disease, or produces a state which is unable to resist disease,

which prematurely removes him from his family, and deprives the patient of his services.

151. So much for the cause; now for the remedy. Ride less, walk more. If patients cannot be cured without a carriage, send one either before, or during, or after your visit. Steal a few hours, when best they can be spared, to unbend the mind, and develop the muscular system. Dig or walk, ride on horseback, row, fish, shoot, or hunt; or do anything which shall, though only for a few hours, once or twice a week, alter the current of the ideas, give freshness to the thoughts, fill the lungs with the pure air of heaven, and give strength and vigour to the muscular system.

152. Depend upon it such a course is money gained to the medical man, as he would take during a longer period a larger sum. It is a life gain, as it would prolong the duration of his existence. It is a gain to his patients, by enabling him to exercise freshness of intellect upon their ailments. It is a gain to his family, who would retain him amongst them for a longer period. It is a gain to society; for it takes not only great natural abilities, but many years of experience and study, to form a skilled medical practitioner.



## CHAPTER VI.

## RELATION OF DEBILITY TO PERIODS OF LIFE.

In the Embryo, 153—Infancy, 154—Youth, 155—Puberty, 156—Death inevitable, 157—Law of mortality, 158—General treatment of old age, 159—Medical treatment, 160, 161—General remarks, 162.

153. Debility is important in its relation to every period of life. It probably commences in the embryo, as dissectors tell me that the aborted fœtus is generally imperfect.

154. After birth, whilst reclining upon the mother's breast, the perfection of the milk and the health of the mother are necessary to the well-being of the infant; and many diseases arise from their irregularities. During the first year, diarrhœa, tabes mesenterica, and hydrocephalus are the principal diseases which arise from debility.

155. The weaned child relies more upon its own resources; and, up to five years of age, these maladies gradually decline in frequency. When twelve years of age is attained, many dangers have passed

away, and the greatest mean value of life exists. Nevertheless, debility has its influence, and diseases of the eyes, tegumentary system, and joints, are of frequent occurrence. The well-nourished youth passes through the dangers of hooping-cough, measles, and scarlet fever, whilst those who are imperfectly fed are unable to withstand their effects.

156. Next comes a period of great trial to the frame—the growth into puberty, upon which the welfare of the future man so much depends. Excessive overgrowth, without corresponding bulk, is a serious defect, which may be of lasting injury, decreasing the value of life, and increasing most seriously the liability to disease; this is, however, beyond the remedial art, for we can neither add to nor subtract from our stature. The period of puberty requires the utmost care; a change in the system occurs which, if rightly regulated, makes the man—if wrongly, mars him. The mental and bodily labour should be most carefully adjusted to the powers of the system. Where this development takes place with undue rapidity, the studies should be lessened, the exercise of the bodily powers lowered, and the work adjusted to the capacity of performance. At this period scrofula is triumphant, and obtains its greatest power. Consumption also runs its destructive career, cutting down the fairest in form



and most charming in mind ; and the frequency of the malady continually increases during manhood, till the middle period of life, when the reproductive functions cease.

157. If we relied upon our reason alone, we should be led to suppose that a mechanism which had the power of self-repair, and which had the power of self-feeding, would last for ever, for we should fail to perceive by what means it could possibly stop. With respect to the mechanism of animals, including man himself, of the largest communities, one after another succumbs to death ; for of children born, certainly not more than one in ten thousand lives to a hundred ; and of those who attain to the advanced age of a century, as certainly not more than one in twenty thousand has his life prolonged to 150 ; consequently, not more than one child out of twenty millions lives to the latter age.

158. By Gompertz' law of mortality, the sum of all the people who have as yet lived upon the earth, does not warrant the expectation of an individual attaining the greatest age which history actually reveals as having been reached ; hence mathematical reasoning upon increasing numbers might lead us to infer that man is really immortal, and death but accidental. To medical science, however, death appears as inevitable as growth ;

and as the child is developed from the boy and grows to the man, so the man in his turn retrogrades as certainly to senility and death. We may assume that we are born with the seeds of death, and that death is as natural to man as his growth and development. I have watched, with intensity of feeling, my aged patients passing without disease from manhood to death ; and whilst, as the result of my observations, it is merely accidental whether the retrogression takes place more rapidly in one organ than another, it is clear that death itself is not an accidental but a normal result, neither to be averted by medicine nor parried by mode of life. Viewing age in this light, the physician must not expect much from his skill when he attempts to ward off a result which we are designed from birth to suffer. Nevertheless, health may be secured, and life prolonged, by care and the strictest attention to physical laws.

159. The conditions of health should be rigorously followed. All external agencies, especially heat, should be duly regulated, and the diet should be most carefully adjusted to the power of digestion and the requisite amount of food. When age, unaccompanied with disease, sets in, the appetite gradually and increasingly fails, nutrition and assimilation gradually lessen, and the capacity to



generate force and heat diminishes. At last, nervous power fails, and the patient silently passes into the sleep of death. To this end is man born, and must submit; for as sure as the endogenous tree grows itself to death, so does man, by virtue of some changes in his organization, cease to evince the powers of health, and finally of life.

160. In some cases of old age there is simply a failure of nutrition; less\* food is taken, assimilation is diminished, power fails, and death takes place. Nothing in my experience will, under such circumstances, restore appetite to the failing aged.

