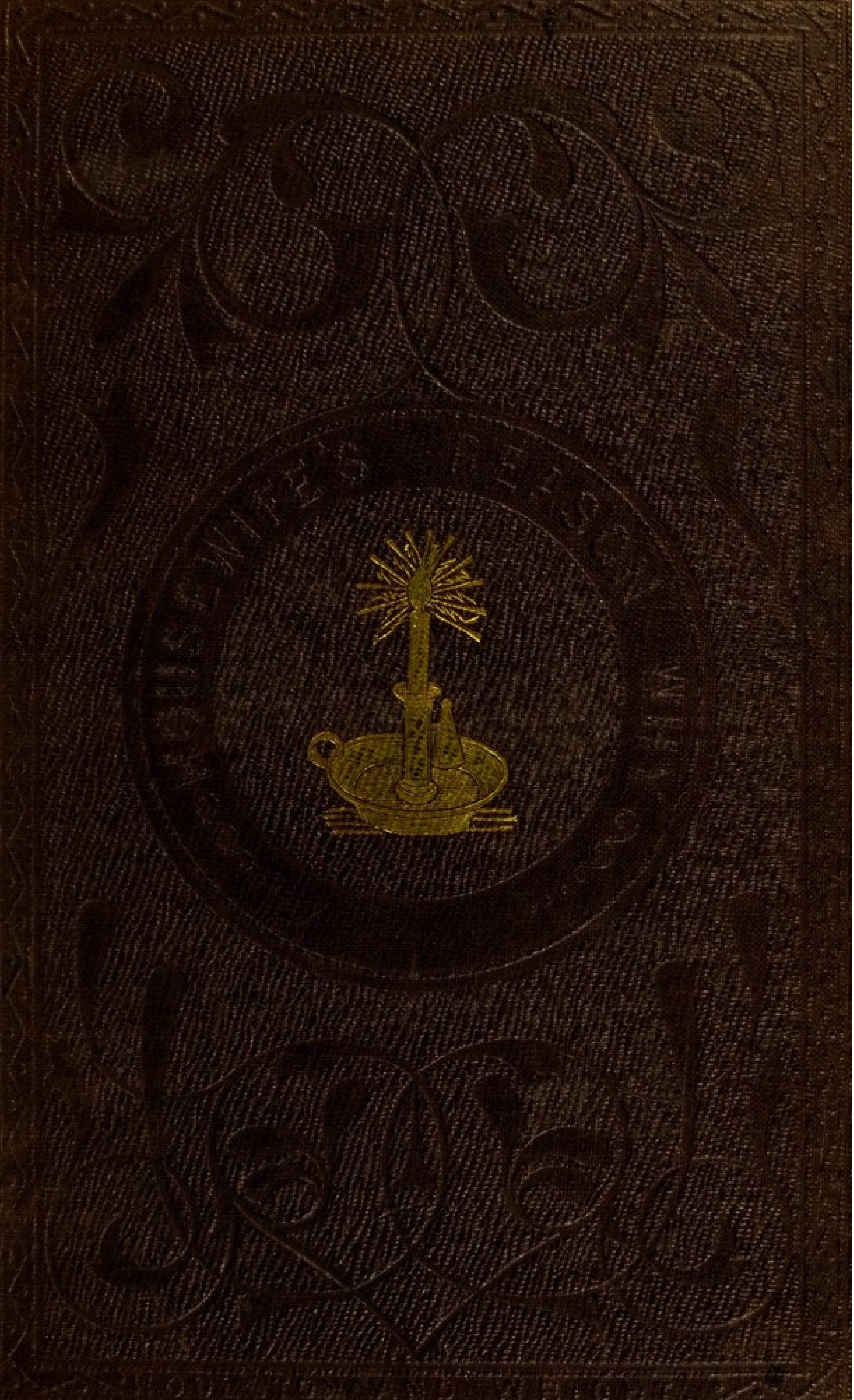
HOUSEWIFE'S

THE HOUSEWIFE'S REASON WHY

AFFORDING TO

THE MANAGER OF HOUSEHOLD AFFAIRS INTELLIGIBLE REASONS FOR THE VARIOUS DUTIES SHE HAS TO PERFORM.

"Strong reasons make strong actions."—SHAKSPERE.

"My reasons are most strong, and you shall know them."
ALL'S WELL THAT ENDS WELL.

"Their understanding
Begins to swell; and the approaching tide
Will shortly fill the reasonable shores,
That now lie foul and muddy."—THE TEMPEST.

"As the morning steals upon the night,
Melting the darkness; so their rising senses
Begin to chase the ignorant fumes that mantle
Their clearer reason."—THE TEMPEST.

PHILP, Robert Kemp

BY THE AUTHOR OF
"THE REASON WHY—GENERAL SCIENCE," &c.

LONDON:
HOULSTON & WRIGHT, 65, PATERNOSTER ROW.

1857

LONDON:
THOMAS HARRILD, PRINTER, 11, SALISBURY SQUARE,
FLEET STREET.

PREFACE.

In recent years Science, which was once understood to stand apart from common things, and to treat only of rare and startling phenomena, has taken quite a domestic turn, and condescended to use the kitchen of the Housewife as a laboratory.

We find Liebig writing upon "the Chemistry of Food," and explaining the philosophy of the boiling or roasting of meat; Donovan treating of Domestic Economy, from the quality of flour to the amount of nutriment in bones; Lardner expounding Domestic Science, from the lighting of a fire to the best method of making tea, through the agency of a non-radiating tea-pot. Johnston, in his "Chemistry of Common Life," treats of "the air we breathe," "the water we drink," "the bread we eat," and "the beef we cook." Various other authors, of equal celebrity, appear to have discovered that the homestead may be made one of the best schools of science.

But there appears to be a considerable drawback to the good that might result from the fraternal co-operation of the Chemist and the Cook: the former does not need the familiar phenomena afforded by the operations of the latter; he has other means of studying the simple or the elective affinities, and the attractive or repulsive agencies; his endeavour, therefore, to throw light upon domestic phenomena is an evidence of good-will to those who have no other means of understanding the processes they have daily to superintend; but the cook cannot comprehend the scientific nomenclatures employed by scientific writers, which, though less used now than formerly, are still employed sufficiently to render facts and principles obscure to the minds of those for whose benefit they are designed.

The good housewife, when she takes up Liebig, is rejoiced to think that so great a man has condescended to throw the light of philosophy upon her daily operations; and she eagerly turns over his pages to seek that knowledge which shall in future make her duties intelligible and pleasing.

But when she finds that the learned chemist, in explaining the properties and elements of meat, tells her that it is composed of *albumen*, *fibrin*, *creatine*, *creatinine*, *lactic acid*, *inosimic acid*, and various *inorganic salts*, and that these are made up of *carbon*, *oxygen*, *hydrogen*, and *azote*, she becomes alarmed at the complexity of the new theory which she felt ambitious to understand, and falls back upon her old notions about "fat and lean, bone and gristle."

It seems to us, therefore, that some one should come between the Philosopher and the Housewife, and endeavour to do away with their unnecessary estrangement.

The Author of the HOUSEWIFE'S REASON WHY, having proposed to himself the task, has made very wide researches in order to bring within the pages of this volume, in the most simple but expressive language, all those illustrations of scientific principles which bear upon the Housewife's duties; so that she may not only know that she should do a thing, but WHY she should do it, and knowing why, perform it all the more effectively and willingly.

Wherever the introduction of scientific terms has been found necessary, they have been explained by reference to some familiar fact or phenomena illustrative of their meaning and application; and in many instances where, for the sake of simplicity, the scientific terms have been omitted altogether from the text, they have been printed in small type immediately after the matter to which they relate, so that those who prefer to retain some of the technicalities of science, and thus give a higher tone to the knowledge they acquire, can do so.

The Author wishes it to be distinctly understood that this work consists chiefly of a *collection* of reasons. But every reason has been carefully weighed in his own mind, and simplified by being partly clothed in his own language. In many cases he was called upon to exercise a careful judgment in the selection of the *best* reasons for phenomena upon which differences of opinion prevailed; and, in other instances, to supply original explanations of matters suggested to him by observation and reading, but of which no satisfactory solution could be found in previous works.

In the pursuit of the soundest information, a large number of works have been consulted. The many notes below the pages add to the value of the "reasons" given, by showing the authority upon which they are based; while they secure to the author or discoverer of any new idea or principle the merit of such discovery.

Of the hundreds of "reasons" contained in this volume, it may be said that every one of them has a practical application; that domestic duties of every kind will be more ably and cheerfully performed, because the Housewife knows the REASON WHY.

Upon the subjects of health, and the management of children, very ample chapters are given. But there has been no attempt made to induce the parent to affect a knowledge of medicine, and to undertake the cure of disease. The principle which has been recognised by the Author of THE HOUSEWIFE'S REASON WHY, is that which has been admirably expressed by Dr. Underwood. He says:—"I am disposed to estimate at a high value the co-operation of the watchful and intelligent parent, in the observation and treatment of the diseases of infants and children. The parent should not be her infant's physician, but she should be its watchful nurse. She should not pretend to understand diseases, which would imply a knowledge of anatomy, physiology, and pathology, which she cannot be supposed to possess; but she should be as one who carefully prepares a brief for counsel, collecting the evidence, but leaving the inferences and the decision to him."

In Van Oven's work upon "The Decline of Life in Health and Disease," he quotes the remark of the celebrated Heberden, that "the life of a physician should be like that of a vestal virgin, which was divided into three periods, in the first of which she learned her profession, in the second she practised it, and in the third she taught it to others."

Such should be the plan of life of every mother. Keeping this principle in view, we have sought to enable the Housewife to *learn*, to *practise*, and to *teach*, many of those essential things upon which the happiness of life depends.

LONDON, *November*, 1857.

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**** *The figures refer to the number of the paragraphs.*

NARRATIVE, AND DEDICATION TO "OWLEY."

FOR the information of the reader I must state that "Owley" was a domestic servant who lived a great part of her life in the service of my Grandfather, with whom I was brought up. When I was a child she was an old woman, but very active, and a perfect mistress of the art of cookery, and of domestic management in general. Between "Owley" and myself there always subsisted the most friendly relation. I was her favourite, and she was mine,—for reasons which this Narrative will gratefully acknowledge. Why she came to be called "Owley" I can scarcely tell, though I believe that her surname resembled it in sound, and that the children having christened her "Owley," she became so proud of it that she at once forgot her godfathers and godmothers, and would answer only to the name which the "little darlings" had conferred upon her. She died many years ago. This volume is affectionately

DEDICATED TO HER MEMORY.

MY first recollections of life carry me back to the time when a kind maiden Aunt and poor widowed "Owley" rivalled each other in their attentions to the caprices of my childhood. Both of them were very indulgent, but Owley extremely so. In every childish struggle I found a champion. When Aunty chided, Owley took my part; and when Owley became my censor, which she rarely did, Aunty came to my rescue.

The scene of Owley's existence was the kitchen; there she achieved those works of culinary perfection which commended her to my early love. I well remember the whiteness of the tables and the floor, the long range of polished dish-covers hanging against the walls in a graduated range from number one, which covered the relishes of the breakfast-table, to number twelve, that came into requisition always at Christmas, and then threw its protecting shield over the finest piece of beef that a good country market could produce.

I can picture to my mind the well-filled dresser, with cups and jugs of all shapes and sizes, which had evidently been modelled before art manufactures had made much progress; and shelves loaded with dishes and plates of the old "willow pattern." I remember the stories which Owley used to tell me about the man in the boat, the three figures on the bridge, the two doves in the air, and the great apples on the trees.

I can tell the very spot where, over the mantelpiece, hung large and small graters, corkscrews, a pyramid of ladles, the flour dredge, and pepper and spice boxes of various sizes, with cups, moulds, strainers, and other apparatus essential to the manipulations of Owley's laboratory; and I well remember the old-fashioned silver watch, round as a turnip, whose black hands kept time as accurately as the electric clock, and between whose workings and my appetite there existed a mysterious sympathy. There are many domestics whose motto seems to be, "A place for everything, *and nothing in its place*;" but it was otherwise with Owley, and hence, though some forty years have rolled away since I looked upon that once familiar scene, I vividly see Owley, surrounded by all the emblems of her science, each in its exact and proper position.

I remember the glorious kitchen fire, which threw its cheering heat into the room, and before which I delighted to stand, when the cold frosts of winter chilled my little fingers and toes, and drove me, like a Robin on a snowy day, from my pleasures in the open air.

I often asked Owley where all the coals went which she put upon the fire? and why the great block of wood, which I used to jump over in the garden, burnt all away when she placed it on the coals, leaving only a few quivering embers, in which I used to trace bright sparks running to and fro, as if they were alive, and made the fire-place their play-ground. What Owley said about these things I can scarcely remember; but I think that *caloric* was a name unknown to her, that *hydrogen* and *oxygen* were not among the revelations which she had received, and that if any one had spoken to her of *carbonic acid gas*, the mere words would have exercised upon her a suffocating effect, almost as fatal as that of the gas itself.

One thing that puzzled me much was the turning of the smoke-jack, and its connection with the spit. How they kept going round and round I could not tell; and I believe that all my appeals to Owley for an explanation of the subject only puzzled her, without enlightening me.

I recollect one day, when, returning from school, I found her with her lap widely spread and full of peas, she told me that she feared she could not shell them all in time; so I volunteered to assist her, and did so, levying a heavy tax upon the raw material for the services I performed. While we were thus engaged, and noticing her anxiety to finish her work, I asked her, How the peas got into the shells? To this she replied, "God put them there,"—an answer which, though I have read some hundreds of books since then, and learnt many things which Owley never dreamt of, I cannot much improve upon. For although I have become acquainted with the wonderful organizations of plants, and the mysterious manner in which they feed upon the gases of the air, and convert that into a solid and palpable form which but a short time before was lost to every sense that we enjoy,—to answer the question, How peas get into shells? would require a whole volume, and then, to a great extent, be unexplained. So I am convinced that Owley knew something, and that, knowing little, she knew the *better part* of philosophy.

I remember, upon another occasion, when she was cleaning my grandfather's shoes, I asked her why, when she put on the blacking, it was of a dull black? and why, when she rubbed another brush over it, it began to shine, and at last became so bright that I could discover my face where I could see nothing but a dull blackness before? And I remember that the answer she gave me was *a large apple*, which immediately diverted my attention from the subject, and gave her time to revolve the problem, and me time to forget it.

I recollect, at another time, taking up a silver spoon, and asking her why, when I looked into the bowl, I appeared upside down, and had such a long face? and when I turned the spoon round and put my face close to it, why I had such a large nose, though by feeling it I found it to be no bigger than before? Upon this occasion she dipped the spoon into some preserves, which had the effect of transferring the interest of the subject from my nose to my mouth, and I felt, as I have always done, that I lost nothing by asking a question.

I used to stand watching Owley's operations before the fire, and my mouth watered when I saw the rich dripping trickling from the meat into the pan beneath. But having been frequently warned by her never to touch anything near the fire, I used to clasp my hands behind my back, stand off at a moderate distance, and look wistfully at the turning joint. This stratagem never failed to bring me something: a slice of home-made bread, dipped into that part of the gravy which clung to the slanting sides of the dripping-pan, was the general offering to Owley's favourite. How nice those pieces of bread were! what a delicious savour! I used to ask Owley why they were so nice? and she replied that I was hungry, and that "hunger was the best sauce," which was doubtless true; but had Owley lived until now I could have astonished her by talking of the *osmazome* of the juice of meat, to which it owes its peculiar and savoury flavour.

Owley used to set a large pan of flour by the fire, and into it she put some yeast and water. This she called "setting a sponge." When she had prepared the mixture, she placed the pan near to the fire, and covered it over with a thick flannel. I was curious to know what went on under that flannel; so I used at times to lift it up and peep beneath, and then I saw large bubbles rise and burst. That was a great treat for me. I wondered where they all came from? Whenever I asked Owley, she replied that if I didn't put down the flannel, I should spoil her sponge, and make her bread heavy. That was the only explanation I could obtain from her; the process of *fermentation* probably being a mystery which she never dared to investigate.

