The adulteration of food.

THE ADULTERATION OF FOOD.*

WHAT is man? is an inquiry which has occupied the attention of physical and moral philosophers from the beginning, and will probably afford a field for investigation to the end of time. Regarding the first part of the question, with which alone we are now concerned, the result of our present knowledge of the physical structure of man is well expressed in the terse language of the Hebrew Scriptures, that he is composed of 'the dust of the earth,' if, by this expression, as we may fairly translate it, be meant the more loosely attached portions of our lower world. It is on this principle that man consumes the vegetables covering the earth's surface, which act as his ministers to collect those particles which are alone fitted to supply the waste of his body. For similar reasons he uses the beasts of the field, which being formed chemically from the vegetable kingdom, afford a still more concentrated form of subsistence. And notwithstanding all that has been urged to the contrary, there can be little hesitation in concluding that the most ancient chronicles confirm the scientific conclusion that man has always been so supported. The earliest ideas of a deity invested him with the same appetites and requirements as humanity, and naturally induced the shepherd to supply him with food in the form of 'the firstlings of the flock and the fat thereof,' while the tiller of the ground could only present to him what was the most valuable treasure in his own eyes, the result of his agricultural occupation, 'the fruit of the ground.' The Pythagorean or vegetable controversy, appears, for these reasons, to borrow little support from history, irrespective of the fact that animal milk is the type of all proper food. That distinguished philosopher, in reference to the use of animal food, could exclaim against the abominable wickedness that men should permit bowels to be buried in bowels, that one greedy body should grow fat with another body crammed into it, and that one animal should live by the death of another animal, and characterize the use of animal food as champing with the teeth, nothing but dreadful wounds, and thus reviving the manners of the Cyclops. 'Why has the sheep deserved death?' he asks with vehemence; 'that harmless animal, which carries nectar in its full dugs, and furnishes us with soft clothing, and aids us more by its life than its death.'

At first sight, it is impossible to avoid sympathizing with the eloquence of so humane an advocate. But the feeling is suddenly changed, when we recollect that Pythagoras, as if to demonstrate that ultra views necessarily produce inconsistency, gave the lie to all his aspiring sentimentality by sacrificing, without any ulterior object to serve, one hundred oxen, in commemoration of his discovery that the square on the hypothenuse of a right angled triangle is equal to the sum of the two squares on the base and the perpendicular. Such a termination to a beautiful mathematical discovery has appeared so inconsistent as to induce his apologists to suggest that the oxen must have been composed of wax. We must not suppose, however, that such opinions have fled before the light of later knowledge; for we find the same school of pseudo-humanity mongers still inculcating the idea respecting the employment of animal food, that 'the man of cultivated moral feeling shrinks from the task of taking the life of the higher grade of animals, and abhors the thought of inflicting pain and shedding blood.'

While we cordially agree that unnecessary pain should never be in-

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* *Food, and its Adulterations, &c.* By Arthur Hill Hassall, M.D., F.L.S. London: Longman & Co. 1855.

Board of Health Reports presented to both Houses of Parliament:—

Report on the Microscopical Character of London Waters during the Epidemic. By Arthur Hill Hassall, M.D., F.L.S.

Report on the Chemical Composition of Metropolitan and Provincial Waters during the Epidemic of 1854. By Robert Dundas Thomson, M.D., F.R.S. L. & E.

flicted on even the most insignificant animals, we are as strongly opposed to the conclusion that animal food should be shunned. We also affirm that the present mode of slaughtering animals is cruel, and degrades the minds of the individuals engaged in it. That such subjects are worthy of attention from the government of the country, we think can scarcely admit of doubt, and they probably will engage the supervision, in due time, of our Board of Health. That the animal food sold in our markets is frequently of a diseased character, and liable to injure those who partake of it, is beyond question. Whether this is due to overfeeding, deficient nourishment, or to the use of improper food, are all subjects deserving of careful consideration.