161. In incipient old age the administration of quinine and iron, in small doses, is attended with good results; and wine, ale, stout, spirits, according to the peculiarity of habit in each case, may be employed at meal-time with benefit. The diet which suits the aged best is that which is frequent, light, and nutritious; and the rich may indulge in turtle, game, poultry, mutton, venison, rice, and similarly easily digested food.

162. In most cases, however, do what we will the aged cannot take food; but whether the failure of the appetite or the failure of the power of assimilation is the primary source of mischief, is a mystery which we may never unravel. We

must rest contented with noting that the diminution of appetite in the aged is a sign that the organism has run its appointed course, and fulfilled the design for which it was brought into existence.



## CONCLUSION.

163. In taking a *resumé* of this paper, I can but be struck, notwithstanding its undue length, with the imperfect manner in which it is treated, which is owing, in some degree, to the extensive bearing of debility upon all departments of medical science. The influence of malaria, of noxious vapours, and of putrid effluvia, are questions of great importance in connexion with debility, but have not been treated on this occasion. As a law, no animal, and perhaps no organic body, can be safely exposed to the excretions of its own kind. Hence debility arises from overcrowding, and mortality from exposure to excrementitious matter. From my observations, I am of opinion that there are times when the atmosphere does not possess the same diffusive power, and the noxious exudations are retained near their source to exercise their death-producing influence. I believe that such a state exists when cholera rages. Very simple causes may produce this stagnant state; and probably a rise of temperature of a few degrees, in the

upper strata of the atmosphere, would suffice to account for that phenomenon.

164. As debility leads to so many diseases, and has so important an influence on the duration of life, it is questionable whether our social system, with respect to the medical profession, is carried out with the best results to the public. In my judgment, every household should have its medical adviser, from whom every member should take directions when debility or failure of health first occurred, and when the greatest benefit could be conferred. I have observed that those who employ medical men as advisers, look upon them in a different light from those who simply desire to be doctored, and run to and fro for some infallible specific for their particular ailment. In the one case, the instructions of the medical man are valued independently of physic, and patients are taught that, at times, the highest medical skill may be employed without the administration of drugs. In the other case, pills and potations are a necessity, and every drug is thought to have its specific effect upon the state of man.

165. For these reasons each household should have its adviser, and probably an annual payment to the medical practitioner would be preferred by the patient, who would thus average the amount paid, and not be saddled with extra payments when



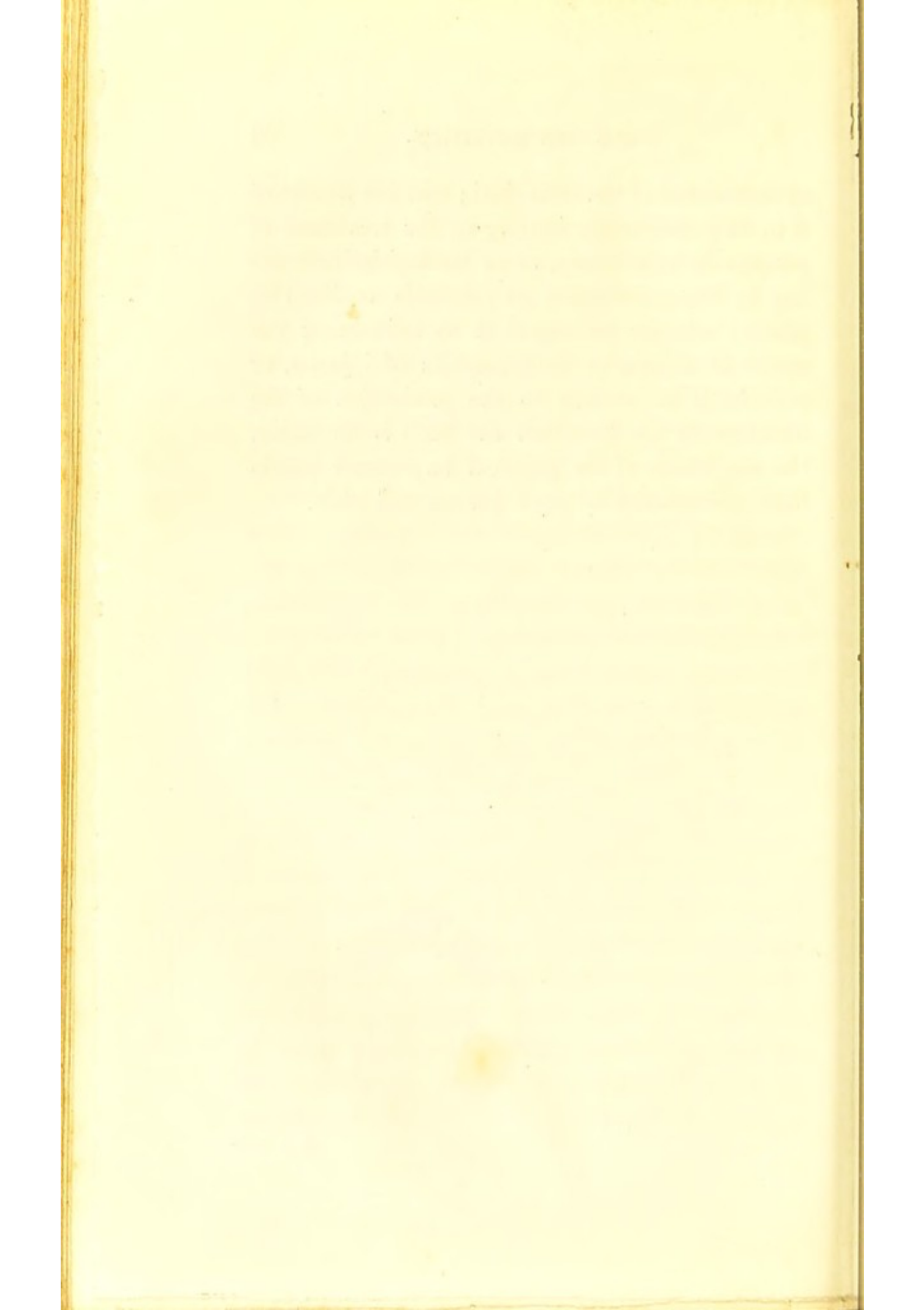
failure of health deprives him of obtaining the means of duly remunerating the medical man. I have always strongly recommended this system myself to the general medical practitioner, as that not only best adapted to ensure health and preserve life, but also as the best preventive against the ridiculous pretensions of many specialists, or the fashionable witchcraft of those who believe in royal roads of cure.