When Owley was preparing for washing-days, I enjoyed a great treat. She used to draw from a deep well numerous pails of water, with which she filled large tubs, leaving it to stand some time before using it. She said it made the water soft, and I thought that by dipping my arm in it, and tossing it about, I must help the softening process. I fancied this, because I liked the amusement, and have since been pleased to learn that there was some truth in my childish supposition. My little fleet of paper boats upon the water in these tubs, afforded me great joy. I asked Owley why it was that they swam, and did not go down to the bottom, like the pebbles I dropped in. She instructed me by saying that the paper boats swam, *and so did the great ships* that were out in the harbour; an explanation which satisfied me for the time, since I clearly saw that if a great ship could swim, a piece of paper might do so. But I have since learned something about the *specific gravites* of bodies, which I think must have had to do with my paper boats, as well as the great ships, even at that time.

I noticed one day, that when I dipped my arm into the water, it looked much shorter than before. I called to Owley, and pointed her attention to this extraordinary fact, that when my arm was immersed in the water, it seemed much shorter than when I drew it out. Owley, who generally gave way to my childish notions, felt called upon to repudiate such a misconception as this; and she denied, not only that my arm became shorter, but that it even appeared so. However, I begged her to get a stick and to measure, which she immediately did; but in making the attempt we were completely puzzled, because, when she put the stick into the water, it appeared to become shorter too. So Owley saw that there was something in it, but instead of explaining what that something was, she intimated to me that I had wetted the sleeve of my frock, and that if Aunty discovered it, she would be very angry indeed. To avoid being called a refractory boy, I gave up for the time my play with the water, and the further investigation of the problem that had puzzled Owley and myself. It was not until many years had elapsed, and after Owley had passed to another world, that I found that the *refraction of light*, in passing from the air to the denser medium, water, was the phenomenon that had perplexed us.

I used to be greatly delighted, as evening closed in, to see Owley strike a light. Lucifer matches were not among the domestic conveniences of that day. The old tinder-box, flint and steel, was the most perfect invention of the time. How fire could come out of either flint or steel puzzled me very much, and I think I catechised Owley upon it a hundred times. Sometimes, when the tinder was slow, or when, from some other cause, the sparks came feebly, she used to say, "My child, I *never shall* get a light if you keep on talking." I don't wonder at her being puzzled, since even now I find it difficult to understand that heat lies hidden in both flint and steel, and that the violent percussion of the substances forces out some of that element previously locked up within them. No one can doubt the fact, because it is demonstrable, but it is so wonderful that it is difficult to comprehend.

The construction of the bellows was a matter of very great curiosity to me; and I believe I interrogated Owley thereon until I wearied her, without having my curiosity satisfied. But one discovery connected therewith afforded me infinite amusement: it was, that if I put my finger into the valve at the bottom, Owley's hand which worked the little machine dropped suddenly down, and her efforts to blow the fire were ineffectual. The great interest which I took in this fact, led me to experiment upon it more frequently than was agreeable to my good old friend, who generally put an end to my experimentalising, by directing the machine against myself, and fairly blowing me away from the place where I could work further mischief.

My inquiries which were addressed to Owley were not limited to matters of a domestic nature. I remember asking her one evening why the moon, which looked so much larger than the sun, gave less light? and when she told me that the size had nothing to do with it, I ventured to contradict her, saying that I knew that large candles gave more light than little ones. Probably she had no knowledge of the relative distances and sizes of the two luminaries; but she did know something in relation to the subject, as she told me that the moon borrowed its light from the sun; from which I ventured again to dissent, saying that if the moon shone with light borrowed from the sun, it would give just the same sort of light as the sun itself. When she asked me how I could make that appear, I told her that if she lent a candle to any one, it would burn just as brightly with that person, as it would if she burnt it herself. A resolution on Owley's part that it was time for me to go to bed, put an end to our discussion upon astronomical theories for that evening, and I have an impression that she felt reluctant to renew the subject ever afterwards.

In my early childhood I slept in a little cot, in Owley's room. One night I awoke just as she was stretching out of bed, with the extinguisher in her hand. "Owley!" said I, So she drew back, and turned her face, which was buried in a superfluity of snow-white cap-borders, towards me. "You awake at this time of night!" she exclaimed. "What do you want?" "I want to know, Owley, where the light will go, when you put out the candle?" Owley paused, and for a few minutes seemed spell-bound; her hand, the extinguisher, the candle, there they were, immoveable! Something must have flashed across Owley's mind—she was about to do a thing she could not comprehend, and therefore hesitated doing; a thing she had done many thousands of times before, but had given no heed to; yet in that act, so many times performed, she had suddenly recognised some impenetrable mystery! "Owley," said I, again, "what are you stopping for?" The extinguisher immediately dropped upon the candle, and she muttered, in a low tone, "Go to sleep." I have often thought of that circumstance, and feel convinced, after a large acquaintance with the world, that there are many, from whom better things might be expected, who, when inquiring minds ask them for knowledge, only mutter, as poor old Owley did, "Go to sleep!"

Owley was naturally intelligent, but quite without education. She had perception enough to see that there was something in each of the many problems I proposed to her, though she knew not what; and while her kindness of heart made her delight to listen to the curiosity of a child, it many times grieved her to think that she could not satisfy that curiosity. I often overheard her talking to my Aunt upon the subject of some of my previous inquiries; and never failed to get such an interpretation of the information thus derived as Owley was capable of rendering. My Aunt's explanations were above my capacity; but Owley, if she could not satisfy me, never discouraged me, and I always felt privileged to question her.

There was an air of tenderness in everything she did—an atmosphere of kindness seemed to surround her. She was practically intelligent; though theoretically she knew nothing. I must, upon many occasions, have enlightened her by my questions, for it had never occurred to her before that such things *might be asked*.

Owley had a cure for all my childish ailments; no hand assuaged a painful colic like hers; no ointment like hers subdued tormenting chilblains; stiff necks and sore throats vanished under her treatment, and growing pains gave way to balmy sleep. Recovering from fever, it was desired that I should eat; many kind friends pressed around me, and tried to tempt me so to do. No one but Owley could succeed. *They* presented me with bread, upon which some nice preserves had been spread; they placed it to my mouth, but I rejected the tasteless morsel; *she* simply turned it over, and pressing the preserves *upon my tongue*, which only the dry bread had touched before, at once awoke my slumbering taste, and brought back my truant appetite.

These are some of the benefactions which Owley conferred upon me in my childhood. They may appear trifles, but they were *then* ALL to me. The sorrows of a child, while they last, are as intense as those that spring from the weightier cares of maturer age. The child loses a toy, the king a throne. The elements of grief are, for a time, the same with each. Should we not feel a lasting gratitude to those who heal the cares we cannot master, and smooth our way in life until we are strong enough to grapple with its deeper trials? And if a poor unlettered woman was capable of doing so much good, how much greater may be the works of those who have the present opportunities of acquiring knowledge, and understanding the "reason why" for the many things they do?

THE AUTHOR.

LONDON, *November*, 1857.

WORKS BY THE SAME AUTHOR.

THE REASON WHY—GENERAL SCIENCE.

THE HOUSEWIFE'S REASON WHY.

PREPARING FOR PUBLICATION.

THE HISTORICAL REASON WHY.

THE GARDENERS' AND FARMERS' REASON WHY.

THE

HOUSEWIFE'S REASON WHY.

"Good reasons must of force give place to better."—SHAKSPERE'S HENRY IV.

THE

HOUSEWIFE'S REASON WHY.

CHAPTER I.

1. *Why is a knowledge of the properties and uses of food essential?*

Because food supplies the elements by which our bodies are built up and sustained. Our physical natures cannot thrive if they are supplied with materials unfit for their use. Dr. Arbuthnot used to say that "the choice and measure of the materials of which our bodies are composed, which we take daily by *pounds*, is at least of as much importance as what we take *seldom*, and only by *grains* and *spoonfuls*."

2. *What are the various nutritive substances derived from the animal and vegetable kingdoms?*

They are ALBUMEN, FIBRIN, GELATINE, OIL and FAT, GLUTEN, STARCH, GUM, MUCILAGE, SUGAR, SALTS, ACIDS, &c.

3. *Of what chemical elements do these nutritive substances consist?*

Some of them consist of *oxygen*, *hydrogen*, *carbon*, and *nitrogen*, in various proportions. Others consist of *oxygen*, *hydrogen*, and *carbon*.

Those that contain nitrogen are called *azotised* substances; those that contain no nitrogen are called *non-azotised*.

Azotised, from *azote*—a name frequently applied to nitrogen.

4. *Albuminous* substances are found in eggs, the flesh of animals, and in the farinaceous parts of vegetables.

5. *Fibrinous.*—The flesh and blood of various animals and portions of vegetables. Fibrin is albumen in a higher state of organisation.

6. *Gelatinous.*—The flesh of young animals, veal, chickens, calf's head and feet, some fishes.

7. *Oleaginous; Fatty and Oily.*—Animal fats, oils, butter, cheese, milk, &c. Vegetable oils, marrows, cocoa, and various nuts.

8. *Farinaceous.*—Wheat, barley, oats, rice, rye, potatoes, sago, arrowroot.

9. *Mucilaginous*—Animal and vegetable juices, carrots, turnips, asparagus, cabbage, &c.

10. *Saccharine.*—The different kinds of sugar, figs, dates, beetroot, carrots, parsnips.

11. *Acidulous.*—Lemons, oranges, apples, grapes, currants.

12. *How may alimentary bodies be classified to express their relative nutritiveness?*

Into two classes. *First*—Meat, bread, and leguminous seeds. *Second*—Edible roots, fruit, and vegetables.

13. *What is albumen?*

Albumen exists in two states in animal substances, *uncoagulated* and *coagulated.* Raw white of eggs presents the purest example of it in the former state; whilst cartilage, horn, hair, and nails consist chiefly of it in the latter. It is one of the principal constituents of the blood, brain, and glands; and enters largely into the composition of oysters, whelks, periwinkles, and snails. It also exists in vegetables.

14. *What is fibrin?*

Fibrin is the principal component of the muscles of animals. The purest form of fibrin met with, under ordinary circumstances, is the *fibres of meat* which has been boiled slowly for a considerable time, as in the process of making beef-tea.

15. *What is gelatine?*

Gelatine is the well-known substance of which *jellies* are

"Let go thy hold when a great wheel runs down a hill, lest it break thy neck with following it; but the great one that goes up the hill, let him draw thee after."
LEAR.

formed. The bones, cartilages, tendons, and ligaments of animals are the parts in which it is found. It constitutes the basis of soups, and is one of the most useful, nourishing, and agreeable ingredients of food.

16. *What is osmazome?*

Osmazome is a peculiar animal substance, to which meat and most compounds of it are indebted for their *peculiar odour and savour*. It is found in the fibrous parts of flesh, and in the blood and brain. The flesh of game, and of full-grown animals, contain it in the largest quantities; it has also been traced in mushrooms, and in a few other plants.

17. *What is gluten?*

Gluten appears to be a *mixture* of fibrin with glutine.

18. *What is caseine?*

Caseine is distinguished from fibrin and albumen by its *not coagulating*, either spontaneously or by heat, and by forming a skin when its solution is evaporated.

19. *What is legumin?*

Legumin is an alimentary substance, *similar to vegetable albumen;* it is so called, because it is the albuminous principle found in *leguminous seeds*, such as peas, beans, lentils, &c.

Leguminous.—Leguminous plants are those which have pods to hold their seeds, as beans, peas, &c.

20. *What is oleine?*

Oleine is a very *fine and delicate oil.* The term is generally applied to refined preparations from oils and fats. One kind of oleine is used by watchmakers for their fine work.

21. *Where is albumen found?*

Albumen is found in vegetable juices; in most seeds, *in the solid form*, as in nuts, almonds, &c. It is also found *dissolved* in the blood, in the juice of flesh, and in other animal fluids.

"Happy are they that hear their own detractions, and can put them to mending."—
MUCH ADO ABOUT NOTHING.

22. *Where is fibrin found?*

Fibrin is found in *vegetable juices,* which deposit it spontaneously on standing. It is found also in seeds, especially those of the cereals, and in smaller quantity in other seeds. It occurs dissolved in blood, in which it coagulates on standing. It constitutes also the chief part of *muscular fibre.*

Cereals.—Grain-bearing plants, as wheat, barley, rye, &c.

23. *Where is gluten found?*

It is found in the flour of wheat and other grain; it *gives tenacity to paste;* it is also found in the juices of plants.

24. *Where is caseine found?*

Caseine is found in vegetables, chiefly in seeds, and in largest proportion in leguminous seeds. In the animal kingdom it is chiefly found *dissolved in milk,* and it is also found in some vegetable juices. It is that principle in milk which is coagulated by an acid, and which *forms cheese.* Cheese made from skim-milk, and well pressed, is nearly pure caseine.

25. *What are the effects of animal food upon the human system?*

It is *more nutritious* than vegetable food; and, used with discretion, causes a more complete development of the body to take place, and consequently increases the energies of different functions. It has the effect of increasing the amount of fibrin in the blood, and favouring the growth of the muscular system.

26. *What are the effects of vegetable food?*

Vegetable food *renders the blood lighter,* and is less stimulating than animal food, which is the reason of the preference shown for it in hot countries.

27. *What are the advantages of a mixed diet?*

It is found, upon very wide observation, that the people who do not limit themselves to either animal or vegetable food, but partake of both, are those in whom *the function of nutrition is most perfectly performed.* Every organ or tissue of their bodies is found to be in the most perfect state in which it can exist.

28. *Why are vegetables, though low in the scale of nutrition, yet very fit to be combined with nutritive meats?*

Because, though they convey little nutriment to the blood, they are of service as they *help to dissolve the albuminous substances of meat,* and they influence the state of the blood by keeping the albumen and fibrin in a liquefied state.

29. Vegetables contain inorganic compounds, which are very useful to our bodies, by assisting the process of digestion. In cabbage and asparagus, lettuce and cabbage sprouts, potash considerably predominates; in spinach, soda and potash are nearly equal; while in rhubarb a considerable amount of lime is contained. Cabbage sprouts are remarkable for their amount of lime and magnesia; and in the stalks and leaves of lettuce, in asparagus and cauliflower, traces of manganese, a metal very similar to iron, have been found.

CHAPTER II.

30. *Why is it said that "flesh makes flesh?"*

Because the meat that we eat, after being dissolved by the stomach, is *converted into blood,* and as such nourishes the various parts of our own bodies.

31. *Of what does flesh consist?*

Chiefly of albumen and fibrin. Albumen is a coagulable substance, similar to the white of eggs; and fibrin is a kind of fleshy fibre, which is shown by the thread-like bundles that are to be noticed in all kinds of flesh.

32. *Why is the flesh of herbivorous animals most commonly eaten?*

Because it is *milder,* more tender, and generally more wholesome than the flesh of carnivorous animals.

33. *Why does the flesh of fishes generally look white?*

Because it *abounds in albumen,* and contains comparatively little of fibrin.

"It is certain that either wise bearing or ignorant carriage is caught, as men take diseases of one another; therefore let men take heed of their company."

HENRY IV., Part II.

34. *Why is animal food more invigorating to the system than a pure vegetable diet?*

Because it is more readily converted into chyle (*digested*) than vegetable matter; and hence nutrition is more immediately supplied by it.

35. *What kinds of meat are the most digestible?*

The richer meats are in *soluble albumen,* the poorer they are in *fibrin* and *fat,* the more digestible they are. Thus the flesh of pigeons and fowls is more digestible than veal; veal more *digestible* than the muscles of oxen, sheep, &c.

36. *Why is the flesh of pigs and geese found to be indigestible?*

Because of the large quantity of *fat* which their flesh contains.

37. *What are the digestive qualities of fish?*

The flesh of fishes, on account of the small quantity of fibrin, and the abundance of *soluble albumen,* would be easily digestible; but it contains a quantity of *phosphorous fat,* which renders it difficult of solution in the digestive juices. This is also the case with the *brain* and *liver* of all vertebrate animals.

Vertebrated.—Having a back-bone containing the spinal marrow.

38. *To what may the difference in the taste of the flesh of various animals be attributed?*

The taste of the flesh of animals is greatly influenced by the *food upon which they live.* Fieldfares have a peculiar taste after they have eaten juniper berries; ducks, gulls, and other aquatic birds which feed on snails, crabs, and fish, have a peculiar taste *referrible to their food.* The flesh of swine in Tahiti, fed on fruits only, resembles veal. Game owes its savoury taste, in a great measure, to its large proportion of *kreatine.* Partridges lose their taste if cooped and fed like domestic fowls. Tame ducks, if left at liberty, become lean, but acquire the flavour of game.* Hence it will be found that the

* *Orr's Practical Chemistry*—Chemistry of Food. Houlston and Wright.

taste of the flesh of various animals arises from *their organisation*, the *food* upon which they live, and their *habits of life*.