It is a remarkable fact that the same dislike to blood which entered as an element into Jewish legislation, has been practically brought down to our times, and perpetuated hereditarily by that important functionary, the butcher. Why should our animals be first deprived of sensation, and then drained of their most nourishing juices as at present practised in the preparation of our animal food? No reason can be assigned, except that it has always been so, and that in the Mosaic code the practice was enjoined. Bruce, the celebrated Abyssinian traveller, imparted the first ray of light on the propriety of this remarkable injunction, by the discovery that among the tribes who had intercourse with the Jews from the earliest times, it was customary to incise live animals, for the purpose of abstracting a portion of their substance, and then to close up the wound without destroying the life of the animal. This sanguinary custom, while it bespeaks poverty in cattle, could not fail to impart blunted feelings to the operators, and when rendered extensively customary must terminate in inevitable demoralization. That animal food is most nourishing when it contains as much as possible of the circulating blood, that is, when it is most juicy, admits of no doubt to those who are acquainted with the chemistry of the human system. Nor is this observation propounded as a mere theory, since we have had opportunities of partaking of animal food obtained by a much more humane method than that commonly practised, and without the abstraction of a single drop of blood. This method is founded upon a simple principle, and is accompanied with less uneasiness perhaps than the operation of drowning. The lungs may be compared to an elastic bag, which is enclosed in a box, formed by the bones of the chest. This elastic bag is capable of being filled by external air, and likewise of being emptied by the action of the muscles of respiration. If, however, we admit air between this elastic bag and the environing box, the bag is no longer capable of being filled with atmospheric air, and the elastic character of the lungs is rendered unavailing — no more oxygen can reach the lungs, and death must speedily ensue. A perforation made on each side into the chest of the largest animal by means of a little instrument, termed in surgery a trocar, and used for the relief of dropsy in the chest, and air pressed in from a bag, through the aperture thus made, causes death in a few seconds, without pain, and without interfering with the natural distribution of the juices of the body. The meat thus killed retains its natural and nourishing fluids. And it is an interesting fact, that could not have been decided by abstract reasoning, that meat thus prepared retains its integrity even longer, according to the testimony of intelligent salesmen, than animal food deprived of its more fluid constituents, and obtained by the hereditary process of destruction. It is scarcely necessary to add that the delicacy of game, and particularly of the hunted hare, which are forbidden by the Mosaic code, is undoubtedly promoted by the presence of the natural blood, that is, by the equal distribution of the juices through every part. The only argument we have heard against the use of such food was, that it was a breach of the Divine injunction — just as if the Hebrew ceremonial code had not been abrogated, and the use of shell-fish and other animals was not as strictly forbidden as blood. But it is strange how much more power-

ful are arguments addressed to our prejudices than to our judgment. This single remark was sufficient to overthrow some progress which had been made in persuading the inhabitants of one of our large cities of the erroneous principle on which the hereditary system of preparing animal food is still persisted in. In truth, the people require reform in regard to the management of their own persons. To accomplish this important object ought to be the work of education. Unfortunately this, one of the most important branches of knowledge, has hitherto been neglected in the training of our youth. Their minds have rather been viewed as mysteries wrapt up in abstract encasements, than as thinking principles, placed in the midst of tangible matter, now influenced by the motion of its component parts, again irritated by its stagnation. Science has not been applied so as to demonstrate to their minds the structure of their bodies or the dangers to be avoided, and the course to be pursued in their physical education. Each man has been left to experiment for himself on health during his life, often too early closed by such fearful trials.

But even among those who have been trained in a wider school, there are errors of education which have been insinuated by custom, dressed out in gaudy trappings by sociality, and almost hallowed by poetry and song, which are as hard to root out as if they had been sown in a more congenial soil. In different districts we find peculiarities of diet, which are either highly objectionable, or at least anti-physiological. Different forms of alcoholic fluids are hereditarily considered necessary sequences of peculiar viands. And even the influence of these morally has been bound up with the earliest recollections. Have not many who have read some of the finest emanations of the ancient and modern Muse, been impressed in some degree by the axiom of Erasmus, of the 'truthfulness of wine?' until by experience, that is, by a series of experiments often ultimately fatal, the objects of the research have found out for themselves that the proverb contains but a shadow of truth, and that the authors who have, in the words of Horace, counselled to 'drown care in the bowl,' are but blind leaders of the blind. Sometimes too human nature has been painted by poesy as being elevated in rank by such indulgences, the pauper being raised to the condition of royalty by 'wine and mirth.' But the philosopher, although he can discover by another route such a possible transference of positions, sees it not in such ephemeral stimulation, but in the calmness and quietude of mind of 'the beggar sunning himself by the side of the highway, who possesses that security which kings are fighting for.'

The purport of our argument may be gleaned from what we have urged, that, although savages and wild animals may have been directed to obtain their nourishment by the instincts of their nature, the question is changed with modern closely-confined, civilized humanity and domestic animals. The subject of food is one of science, and can no longer be entrusted to the tender mercies of advertising mercenaries or cooks, many of whom consider wholesomeness and agreeableness to the palate as synonymous terms. True, it may be that good cookery will present healthy food in an agreeable form, but the relish should never be mistaken for the substance, the glittering for the reality. For example, at the present time there is a great demand for animal matter in the production of manure, and the supply is somewhat short of the demand, a condition increased by the fact that much of the substance, and particularly the tongues, of horses which die in the metropolis from disease, or are slaughtered after serving their day, make their way into provision shops under the various forms of sausages and genuine reindeer organs from Scandinavia. The detection of all such practices ought to constitute part of the functions of the Board of Health, since the prevention of disease, as has been demonstrated by the progress of science, true to the adage, is infinitely 'better than cure.' Science, in this respect, would become a great power, if it were only

allowed to have fair play and develope itself.