166. A strong man is wealth to his country, whilst poverty comes from debility. To ensure strong men, we must have strong mothers, strong children, and strong adolescence. Strength, in the ever-changing organism of man, depends upon due food, proper exposure to the external agents, and duly regulated exercise of the powers of the animal economy. It is the duty of the medical man to promote strength, and to ward off debility as soon as the normal appetite flags, the power of changing food in the economy is lessened, or the capacity for thought, or the production of physical force, is diminished. When disease exists, the influence of debility is paramount, for the presence or absence of debility frequently regulates the restoration to health, and decides the life or death of the patient. Whether we regard debility in its political aspect, as effecting the property of the country; in its social aspect, as affecting the happiness of a family,

or the comfort of the individual ; whether we regard it in its philanthropic bearing in the treatment of paupers in workhouses, or in its legislative bearing in the punishment of criminals confined in prison ; whether we regard it as influencing the course of disease, or the reparation of injuries, or consider it as tending to the production of the innumerable ills to which the body is amenable, the magnitude of its practical importance stands forth unshadowed by any other medical topic.







## APPENDIX.

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THE following tables have been compiled to indicate the manner in which man derives the elements of which his system is composed from the ordinary articles of food ; also the proximate composition of various articles of food, and the time required for their digestion, as ascertained by Dr. Beaumont. But whilst they are capable of affording a rough indication to the medical practitioner, yet chemical science has not yet attained that perfection as to enable implicit reliance to be placed in their results. With our present information, it would be fraught with danger to treat chemical analyses as though they had the perfection of the properties of numbers. In the compilation of these tables, I had to acknowledge the kind assistance of Mr. Malone, Director of the Laboratory of the London Institution in the First Edition. In the present edition, Mr. Attfield, Demonstrator of Chemistry at St. Bartholomew's Hospital, has kindly contributed some useful additions.



(1.) *Proportion of Nitrogen in various Foods.*

	Percentage of Nitrogen.	Authority.
Gelatin . . . . .	18.3	Mulder.
Isinglass . . . . .	18.7	Scherer.
Tendons of Calves' Feet . . . . .	18.4	"
Animal Albumen (of eggs) . . . . .	15.9	"
Vegetable Albumen (of wheat) . . . . .	15.9	Jones.
Gluten . . . . .	15.9	"
Roasted Beef . . . . .	15.2	Playfair.
Roasted Veal . . . . .	14.7	"
Haricot Beans (dried) . . . . .	4.3	Boussingault.
Peas (dried) . . . . .	4.2	"
Brown Bread (dried) . . . . .	2.6	Thomson.
Wheat (dried) . . . . .	2.3	Boussingault.
White Bread (dried) . . . . .	2.2	Thomson.
Oats (dried) . . . . .	2.2	Boussingault.
Essex Flour (dried) . . . . .	2.1	Thomson.
Barley (dried) . . . . .	2.0	Boussingault.
Indian Corn or Maize (dried) . . . . .	2.0	"
Rye . . . . .	1.7	"
Rice (dried) . . . . .	1.39	"
Potatoes, fresh . . . . .	0.37	"
White Garden Cabbage . . . . .	0.28	"
Turnips . . . . .	0.17	"

(2.) *Proportion of Carbon in various Foods.*

	Percentage of Carbon.	Authority.
Hogs' Lard . . . . .	79.0	Chevreul.
Mutton Fat . . . . .	78.9	"
Olive Oil . . . . .	77.7	Saussure.
Butter . . . . .	65.6	Berard.
Animal Albumen (from eggs) . . . . .	55.0	Scherer.
Vegetable Albumen (from wheat) . . . . .	55.0	Jones.
Gluten (from wheat) . . . . .	55.2	"
Roasted Beef . . . . .	52.5	Playfair.
Roasted Veal . . . . .	52.5	"
Alcohol . . . . .	52.1	"

	Percentage of Carbon.	Authority.
Oats (dried)	50.7	Boussingault.
Isinglass	50.5	Scherer.
Cane Sugar (dry)	47.0	Peligot.
Rye (dried)	46.2	Boussingault.
Peas (dried)	46.5	"
Wheat (dried)	46.1	"
Potatoes (dried)	44.0	"
Turnips (dried)	42.9	"
Wheat Starch	37.5	Prout.
Arrow Root	36.4	"
Fresh Bread	30.1	Liebig.
Fresh Meat devoid of Fat	13.6	"
Soup (made at Giessen)	0.4	"
Gelatin	50.4	Mulder.