39. *What are the nutritive properties of the internal organs of animals?*

The liver, spleen, sweetbread, brain, kidneys, and tripe, contain *soluble albumen* in remarkable abundance. Of these the sweetbread is the most delicate, because, in addition to a great quantity of albumen, it contains much gelatinous tissue, with a very small proportion of fat; while in the brain and liver a considerable quantity of phosphorous fat (an indigestible substance) is intermingled. The heart is indigestible, on account of its large amount of fibrin.

40. *What are the nutritive properties of eggs?*

No other aliment unites so completely the advantages of meat as the eggs of our domestic birds. The *yolk* and *white* consist chiefly of albuminous matters—the yolk of caseine and albumen, the white of soluble albumen containing some sulphur, and of an albuminous body containing a large quantity of sulphur. The white contains more water than the yolk; and the yolk is richer than the white in fat and in albuminous substances. The yellow oil of the yolk contains a large quantity of oleine.

41. *What kinds of meat are the most nutritious?*

All kinds of flesh contain a sufficient proportion of fat and salts to restore to the human body the *inorganic* constituents which it needs; but with regard to the organic substances, that flesh which contains albuminous matters in the greatest abundance is the most nutritious. Venison and beef are therefore more *nutritious* than veal, and veal more nutritious than fish. Pigeons and fowls surpass beef in nutritiveness, because they contain an equal amount of albuminous matters, with less fibrin, from which arises their superior digestibility. Pork is less nutritious than beef, because it possesses fewer albuminous compounds, and these are combined with a preponderant quantity of fat, which causes it to be indigestible.

"Our bodies are our gardens, to the which our wills are gardeners."—OTHELLO.

42. Dr. Truman says that many persons entertain very different opinions respecting the variety or the simplicity that should be observed in our eating. Some consider that the human race has degenerated, and that diseases have become more numerous and fatal since the variety of our food has been so much increased. Certain authors state in their writings that the ancient Greeks and Romans were mainly indebted for their superiority over their contemporaries, to their frugal manner of living, and to the little variety of diet they enjoyed; for they had neither brandy, liqueurs, tea, coffee, chocolate, sugar, butter, nor any of the numerous articles of food used at present in Europe, which have been introduced, or are imported, from Asia and America. Allowing that some of the greatest ornaments of the human race have emanated from among these people, the mass of the population were not all in an analogous state of advancement, but, on the contrary, were in a very abject condition both of mind and body, existing, for the most part, in a state of slavery. The average length of life was shorter amongst them than amongst us, and they were affected with many diseases more dreadful than anything of the kind known in modern times, as many forms of leprosy, &c., which must be principally attributed to defective nutrition of the body.

43. *Why is the sweetbread of calves suitable meat for invalids?*

Because it is *easily digestible,* and contains a large amount of *soluble albumen,* with a very small proportion of fat and fibrin.

44. *Is the flesh of very young animals unwholesome?*

The flesh of very young animals, although unpleasantly soft and flabby, is *not actually unwholesome.* It was enacted, in the reign of King James, that no butcher should kill any calf to sell under five weeks old.* This was based upon the supposition that such meat was unhealthy; but that is not the case. Calves are killed at from six to sixteen weeks old, but they are reckoned best at ten or twelve. Lambs are generally killed at from eight weeks to half a year.

45. *Why are animals sometimes "in season," and at other times "out of season?"*

The influence of the seasons upon animals depends upon the more or less plentiful supply of food to them, upon the kinds of food which they eat in summer or winter, upon the periodical changes which take place in their bodies, and upon temperature.

The flesh of most full-grown quadrupeds is in the highest season during the first months of winter, *after having enjoyed the advantage of the abundance of fresh summer food.* Its flavour

* *Encyclopædia Britannica,* Sup. Art. "Food."

then begins to be injured by the turnips given as winter food, and in spring it becomes lean from deficiency. For these reasons beef and mutton are best in November, December, and January.

Females are generally "out of season" when they are suckling, or have recently given suck.

Young animals are "in season" at that time when they arrive at the age which combines tenderness and flavour in their flesh.

Fish of every kind are best some time before they begin to spawn, and are unfit for food some time after they have spawned.

46. *Why should animals not be eaten that die a natural death?*

Because it is obvious that *their bodies being impure*, the flesh thereof may impart disease to those who eat it. But the flesh of animals *killed by accident* differs only from that of animals otherwise killed in not being properly bled.

47. *Why are vegetables nourishing?*

Because they contain albumen, gluten, starch, and other nutritive elements, and the gluten and starch of vegetables are *similar* in some important respects to the *albumen, gelatine, and fibrin of flesh.*

48. *Why does cooking vegetables render them digestible?*

Because the heat separates and dissolves their fibres, drives out the water they contain, and bursts their starch-cells, so that their ultimate atoms are *more readily brought under the action of the stomach.*

49. *Why are cakes less healthful than bread?*

Because, in a great many instances, the essence of almonds and the indigestible skins of dried fruits and seeds are admixed with them. There is also a considerable mixture of lard or butter, which, in the process of baking, becomes converted into *an indigestible oil.*

"How hard it is to hide the sparks of nature."—CYMBELINE.

50. *Why is sugar considered a healthy vegetable substance?*

Because it is allied to the starch of vegetable matter, and, if not used in excess, it forms an acid in the stomach which *materially aids digestion.* But if too much of it is used, it is found to "turn acid upon the stomach," which may be construed into an indication that too much of it has been taken.

51. *What are the relative properties of various kinds of grain?*

Wheat contains the greatest quantity of gluten, and the smallest of starch; rye, a medium proportion of both; while in rice and barley, oats and maize, the largest proportion of starch, and the smallest of gluten, are to be found.

52. *Why is bran bread more nourishing than that prepared from sifted flour?*

Because, in the external covering of all kinds of grain, there are contained more gluten and fat than in the interior. Hence, sifted wheat flour is *deficient of much of the nutrition* yielded by the entire wheat. Peeled rice and barley, for the same reason, lose a great deal of their natural nutritiveness.

53. *Why is bran bread too irritating for delicate stomachs?*

Because the bran which contains the gluten consists of hard cellular tissue, which is *difficult of digestion,* and causes diarrhœa in weak digestive organs.

54. There is a flour to be obtained which does not contain the larger flakes of bran, but only what is called the *second sifting.* This combines much of the gluten and fat of the bran without its indigestible cellular matter, and produces very healthy and nourishing bread. Persons who find bran bread too stimulating, need not eat it at every meal. *Once or twice a week* it might be taken, not only as an agreeable change, but as a natural laxative.

CHAPTER III.

55. *Why is there such a variety of vegetable substances?*

The differences in vegetable substances arise out of the various organisations of plants, enabling them to *absorb from the soil*

"Plate sin with gold,
And the strong lance of justice hurtless breaks;
Arm it in rags, a pigmy's straw doth pierce it."—LEAR.

and the atmosphere those chemical elements which impart to them their distinguishing qualities.

56. *Do all plants subsist upon the same elements?*

The food of all plants is precisely the same; but what a multitude of forms do these assume in the organisms of different plants! The same soil on which we grow grain, beetroot, or potatoes, yields also tobacco and poppies. In grain and potatoes we have *starch*, in beetroot *sugar;* in all three a certain amount of compounds containing *sulphur* and *nitrogen:* in the poppy a *fat oil* and a series of organic bases, containing *nitrogen* but not sulphur; in tobacco a *volatile oil.** These various vegetable formations are produced by peculiar organs with which the plants are endowed, and which are called their *secreting organs.*

57. *Why is there such a variety of animal substances?*

Because animals, like plants, are endowed with organs by which the matters constituting their food are changed, and a variety of substances, differing materially in the several classes of animals, are formed therefrom.

58. *Why is the use of vegetable oils with food generally healthy?*

Because they readily remove the inconveniences caused by sluggish bowels, an evil which is very prevalent with persons of sedentary habits.

Olive oil is superior to all others for alimentary purposes.

59. *Why should breakfast be served with great regularity?*

Because the breakfast is the *starting point* of the day, not only as to eating and drinking, but as to the various duties that follow. When the breakfast is served punctually and satisfactorily, it gives an impetus and a cheerfulness to the whole proceedings of a day; but a late breakfast frequently disarranges a whole chain of events.

Such is the sensibility of the stomach, when recruited by a good night's rest, that, of all alteration in diet, it will be most disappointed at any change of this meal—either of the time

* *Liebig's Chemistry of Food*, by Dr. Gregory. Taylor and Walton.

"Unquiet meals make ill digestions:
These of the raging fire of fever bred."—COMEDY OF ERRORS.

it is taken, or of the quantity or quality of it—so much so that the functions of a delicate stomach will be frequently deranged throughout the whole day after.*

60. *Why are tea and bread and butter suitable aliments for breakfast?*

Because the substances of the body *are but slightly impoverished during the hours of rest;* and as the breakfast is succeeded by the anxious business of the day, a light and slightly stimulating meal is the best that we can take.

61. *Why are meat and vegetables best adapted for dinner?*

Because, from the labour and anxiety of the principal portion of the day, *the body undergoes considerable exhaustion,* and requires substantial renovation.

62. *Why should dinners be generally warm?*

Because the substances taken for dinner consist in a great part of *oils and fats,* which are more readily digested when *in a warm or liquid state.* Gelatine, too, when cold, is *highly indigestible.* The large amount of solid matter taken at dinner, being admitted into the stomach in a cold state, would draw off a considerable amount of heat from that organ, and in doing so would greatly lower its tone.

63. *What is the best hour to dine?*

So various are the pursuits of life, and so different the circumstances of individuals, that it is impossible to suggest "a rule with a reason" upon this matter. It has been said that the proper hour to dine is "*for a rich man when he can find an appetite, and for a poor man when he can find a dinner!*"

64. *Why does hunger return less rapidly after a meal with wine, than when no wine is taken?*

Because, as a portion of our food *goes to support respiration,* and as alcohol is a *respirable spirit,* consisting of the three chemical elements of respiration, *oxygen, hydrogen,* and *carbon*

* Kitchener's *Art of Prolonging Life.* Hurst, Robinson, and Co.

it takes the place of food in supplying the lungs, consequently less of our solid aliment is consumed in the function of respiration.

65. *Why is wine or beer hurtful when taken in excess during dinner?*

Because in excess it *coagulates the albuminous parts of our food*, rendering it indigestible. But in moderation it *stimulates the stomach* to healthy action, and, passing into the circulation, accelerates the whole process of nutrition.

66. *Why should not nuts be eaten after dinner?*

Because they are highly indigestible; and being taken upon a full stomach, they not only remain undigested themselves, but they impair the digestibility of the food previously taken. When indulged in as a dessert, *salt should always be eaten with them.*

67. *Why should rest be taken after a heavy meal?*

Because active exertion calls away the blood from the stomach, which for the purposes of digestion requires *a free circulation in its coats, a full heat, and plenty of muscular vigour.*

"After dinner sit awhile,
After supper walk a mile."

68. Dr. Harwood, professor of anatomy at Cambridge, took two pointers which were equally hungry, and fed them equally well. One, which he suffered to follow the promptings of instinct, curled himself round till he was comfortable, and went to sleep as animals generally do after eating. The other was kept for about two hours in constant exercise. The two dogs were then killed. In the stomach of the one which had been quiet and asleep, all the food was digested; in the stomach of the other that process was hardly begun.

69. *Why do persons who eat suppers frequently wake up in a restless state towards the morning?*

Because, when the stomach has emptied itself, it produces such a change in the condition of the body, that sleep becomes disturbed, the action of the stomach *suddenly ceases*. Persons who go to sleep in the midst of noise, will start up when that noise ceases; and those who fall asleep in stillness will awake at

"They are as sick that surfeit with too much, as they that starve with nothing."
MERCHANT OF VENICE.

a slight noise. Eating a bit of biscuit and drinking a drop of toast and water, will frequently induce sleep again with those who wake up from the occupation of the stomach having ceased.

70. *Why should suppers be taken two or three hours before going to bed?*

Because the *digestion is almost at an end before the body lies down to sleep.* Digestion, especially in human beings, is to some extent a waking function, or one which is best performed when repose and cheerfulness are enjoyed; it breaks the soundness of sleep, and gives rise to dreams and visionary oppressions by disturbing the nervous system.

71. *What are the best aliments for supper?*

Anything of a light and digestible kind, which does not *remain long upon the stomach,* such as light soups, but not fish or leguminous seeds. Only when some time is to elapse between supper and bed-time should meat, salads, and bread be taken.

72. *Why do the same meats when taken day after day become repugnant?*

Partly because we are accustomed to variety, and that the senses of taste, sight, and smell find equal gratification in change. But also because a variety of food *best supplies a complete nutrition,* by contributing all the elements which our bodies demand. To the digestive organs that aliment always presents the keenest stimulus which contains the chemical elements of which the body is in need.

73. As the uniformity of a stimulant, even if repeated at longer intervals, is prejudicial to its effect, a regular arrangement of dishes, repeated certain days every week, is a custom not to be commended. If a stiff regularity only too clearly betrays a common-place narrowness of mind, such a regular repetition becomes a source of petty formalism, insensibly, but all the more dangerously, repressing the free movements of the mind. Whoever has watched himself with attention will often enough have experienced how the refreshing and stimulating effect of a walk is evidently lost, if taken for a long time daily at the same hour. It is the same with uniformity in viands; and while the eminent physicians used actually to assert it to be useful sometimes to throw the body out of order, in accordance with this doctrine it is perfectly true that an inflexible regularity of life is by no means compatible with a genial freedom.

"'Tis in ourselves that we are thus, or thus."—OTHELLO.

74. If housewives only knew how many evils arise from rendering home monotonous—if they understood how their daily ordinances are insensibly and unintentionally reflected in the countenances and conduct of fathers and children—they would treasure the philosophy which we are endeavouring to impart to them. Many a man has been fed up to an ill-humour by bad management; coldness, sameness, and gloom about his home, have gathered up the elements of strife, which have broken out in storm; then some little extra attention on the part of the wife has cleared the atmosphere for a short time. But there ensues another stagnation of the moral elements—the same chain of domestic routine is gone through link by link—and the storm breaks out again, as might have been predicted by any one who understands the meteorology of the human heart, stomach, and brain. A wife should look upon home as her empire, and if she desired loyal subjects, she should rule that empire well. Men emigrate to foreign lands when they are dissatisfied with their native soil; they wander from home when it has no attractions for them.

CHAPTER IV.

75. *Why should we always "rise from table with an appetite?"*

Because, as the supply of food to the stomach must always *precede the cessation of the feeling of hunger*, it follows that if we continue eating until the feeling of hunger entirely ceases, we have gone too far, and have taken more food than the stomach required.

76. *Why is eating too fast attended by great evils?*

Because when we eat hastily we cannot *properly masticate our food;* mastication is a material branch of digestion. By eating slowly we are enabled to study the indications of appetite as to the sufficiency of the food we have taken for the wants of the system. The moment the relish for food begins to slacken, it is time to put down the knife and fork, and allow the stomach to do its work.

77. The appetite continues till the first food neutralizes the gastric fluid which had accumulated in the stomach, and caused the sensation of hunger. If the patient eats with great rapidity he will, during the time required for this combination, put such a quantity of food on the stomach as to occasion some degree of morbid disten-

sion, which will be greatly increased by the swelling of the food, in consequence of digestion being impeded by the distension; while the stomach, at the same time, for reasons that will be explained, does not, with the usual facility, propel it into the intestine. Thus it is that the feeling of distension often increases for some time after too full a meal, and is frequently accompanied with actual pain.

78. *Why will a few mouthfuls taken before dinner frequently destroy the appetite?*

Because the gastric juice formed in the glands of the stomach becomes *discharged under the excitement* caused by the entrance of food, and passes into the stomach. It is probably the distension of these glands by the gastric fluid that causes the immediate sensation of hunger. When the glands are emptied, the sensation of hunger ceases.