Diseased sausages are well known to be productive of a peculiar form of fatal malady, and even short of the actual occurrence of a special complaint, they must be pronounced, if made with meat of a dubious character, as objectionable, and as calculated to form a basis in the human system for the settlement and propagation of the seeds of atmospheric diseases. Shall we not look in the local air or food for the fact that, whereas in some places only fifteen in one thousand persons die during the year, in other localities thirty-five and upwards per thousand of the same sturdy Anglo-Saxon race disappear from the face of the earth—and shall no effort be made to save more than the half of the population thus sacrificed? Those who have best studied the subject are of opinion that this object can be effected, and it appears to us a matter of regret that Dr. Farr's view was not adopted in Sir B. Hall's Bill, that the government should endeavour to reduce the mortality of all England to fifteen per thousand, instead of being content with its remaining at twenty-four or twenty-five per thousand. It is clear that all deaths in excess of fifteen per thousand are unnatural, and the Board of Health should supply its measures to save life in such cases.

The system pursued by our agricultural societies of offering premiums for monstrous specimens of cattle, we consider highly deserving of censure, since even cursory observations exhibit an unnatural or diseased appearance, particularly in the fatty portions of such animals, and even at best, as Byron well said, fatness is but 'an oily dropsy.' Can any one tell us the cause of measly pork? Who can say how much mortality is propagated by diseased meat until chemistry shall have been applied to discriminate the results of the extraordinary modes of feeding animals intended for the market? It is only the meat palpably and extensively diseased to the eye of the inspector, who is destitute of any of the appliances of science, that is intercepted in its passage to the stomachs of the lieges. Measly pork, for example, is condemned when it appears highly diseased; but it may be quite as unwholesome when the disease is less obvious to the eye. Pork owes it measled aspect to the presence of an infinite number of little creatures situated in the muscle of the animal, each of which is capable, if introduced into the human interior, of enlarging into an immense tapeworm. There is no doubt, from what is now known of the history of the whole tribe of worms which produce such extensive disease and death among children and even adults, that these ova or eggs are swallowed with the food. Why should not the aid of science be employed to examine into the sources of such fatality? It is no one's business at present to investigate these matters. It is the farmer's occupation to augment the weight of his cattle, the butcher's to sell them, and the public to consume them. It is the part of the water suppliers to dispose of Thames water as profitably as possible; but who is there to determine whether the water of this river, after serving as a common sewer for extensive districts of country, and for populous towns, is destitute of the seeds of disease in the form of the ova of tape and other worms, the seeds of cholera, and of the extensive catalogue of diseases which ever and anon strike whole districts as by a thunderbolt? Yet it is the function of practical science to investigate such questions, and she is ready to commence the inquiry at the call of the government.

No proof could be afforded more conclusive of the limited character of the education of our legislators, than the inattention hitherto directed by them to the all-important subject of the public health in reference to food. During the total neglect of the subject by the Legislature the question has been taken up by the Coroner for Middlesex and the Commissioner of *The Lancet* (Mr. Wakley and Dr. Hassall). The Coroner devised the admirable scheme of causing the articles used for human food and medicines as found in the shops of London to be examined from week to week, gazetting the results in *The Lancet*,

printing the names unreservedly of those who sold nefarious articles, and of those who offered genuine materials to the public. It is impossible to overrate the value of this plan for the public benefit, or the able manner in which the investigation was prosecuted.