(3.) *Proportions of Hydrogen and Carbon in some Alimentary Substances.*—(PEREIRA.)

	Hydrogen.	Carbon.
Alcohol	19.7	79
Sugar	11.8	79
Hogs' Lard	11.7	79
Mutton Fat	11.1	79
Starch	10.9	79
Gelatin	6.6	50

(4.) *Quantity of Phosphorus in certain Foods, in 1,000 parts.*  
(PEREIRA.)

		Authority.
Oleophosphoric acid (in brain)	12.0	Fremy.
Cerebric acid (in brain)	9.0	"
Albumen of eggs (dried)	3.2	Mulder.
Potatoes (dried)	2.5	Einhoff.
Wheat	1.9	Hermbstaedt.
Rye	1.3	"
Milk	0.5	Berzelius.
Oats	0.3	Hermbstaedt.
Rice	0.3	"
Barley	0.2	"





# PROXIMATE COMPOSITION OF VARIOUS SUBSTANCES.

(12.) *Proximate Composition of Flesh Meat, according to Mr. BRANDE, in 100 parts.*

	Water.	Albumen or Fibrin.	Gelatin.
Mutton . . .	71	22	7
Chicken . . .	73	20	7
Beef . . .	74	20	6
Veal . . .	75	19	6
Sole . . .	79	15	6
Cod . . .	79	14	7

(13.) *Composition of Wheaten Flour.—(PEREIRA.)*

	French Wheat.		English Wheat.
Starch . . .	71.49	Water . . .	14.0
Gluten . . .	10.96	Gluten . . .	12.8
Sugar . . .	4.72	Albumen . . .	1.8
Gum . . .	3.32	Starch . . .	59.7
Bran . . .	..	Sugar . . .	5.5
Water . . .	10.00	Gum . . .	1.7
	<hr/>	Fat . . .	1.2
	100.49	Fibre . . .	1.7
		Ash . . .	1.6
			<hr/>
			100.0

(14.) *Composition of Maize or Indian Corn.—(GORHAM.)*

Starch . . .	77.0
Zeine . . .	3.0
Albumen . . .	2.5
Gummy matter . . .	1.75
Saccharine matter . . .	1.45
Extractive . . .	0.8
Cuticle and Ligneous fibre . . .	3.0
Phosphate, Carbonate, and Sulphate of Lime, and loss . . .	1.5
Water . . .	9.0



15. *Composition of Wheat Bran.*

Water . . .	12.8
Gluten . . .	13.8
Starchy matter . .	53.2
Oily matter . . .	2.5
Fibre . . .	11.5
Ash . . .	6.2
	<hr/>
	100.0

(16.) *Composition of Bread.*  
(SIBSON.)

Water . . .	32.5
Gluten and nitrogenous substances . . .	8.8
Modified starch, sugar, gum, &c. . .	57.6
Ash . . .	1.1
	<hr/>
	100.0

(17.) *Composition of Rice.*

Water . . .	13.5
Gluten . . .	6.5
Starch . . .	74.1
Sugar . . .	0.4
Gum . . .	1.0
Fat . . .	0.7
Fibre . . .	3.3
Ash . . .	0.5
	<hr/>
	100.0

In cooking, rice takes up three times its weight of water.

(18.) *Composition of Oatmeal.*  
(SIBSON.)

Water . . .	13.09
Nitrogenous compounds	15.68
Starch, with a little sugar and oil . .	68.17
Woody fibre . . .	1.90
Ash . . .	1.16
	<hr/>
	100.00

Barley-meal has somewhat less nitrogen and more starch; otherwise its chemical composition resembles that of oatmeal.

(19.) *Composition of Potato.*

Water . . . . .	75.4
Albumen, &c. . . . .	2.0
Gum, and a little sugar . . . . .	3.0
Starch . . . . .	15.5
Fibre . . . . .	3.1
Ash . . . . .	1.0
	<hr/>
	100.0

(20.) *Composition of Carrots, Turnips, and Parsnips.*  
(SIBSON.)

	Carrots.	Turnips.	Parsnips.
Water . . . . .	87.30	90.43	82.20
Albumen, &c. . . . .	0.66	1.14	1.28
Cellular tissue, gum, &c. . . . .	2.56	5.45	8.92
Sugar . . . . .	5.54	..	3.20
Woody fibre . . . . .	3.20	2.34	3.47
Ash . . . . .	0.74	0.64	0.93
	100.00	100.00	100.00

(21.) *Composition of Peas and Beans.*—(SIBSON.)