It is for this reason, also, that when a meal is interrupted for some ten or fifteen minutes, the appetite for further food passes away.*

79. *Why does the use of condiments frequently induce persons to eat to excess?*

Because the stimulus of high-seasoning *excites the palate,* and induces us to eat, not because we continue to feel hungry, but because we like the artificial flavours in which we indulge. Hence the stomach becomes over-distended, and the meal, which should have refreshed us, has an opposite effect.

80. *Why is new bread difficult of digestion?*

Because, being in a moist state, and its cells filled with a heavy gas, it is not *easily pervaded by the gastric juice.* Because, also, there may still be a slow fermentation occurring in it, which in the process of becoming old or stale would be completed.

81. *Which are the best vegetables for dyspeptic persons?*

Mealy potatoes, turnips, and broccoli.

82. *Which are the worst vegetables for dyspeptics?*

Peas, beans, cabbage, and waxy potatoes.

* Philip's *Treatise on Indigestion.* Underwood.

"Where words are scarce, they're seldom spent in vain,
For they breathe truth that breathe their words in pain."—RICHARD II.

83. *Why does riding on horseback, or any violent exercise, immediately after a meal, produce internal pain?*

Because in digestion the outer covering of food is acted upon by the gastric juice, dissolved, and removed, and then another coating follows. But violent exercise *intermingles the particles of food* so that the gastric juice cannot continue its solvent action. The consequence is, an undigested mass, which soon begins to ferment, producing great pain and inconvenience.

84. *Why are some articles of food difficult of digestion?*

Because when any hard or incongruous mass becomes exposed to the action of the gastric juice, it will naturally require to be exposed a longer time than other matter, on account of the difficulty which the gastric juice experiences in reducing it to chyme. It will therefore be a longer time before the surface of the alimentary mass floats off, so as to leave the next layer exposed to the action of the gastric juice, and the under layers, which are waiting for their turn to be exposed, will be kept waiting longer than the usual space of time. The consequence is, that before the gastric juice can reach them, they ferment and decompose.

85. *Why should persons who have weak digestion partake only of light food?*

Because the stomach is *subject to fatigue*, just as the eye is by long exertion of vision, or any other organ of the body, by a protracted performance of its peculiar function.*

86. *What is the most digestible kind of pudding?*

The most digestible pudding is that made with *bread*, and boiled; *flour* or *batter* pudding is not so easily digested; and *suet* pudding is to be considered as the most mischievous to invalids of the whole catalogue. *Pancake* is objectionable on account of the process of frying imparting a greasiness to which the dyspeptic stomach is not often reconciled.†

* Dick's *Diet and Regimen*. Whittaker and Co.
† Dr. Paris's *Treatise on Diet*. T. and G, Underwood.

"The robb'd that smiles steals something from the thief."—OTHELLO.

87. *Why are waxy potatoes indigestible?*

Because the *starch-cells within them are imperfectly formed.* They are therefore as indigestible as green apples, and frequently pass through the bowels unchanged. The mealy potato, on the other hand, readily yields to the powers of the stomach, and affords healthy nutriment; in some respects it supplies the place of bread, and therefore should be partaken of freely when our other food is concentrated.

88. *Does mashing potatoes improve their digestibility?*

It does not, but rather impairs it, because in the proper mastication of the unmashed potatoe, it becomes mixed with the salivary fluid, which materially aids digestion.

89. *Why are baked apples useful to dyspeptic persons?*

Because by baking they acquire *laxative properties.*

90. *Why should not sponge-cakes be introduced with wine after dinner?*

Because the stomach is already filled with substances in a partial state of digestion. The spongy texture of the cake absorbs the solvent juices already acting upon the food, and the process of digestion is retarded.

It is wrong, also, to *continue* eating after a hearty meal, however small the morsels may be that are taken; because, by so doing, food in various states of digestion is mingled in the stomach, and flatulency produced, instead of that even and gradual digestion that would otherwise occur.

91. The custom of introducing cake after a rich entertainment is very ancient; but the cakes or "*mustacea*" of the Romans were very different compositions. They consisted of meal, aniseed, cummin, and several other aromatics; their object was to remove or prevent the indigestion which might occur after a feast. A cake was therefore constantly introduced for such a purpose, after a marriage entertainment; and hence the origin of the "bride cake," which in modern times is an excellent invention for *producing* instead of *curing* indigestion.

"Trifles light as air
Are to the jealous confirmations strong
As proofs of holy writ."—OTHELLO.

CHAPTER V.

92. *Why are Welsh-rabbits unsuitable for dyspeptic persons?*

Because when cheese is toasted it acquires a *tenacity of texture* which renders it highly indigestible.

93. *Why should not costive persons eat boiled eggs?*

Because eggs when raw are *laxative*, when boiled they produce costiveness.

94. *Why are eels unsuitable to dyspeptic persons?*

Because of the large amount of *oil* which they contain. When taken, they should be eaten with vinegar, and their skin should be rejected. Any kind of fish which is oily and viscid is unsuited to delicate stomachs; hence salmon, turbot, &c., are inferior to whiting and haddock.

95. *Why are oysters frequently found distressing to weak stomachs?*

Because they are generally swallowed *without mastication*. The stomach, therefore, has an unusual labour to perform. There is no reason why oysters should not be masticated, as well as other food; by being so they would form a light and agreeable diet.

96. *Why do we require a more stimulating food in winter and spring than in summer and autumn?*

Because animal food, and the chyle formed from it, is *more putrescible* in warm than in cold weather, therefore a light and vegetable diet is best suited to spring and summer; but in the winter our bodies are more liable to the effects of cold, if the circulation is not rendered vigorous *by a stimulating diet*.

97. *What effects have spices upon digestion?*

They *excite the digestive glands*, and thereby promote the solution of food. But their properties are so intense that they may easily be used to excess, and the instances in which they produce injury are very numerous.

"As surfeit is the father of much fast,
So every scope by the immoderate use
Turns to restraint."—MEASURE FOR MEASURE.

98. The spices cannot be called restoratives, as their most essential substance does not convey to the blood an essential constituent; they are stimulants, and whatever stimulates renders over-excitement probable.*

99. *Why are cloves so highly aromatic?*

Because they contain a larger proportion of *volatile oil* than any other of the spices. The acridity of nutmeg and cinnamon arises rather from the quality than the quantity of their volatile oils.

100. *Why is an excess of fat meat unwholesome?*

Because fat when swallowed becomes *changed into oil* by the heat of the stomach, and floats on the surface of the food.

101. *Why is the fat of meat difficult of digestion?*

Because the oil which it forms *cannot mingle with the mass,* until it is separated into little globules, such as we see when water and oil are shaken up together.

102. *How are the frequent calls of hunger and thirst accounted for?*

By the various organs of animal economy unremittingly *undergoing a waste* which requires to be continually recruited, and thus induces an instinctive craving for food.

103. *Why does sugar aid digestion?*

Because sugar, while being digested, enriches the gastric juice with a substance which assists in dissolving food; coming into contact with the saliva, it is partly transformed into *lactic acid,* which acts upon the alimentary substances in the same manner as does *the acid of the gastric juice.*

104. *Does the use of sugar injure the teeth?*

On the contrary, it *improves them* by assisting the solution of food which supplies lime for their nourishment.

105. *But why does sugar cause pain in a decayed tooth?*

As creosote relieves an aching tooth by coagulating a film of albumen over the nerve, sugar may cause a tooth to ache by

* *Orr's Practical Chemistry*—Chemistry of Food. Houlston and Wright.

its solvent influence *dissolving the albumen* by which the nerve may be protected. But sugar will do no injury to a sound tooth. Negroes, who eat large quantities of sugar, have beautiful teeth.

106. *Why should not our fluid food be taken too hot?*

Because the effect of fluids at too high a temperature is to *distend the stomach, and debilitate its nervous, digestive, and muscular energies.* The temperature most suitable for fluid food is a little below that of our own bodies, say 96 degrees Fahrenheit.

107. *Why is it dangerous to take a draught of cold water when the body is warm?*

Because when the body is heated, and transpiration by the skin is taking place, a draught of cold water *suddenly strikes a chill* through the system, and, checking the action of the skin, throws sudden and *increased duties upon the lungs.*

108. Dr. Paris's opinion upon the proper time for drinking is as follows:—By drinking *before* a meal we place the stomach in a very unfit condition for the duties it has to perform. By drinking during a meal, we shall assist digestion if the solid matter be of a nature to require it; and impede it, if the quantity taken renders the mass too liquid. Those physicians, therefore, who have insisted upon the necessity of a total abstinence of liquid during a meal, appear to have forgotten that every general rule must be regulated by circumstances. The best test of its necessity is afforded by the sensations of the individual, which ought not to be disregarded, merely because they appear in opposition to some preconceived theory.

109. *Why does food become tasteless during mastication?*

Because of the *absence of salt in the saliva,* which lubricates the food, and removes its savoury parts, leaving the fibrous and albuminous portions to be ground by the teeth. The insipidity of food in the mouth is one indication that it has been sufficiently masticated, and is fit for transmission to the stomach.

110. *Why is punch less intoxicating than other spirituous beverages?*

Because a portion of the alcohol is *converted by the stomach into an acid*—a change which is promoted by the acid of lemon, aided by the sugar.

"The silence often of pure innocence
Prevails when speaking fails."—WINTER'S TALE.

111. *What is the best general rule respecting diet?*

It is to eat and drink only of such foods, at such times, and in such quantities, as a watchful experience has convinced you *agree with your constitution*, and avoid all other.

112. It may be asked, then, of what avail is your teaching, if, after all, we are to turn to personal experience, and each individual is to establish a rule of life to himself? Such a thought may occur to the minds of many persons. But the very object of our teaching is *to enable people to understand their experience.* "I have eaten so and so for dinner, and have found it disagree with me." This is experience—our theory explains the *reason why.* "But the other day I took the same food, and it did not disagree with me." This is *experience* again. Theory explains that at that time the food was unsuited to the season, or that little exercise had been taken previously, or that some other article of diet had been taken at the same meal which interfered with healthy digestion. Thus the theories which we have been explaining assist mankind to read and interpret their experience aright, and not to run blindly from one extreme to another, anxiously seeking comfort, but seldom finding it.

113. *Why are potatoes less nutritious than meat?*

Because the latter is *very similar to the blood,* while potatoes contain very little albumen, and a large proportion of starch. But potatoes are nevertheless nutritious, because their starch is *formed into fat* by the digestive process, and this fat represents an essential constituent of the blood.

114. *Why may the white of eggs be advantageously added to fried or mashed potatoes?*

Because the white of egg *supplies those elements of nutrition of which potatoes are deficient,* and which, being combined with the nutritive matter of the potatoes, forms an excellent food. Potatoes combined with a certain portion of white of egg become as nourishing as milk or meat.

115. *Why does vinegar assist digestion?*

Because it has the effect of *dissolving the albuminous parts of food.*

116. *Why does salt improve digestion?*

Because it acts as *a solvent of the albuminous parts of food.*

"To mourn a mischief that is past and gone,
Is the next way to draw more mischief on."—OTHELLO.

117. *Why is the flesh of wild animals richer in kreatine than that of tame animals?*

Because, from the more active lives which they lead, they inhale larger quantities of oxygen, which transforms the nitrogenised bases of the tissues into *kreatine.*

118. *Why does venison possess the peculiar piquant flavour which distinguishes it from beef?*

Because of the larger amount of *kreatine* which its flesh con tains, consequent upon its more active life.

119. The same remark applies also to birds. The higher temperature of the bird proves that it consumes oxygen faster than the reptiles crawling on the earth; even faster than the mammalia, the only class of animals with which it shares the appellation of warm-blooded. Hence the more rapid decomposition of its albuminous matter, of which the proportion of soluble albumen is, besides, greater than in other mammalia; hence, also, the abundance of kreatine in the muscles of birds. Hence, also, why the flesh of domestic poultry differs from that of wild birds.

CHAPTER VI.

120. *Why is it an error to suppose that solid food only satisfies hunger, and liquid food only satisfies thirst?*

Because *water is contained in all aliments* in such an abundance that, on an average, it constitutes *more than half* of their weight. All beverages, on the other hand, contain also some other alimentary principles than water; for even in what we are accustomed to call pure water, there are always contained some of the compounds of chlorine and salts; while in milk we have all classes of simple alimentary substances together, it being composed of water, compounds of chlorine, salts, caseine, fat, and sugar.

121. *Why do we require variety in our food?*

Because none of the alimentary substances are *by themselves* capable of supplying the wants of our bodies. Not sugar alone,

"Never anything can be amiss
When simpleness and duty tender it."
MIDSUMMER NIGHT'S DREAM.

nor salts alone, nor albumen alone, is able to repair the consequences of the changes that occur in our bodies.

Without phosphates of lime the bones cannot be formed, whatever quantity of albumen and fat we consume ; no muscular tissue could grow without albumen, however we might overload the stomach with sugar and salts ; and without fat, no brain. The bones, the brain, and the muscles are the most essential organs of the human body.

No element can be transformed into another. Phosphorus does not turn into oxygen, nor oxygen into carbon, nor carbon into nitrogen, nor nitrogen into sulphur. The organic alimentary principles, destitute of nitrogen, nor the nitrogenised organic substances into inorganic salts containing any other elements than nitrogen, carbon, oxygen, hydrogen, sulphur, and phosphorus.

122. *Why are some substances more digestible than others?*

It must be remembered that digestion consists, *not only in the solution of bodies*, but in their *transformation into the essential constituents of the blood.* If two substances are dissolved with equal ease, that one will be the more digestible which has the greater similarity to the constituents of the blood.

Hence it occurs that the difficulty with which alimentary substances are dissolved is, in many cases, compensated by their conformity with the ingredients of the blood. Although gum, for example, is much more easily dissolved than fat, the latter, if not taken in too great a quantity, is digested by a healthy stomach, under certain circumstances, more readily than gum ; for gum is not contained in the blood, while fat is allied to its constituents.

Gum has first to be transformed into sugar, then into an acid, and finally into substances of a fatty nature ; while fat is at once prepared, upon being dissolved, to contribute to the blood.

123. *What is the leading principle to be borne in mind in the cookery of meat?*

It is this, that as *the flesh which we eat is to become the flesh* *of our bodies,* and to retain the power of reproducing itself in its original condition, none of the constituents of raw flesh ought to be withdrawn from it during its preparation for food. If its composition be altered in any way, if one of the constituents which belong essentially to its constitution be removed, a corresponding variation must take place in the power of that piece of flesh to reassume, in the living body, the original form and quality on which its properties in the living organism depend.*

124. *What are the changes produced in meat by cookery?*

The most important changes produced in food by cookery are *the destruction of its vitality,* an indispensable condition to its digestion; the coagulation of the albumen, and the liquefaction of the gelatine, osmazone, and fatty matter; and, therefore, the observation by Evenus that fire is the best sauce in the world is perfectly correct.†

125. Acum, in his *Culinary Chemistry,* says that a kitchen is, in fact, a chemical laboratory; the boilers, stew-pans, and cradle-spit of the cook, correspond to the digestors, the evaporating basins, and the crucibles of the chemist. And numerous as the receipts are, the general operations (like the general process of chemistry) are but few. In some, the object aimed at is to extract the constituent parts of the food, so as to exhibit them in a separate state, or to combine them with other substances, to produce new compounds, which differ widely from those from which they originated. In others, the qualities of the substances are simply altered by the action of the fire, to render them more palatable and nutritious.

From the multiplicity of circumstances to be attended to in this art, the whole of which is founded upon the principles of chemistry, we may easily see that it must be a very precarious one; and, there is reason to believe, that among the variety of circumstances which produce diseases, the improper modes of cooking food are often the primary cause. Will it be believed, that in the cookery-books, which form the prevailing oracles of the kitchens in this part of the island, there are express injunctions to "*boil greens with halfpence, or verdigris,*" in order to improve their *colour!* That our puddings are frequently seasoned with laurel leaves, and our sweatmeats almost uniformly prepared in copper vessels? Why are we thus compelled to swallow a supererogatory quantity of poison which may so easily be avoided? And why are we constantly made to run the risk of our lives by participating in custards, trifles, and blancmanges, seasoned by a most deadly poison, ex-

* Liebig's *Chemistry of Food.* Taylor and Walton.

† Truman, *On Food, and its Influence on Health and Disease.* Murray.

"The sweat of industry would dry and die,
But for the end it works to."—CYMBELINE.

tracted from the *prunus louroceraสus?* Verily, where such detestable systems of cookery are practised, we may exclaim, with the sacred historian, that there is "Death in the pot."