One of the most important subjects investigated by Dr. Hassall was that of the water supplied to the metropolis. Who has not read the description of the magnificent Roman aqueducts by which water was brought from pure mountain springs at a distance from the haunts of men? Although the Tiber flowed through the city of Rome, its waters were rejected because it was known more than two thousand years ago that water from such a source was unwholesome. And yet here we are, in the metropolis of the world, in the year of grace eighteen hundred and fifty-five, not only swallowing the disgustingly polluted Thames water, but positively paying handsomely for the privilege. It does appear that our exclusively classical education has conferred little practical benefit upon us. Every one may now know, from the Reports of the Board of Health quoted at the beginning of this article, that the Thames at London, from which two of our water companies obtain their supply, and which is distributed to Southwark, Chelsea, and Westminster, consists of river water, mixed twice a-day with sea water, with the disgusting contents of sewers, and consequently of all the *débris* of the metropolitan population — of portions of our food which nature has rejected as pernicious and unwholesome, and of products of intestinal disease. Whether we shut our eyes to the facts or not, the smallest reflection must produce the conviction that these abominations must be present in the water. Let any one who has any scepticism on the subject, and who is acquainted with the use of the microscope, or has a friend supplied with a good instrument, make this experiment. During the time that the water of the Southwark Company is flowing into a cistern let him tie over the mouth of the service pipe a piece of muslin, and allow it to remain till the water has ceased to flow. On unloosing the muslin it will be found to be covered with a black sediment. And if a portion of this be placed under the microscope with a power of 200 diameters, little yellowish masses will be detected in abundance, which, with a higher power, will be found crossed by delicate ridges. These minute bodies are portions of excrement. All this has been pointed out by the Board of Health Reports, and the demonstration afforded that London is traversed by a mighty open sewer, steaming off its miasms on its onward progress, and dealing out a source of disease to all around. It does not signify that whole Blue Books have been filled by the evidence of witnesses, adduced by interested water companies, who did not see these things, as they did not look for them. It is undeniable that for years upon years the population on the Surrey side of the river has been supplied with this horrible jakes-house mixture, and even now it labours under the same infliction. And to make matters worse, men have been found who have blasphemously attributed disease occurring among the people consuming such an unwholesome beverage to the hand of an all-wise and benevolent Creator. It is true the Thames companies are about to obtain their water supply from Thames Ditton. But this is only a slight amelioration of the objection —the Thames is still there, the sewer of the districts which it traverses bearing with it the disgusting *rejecta* of the population residing on its banks, and the drainage of the manured lands of the central and western parts of the country. Those water companies which do not derive their supplies from the Thames, are more or less liable to the objection that the streams, canals, and wells from which their waters flow are exposed to the access of vast quantities of impurities, derived from ever-passing nuisances, from the surrounding spongy soil saturated with filth, necessarily induced by the surrounding population. The question of the water supply of London is one of pressing importance to the health and interests of a mighty people—it is one whose

reform has been kept in abeyance by mercenary interests; but the discussion must erewhile be renewed, and pure water must be found for a temperate population.

The hardness of water is a question of great import in an economical point of view, and likewise in reference to the preservation of health. Nothing is more striking or disagreeable to one visiting London from Manchester, or such places as have had water introduced of a proper quality, than the curdiness engendered when soap is brought in contact with metropolitan waters. The least scientific adept knows that there is something wrong in this condition of waters. He sees that a considerable amount of soap-rubbing is required before the cleansing process which he has in view commences, and there is something in the water therefore which ought to be absent. He is right; the lime which causes the hardness and the harsh sensation in washing should be removed from the water since it is both unwholesome and expensive. The value of the soap consumed in London exceeds half-a-million sterling, and no small portion of this expenditure is due to the lime in the water. A patent method for removing this lime (Dr. Clark's process) is now in action at the Plumstead Waterworks, and has proved eminently successful. The water thus treated is softened and rendered incapable of throwing up green scum, or of forming the green deposit in water bottles so familiar to the consumers of Thames water. The company which has adopted this valuable process is however a new one, and we are not aware that a single engineer from the old companies has given any attention to this important and successful experiment. Nor do we believe that one of the old companies, although many of them are now reforming their works, contemplate making any attempt at ameliorating this expensive and unwholesome character of London water. 'Hard and impure waters,' says Dr. Prout, the father of organic chemistry as applied to medicine, 'possess great influence on urinary diseases and deposits; an old opinion of which I am constantly reminded by experience. They operate in various ways, and produce very different effects, on different diseases and constitutions; but their general influence in all forms of urinary deposition is, according to my observation, very unfavourable.'

Turning from the consideration of water to that of the condition of many articles of human food as sold by the retailer, we might be very apt to infer that nothing can ever be obtained genuine under the sun. But while this conclusion would be too sweeping, and as erroneous as that which would attribute universal adulteration of tea to the Chinese, because Sir Francis Davis years ago discovered that in certain cases Prussian blue and gypsum were used to face teas, still the conviction has been forced upon the public, that the character alone of a dealer is not sufficient to warrant the genuine character of the food he retails. Indeed so frequent has been the change in the composition of an article, while the name has been retained, that it is not uncommon for those engaged in such traffic, to defend the morality of their occupation by such an affirmation as that the name is nothing if the public taste is satisfied. What is sold as mustard they tell us is scarcely ever derived from the mustard plant, but is an imitation of the colour and taste of ground mustard seed, consisting of flour and turmeric, or whatever suits the dealer; and this substitution has been supplied, because the demand has been greater for it than for the genuine article. And so argues the sophisticating coffee-dealer when he sells, under the name of this refreshing beverage, the scorched ground roots of chicory or dandelions, carrots, or roasted peas, beans, &c. The same system of reasoning prevails with the adulterator of tea, when he mixes it with iron filings to magnify his profit on an article which is sold by weight, or when he tells us that a villanous compound of fifteen parts of hedge or black currant leaves, and eighty-five of catechu, under the name of *La Veno Beno*, assists in augmenting the flavour of tea. But it is impos-

sible so charitably to deal with the conduct of the imposition of potato starch for arrowroot, the watering of milk, the mixture of oil of vitriol with vinegar, the carelessness of allowing poisonous copper to become mixed with pickles during their preparation, or of criminally adding them to heighten their green aspect. Can we stigmatize as otherwise than deserving of punishment such dealers as mix rubbish with their spices, who colour cayenne pepper with poisonous red lead, who manufacture bottled fruits and vegetables mixed up with poisonous ingredients, either intentionally or through negligence?