	Dry split Peas.	Green Peas (after boiling).	Dry Haricot Beans.	French Beans (after boil- ing).
Water . . . . .	14.02	84.02	14.20	89.94
Legumine (vege- table caseine) . . . . .	23.30	4.34	24.06	2.86
Oil . . . . .	2.02	0.37	1.30	0.15
Starch, sugar, &c. . . . .	39.50	7.35	37.42	4.36
Cellular tissue . . . . .	8.14	1.51	10.32	1.20
Woody fibre . . . . .	10.42	1.94	9.50	1.12
Ash . . . . .	2.60	0.47	3.20	0.37
	100.00	100.00	100.00	100.00

(22.) *Composition of Cabbage.*

Water . . . . .	89.5
Oil . . . . .	0.1
Albumen, &c. . . . .	1.5
Fibre . . . . .	1.1
Cellular tissue . . . . .	7.0
Ash . . . . .	0.8
	<hr/> 100.0

(23.) *Composition of Onions.*

Water . . . . .	87.7
Nitrogenous matter . . . . .	1.5
Mucilage, &c. . . . .	9.7
Fibre . . . . .	0.6
Ash . . . . .	0.5
	<hr/> 100.0



(24.) *Composition of Milk.*

	Cow.	Ass.	Woman.	Sheep.	Bltch.	Goat.	Cream
Water . . .	873.00	916.5	879.8	856	663	820	62.50
Butter . . .	30.00	1.1	35.5	45	148	45	30.58
Casein . . .	48.20	18.2	15.2				5.62
Milk-sugar . .	43.90	60.8	65.0				trace
Phosphate Lime	2.31						
„ Magnesia	0.42						
„ Iron	0.47						
Chloride Potassium	1.44	3.4	4.5	57	160	90	1.30
„ Sodium	0.24			42	29	45	
Soda in combination with Casein	0.42						
	1000.00	1000.0	1000.0	1000	1000	1000	1000.0

(25.) *Composition of White of Egg.*

(BOSTOCK.)

Water . . . . .	80.0
Albumen . . . . .	15.0
Mucus . . . . .	4.5
	<hr/>
	100.0

(26.) *Composition of Yelk of Egg.*

(PROUT.)

Water . . . . .	53.78
Albumen . . . . .	77.47
Yellow Oil . . . . .	28.75
	<hr/>
	100.00

ULTIMATE ANALYSES OF VARIOUS ANIMAL  
PRODUCTS.—(FOWNES.)

(27.) *Albumen.*

Carbon	.	.	.	.	.	53.5
Hydrogen	.	.	.	.	.	7.0
Nitrogen	.	.	.	.	.	15.5
Oxygen	.	.	.	.	.	22.0
Phosphorus	.	.	.	.	.	0.4
Sulphur	.	.	.	.	.	1.6
						<hr/>
						100.0

(28.) *Fibrin of Blood.*—(MULDER.)

Carbon	.	.	.	.	.	52.7
Hydrogen	.	.	.	.	.	6.9
Nitrogen	.	.	.	.	.	15.4
Oxygen	.	.	.	.	.	23.5
Phosphorus	.	.	.	.	.	0.3
Sulphur	.	.	.	.	.	1.2
						<hr/>
						100.0

(29.) *Gelatin.*—(FOWNES.)

Carbon	.	.	.	.	.	50.05
Hydrogen	.	.	.	.	.	6.47
Nitrogen	.	.	.	.	.	18.35
Oxygen	.	.	.	.	.	25.13
						<hr/>
						100.00
With Sulphur	.	.	.	.	.	0.1 per cent.



(30.) *Skin of the Sole of the Foot.*—(SCHERER.)

Carbon	.	.	.	.	.	50.20
Hydrogen	.	.	.	.	.	6.78
Nitrogen	.	.	.	.	.	17.22
Oxygen	}	.	.	.	.	25.80
Sulphur		.	.	.	.	
						<hr/> 100.00

(31.) *Cerebric Acid.*

Carbon	.	.	.	.	.	66.7
Hydrogen	.	.	.	.	.	10.6
Nitrogen	.	.	.	.	.	2.3
Oxygen	.	.	.	.	.	19.5
Phosphorus	.	.	.	.	.	0.9
						100.00

(32.) *Composition of Human Blood.*—(LECANU.)

Water	.	.	.	.	.	780.15
Fibrin	.	.	.	.	.	2.10
Albumen	.	.	.	.	.	65.09
Colouring Matter	.	.	.	.	.	133.00
Crystallizable Fat	.	.	.	.	.	2.43
Fluid Fat	.	.	.	.	.	1.31
Extractive Matter, uncertain	.	.	.	.	.	1.79
Albumen, combined with Soda	.	.	.	.	.	1.26
Chlorides of Sodium and Potassium; Carbonates, Phosphates, and Sul- phates of Potash and Soda	.	.	.	.	.	8.37
Carbonates of Lime and Magnesia, Phosphates of Lime, Magnesia, and Iron; Sesquioxide of Iron	.	.	.	.	.	2.10
Loss	.	.	.	.	.	2.40
						1000.00

(33.) *Composition of Human Bones.*—(BERZELIUS.)

Animal Matter . . . . .	33·3
Phosphate of Lime, with a little Fluoride of Calcium . . . . .	53·04
Carbonate of Lime . . . . .	11·30
Phosphate of Magnesia . . . . .	1·16
Soda and a little Common Salt . . . . .	1·20
	<hr/>
	100·00

The Teeth have a very similar composition to Bone, but contain less animal matter.