CHAPTER VII.

126. *Why does meat lose weight by cooking?*

Chiefly because *its watery particles are driven off by heat,* and its juices condensed; but also because *some portion of the fat melts;* in boiling, some of the gelatine and of the essential juices of the meat are extracted.

127. Professor Wallace made a series of experiments, in which he ascertained that 100 lbs. of beef, in pieces of 10 lbs. each, lost on an average, by boiling, 26 lbs. 4 oz.; baking, 30 lbs. 2 oz.; roasting, 32 lbs. 2 oz. Mutton, the leg, by boiling, 21 lbs. 4 oz.; by roasting, the shoulder, 31 lbs. 1 oz.; the neck, 32 lbs. 4 oz.; the loin, 35 lbs. 9 oz. Hence it is shown that mutton loses by boiling about one-fifth of its original weight, and beef about one-fourth; mutton and beef lose by roasting about one-third of their original weight.

128. *Why is roasted meat so much fuller in flavour than boiled?*

Because it *retains the savoury and odorous soluble constituents* of meat, which in boiling pass into the liquor.

129. *Why is roasted meat generally more digestible than boiled?*

Because the process of roasting *forms a coating on the outside of the meat;* but it does not coagulate the albumen of the internal parts of the meat so thoroughly as is the case when meat is boiled.

130. *Why are roasted meats more nutritious and economical than boiled?*

Because in the process of roasting *nothing is removed from the meat but the gravy,* which also *becomes an article of food;* whereas in boiling a certain portion of the juices of the meat is extracted and *lost in the water.*

"The great man down, you mark his favourite flies;
The poor advanc'd makes friends of enemies."—HAMLET.

131. *Why is animal food generally of a red colour?*

Because there are dispered through it an immense number of small blood-vessels, which retain some of the *colouring matter of the blood.*

132. *Why does the colour of flesh change in cooking?*

Because heat *coagulates the blood,* and disguises the colouring matter by surrounding it with coagulated albumen.

133. *Why are cooked vegetables so much more digestible than raw?*

Because heat *drives off much of the water and air* contained in raw vegetables; it also *changes the free acid* which they contain, and which would impair digestion; and it renders the vegetable farina and fibre softer, and more soluble under the action of the gastric juice.

134. *What is the difference in the effect of heat upon albumen and upon gelatine?*

Heat *hardens albumen,* but *softens gelatine.* Hence gravies are generally rich in gelatine, but poor in albumen. Fat being also soluble by heat, forms gravies with gelatine. The fat separates partially from the gelatine upon cooling, leaving an almost pure jelly.

135. *Why is meat which is properly cooked, with its juices in it, more digestible than that which is dried up by over-cooking?*

Because the juice of flesh contains a *considerable amount of an acid similar to the gastric juice,* which acts as a solvent upon the fibrous and gelatinous parts of the meat.

136. *What is the use of a covering of lard in roasting?*

It acts *like the skin of albumen,* preventing the savoury and nutritive juices from escaping. It also prevents the evaporation of the water of the flesh, and therefore keeps it moist and tender, when it would otherwise become hard and dry; and it keeps the surface from being dried and charred.

"Blunt wedges rive hard knots."—TROILUS AND CRESSIDA.

137. *Why is meat roasted on a spit superior to that which is roasted by being suspended before a fire?*

Because on a spit it is placed *horizontally*, and the rotary motion causes the fat to *flow round the meat*, which is thus self-basted; while, on the contrary, with meat roasted in a *vertical position*, the fat *runs off from it* as soon as warm.*

138. *When meat is burnt in roasting, what is the black matter which remains?*

The black matter is *carbon*, one of the chemical constituents of animal bodies.

139. *Why should meat not be too long exposed to the fire?*

Because the long-continued application of heat dissipates the juices, *drives off their more volatile flavouring principles*, hardens the albumen, and dries up the muscular fibre. These are the reasons why meat that is "kept waiting" for the table becomes tasteless, and lacks the flavour which it would have possessed if served up at the right moment.

140. *Why should meat, when it is first set down to roast, be put near to the fire, and afterwards removed to a greater distance?*

Because the intense heat, when first applied, would form a coating of albumen over the joint, by which its goodness would be preserved. It should then be removed to a further distance, in order to allow the heat to gradually penetrate the joint; and as the roasting proceeded, the joint should again be brought nearer to the fire, so that it may be cooked throughout, without hardening the fibre of the meat.

141. *Why do potatoes, which are unpleasant to the palate when raw, become palatable when cooked?*

Because the heat, and the action of heated water, dissolve the mucilage and starch, which in the raw potato are *encased in hard cells*, and the same causes render the gluten and fibre of the potatoes softer and more pulpy.

* Eckstein, *On Chimneys*. Weale.

"Where fair is not, praise cannot mend the brow."—LOVE'S LABOUR LOST.

142. *Why should hard water be used for boiling joints of meat when the soup is not to be used?*

Because hard water will *extract less of the animal juices* than soft water. The meat, therefore, retains more of its goodness.

143. *Why should fish be boiled in hard water?*

Because, as *firmness* is an essential in fish, it will be better obtained by boiling in hard water than in soft.

144. *Of what does the scum which rises upon the water in which meat is boiled consist?*

It consists of a small portion of the *albumen* of the meat, and some of the *coagulated blood.*

145. *Why should this be skimmed off?*

Because it would be unsightly if allowed to remain, and as it *contains no nutrition* worth estimating, and does not contribute to the flavour of the meat or soup, it should be removed.

146. *Why does boiling deteriorate the quality of meat?*

Because it causes *a separation of the soluble from the insoluble constituents of the flesh.* The water takes up the soluble parts; and it therefore follows that when boiled meat is eaten, *without the soup formed in boiling it,* a considerable part of its nutrition is lost.

147. *Why does flesh when much boiled become tasteless and stringy?*

Because the savoury and odorous constituents of meat exist in it in a soluble state. Boiling extracts these constituents, and leaves the *fibrin,* or flesh-threads, of meat hardened by the insoluble constituents, phosphate of lime, and phosphate of magnesia.

Phosphate of lime is a salt formed by phosphorus, oxygen, and lime, it is the chief constituent of the bones. *Phosphate of magnesia* is also a salt formed by phosphorus, oxygen, and magnesia, and is another of the constituents of the bones.

148. *Why should meat that is to be boiled for the table, be put into water that is boiling?*

Because the temperature of the boiling water at once *hardens* *the albumen* of the meat, and prevents its soluble constituents from escaping. The richness and nourishment of the meat is thereby improved.

149. *Why should cold water be added after a few minutes, and the water then be allowed to simmer?*

Because then the heat is *gradually transmitted through the meat,* and it becomes thoroughly cooked, without being hardened.

150. *Why should some of the liquor of boiled meat be taken with the meat?*

Because the soup extracts from the meat *two of the chief constituents of the gastric juice.* When, therefore, boiled meat is eaten without any of the soup, it not only loses much of its nutritive properties, but it is also less digestible.

151. *Why does causing anything to boil too violently act injuriously?*

Because it *does not expedite in the slightest degree, the process of cooking,* but occasions a most enormous waste of fuel; and, by driving away with the steam many of the more *volatile and the most savoury particles of the ingredients,* renders the victuals less good and palatable.

Boiling should at all times be *as gentle as possible,* especially in the making of soups, in which it is designed to combine the more volatile essences of vegetables and meat. If it were possible to keep the soup always just boiling hot, without actually boiling, it would be so much the better.*

152. We see also that in cooking, as in other domestic arts, long experience and observation have led in many instances to the most judicious practice. It is the want of scientific basis, however, for the culinary art that has given rise to many absurd and hurtful methods of preparing food; as, for example, the very common English practice of boiling meat or vegetables with a very large quantity of water, which is thrown away, and with it the whole, or nearly the whole of the soluble matter. The advantage of steaming over boiling depends on the fact that in the former all the soluble matter is retained in the sauce or juice which is served with the meat.

153. Count Rumford has shown by experiment that the heat of boiling water never

* Count Rumford's *Essay on Food.* Robertson, Dublin.

"Who seeks and will not take when once 'tis offered,
Shall never find it more."—ANTONY AND CLEOPATRA.

rises above 212°, however fierce may be its ebullition. Let us, then, consider what is the effect when, over a moderate fire, a vessel is made to boil gently. In that case, *the highest degree of heat* is attained with the *smallest amount of fuel.* But when a fierce fire, and an equally fierce ebullition are kept up, the heat above 212°, as fast as it is evolved, is *carried away by the volumes of steam* that rise from the surface of the water. This is clearly a waste of fuel.

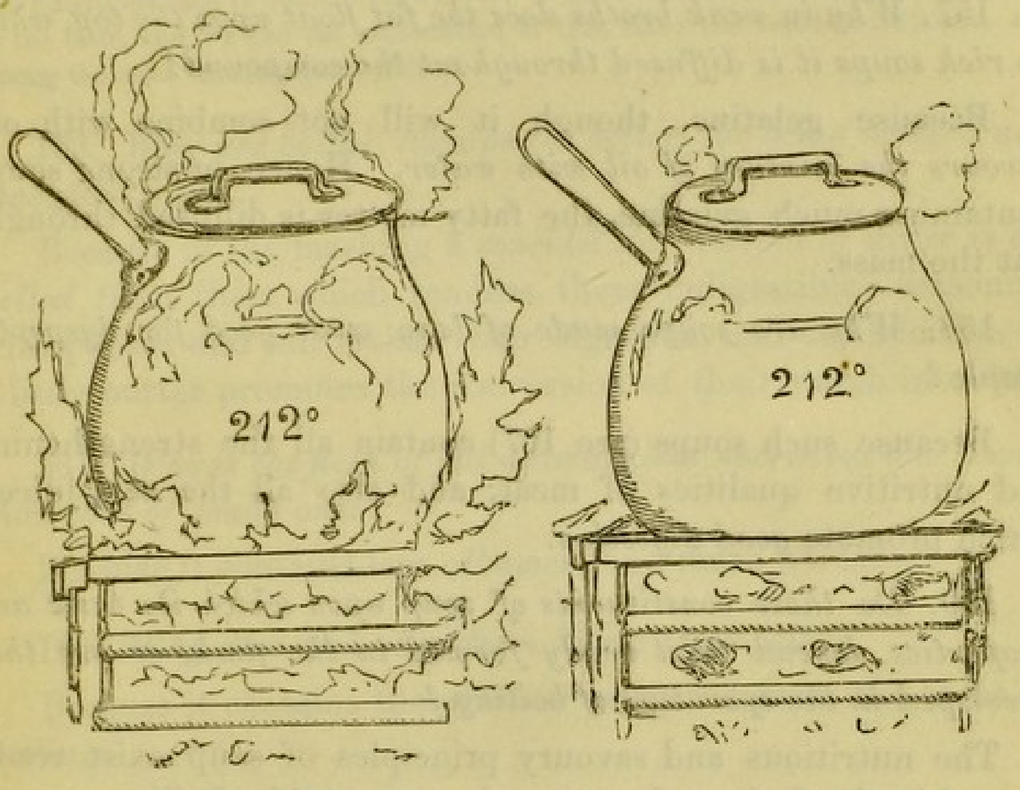


DIAGRAM DEMONSTRATING THE WASTE OF FUEL.

CHAPTER VIII.

154. *Why does boiling fast render meat hard?*

Because the excessive action of heat causes the albumen of the meat to *set solid,* crisps up the fleshy fibres, and prevents heat having a gradual access to the interior.

155. *Why is hard water very unfit for making pea-soup?*

Because, in boiling, the *lime of the water* unites with the legumin of the peas, and transforms it into a very hard and indigestible substance. Filtered rain water is the best for the purpose.

What need the bridge much broader than the flood,
The fairest grant is the necessity."—MUCH ADO ABOUT NOTHING.

156. *Why should peas when used for green-pea or other soups, be strained after boiling?*

Because the straining removes the hard and indigestible coating of cellulose.

157. *Why in weak broths does the fat float upon the top, while in rich soups it is diffused throughout the compound?*

Because gelatine, though it will not combine with oil, *favours the mixture of oil with water.* Hence, in strong soups containing much gelatine, the fatty matter is diffused throughout the mass.

158. *Why are soups made of lean meat good for dyspeptic people?*

Because such soups (see 167) contain all the strengthening and nutritive qualities of meat, and also all the acid juices, which promote *good digestion.*

159. *Do those constituents of soup upon which its taste and properties depend exist ready formed in the flesh, or are they developed in the operation of boiling?*

The nutritious and savoury principles of soup exist ready formed in the flesh, and are merely *extracted* by boiling.

160. *Why, when a good soup or broth is required, should the meat be put into cold water?*

Because, as the heat is developed very gradually, there occurs an intermixture between the *juices of the flesh* and the *external water.* The soluble and savoury parts of the meat escape and enrich the soup.

161. *Why are stews generally healthful and digestible?*

Because, being compounds of various substances, they contain *all the elements of nutrition;* and as the office of the stomach is to liquefy solid food before digesting it, the previous stewing assists the stomach in this particular.

162. Dr. Gregory, in his edition of Liebig's *Chemistry of Food,* makes the following remarks upon that culinary saving's bank, the stock pot:—The stock so much

"Men, like butterflies,
Show not their mealy wings, but to the summer."—TROILUS AND CRESSIDA.

used by good cooks, and for preparing which, generally from beef, but often also from mixed flesh, such minute directions are given in books on cookery, is essentially such a concentrated infusion of flesh as that described in the text. It is usually made by long boiling, but this is not indispensable. The addition of stock to any dish not only improves the flavour, but often restores the soluble matter removed in previous operations, such as boiling, etc., and thus renders it much more wholesome and nutritious than it would otherwise be. A good cook judges of almost everything by the taste, and we see the explanation of this, since the sapid constituents are among the most valuable parts of food.

163. *Why are boiled turnips the better for being mashed and seasoned?*

Because in the mashing a *considerable amount of water is expelled* from them which renders them indigestible; seasoning with pepper and salt assists their digestion, and the addition of a little butter promotes the conversion of their starch into fat.

164. *Why is the flesh of old animals less nutritious and tender than that of young ones?*

Because it contains less *albumen*, and more *fibrin*.

165. *Why does rich soup form into a thick jelly?*

Because it contains the *gelatine* extracted from the meat by boiling.

166. *From what part of the soup does its savour arise?*

The savour and odour of soup principally arise from that soluble extract of meat which the chemists call *osmazome*, from two Greek words meaning *odour* and *juice*. The gelatine by itself is without taste or smell. Osmazome will not form a jelly.

167. Liebig, in his *Chemistry of Food*, says that when one pound of lean beef, free from fat, and separated from the bones, in the finely-chopped state in which it is used for beef sausages or mince-meat, is uniformly mixed with its own weight of *cold* water, slowly heated to boiling, and the liquid, after briskly boiling a minute or two, is *strained* through a towel from the coagulated albumen and the fibrin, now become hard and horny, we obtain an equal weight of the most aromatic soup, of such strength as cannot be obtained, even by boiling for hours from a piece of flesh. When mixed with salt, and the other additions, by which soup is usually seasoned, and tinged somewhat darker by means of roasted onions or burnt sugar, it forms the very best soup which can in any way be prepared from one pound of flesh.

"The labour we delight in physics pain."—MACBETH.

168. *Why should saucepans and boilers used for making soups and stews have double bottoms?*

Because the "burning" which frequently destroys good dinners just at the last moment would thereby be prevented.

169. To prevent the soup from burning to the boiler, the bottom of the boiler should be made double; the false bottom (which may be very thin) being fixed on the inside of the boiler, the two sheets of metal being everywhere in contact with each other, but they ought not to be attached to each other with solder, except only at the edge of the false bottom where it is joined to the sides of the boiler. The false bottom should have a rim about an inch and a half wide, projecting upwards, by which it should be riveted to the sides of the boiler; but only few rivets or nails should be used for fixing the two bottoms together below, and those used should be very small; otherwise, where large nails are employed at the bottom of the boiler, where the fire is most intense, the soup will be apt to burn to; at least on the heads of those large nails.

170. *Why is it proper to eat bread or other solid substances with soups?*

Because fluids, *when taken without solids*, pass very rapidly out of the stomach, but when eaten with bread, rice, maccaroni, &c., by which they are imbibed as by a sponge, they are retained long enough in the stomach for the gastric juice to operate upon them.