Of coffee, Dr. Hassall says—

From an examination of this table, it appears that of the thirty-four coffees, *thirty-one* were adulterated; that chicory was present in *thirty-one* of the samples; roasted corn in twelve; beans and potato-flour each in one sample; that in sixteen cases the adulteration consisted of chicory only; that in the remaining fifteen samples the adulteration consisted of chicory, and either roasted corn, beans, or potatoes; that in many instances the quantity of coffee present was very small; while in others it formed not more than one-fifth, fourth, third, half, and so on, of the whole article. From calculations which we have made, we are satisfied that the gross aggregate of the adulterations detected did not amount to less than one-third of the entire bulk of the quantity purchased. Now, on referring to the revenue returns, we find that the sum derived from the duty on coffee for 1849, was £709,632 3s. 11d., an amount which we have no hesitation in saying might be increased by vigilance in the detection of the adulteration of this important article, and by punishment of the fraud when detected, very nearly to £1,000,000.

In reference to brown sugars, we find it stated that of thirty-six samples, disgusting looking acari (small insects) were present in thirty-three; sporules and filaments of fungus in at least ten cases; that grape sugar was detected in the whole thirty-six sugars, often in very considerable amount; that the whole of the sugars contained vegetable albumen; that woody fibre, pieces of sugar-cane, stones, wood, and starch or flour were to be found in most of the specimens.

Arrowroot, we are told, was adulterated, in twenty-two out of fifty samples, with potato-flour, sago-meal, and tapioca-starch. Of forty-two specimens of pepper, one half was adulterated with wheat-flour, linseed-meal, pea-flour, mustard-seed, &c. Genuine mustard, we are informed, whatever be the price paid for it, is scarcely ever to be obtained; that of forty-two samples submitted to examination, every one was adulterated; that the adulteration practised in every case was the same in kind, varying only in degree, and consisted in the admixture of genuine mustard with immense quantities of wheaten flour, highly coloured with turmeric. Of fifty-six samples of cocoa eight only were genuine, sugar being used for adulterating purposes in forty-three specimens, sometimes nearly to the extent of fifty per cent. Starch also entered into the composition of forty-six samples, the quantity varying from five to nearly fifty per cent., and consisting either of wheat, potato-flour, sago-meal, &c., or mixtures of these in various proportions; while in other cases cocoa was adulterated with chicory. Of sixteen specimens of oatmeal, thirteen were adulterated with barley-meal. This exposure is one pregnant with import to the poor, since oatmeal is far more nutritious than barley-meal; but the following letter exhibits the cause of the villany, and upon whom the fraud falls :—

'Since your able analyses have taken place, it has struck me that I may be able to give you a little information as to an article of food which is adulterated to a most awful extent—viz., oatmeal. I will first mention oatmeal as sent into workhouses, prisons, and charitable institutions, which are generally taken at contract prices. I enclose one for the parish of ———, for 1848, where I find the oatmeal was taken at 14s. per cwt. by ——, and by reference to my stock-book I find the market-price was 17s. 6d. per cwt; thus the oatmeal was reduced 3s. 6d., and left an excellent profit. Well, at that time I was trying for all the contracts in London, and could not succeed, my prices being generally about 4s. dearer than anyone's else. This was a mystery to me. By accident I found out oatmeal was adulterated with barley-flour, which is bought at

about 7s. per cwt.; this being mixed with the oatmeal, of course reduced the price, and then being as wise as my competitors, tried, and have served the above workhouse since. Now, the fault lies here. If the workhouse were to take the contracts at a per-centage on market value, then they would get good oatmeal; but they always cut down the price, and thus get an adulterated article. You will see the prices are 14s., 15s. 6d., 16s., and 17s.; thus, if a man wants to be honest with them, *they will not let him.* I have again and again wished to supply at a per-centage on market value; the answer I get is, 'Well, we are very well satisfied, and have no complaints.'"

The author affirms that he has, from the preceding hint, examined samples procured from our unions and workhouses, and has found them, without exception, to be adulterated with barley-meal. Though there may be no poisoning result in this fraud, it is precisely analogous to other kinds of swindling, since it is receiving money with an engagement to pay an equivalent without the performance of the promise. That the unfortunate persons defrauded are ignorant of the deception does not, according to the Artful Dodger's moral code, diminish the crime, or remove it in the smallest degree from the guilty category. If when making such large purchases the guardians of the poor were to have their flours and meats chemically examined, such frauds would be prevented.