(34.) *Composition of Urine.*—(BERZELIUS.)

	In 1000 parts.
Water . . . . .	933·00
Urea . . . . .	30·10
Lactates and unknown bodies . . . . .	17·14
Uric Acid . . . . .	1·00
Sulphates, Potash and Soda . . . . .	6·87
Phosphate of Soda . . . . .	2·92
„ Ammonia . . . . .	1·65
„ Lime and Magnesia . . . . .	1·00
Chloride of Sodium . . . . .	4·45
Sal Ammoniac . . . . .	1·50
Silica . . . . .	0·03
Mucus . . . . .	0·32
	<hr/>
	1000·00

Liebig has found the *kreatin* of flesh in the urine also.

(35.) *Flesh and Fat of Meat after Cooking.*—(VÆLCKER.)

	Water.	Albumen or Fibrin.	Fat.	Ash.
Beef . . . . .	40·5	24·0	34·5	1·1
Mutton . . . . .	46·0	26·5	26·0	1·5
Veal . . . . .	60·0	29·0	10·0	1·0



(36.) *Cheese.*—(SIBSON.)

	Cheddar.	Double Glo'ster.	Skin.
Water . . . .	36·64	35·61	43·64
Caseine . . . .	23·38	21·76	45·64
Fatty matter . . . .	35·44	38·16	5·76
Ash . . . .	4·54	4·47	4·96
	100·00	100·00	100·00

(37.) *Beer.*

In One Imperial Pint.	Water.	Alcohol.	Sugar.	Acetic Acid
	ozs.	ozs.	ozs. grs.	grs.
London Stout . .	18½	1½	0·281	54
London Porter . .	19½	0	0·267	45
Pale Ale . . . .	17½	2½	0·240	40
Mild Ale . . . .	18¾	1½	0·280	38
Strong Ale . . . .	18	2	2·136	54

(38.) *Wine.*

In One Imperial Pint.	Water.	Alcohol.	Sugar.	Tartaric Acid.
	ozs.	ozs.	ozs. grs.	grs.
Port . . . .	16	4	1·2	80
Brown Sherry . .	15½	4½	360	90
Pale Sherry . . .	16	4	80	170
Claret . . . .	18	2	0	161
Burgundy . . . .	17½	2½	0	160
Hock . . . .	17¾	2¼	0	127
Moselle . . . .	18½	1¾	0	140
Champagne . . .	17	3	1·133	90
Madeira . . . .	16	4	400	100
Cider . . . .	19	1	400	120*

\* The acid here is malic. Perry has a similar composition.

(39.) *Tea, Coffee, and Cocoa.*—(SIBSON.)

	THE SOLID STATE.			THE BEVERAGE.		
	Tea.	Coffee.	Cocoa.	Tea.	Coffee	Cocoa.
Water . . . .	12	13·0	15·56	99·31	98·80	97·88
Theine . . . .	1	·5				
Theobromine . .	0	·0	·50			
Nitrogenous matters	25	13·0	15·06			
Fatty matters . .	4	10·0	36·68			
Tannic Acid . .	12	5·5		·54	·95	1·93
Gum, Cellulose, &c.	19	21·5	24·04			
Woody Fibre . .	22	30·0	5·20			
Ash . . . .	5	6·5	2·96	·15	·25	·19
	100	100·0	100·00	100·00	100·00	100·00

(40.) *Average percentage of Starch in various Foods.*

Wheat Flour . .	39 to 77	Buck Wheat . .	52
Rye . . . .	50 „ 61	Beans . . . .	38
Barley . . . .	67 „ 70	Peas . . . .	39
Oatmeal . . . .	70 „ 80	Lentils . . . .	40
Rice Flour . . .	84 „ 84	Potatoes . . .	16 to 23
Maize Flour . .	77 „ 80		

(41.) *Average percentage of Water in various Foods.*

Potatoes . . . .	75	Rice . . . .	13
Carrots . . . .	86	Beans . . . .	14
Turnips . . . .	87	Parsnips . . . .	79
Flour . . . .	14	Mangel Wurzel . .	85
Barley Meal . . .	14	Cabbage . . . .	92
Indian Meal . . .	14	Bread . . . .	44
Oatmeal . . . .	13	Cocoa . . . .	5
Rye . . . .	13	Lentils . . . .	14
Peas . . . .	14	Buckwheat . . . .	14
Milk . . . .	86	Mutton . . . .	44
Bacon . . . .	30	Pork . . . .	38
Veal . . . .	62	Fish . . . .	78
Beef . . . .	50	Eggs . . . .	80
Lamb . . . .	50	Cheese . . . .	40



(42.) *Time required for the Chymification of various Food, as determined by DR. BEAUMONT.*