This applies only to soups and fluids containing some proportion of solid matter.

171. *Why will not hard water make good pease soup?*

Because the earthy matters held in suspension in the water, and which cause its hardness, prevent it from *dissolving the farina of the seed.*

172. *Why should large quantities of drink after dinner be avoided?*

Because they are likely to weaken the digestive powers of the stomach by causing its distension, and, by diluting the gastric juices, diminish their solvent powers. Persons troubled with weak digestion frequently find great relief in taking *a little* drink before dinner, or some hours after it, instead of at dinner. (See 108.)

173. *What causes the crackling noise when lard is put into a frying-pan?*

Lard always contains some portion of *water*, and it is the

"How much better is it to weep at joy, than to joy at weeping! There are no faces truer than those that are so washed."—MUCH ADO ABOUT NOTHING.

expansion of this water into steam, forcing its way through the fat, which causes the crackling noise.

The heat at which fat or oil boils, is much greater than that of water. When the crackling ceases, the water has been driven off from the fat; and when the fat begins subsequently to boil or bubble, its heat will be very high.

174. *Why in frying fish should the fat or oil be made very hot before the fish is put in?*

Because, if the temperature is low when the fish is put into the frying pan, *it becomes soddened in the steam* formed by its own water; but if the oil be very much heated, the water will be at once driven off, and the fish nicely browned by the scorching oil.

175. *Why is broiled meat so juicy and savoury?*

Because the action of the fire hardening its surface *seals up the pores through which the juices might escape.* It acts in the same way that the sudden dip into boiling water does upon joints of meat, but more effectually. To turn broiling meat never use a fork, but a tongs; a fork opens an escape for the juice, and wastes the best part of the meat.

176. *Why should fish or meat that are being fried be frequently turned?*

Because the turning assists the evaporation of the water. When the fish or meat is allowed to lie too long *steam is generated under it,* and the substance becomes soddened; and the moment the steam is driven off, the surface catches to the hot pan, and becomes burnt and broken.

177. *Why does cabbage-water possess such a disagreeable smell?*

Because it dissolves the *essential oil of the cabbage.* The water should be changed when the cabbage is half boiled; the cabbage would thereby acquire a greater sweetness, and be less likely to excite flatulency.

"We, ignorant of ourselves,
"Beg often our own harms which the wise powers
Deny us for our good."—ANTONY AND CLEOPATRA.

178. *Why is the onion considered such an useful vegetable?*

Because, as well as imparting an agreeable odour and savour to compound dishes, the *essential oil* which it contains is an excellent stomachic stimulant.

179. *Why is water-cress beneficial?*

Because, like the onion, it contains *a peculiar oil*, which acts as a very healthful stimulant upon the stomach.

180. *Why do vegetable and animal bodies decay so rapidly?*

This is one of the benevolent provisions of nature. If such bodies were more enduring, they would *accumulate and encumber the earth.* No sooner is their life extinct than they begin to dissolve. The ingenuity of man enables him to preserve those that are essential to his wants. Nature removes the rest in a noiseless and imperceptible, but most effective, manner.

181. *Why is salt meat less nutritious than fresh?*

Because the brine *absorbs those constituents of meat which are found in soup*, and which are necessary, not only to nutrition, but to the digestion of the meat.

182. This is stated upon the authority of Liebig, but Professor Donovan takes a different view. He says :—"I believe that the nutritive qualities are scarcely impaired by a few days salting, notwithstanding the great quantity of gravy-like juices which pour out. But there can be little doubt that the action of long-continued salt is to corrugate and harden the fibre, to render it somewhat less easily digestible, and probably to lessen its nutriveness. Very little changes seem to take place in the meat beyond these; but that no argument ought to be founded upon the abundant extrusion of gravy-like juices, the following experiment, which I made some years ago, seems satisfactorily to show :—Forty-two pounds and a half of beef were well rubbed with salt in the usual manner, and put into a dry crock in the month of December; in twenty-four days it was taken from the brine which had formed, and was suspended for some hours above the crock in order that it might drain. The beef was found to weigh forty pounds, and the brine five pounds and a half. Evaporation had removed some of the water from the meat, and much of the salt had entered permanently into the interior. The whole of the brine was made to boil in a clean iron pan; and as fast as salt crystallized it was skimmed from the top and scraped from the bottom. When it was reduced to the measure of half a pint, it was allowed to cool. I judged that this should prove a very strong gravy; if any of the valuable parts of the meat had ever been contained in it; but on tasting it I could not perceive much difference between it and a saturated solution of salt in common water. The liquid was then evaporated to one-half, and on separating the salt the taste was still as poor as ever. The proper conclusion seemed to be, that by the loss of these juices, when the meat is subjected to the action of salt, very little, if any, of the nutritious

" When the sea is calm, all boats alike
Show mastership in floating."—CORIOLANUS.

portion is abstracted. The liquid consists merely of water tinged with blood; and one use of the process is to expe. from the meat this blood and water, which, if allowed to remain, would tend to promote its putrefaction."

CHAPTER IX.

183. *Why should meat be kept some time before it is salted?*

Because its fibre will become *short and tender by keeping;* but if it is salted when quite fresh it will be tough and hard.

184. *Why is meat frequently salted immediately that the animal is killed?*

When meat is *wanted for warm climates* it is found advantageous to salt it before it gets cool, because, the vessels of the flesh being open, the salt is more readily absorbed, and the meat immediately and thoroughly cured. Such meat, however, becomes very hard.

185. *Why, when meat is pickled, is it an error to add a little sugar to the brine?*

Some persons appear to imagine that because meat may be *preserved in sugar,* therefore a *little* sugar added to the salt brine will improve its antiseptic powers. But, although a *large* proportion of sugar exercises a preservative influence, a *small* proportion has precisely *an opposite effect.*

186. *Why does salting preserve meat?*

When salt is applied to the flesh of animals, the fibre becomes wrinkled, the spaces between the fibres are closed, and the *watery parts of the meat are pressed out.* Salt preserves meat by three operations: by taking up the *water,* which would promote putrefaction, by excluding the *air,* and by its *antiseptic properties.*

187. *Why does putrefaction generally commence near to the bones and joints?*

Because it is in those positions that the most *gelatinous* parts of meat are found.

188. *Why is salt wholesome?*

Because, from the *stimulating properties* which it possesses, when it comes in contact with the membrane that lines the stomach, it affects its sensibility agreeably and healthily.

189. As a singular instance of how doctors disagree, we may mention that Dr. Robert Howard has published a pamphlet entitled "A Treatise on Salt, showing its Hurtful Effects on the Body and Mind of Man and on Animals; its tendency to cause Consumption, Insanity, and other diseases, as taught by the Ancient Egyptian Priests and wise men, and by Scripture, and the Author's Experience."* According to this pamphlet all the ills (and many more) that physicians and physiologists ascribe to the *absence of salt*, Dr. Howard attributes to the *use of it*. We have looked through his pamphlet; but can find no reason whatever for distrusting the almost universal confidence in the salutary effects of salt when used in moderation. Dr. Howard recommends the substitution of *vinegar* for salt—a remedy worse than the evil, if acted upon to the extent that the abandonment of salt would require.

190. *Why should salt be applied to vegetables intended for pickling, previously to putting them in the vinegar?*

Because all vegetables *abound in watery juices*, which, if mixed with the vinegar, would dilute it so much as to *destroy its preservative property*. Salt absorbs a portion of this water, and indirectly contributes to the strength of the vinegar.

Observe how much water salt will extract from a cucumber cut into slices, and sprinkled over it upon a plate.

191. *Why should pickles not be kept in metal vessels?*

Because vinegar is a *corrosive acid*, capable of dissolving several metals and the glazes of earthenware which contain lead. Vinegar will dissolve copper, and produce verdigris; it will dissolve lead, and produce sugar of lead; these are poisonous compounds. Neither pewter, tin, nor zinc are altogether safe. Iron is harmless, but is liable to slight corrosion from vinegar.

The safest materials for pickling vessels are *unglazed* earthenware, glass, porcelain, and stone-ware.†

192. *Why does frozen meat keep fresh for a great length of time?*

Because substances, so long as they are in a frozen state, cannot undergo the chemical changes that produce putrefaction. *Their particles are hermetically sealed* against the effects of oxygen, the great agent of chemical changes.

* W. and T. Piper, 1851.

† Webster and Parker's *Encyclopædia of Domestic Economy*. Longman and Co.

"Misery makes sport to mock itself."—RICHARD SECOND.

193. *Why is the moderate use of salt considered essential, and yet numerous diseases are attributed to the use of salted meats?*

It is true that a certain proportion of this condiment is not only useful but indispensable; but *an excess of it* is as injurious as its moderate application is salutary. This observation applies with as much force to the vegetable as to the animal kingdom; a small proportion applied as a manure promotes vegetation in a very remarkable manner, whereas a larger quantity actually destroys it.

194. Dr. George Fordyce has urged a conclusive objection to that hackneyed maxim "that we ought to live *naturally*, and on such food as is presented to us by nature;" namely, that *man has no natural* food. It is decreed that he shall earn his bread by the sweat of his brow; or, in other words, that he shall, by his industry, discover substances from which he is to procure subsistence; and that, if he cannot find such, he must cultivate and alter them from their natural state. There is scarcely a vegetable which we at present employ that can be found growing naturally.*

195. *What evil arises from abstinence from salt?*

Several cases are upon record of persons who, from fancy or caprice, abstained entirely from salt, becoming fearfully afflicted with worms. This arises probably from the absence of *the corrective agency of salt;* and the consequent debility of the digestive organs.†

196. *Why is saltpetre often added to brine?*

Because it is found to *impart redness* to meat, giving it a better appearance for the table.

Saltpetre is a natural production, and is found crystallized on the surface of the soil in certain countries and places, particularly among old walls and spots that have been uninhabited. The surface of the ground is swept off frequently, and the saltpetre contained in it is procured by mixing the whole in water; when the salt dissolves and the impurities have subsided, the former is obtained by evaporation. What is used in England comes from Bengal in a very impure state; it is purified here; that which is of the best quality is in long transparent crystals. Its taste is sharp, bitterish, and cooling; it is possessed of a greater degree of antiseptic power than common salt. Sir John Pringle found that it exceeded the latter four times; hence it is always an ingredient in making strong brines where the saline taste is to be avoided. When common salt alone is used it is apt to give a greenish tinge to the

* Dr. Paris's *Treatise on Diet.* T. and G. Underwood.

† See numerous cases in Dr. Paris's *Treatise on Diet*, pp. 146, 147, and the *London Medical and Physical Journal*, vol. xxix., No. 231.

"Striving to better oft we mar what's well."—LEAR.

meat, and those who are desirous of having the beef of a fine red colour, add a little saltpetre, which has the property of giving this colour; but as this salt has also the effect of hardening the meat, and communicating a harsh taste, to correct these effects, some sugar or molasses is likewise added. Those who are desirous of the red colour without using saltpetre, may give it by a little cochineal, which is perfectly harmless.

197. *Why may brine once used be boiled and afterwards used again?*

Because the boiling of the brine drives off the watery matter absorbed from the meat, hardens the albumen and blood, which, being sent to the surface *may be skimmed off*, thus rendering the brine free from contamination. Fresh salt should be added each time to increase the strength of the brine, and make up for the loss of salt absorbed by the meat.

198. *Why was the scurvy a very prevalent disease in London in the seventeenth century?*

Because the supply of *vegetable aliment* to the inhabitants was deficient. At that period the art of gardening had not long been introduced. The most common articles of the kitchen garden, such as cabbages, were not then introduced. Queen Catherine of Arragon could not procure a salad until a gardener was sent for from the Netherlands to raise it.

199. *Why is bay-salt preferred for curing meat?*

It is probable that the largeness of the crystals of bay-salt, and the slowness with which they dissolve, produce a more intimate combination of the brine with the water of the meat. It is also supposed that the *mineral matters* which are combined with bay-salt improve its efficiency.

200. *Why does pork require less salt for its preservation than other meat?*

Because of the *extreme fineness and closeness of its fibres*, and also of its larger proportion of *fat* than other meats. Fat has a less tendency to putrefaction than lean.

201. *Why is the floating of an egg in brine an imperfect test of its strength?*

Because a saturated solution of salt will bear an egg, and the same solution, *diluted with almost double its weight of water*, will do the same thing. Hence the test of an egg floating in brine is a very imperfect one.

202. *What proportion of salt and water forms a proper brine?*

Seven and a half ounces of salt should be dissolved in an imperial pint of water at 60 degrees. The advantage of preserving meat *with a proper degree of saltness* is important, as it conserves the greatest amount of goodness in the meat, without hardening to a great degree its fibrous parts.

203. *Why does enveloping meat in a cloth damped with vinegar and water preserve it in hot weather?*

Because the sour vapour of vinegar *keeps away the flies*, and the evaporation of the dampness *keeps the meat cool.*

204. I found a wet towel freely exposed in a room of which a window was open to be but 68°, when a thermometer hanging in the room was 78°. A difference of 10° in sultry weather, is of some importance in the preservation of meat.*

205. *Why is vinegar unfit to be used with peas, beans, and lentils?*

Because, although it dissolves albumen, and transforms cellulose and starch into sugar, and thus assists its digestion, it has the property of *hardening legumin*, the nutritive property of leguminous seeds.

206. *Why should mothers who are nursing abstain from the use of vinegar?*

Because the dissolving action of vinegar acts so powerfully upon the blood, that in milk the proportion of *caseine cells* which contains the butter, decreases if the mother takes much vinegar.

207. *Why is it an error for young ladies to take vinegar with the view of making themselves look delicate?*

Because, independently of the morbid vanity of such conduct, the quantity of vinegar that would be healthful, would rather

* Donovan's *Domestic Economy*—Human Food. Longman and Co.

have *an opposite tendency;* but a larger quantity, sufficient to produce delicacy of appearance, would only do so by *sowing the seeds of inevitable disease.*

CHAPTER X.

208. *Why does smoking meat prevent its undergoing putrefaction?*

Because the vapours of smoke contain a proportion of *creosote,* which is a powerful antiseptic.

Antiseptic, opposing or resisting putrefaction.

209. *Why does pyroligneous acid preserve meat?*

Because it is a powerful antiseptic, possessing in a concentrated state the principle of smoke.

Pyro-ligneous, from a Greek word meaning *fire,* and the Latin *lignum,* wood.

210. With respect to the theory of preserving by smoke, it is now known that in the smoke of wood there is an acid vapour which rises with it, and is the cause of the preservation of the meat. Every one must have remarked how much more pungent for the eyes is the smoke of wood and turf than that of coal; this is owing to the acid just mentioned, which can be procured in a separate state, and as this was at first thought to be one of a peculiar kind, distinct from all other acids, it received the name of *pyroligneous* acid, or acid of wood. But subsequent observations have shown that it is not a peculiar acid, but the same as the acetic, which forms the sour principle in vinegar—an opinion which is confirmed by the manufacture of actual vinegar in the distillation of wood. The liquid that comes over first in this distillation is of a dark brownish colour, and consists of acetic acid mixed with tar and water, from which good vinegar is afterwards prepared by rectification. The crude liquor still goes by the name of the pyroligneous acid, and is now successfully applied to the preservation of animal substances by simply washing them with it; which is in fact, making use of the active principle in wood smoke; and this substance might, without much impropriety, be familiarly styled the *essence of smoke.**

211. Dr. Wilkinson communicated the following particulars to a scientific meeting at Bath; they were subsequently published in the *Philosophical Magazine:*—Mr. Sockett having directed his attention to the smoking of hams with wood smoke

* *Encyclopædia of Domestic Economy,* by T. Webster, F.G.S., and Mrs. Parkes. Longman and Co.

"It is excellent
To have a giant's strength, but it is tyrannous
To use it like a giant."—MEASURE FOR MEASURE.

either in a building erected for that purpose, or in a chimney where wood alone is burned, in addition to its considerable increase of flavour, he considered it more effectually preserved from putrefaction by being what is commonly called smoke dried. Mr. Sockett having ascertained by experiments that meat thus cured required less salt, he was induced to suppose some antiseptic quality in the same, not attributable to the mere application of heat. A neighbouring manufactory of pyroligneous acid afforded him an opportunity of trying a variety of experiments, which convinced him of the correctness of the supposition of the antiseptic quality of wood smoke, as the same effects as to flavour and preservation were produced in a superior degree without the aid of any increase of temperature, which by drying diminishes the nutritious quality of meat thus exposed.