It is a remarkable circumstance that chemistry has made more impression on those connected with agriculture than on any other branch of trade. The dealers in manures have the prices of their articles entirely determined by their chemical value, and their proposal to sell is uniformly accompanied with a statement of the exact composition of the article in question.

Tea was found to be adulterated in twelve out of thirty-five samples. The genuine teas were the congos and souchongs; and the adulterated teas, samples of scented pekoe and scented caper, Chusan, or black gunpowder, as well as imitations of these made from tea-dust. The adulterations detected consisted in facing, so as to improve the appearance of the teas, the surfaces of the leaves with black-lead, an iridescent powder resembling mica, indigo and turmeric; and in the manufacture of imitation-tea out of tea-dust, sand, &c. It appears likewise that the fabrication of spurious black tea is carried on extensively at the present time in the metropolis, and in other towns of the kingdom, two processes of manufacture being adopted. In the first the exhausted tea-leaves are made up with gum and re-dried: black-lead and the mica-like powder, rose-pink, and carbonate of lime being sometimes added to bloom or face the teas, as well as sulphate of iron or copperas to darken the colour of the leaves, and to give a stringency. In the second, other leaves than those of tea are used. These, after being dried, are broken down, mixed with gum catechu, and made into a paste; the leaves are then re-dried, and further broken down, and then re-coated with gum. The conclusions to which the commissioner has come with reference to green teas are startling, and are calculated to persuade the housewife to be contented with the black varieties. With the exception of a few green teas of British growth and manufacture from Assam, they are invariably adulterated. that is they are glazed with colouring matters of different kinds, the colouring matters used being in general Prussian blue, turmeric powder, and China clay, while other ingredients are occasionally employed — so that, in truth, in this country there is no such thing as a green tea, that is, a tea which possesses a natural green colour.

Milk, that important nutritive fluid, particularly to the young and aged, as is well known, does not escape the falsifying touch of the sophisticator. Of twenty-six samples examined, only twelve were genuine, while the remainder was also adulterated with water, in quantities varying from ten to fifty per cent. When this fraud is translated into a money value, it means that the milkman cheats us from the extent of $1\frac{1}{5}$d. to 6d. in the shilling, in fourteen times against twelve when we get genuine milk.

One of the most atrocious adulte-

rations is in the case of cayenne pepper, a most valuable and agreeable condiment, since here the purchaser is not merely defrauded, but is in danger of being poisoned. Of twenty-eight samples twenty-four were adulterated. Of these, twenty-two contained mineral colouring matter; in thirteen, poisonous red-lead was present, often in large and deadly quantities; Venetian red, red ochre, brick-dust, &c., were contained in seven samples; cinnabar or vermilion was detected in one sample. Six of the samples consisted of a mixture of ground rice, turmeric, and cayenne, coloured with either red-lead or a red ferruginous earth.

The beverages usually employed to minister to the wants of the toiling labourer are, no less than his substantial food, made the vehicles of fraud. The samples of stout either obtained from agents or purchased at the taps of several of the London porter-brewers, were considerably stronger than those procured from publicans — the latter thus acting the part of the milkmen in the nefarious use of water. Brown sugar and treacle, with salt, a mixture known under the name of *foots*, is employed in such cases to increase the specific gravity and heighten the colour of the beer which has thus been watered. Gin was found to range in strength from $22\frac{1}{3}$ to 49 per cent.; the strength being estimated by the amount of alcohol or strong spirit which can be distilled from it. All this variety is produced by the agency of water—that pure fluid which is thus extensively employed as an instrument of the most infamous frauds. Some of the samples contained oil of cinnamon, others cayenne pepper, to such an extent as to afford by evaporation a burning and fiery spirit. Most of the samples contained combined sulphates, chiefly derived from water and alum, used in the adulteration and clarification of the gins.

Butter, an article of universal consumption in this country, is extensively adulterated. All salt butters have been found to contain unusual quantities of water, ranging from $8\frac{1}{2}$ to $28\frac{1}{2}$ per cent., while the amount of salt varied from $1\frac{1}{2}$ to $8\frac{1}{4}$ per cent. Both water and salt in excess in butter must be viewed as fraudulent sophistications. Some strange revelations of the adulterating process are given. We are told that it consists in bringing the butter to the melting point, then stirring in water and salt till the mixture is cold. We would earnestly direct the attention of our readers to the danger of using coloured and perfumed confectionary, the substances employed for these purposes being often poisonous. Cake ornaments are contaminated with poisonous white lead, the colouring matters being chromate of lead for yellows, vermilion for reds, Prussian blue, green verdigris, Scheele's green, all of which are more or less injurious, and some of them virulent poisons. Plaster of Paris is likewise extensively employed to adulterate sweetmeats, and is to be avoided as prejudicial to the stomach. For perfuming various comfits with the odour of pears, pine-apples, &c., poisonous preparations of oil of grain are used, which should also be carefully shunned.