	Hours.	Min.
Venison steak, broiled . . .	1	35
Sucking pig, roasted . . .	2	30
Lamb, fresh, boiled . . .	2	30
Beef steak, boiled . . .	3	0
Mutton, fresh, boiled . . .	3	0
Pork steak, boiled . . .	3	15
Veal, fresh, boiled . . .	4	0
Beef, old, hard, salted, boiled . . .	4	15
Tripe, soured, boiled . . .	1	0
Brains, animal, boiled . . .	1	45
Liver of the Ox, fresh, boiled . . .	2	0
Eggs, whipped, raw . . .	1	30
Eggs, fresh, raw . . .	2	0
Eggs, fresh, roasted . . .	2	15
Eggs, fresh, soft boiled . . .	3	0
Eggs, fresh, hard boiled . . .	3	30
Eggs, fresh, fried . . .	3	30
Trout (Salmon), fresh, boiled . . .	1	30
"    "    "    fried . . .	1	30
Cod-fish, cured, dry, boiled . . .	2	0
Flounder, fresh, fried . . .	3	30
Salmon, salted, boiled . . .	4	0
Oysters, fresh, raw . . .	2	55
Oysters, fresh, roasted . . .	3	15
Oysters, fresh, stewed . . .	3	30
Oyster soup, boiled . . .	3	30
Butter, melted . . .	3	30
Mutton suet, boiled . . .	4	30
Beef suet, fresh, boiled . . .	5	30
Cheese, old, strong, raw . . .	3	30

	Hours.	Min.
Calf's-foot jelly, boiled . . .	1	0
Isinglass jelly, boiled . . .	1	0
Gelatin, boiled . . .	2	30
Cartilage, boiled . . .	4	15
Tendon, boiled . . .	5	30
Turkey, boiled . . .	2	25
,, roasted . . .	2	30
Goose, wild, roasted . . .	2	30
Chicken, full-grown, fricasseed .	2	45
Fowl, domestic, boiled . . .	4	0
,, ,, roasted . . .	4	0
Duck, domestic, boiled . . .	4	0
,, ,, roasted . . .	4	30
Rice, boiled . . .	1	0
Cake, Sponge . . .	2	30
Custard, baked . . .	2	45
Dumpling, apple, boiled . . .	3	0
Bread, wheat, fresh baked . . .	3	30



# SOLID CONSTITUENTS IN ONE GALLON OF WATER SUPPLIED TO TOWNS.

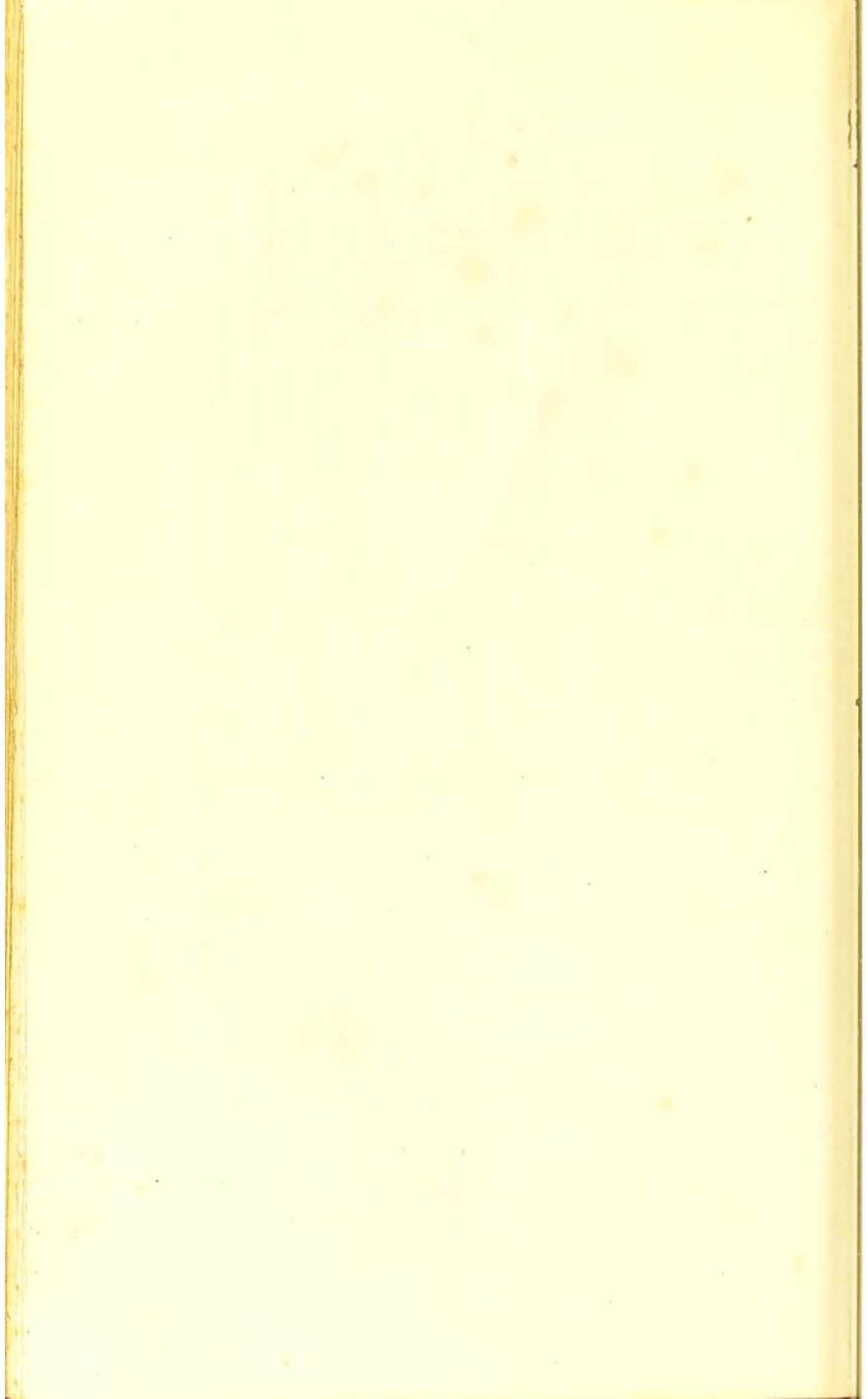
Compiled by J. ATTFIELD, F.C.S., Demonstrator of Chemistry at St. Bartholomew's Hospital.