Mr. Socket ascertained that if a ham had the reduced quantity of salt usually employed for smoke-dried hams, and was then exposed to smoke, putrefaction soon took place when pyroligneous acid was not used; even one-half this reduced portion of salt is sufficient when it is used, being applied cold, and the ham is thus effectually cured without any loss of weight, and retaining more animal juices.

The mode adopted was by adding about two tablespoonfuls of pyroligneous acid to the pickle for a ham of 10 or 12 lbs.; and when taken out of the pickle, previous to being hung up, painted over with the acid, by means of a brush. In many instances, Mr. Sockett has succeeded by brushing the ham over with the acid, without adding any to the pickle. The same mode answers equally well with tongues, requiring a little more acid, on account of the thickness and hardness of the integuments.

Upon dried salmon it answers admirably; brushing it over once or twice had a better effect than two months smoking in the usual way, and without the same loss from rancidity. From the result of a few experiments on herrings, he is persuaded that this mode of curing might be most advantageously introduced in our fisheries, so that herrings might be cured here superior to those imported from Holland.

These experiments so satisfactorily demonstrating the antiseptic qualities of this acid, where only small portions of salt were employed, Mr. Sockett was then induced to try the results of the application of this acid when no salt was employed: he placed some beefsteaks upon a plate and covered the bottom with the acid, the steaks being daily turned, and, at the time of recording the experiments, he noticed that they kept above six weeks without the least tendency to putrefaction. Many families in Swansea and its vicinity, practice with the greatest success this mode of curing hams, tongues, beef, fish, &c.

212. *Why, when copper vessels are being used for cooking food, is it dangerous to put salt into the water, if the water is to be taken as soup?*

Because, if salt and water be boiled in a copper vessel, *the salt will dissolve an amount of copper* that will render the water decidedly unhealthy.

"Duty never yet did want his meed."—Two Gentlemen of Verona.

213. *Why do preserves, pickles, meats, &c., that are intended for preservation, decay unless the air is carefully excluded from them?*

The putrefactive changes which occur in these substances probably result from *the germs of fungi,* microscopic plants, which abound in the air, and to which the inorganic substances offer a suitable soil.

When a vegetable juice, such as grape juice, or an infusion of malt, ferments, the admission of air is necessary to the commencement of the change, which then goes on, even if the air be afterwards excluded. But the air may be admitted to such solutions, without fermentation occurring, provided the air be passed through a tube filled with cotton wool.

The reason seems to be that the germs of fungi are thus arrested, which would otherwise cause fermentation by being developed in the substance which is decomposed during their growth.

214. *Why should the quantity of sugar used in preserving fruits be regulated with the greatest care?*

Because *a weak solution of sugar has a great tendency to ferment,* and will quickly become sour in a low degree of temperature. If, on the other hand, the syrup be too concentrated, the sugar will *crystallize* and spoil the fruit.

215. *Why should preserved fruits be removed from the preserving pan to an earthen pan as soon as possible?*

Because *the acid of the fruit dissolves the copper* of which the preserving pan is made, producing a very poisonous compound.

CHAPTER XI.

216. *Why does cabbage frequently produce flatulency in persons of weak digestion?*

Because it contains a great proportion of *cellulose,* which is very difficult of digestion.

"How sharper than a serpent's tooth it is
To have a thankless child."—LEAR.

Cellulose is a kind of *woody fibre*, from which the stringiness of cabbage arises. Vinegar dissolves this cellulose, and is therefore a proper addition to cabbage.

Of the various kinds of cabbage, the white cabbage (which the Germans use in making sour-krout) is the best, since it contains lactic acid, which renders it readily digestible.

The complaint of indigestibility which is frequently brought against white cabbage, might more consistently be laid against the pork and hard-boiled peas pudding generally taken with it.

217. In a very learned and elaborate work, the public are treated with this piece of information, "*Cabbages were known to the Romans!*" In another work of equal pretensions a long discussion is entered upon to ascertain whether it was really the cabbage, or some other plant which the Romans enjoyed. In the few facts we have given respecting this useful vegetable, we have endeavoured *to make cabbages known to ourselves.* This kind of information has a practical utility of considerable value; and we doubt not that the housewife will derive greater benefit from knowing what a cabbage contains that is good or bad, than from knowing that Cæsar and cabbages were contemporaneous.

218. *Why have leeks, garlics, &c., such a pungent taste?*

The pungent taste of leeks, garlic, radishes, horse-radish, onions, &c., is produced by certain volatile oils, which may be extracted, and will be found to possess the peculiar smell and taste of the vegetables themselves.

219. *Why are edible roots, such as potatoes, more digestible than esculent vegetables, such as cabbages, &c.*

Because the starch, gum, and sugar of the roots are *more readily soluble* than the *cellulose* of the vegetables; and the constituents of fat and albumen are more abundant in roots than in leaves and stalks.

220. *What is the process of fermentation in bread?*

Fermentation raises the dough *by the evolution of gas through its entire mass*, the gas being *carbonic acid;* a small quantity of sugar and some alcohol also result from the same process; these various products owing their formation to the decomposition of a part of the starch and a little sugar pre-existing in the flour, from the action of the ferment.*

* Marcet, *Composition of Food.* Churchill.

"Love all, trust a few,
Do wrong to none."—ALL'S WELL THAT ENDS WELL.

221. *Why do loaves become lighter in weight by baking?*

Because during the process a large quantity of water is driven off.

222. *Why does bread become stale?*

It is commonly supposed that bread becomes *stale,* because it *dries,* through losing water; but such is *not the case.* Stale bread is scarcely drier than fresh: in five days fresh bread loses one-hundredth part only of its amount of water; and it becomes stale even if kept in a moist atmosphere.

The staleness of bread arises from *some peculiar change which its atoms undergo,* and which is again disturbed by the re-application of heat. Hence toasting bread, which might be supposed to dry it, makes it moist, except upon the surface; and stale bread may be freshened by being again put into the oven.

223. *Why are cakes preserved in a moister condition when kept in tin boxes which exclude the air?*

It has been said that bread does not become stale by the evaporation of water; it may therefore seem inconsistent to say that cakes remain moist in tin cases, because their water is prevented from evaporating. This, however, is in part the reason: *cakes are kept a much longer time than bread,* and hence the slow evaporation acting continually upon them would produce dryness. The tin cases, moreover, prevent the volatile oils of the spices and fruits employed in making the cakes from escaping, and also preserves the sugar in a moist condition.

224. *What produces the holes in bread?*

The carbonic acid gas, produced by fermentation, is prevented from escaping by the *tenacity of the gluten.* It therefore produces numerous cells, which impart lightness to the bread.

225. *What changes occur in the process of baking bread?*

In the process of baking, a portion of the starch in the external layer is *transformed into gum and sugar.* This gives the well-known sweetness to crust, when not over-baked. Internally the albumen is coagulated, and the gluten fixed. A small quantity of alcohol, produced by fermentation, is driven off, with a portion of the water.

226. *Why does crust, which is much baked, become bitter?*

Because, at a very high temperature, a peculiar principle called "*roast bitter*"* is produced.

227. *Why is rye bread less spongy than wheaten bread?*

Because wheat flour is *richer in gluten than rye flour*. The gluten causes the sugar to undergo fermentation, and it also prevents the carbonic acid gas, formed by this fermentation, from escaping.

228. *What is the active principle of yeast?*

It is well known that ferment, or yeast, is, in a great measure, made up of *a cellular plant*, and it would appear that the germs of this plant abound in the atmosphere, and when they find a solution of albumen, fibrin, &c., grow in it; in so doing they excite a decomposition of the fibrin, which, being communicated to the sugar, causes it to ferment.†

229. *Why is American flour whiter than English flour?*

Its superior whiteness arises from the method of its preparation; it is prepared in *batten sifting machines*, and is cooled in a suitable apparatus, while the English flour is allowed to cool in sacks.

The flour becomes warm through friction in grinding.

230. *Why is pastry unhealthy?*

Because of the fat, which, in the process of baking, is converted into an *indigestible oil*. The albumen of the eggs employed becomes baked into a very indigestible substance.

231. It is the fat so abundantly mixed with many tarts in the form of butter, and as a constituent of the eggs and almonds, which renders many kinds of pastry

* Chemically known as *assamar*.

† Gregory's *Handbook of Organic Chemistry*. Walton and Maberly.

so difficult of digestion. The more these fats are transformed by heat into the products of their respective decomposition, the more will this be the case. For this reason, macaroons, almond tarts, or chocolate cakes, containing the fat of cocoa, are more indigestible than other fruit-cakes and pastry which contain neither almonds nor cocoa. The indigestibility of the latter, however, corresponds exactly to the quantity of butter and yolks of eggs used in their preparation; for in the yolk the fat of the egg is principally to be found. Cakes, therefore, containing only a small proportion of butter and eggs, are the most innoxious.*

CHAPTER XII.

232. *Why do eggs become putrid by being kept?*

Because the shell which covers them, though it looks solid to the eye, *is in fact very porous,* and air and moisture, acting upon the contents of the egg, produce putrefactive changes. This explains why covering eggs with grease or oil, or burying them in dry bran or saw-dust, tends to preserve them for a longer time.

233. Any kind of varnish will answer the purpose, but the readiest mode is by an admixture of beef and mutton suet. The following is, however, the most effectual method that can be adopted:—Melt some beef and mutton suet mixed in a pipkin, and dip the eggs in it. Wipe off the superfluous fat, and set the eggs on end, small end uppermost, wedged close together, and one above another, with layers of bran between; the box in which they are placed should be kept closely shut. They thus come into use equal to new eggs. The simplest method which is resorted to for the preservation of eggs, is boiling them for one minute, by which process the albumen next to the shell is coagulated, and the remaining portions of the egg consequently protected. They will thus keep for some weeks.

234. *Why do eggs become hard by boiling?*

Because heat has the effect of *fixing the atoms of the albumen,* and destroying their fluidity. Heat, which generally softens substances, hardens albumen.

235. *Why are eggs that are slightly boiled more digestible than eggs rendered hard by boiling?*

Because the albumen, being in a *semi-fluid state* in the soft egg, is more easily dissolved than when it is rendered hard.

* *Orr's Practical Chemistry*—Chemistry of Food. Houlston and Wright.

"That we shall die we know, 'tis but the time
And drawing days out that men stand upon."—JULIUS CÆSAR.

236. *But why does boiling an egg assist its digestion?*

Because the stomach would itself *partly coagulate a raw egg* before proceeding to dissolve it. When, therefore, an egg is slightly boiled, it is at once fit to undergo digestion.

237. *Why do oranges decay when their rind is injured?*

Because the rind contains an *aromatic oil* of a highly preservative nature; but when the rind is broken, the *oxygen of the air* finds access to the inner parts of the fruit, and produces decomposition.

238. *Why is the excessive use of spices injurious?*

Because they impair the nervous irritability of the stomach, and weaken its digestive powers. By "nervous irritability," is meant that *healthy excitability* which sets it in action whenever food is taken.

239. *From what does the peculiar flavour of orange and lemon peel arise?*

From an aromatic oil, which is a peculiar secretion of the rind. The properties of this oil are of a tonic nature.

Tonic, from a Greek word, meaning I strengthen. Tonics improve the tone of the muscular system.

240. *Why are ripe fruits sweeter than those that are unripe?*

Because, although they contain generally a larger amount of acid in their ripe than in their unripe state, its presence is *disguised by the sugar* which distinguishes the ripe state. In the unripe state, the acid predominates over the sugar; in the ripe state, the sugar over the acid.

241. *Why are stewed fruits, and fruit jelly prepared with sugar, preferable to raw fruit?*

Because a *mucous jelly* is formed, which weakens the acids, and envelopes and disguises them, just as sugar does in the ripe fruit. This jelly protects the stomach from the too irritating power of the acids of the fruit.

"When sorrows come, they come not single spies,
But in battalions."—HAMLET.

242. *What effect have melons and cucumbers upon the blood?*

Their effect is similar to that of fruits: *they dissolve albuminous matters and exercise a cooling influence.* They are more nutritious than green vegetables, and less so than potatoes; they have a great advantage over the latter in not loading the blood with fat.

243. *Why have raspberries and peaches such a delicate fragrance?*

It arises from *a very delicate ether*—something finer than a volatile oil—which they form in their growth.

244. *What effect have vegetable acids upon the blood?*

They *cool and dilute the blood,* and generally refresh the system. All fruits contain acids and salts, which exercise a cooling and invigorating influence. Apricots, peaches, apples, pears, gooseberries, and currants contain *malic* acid. Lemons, raspberries, grapes, and pine-apples contain *citric* acid. The skin of grapes, plum, sloes, &c., contain *tannic* acid, which has a bitter taste.

Malic, from the Latin, *malun*, an apple, meaning the acid of apples; *citric* acid the acid of lemons; *tannic* acid, an acid found chiefly in the gall-nuts of the oak.

245. *What causes the peculiar flavour of almonds?*

It is caused by a peculiar compound called *emulsine,* or ferment of almonds. A similar principle exists in bitter almonds, and in the stones of peaches, plums, &c.

246. *Why are chestnuts so dry and floury?*

Because they contain an abundance of *starch.*

247. *Why are almonds and other nuts so smooth and moist?*

Because they contain a considerable proportion of their peculiar *oils.*

248. *Why is fruit most wholesome when eaten on an empty stomach?*

Because it contains a large amount of *fixed air,* which re-

"Wise men ne'er sit and wail their woes,
But presently prevent the ways to wail."
HENRY FOURTH, PART THIRD.

quires great power to disengage and expel it, before it begins to digest.

249. *Why is boiled or roast fruit more wholesome than raw?*

Because, in the process of boiling or roasting, fruit *parts with its fixed air*, and is thus rendered easier of digestion.

250. *Why are nuts unwholesome?*

Because they are not only difficult of digestion, but also contain *a large amount of oil*, which turns acrid and rancid on the stomach.

251. *Why are roasted chestnuts more digestible than raw ones?*

Because roasting expels a great deal of fixed air and water from them, and *converts a portion of their starch into sugar*.

252. *Why does toast purify water?*

Because the bread, being slightly charred, *absorbs whatever organic impurities abound in the water*.

Sir R. Carlisle suggests that toast and water should be made from hard biscuit, reduced by fire to the brown colour of coffee. There is an advantage, he says, in the biscuit being free from yeast.

253. *Why is it necessary to mix liquid with solid food?*

Because *salts are constantly accumulating in the body* from the food we eat, which are washed away by liquor, and which, if suffered to remain, would cause the blood to become too thick, and obstruction and inflammation would ensue.

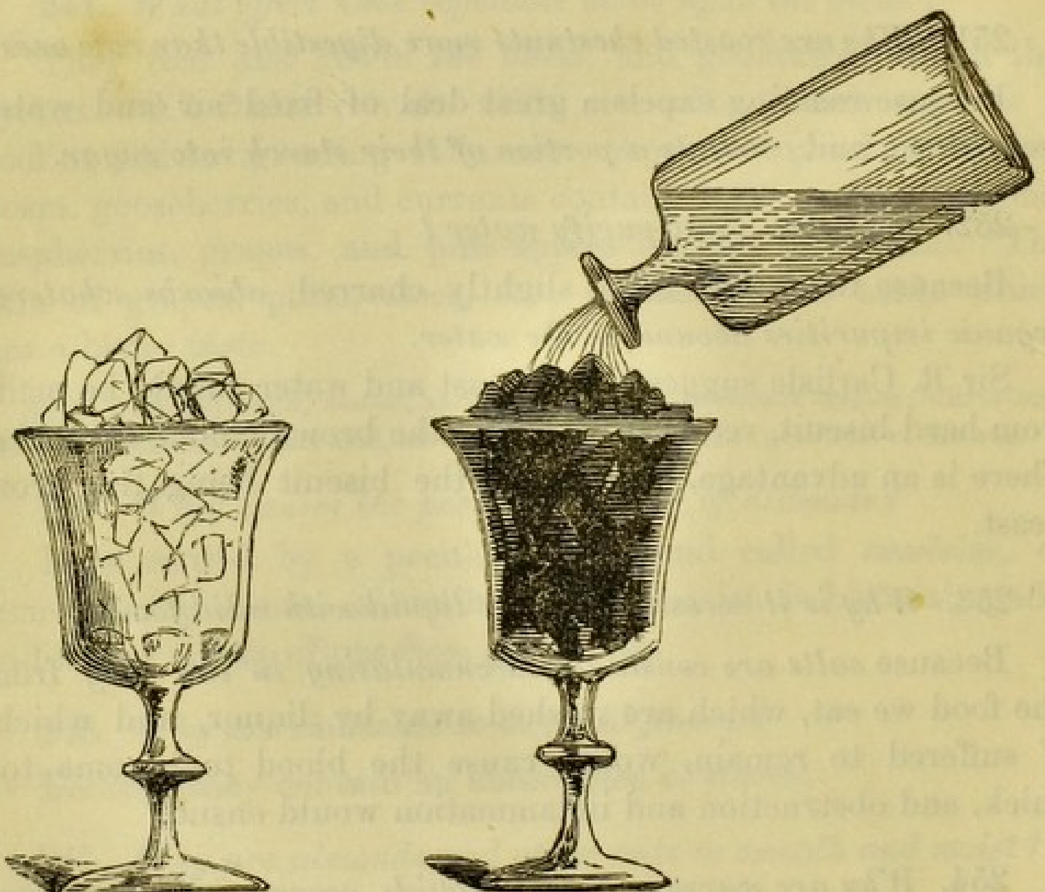
254. *Why are warm and cool liquids occasionally necessary to health?*

Because, when the body is cold, warm liquors *restore the necessary heat*; and, when the body is heated, cooling liquors *absorb the heat* and regulate the temperature, and both of them tend to promote the bile, and other secretions of the stomach.