One would have supposed that preserves, which are employed in comparatively limited quantities, would have some chance of being safe from the falsifier. But even in this expectation analysis disappoints us. Thus, in the article of anchovies, which all might take for granted was of true Gorgonic origin, it is found that not one-third of the samples sold consist of the genuine fish, which are replaced by Dutch fish of greatly inferior value, both as an article of diet and in price, while it is said that common sprats are frequently substituted. To conceal the muddy appearance of the brine in which the fish are preserved, it is customary to impart an unnatural or brown colour by means of Venetian red, Armenian bole, or probably brick earth. The reader must bear in mind that these tricks are not perpetrated alone by dealers in the purlieus of Whitechapel or St. Giles's, but that through the plate glass of Piccadilly and Regent-street may be detected the same filthy mixture destined to cheat the eye and cloy the stomach, after the manner of the savage earth-

eaters of the tropical regions of the earth.

These and other dangerous preparations have been well detected and exposed by Dr. Hassall, and are described in his book, which will repay frequent consultation, whether we refer to the letterpress, or to the botanical drawings, in which important vegetables are most truthfully delineated, and which are of great value not only as helps to detect imposture, but as records of scientific observations. After all the extraordinary revelations contained in this volume of the infamous condition of the articles sold in the provision-shops of the metropolis, we must confess that we were not merely surprised but shocked to find a literary critic making the extraordinary statement that the perusal of Dr. Hassall's book had raised the character of the London shopkeepers in his opinion. We very much question if such a total disconnexion between premises and conclusion were ever before perpetrated. Take but the limited statistics which we have given in this article, and say if in many substances of vital importance to life and health it were possible for the parties accused to commit greater frauds? or if the facts which have recently been revealed have not occasioned a kind of general want of confidence in all connected with the supply of the necessaries of life? Such superficial opinions, propounded for popular purposes, are mischievous in the highest degree, and degrade literature and science through such organs of the press as give utterance to them. The *Lancet* has confirmed preceding experience, which has shown that no dependence is to be placed on the virtuous self-laudation of advertising dealers in reference to their stocks. A notorious murderer and tea-dealer distinguished himself by libellous attacks on his fellow tradesmen, which he suspended in his shop windows, while it is said he never laid in a more expensive stock of the Chinese vegetable, than what could be procured from the most convenient hawthorn hedges in the suburbs of town. A magistrate brought some tea one day to a chemical physician, complaining that although it was obtained from one of the best houses it would not *draw*. From its weight suspicion might have been aroused. The magistrate's friend, taking out his penknife, previously rubbed on a magnet, plunged it into the leaves, and withdrew it covered with iron filings. Is respectability of character a thorough safeguard against adulteration? We think not, unless the respectable uses the means for detecting the sophistication. Is it right in the Government to allow advertisements to appear in the newspapers, asserting that some unknown matter is valuable as a food for children, as long as the community are so badly educated as to give credit to every paragraph that appears in print, indited by the hand of mercenary empirics, and when even individuals who ought to know better write such a letter as the following to the advertising gentry?

> Sirs,—I am free to assure you that I have no ill will whatever to your preparations, which I have heard well spoken of in respectable quarters, and may very likely order for a trial on my own account ere long—I am Sirs, your obedient servant.

To make such experiments on human health appears to us most melancholy. To ascertain the wholesomeness of an article of diet would require many days of hard labour on the part of a chemical physician of decided *character*, since the chemical composition of food is now understood. It is not, therefore, required that every man should make trials on himself as to the nutritive or injurious influence of aliment. After the fearful exposures of the adulteration of meal which were made in Scotland during the period when the Government fed the starving Highlanders, and the Goldner infamy, the system of contract without scientific supervision seems impracticable. The value of the check thus properly exercised by the Excise for many years has rendered the adulteration of tobacco and snuff a comparative rarity. The absence of an equally stringent inspection of drugs is an argument in the same direction, since, although

we have a code of medicines, or a pharmacopœia, issued under the sanction of her Majesty, which declares it penal to make any preparation otherwise than as therein prescribed, experience has shown that to find articles corresponding in purity to such as are ordered, is the rare exception, and seldom the rule.