	South Essex Company.	New River Company.	East London Company.	Kent Water Company.	Thames Ditton & Grand Junction Company.	Farnham.	Watford.	Loch Katrine.	Aberdeen.	Liverpool.	Manchester.	Artesian Well, Trafalgar Square.	Artesian Well, Bank of Buekland.	Surface Well, Bank of Buekland.	Surface Well, at Clapham.
Carbonate of Lime .	15.33	7.82	10.16	7.02	11.79	.23	10.13	..	.85	.76	..	3.25	T.	15.70	15.09
Sulphate of Lime .	1.13	3.23	2.33	11.03	3.06	1.317	..	.38	.12	1.00	3.57	..	..	..	15.32
Nitrate of Lime .	1.67	.02	.72	.07	.27	trace	.23	..	..	..	..	..	..	..	..
Carbonate of Magnesia	1.47	1.03	1.51	3.42	1.27	.64	.75	.15	..	.11	..	2.25	3.00	0.63	13.97
Carbonate of Soda .	0.68	..	..	..	..	..	..	..	..	..	..	18.05	14.60	10.74	..
Sulphate of Magnesia .	..	..	..	..	..	..	..	..	.32	..	1.55	..	..	..	..
Chloride of Magnesium	..	..	..	..	..	..	..	..	..	..	.13	..	..	..	..
Chloride of Sodium .	2.57	1.73	1.76	3.50	1.10	.93	1.01	.45	.67	1.56	1.02	20.05	13.30	6.82	11.46
Sulphate of Soda .	..	1.49	.94	..	..	.07	1.31	.58	..	..	..	8.74	13.50	6.30	10.77
Chloride of Potassium .	..	..	..	..	.67	..	..	..	..	..	.57	..	..	..	..
Sulphate of Potash .	1.55	1.11	1.25	.70	.17	.43	.44	trace	..	..	..	13.67	1.01	1.41	6.74
Iron, Alumina and Phosphates .	..	traces	.47	traces	.09	.88	..	traces	.8	.24	.75	.33	..	..	.32
Silica . . . .	0.96	.50	.62	.76	.62	.99	1.59	trace	.14	.16	.88	.97	T	3.00	.24
Organic Matter . .	none	2.79	4.12	2.61	2.29	1.78	1.26	.82	1.82	1.40	1.25	.91	1.60	3.00	..
Total grains per gal.	25.36	19.78	23.88	29.11	21.33	7.26	22.72	2.03	4.00	5.42	9.72	68.22	47.01	43.00	73.59

## SOLID CONSTITUENTS IN ONE GALLON OF WATER SUPPLIED TO TOWNS—(continued).

	Well, Burton-upon-Trent.	Dee.	Plumstead.	Well, Soho.	Well at the Royal Mint.	Camden Town Station.	Chadwell Springs, Ware.	Watford Station.	River Colne.	Tring Station.	Asbridge.	Well, Arsenal, Woolwich.
Carbonate of Lime	15.51	0.85	11.406	13.926	3.50	..	13.50	19.54	18.10	14.72	2.84	16.10
Sulphate of Lime	18.96	0.12	8.864	11.874	..	..	1.20	0.94	1.20	1.09	8.8	20.82
Nitrate of Lime	..	..	..	..	..	..	..	..	..	..	..	..
Carbonate of Magnesia	1.70	0.36	1.450	1.618	1.50	..	..	..	..	..	..	..
Carbonate of Soda	..	..	..	5.233	8.63	17.60	..	..	..	..	..	..
Sulphate of Magnesia	9.95	..	..	..	..	..	..	..	..	..	..	..
Chloride of Magnesium	..	..	..	7.550	..	..	..	..	..	..	..	10.75
Chloride of Sodium	10.12	0.72	3.558	12.07	10.53	11.10	2.50	1.90	2.00	1.38	2.33	58.83
Sulphate of Soda	..	..	1.235	..	13.14	13.00	..	..	..	..	8.13	..
Chloride of Potassium	..	..	..	..	..	..	..	..	..	..	..	..
Sulphate of Potash	7.65	..	0.284	14.883	..	..	..	..	..	..	7.44	..
Iron, Alumina, and Phosphates	0.70	0.06	0.340	0.944	..	..	..	..	..	..	..	..
Silica	0.79	0.14	0.720	0.539	0.50	..	0.40	..	..	..	2.08	..
Organic Matter	..	1.61	2.72	7.800	..	2.30	0.40	1.32	..	1.61	1.12	considerable
Total grains per gallon	65.38	3.89	30.577	91.555	37.80	44.00	18.00	23.70	21.30	18.80	32.80	106.50 +





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