After a long acquaintance with the subject, we have come to the conclusion that it is the function of the Board of Health to organize a department for the scientific examination of provisions, drugs, and for the surveillance of all matters connected with the health of the community, such as the weekly examination of water supplied to the inhabitants, particularly of London; of the gas used in streets and houses; of the conditions of ventilation of public buildings and carriages; of rivers traversing towns; and of provision and butcher markets, &c. The details by which all these objects should be brought under constant check could be easily arranged by one familiar with the subjects. The existence of such an organization would of itself have a powerful moral influence on those disposed to fraudulent dealings, since they would be continually liable to informations and consequent detection. It would not be necessary to enter every shop daily, any more than it is incumbent for the police to check crime by entering each house in the metropolis. But the results of the examinations, both favourable and unfavourable, should be periodically announced at short intervals in an official organ of the Board of Health. It is through such an institution as this too that the subject of the sale of poisons should be arranged, and so much crime and temptation obviated. The local boards would thus have an opportunity of procuring scientific opinions on the aliments so presented to the population throughout the country.

Some time ago the importation of bitter seed gave rise to the idea among some traders, that as it was fit for nothing else, it might be roasted and sold as coffee. Application was made to a scientific man to supply a testimonial of the wholesomeness of the vegetable. And here, by way of digression, we may say that it is scarcely possible to reprobate in too strong terms the system which certain pretenders to science adopt, of allowing their signatures to be appended to certificates in commendation of articles which are puffed in advertising periodicals, whether this be done from the excuse of lucre or notoriety. The *savant* examined the importation, and pointed out to the parties that it contained none of the essential ingredients of coffee, and that to propose it as a substitute would be criminal; but he discovered during his investigation that the bitter principle which it contained, and which rendered it nauseous to cattle, could be very easily removed simply by the action of water. The mode of using the cargo legitimately was thus pointed out and carried into effect, and a swindle obviated.

A properly arranged scientific department of the Board of Health would take cognizance of all such matters. It would publish from time to time the names of defaulters, and the nature of the adulterations; it would point out the proper mode of using many commercial articles which might be ignorantly proposed as aliment, or for purposes which were detrimental to health. It would keep the public on their guard against empirics. For example, if the Government should still continue to protect the sale of quack medicines, should it not at the same time publish the composition of the physic which it, in some measure, recommends to the public? This practice is pursued with reference to patents bearing on the industry and wealth of the country, and why should it not be applied to the more tender and precarious subject of human health? We can replace a spinning-jenny when it has been consumed, but a valuable life is comparatively a rare commodity, and to repair the loss to the community of such a deprivation may require the lapse of many years. The Excise at the present time send their officers, from time to time, into the shops of those who deal in the articles under their cognizance, and examine chemically and microscopically the suspected objects. Among these officers are several

experienced scientific observers, who have been carefully educated. This valuable improvement was introduced by the present able Chairman, and has been in active exercise for many years. The only deficiency in this arrangement is the absence of a controlling head, thoroughly acquainted with the existing condition of the collateral sciences. 'The absence of any very great or extensive adulteration is to be explained, we apprehend, by the constant supervision exercised over the manufacture of tobacco on the part of the Excise.' This is the affirmation of Dr. Hassall, and holds out every prospect of a similar result in reference to the surveillance of articles intended for human consumption. The Excise, however, have not been so successful in the prevention of adulteration in retailed spirits and fermented liquors. In this respect the Sanitary Commission has done good service, and has demonstrated that the best way is to detect and pillory the perpetrators of such abominations as are now common, of mixing tincture of capsicum or cayenne, oil of cassia with gin, and thus advertise the consumers of such substances of the nature of the fiery particles introduced into their interiors. The Board of Health has already, unlike its predecessor, begun its operations on a genuine scientific basis, by the appointment of a Medical Council, and the publication of a series of reports on the state of the water supply and the atmosphere, and the influence of medicine on the epidemic which has so recently devastated many a dwelling. We begin to have some hopes that our Government has at last discovered the only genuine method of instituting inquiries, viz., not by compiling Blue Books filled with an *omnium gatherum* of all sorts of opinions, conjectures, and surmises, but by putting forth a simple statement of facts by competent, responsible observers, and a scientific analysis of the results, and careful logical deductions without overstraining the premises. The reports now issued by the Board of Health are of such a character that they cannot fail to prove valuable works of reference in the sciences of meteorology, chemistry, natural history, &c.; and from the care with which the data have been obtained, the caution exercised in the conclusions, the artistic power exhibited in the drawings, there can be no doubt the Board will constitute a new power in the state, if its operations are followed out as ably as they have been commenced.

DREAM-LAND.

Wonderful Life!
So sad with partings, and so sweet with meetings,
Made up of wild farewells, and wilder greetings;
Oh word, with wonder rife!

What do we here?
Whence come we with this longing loving breast?
Why do we live to die? we fear our rest;
And are afraid to fear!

Ah! tell us why,
Why are our pleasures dead within the day,
While pains make nest-homes of our hearts and stay!
Wherefore comes misery?

And wherefore Pain?
And why on our sad Planet, else so fair,
Dwell Hate, and Cowardice, and pale Despair,
And the hot rage for gain?