"The amity that wisdom knits not, folly may easily untie."—TRIOLUS AND CRESSIDA.

255. *Why is bread made from wheat flour more strengthening than that made from barley or oats?*

Because, as *gluten, albumen,* and *caseine* are the only substances in the bread capable of forming blood, and consequently of sustaining the strength and vigour of the body, they have been appropriately called the *food of nutrition,* as a distinction from those which merely support respiration. Wheat contains 825 parts of starch, 315 of *gluten, albumen,* and *caseine,* and 60 of *sugar* and *gum;* while barley contains 1200 of *starch,* 120 of gluten, albumen, and caseine, and 160 of sugar and gum; hence wheat is much richer than barley in the *food of nutrition.*



EXPERIMENT DEMONSTRATING THE COMPOSITION OF SUGAR.

256. *Of what elements do starch, sugar, and gum consist?*

Starch, sugar, and gum consist of *nearly equal proportions of carbon,* and the elements of water. Sugar differs from starch in its elementary composition only in containing *rather more water.*

"'Tis not enough to help the feeble up,
But to support him after."—TIMON OF ATHENS.

257. A very simple experiment will prove that sugar, though so very unlike charcoal, really consists of charcoal and water. Fill a wineglass with lumps of white sugar, and then carefully pour from a phial some sulphuric acid (oil of vitriol). The acid will immediately deprive the charcoal of the sugar of the water with which it is combined, and a black mass will be the result. This is the carbon of the sugar, which is burnt up within our bodies by the process of respiration, and explains why sugar, starch, and gum are called the *food of respiration*, in distinction from the gluten, albumen, and caseine which form the flesh, and are called the *food of nutrition*.

CHAPTER XIII.

258. *Why should meat which is to be dried for preservation not be subjected to a great heat?*

Because the albumen of the meat coagulates at a temperature of 140°, after which *it cannot again be dissolved.* But it may be dried at a lower temperature than this, and retain its soluble property. Gelatine, on the contrary (as is known by the use of glue), may be heated to the boiling point, and still *retain its solubility* after becoming cold.

259. *Why are vegetables preserved by burying them in the earth?*

Because at a certain depth below the earth *the temperature does not vary*, summer nor winter, and it is never so cold there as to freeze. This tends to the preservation of vegetable substances. In many parts of Europe, potatoes, turnips, carrots, onions, &c., are preserved for one or more years, by burying them in deep pits in a clay soil, the pits being previously burnt out to exclude the moisture.

260. *Why should the earth adhering to potatoes and other roots intended for preservation, be allowed to remain?*

Because it tends to keep them fresh, the little fibres by which it is retained still continuing to *draw some nutriment from it.* If these are broken, the juices escape through the minute tubes, and the vitality of the vegetable is impaired.

"A surfeit of the sweetest things
The deepest loathing to the stomach brings."
MIDSUMMER'S NIGHT DREAM.

261. *Why is the flesh of sheep fed near the sea more nutritious than that of others?*

Because the *saline particles* which they imbibe correct their juices, and give consistency and purity to their flesh.*

262. *Why should wild animals be roasted in preference to being boiled?*

Because, from their constant motion and exercise, *their flesh becomes drier* than that of tame animals, and consequently less juicy. Roasting preserves their juices more than boiling.

263. *Why is salt-water fish more wholesome and palatable than fresh-water fish?*

Because the saline element in which they live hardens their flesh, and renders them *less exposed to putrescency when killed.*

264. *Why is it necessary to eat bread with animal food?*

Because it counteracts the excessive stimulation, and neutralizes the putrefaction, which animal food eaten alone would engender.

265. *Why does the marbled appearance of fat in meat indicate that it is young and tender?*

Because in young animals fat is dispersed through the muscles, but in old animals it is laid in masses on the outside of the flesh.

266. *Why is the flesh of animals killed by hunting tender?*

Because muscle possesses a property which is called "*irritability,*" to which it owes its firmness and strength. Whatever exhausts this irritability causes the flesh to be tender.

267. *But why are animals that are exercised tough?*

Because exercise develops "irritability" in the muscles, and *increases their strength;* but fatigue, and exhaustion have the opposite effect.

* Willich's *Lectures on Diet and Regimen.* Longman & Co.

"Experience is by industry achieved
And perfected by the swift course of time."
TWO GENTLEMEN OF VERONA.

268. *Why is some flesh white and other flesh red?*

White flesh generally contains a larger proportion of *albumen* than that which is red. But the amount of *blood* retained in the flesh also influences its colour.

269. *Why is it said that an oyster is never good except when there is an R in the month?*

Because in the months of the year in which no R occurs, oysters undergo certain *physiological changes*, which render them unsuitable for food, these changes chiefly arise from the fact that the summer is their breeding season. Although they may be eaten in August, they are not in their best condition until September.

270. M. Bremnil is said to have discovered that the poisonous property of muscles depends upon the presence of a minute star-fish which enters into the shell in summer time, but is never found in it in winter. He collected some of these star-fish, and gave them to dogs, upon whom the same symptoms were produced that appear when poisonous muscles are eaten.*

271. *Why do muscles, cockles, and shell-fish disagree with some persons?*

Popular notion ascribes the unhealthiness of these substances to the supposition that the fish are affected by *coppery matters* deposited on the beds whereon they feed; it is also thought that some poisonous properties exist in the *beard*, or other parts, of these fish. But these notions are in all probability *erroneous.* The effects arise from peculiarities of constitution in different people. There is scarcely an individual but knows some kind of food which does not agree with him. These cases of peculiarity of constitution cannot be explained.

272. *Why are fish crimped?*

It is supposed that the system of crimping, by knocking the fish on the head as soon as caught, and then cutting the fish transversely, *preserves the "irritability" of the muscles* for a longer time, and gives *firmness* to the fish.

* Webster and Parkes's *Encylopædia of Domestic Economy.* Longman and Co.

"O that men's ears should be
To counsel deaf but not to flattery."—TIMON OF ATHENS.

273. *Why does a fish diet, when taken too frequently, produce cutaneous eruptions?*

Because of the *oily matter of fish*, which is absorbed by the blood. Animals that are fed upon fish on the sea-coasts acquire a fishy flavour. Hence we see another instance of the propriety of changing our diet frequently.

274. *Why are raw oysters more wholesome than when cooked?*

When cooked they are *deprived of their salt water* which promotes their digestion, their *albumen becomes hard*, and they lose a portion of their nutritive mucilaginous matter.

Mucilaginous.—Holding solid matter in solution.

275. *Why have some oysters a green tinge?*

This has been erroneously attributed to the effects of copper; but it arises from the oysters feeding upon green confervæ, that grow in shallow waters.

Confervæ.—Small aquatic plants.

276. *Why, in making fruit jellies, are they frequently spoiled for the want of sufficient sugar?*

Because, when the sugar which is added to them is insufficient to absorb the watery matter, additional boiling is required to evaporate the water. This excessive boiling *destroys the coagulative property of the jelly*, and produces a mucilage which undergoes fermentation.

277. *Why is cabbage rendered more wholesome and nutritious by being boiled in two waters?*

Because (according to Dr. Paris) cabbages contain an essential oil, which is apt to produce bad effects; and he recommends that they should be boiled in two successive waters, till they are soft and digestible.

278. *Why are salads mixed with mustard, vinegar, salt, oil, &c.?*

Because raw vegetables are liable to ferment in the stomach; they are therefore dressed with condiments, which *afford a* *stimulus to the stomach,* enabling it to digest the vegetables before fermentation commences.

279. *Why should horse-radish be scraped for the table only just before it is required?*

Because the *oil of horse-radish is very volatile,* it quickly evaporates, and leaves the vegetable substance dry and insipid.

280. *Why is mint eaten with soup?*

Because its properties are stomachic and antispasmodic. It is therefore useful to prevent *the flatulencies* that might arise from eating soups, especially those of green or dried peas.

281. *Why is apple sauce eaten with pork, goose, &c.*

Because it is *slightly laxative,* and therefore tends to counteract the effects of rich and stimulating meats.

282. *Why should a little old cheese be eaten when raw apples have been partaken of freely?*

Because the *ammonia* of the cheese has a remarkable effect in neutralising the *acid* of the apples.

283. *Why does confining fowls in coops fatten them?*

Because they are kept in a constant state of repose, which, combined with liberal feeding, produces a considerable *formation of fat.*

284. *Why, when they are confined for a short time only before being killed, is the effect uncertain?*

Because fowls when first confined *pine on account of their loss of liberty,* and the fretting of the fowls causes them to lose flesh instead of fattening.

285. *Why are old green peas indigestible?*

Because the husk which surrounds the pea has become fully developed. This consists of a substance called *cellulose,* the cell principle, which, like the bran of wheat, is difficult of digestion.

286. *Why do potatoes become sweet after being rozen?*

The change may arise from *mechanical* causes, from the particles of ice during their formation, tearing asunder the cells and fibres; or *chemical*, by destroying the intimate union of the constituents of the juices.

287. *Why should larders, pantries, and safes be sheltered from the rays of the sun?*

Because the sun's rays quicken all kinds of *chemical changes;* not only those which arise from heat, but peculiar changes which spring from the *chemical effects of light.*

288. *Why should larders, pantries, &c., be open and airy?*

Food should either be preserved by *complete exclusion from air*, or by draughts of air, which, by remaining only momentarily in contact with the surfaces, will not *favour the progress of putrefaction.* Warm, still, and moist air, causes meat to change most rapidly.

289. *What is isinglass?*

Isinglass is the purest kind of gelatine; it is prepared from the sounds of several kinds of fish.

290. *Why is the white of egg used to clarify liquids?*

Because the *albumen of the egg coagulates*, and in doing so it *fixes in its own substance the impurities floating in the liquid.* When strained off, the liquid therefore becomes much clearer.

291. *What parts of meat are most likely to putrefy?*

Those parts which contain the most *gelatine.* When gelatine is removed from meat the remainder of the substance is less liable to putrefaction.

292. *Why is boiled rice good for persons suffering from diarrhœa?*

Because it exercises an *astringent influence*, which probably arises from the bland and mild mucilage which it forms in the stomach, and which shields the intestines from acrimonious humours.

"Good name in man or woman
Is the immediate jewel of their souls."—OTHELLO.

293. *Why are kidney beans more digestible than haricot beans?*

Because they contain *less gluten* than the mature bean, and the pod, when well boiled, is light and easy of digestion.

294. *Why do oils and butter become rancid?*

Because in certain states they combine with an excess of oxygen, which develops within them a pungent acid.

295. *Why does leaving the stoppers out of bottles cause acids and spirits to become weaker?*

Acids become weaker by *absorbing water* from the air; spirituous mixtures become weaker by the *evaporation of their spirit*, which is extremely volatile.

296. *Why does milk sometimes appear of a blue colour?*

When it does so it is impregnated with *microscopic vegetation*, or by an infusion of animalcula.*

297. *Do hot liquids destroy the teeth?*

Some physicians are of opinion that they do so. It has been said that "man is the *only animal* accustomed to *hot food*, and almost the only one affected with carious teeth." Dr. Paris says, "this is far from being true; the term of life in all graminiverous classes appears to be principally limited by the decay of the teeth."

298. *Why is it injurious to take ices after animal food?*

Because the fat and gelatine of the meat become *hardened by coldness*; and the temperature of the stomach being suddenly lowered, it is a long time before it regains the necessary tone which favours digestion.

299. *Why is eating ices injurious to the teeth?*

Because the teeth consist of a *brittle enamel* which, like glass, is liable to expansion or contraction under the effects of heat and cold. The enamel of the teeth has been known to have cracked under the sudden application of cold.

* Marcet *On Food*. Churchill.

"Be able for thine enemy
Rather in power than use."—ALL'S WELL THAT ENDS WELL.

300. *Why is the artificial oil of bitter almonds preferable to the natural oil?*

Because, though differing in composition from the real oil of bitter almonds, it resembles it very closely in flavour and odour. It is *safer* than the natural oil for use in confections and cookery, because it can never contain the *prussic acid* which is sometimes present in the natural oil.

Sold under the name of "Artificial oil of bitter almonds," and of "Essence de Mirbane."

CHAPTER XIV.

301. *Why do the names of the flesh of animals differ from the names of the animals?*

Because most of our animals serving as food preserve their Saxon names while living; but the names of their dead substances are derived from the French. Thus they are *ox*, *calf*, *sheep*, *deer*, and *pig*, while alive; but *beef*, *veal*, *mutton*, *venison*, and *pork* when dead. This might arise from the superiority of our neighbours in the art of cookery, which gave rise to the names of our *dishes*, though not to those of the *animals* from which they were derived.*

302. *Why have Westphalian hams a peculiarly pleasant flavour?*

Because the hogs are driven into forests where they feed upon *acorns*; the astringent quality of acorn food is supposed to harden the flesh, and to impart to it a peculiar flavour.

303. *Why is it necessary that the mind should not be harrassed during the time of repast?*

Because, without some degree of attention to the process of eating, and some distinct perception of its gratefulness, the food *cannot be duly digested*. When the mind is so wholly absorbed as to be unconscious of it, or even indifferent to it, the stomach lacks its proper impulses, the food is swallowed without mastication, and lies in the stomach an undigested mass for hours.

* Webster and Parkes's *Encyclopædia of Domestic Economy*. Longman and Co.

"Truth can never be confirmed enough,
Though doubts did ever sleep."—PERICLES.

304. *Why is drinking before a meal injurious?*

Because the bile and gastric juices are dilated by the liquid taken, and their digestive powers thereby weakened. (See 108.)

305. *Why is glass the most proper substance for drinking vessels?*

Because it is not affected by acids, as other substances are liable to be; and after each occasion of being used, *it can always be rendered sweet and clean.*

306. *Why is new bread unwholesome?*

Because it contains fixed gases, which free themselves in the stomach; it produces acidity by the revival of fermentation, when that process has not been completely extinguished by the heat of the oven.

307. *Why does inactivity frequently produce obesity?*

Because we take with our food a certain amount of *carbon* whose office is to invigorate and nourish the frame. And when carbonaceous food is taken to a greater amount than is required to support respiration, its constituents are deposited in the cellular texture, in the form of fat.*

308. Hence the fattening of the lower animals is most successfully conducted in confinement, as is usually practised with oxen, pigs, &c. When the goose is fattened as a delicacy for the epicure, it is placed in a coop with its legs tied; and then its liver becomes double or treble the natural size, from the deposition of fat in its cells.

309. *Why do the inhabitants of warm climates require less animal food than in colder regions?*

Because during its assimulation animal food generates *a greater quantity of heat* than that of a vegetable kind, from which circumstance the appetite is naturally greater for cooler and less stimulating sustenance.

310. *Why will a youth of fourteen or fifteen years of age require as much food as a man?*

Because, independent of the supply necessary for the waste of the system, the *increase of the muscles,* and the *growth of*

* Davidson's *Treatise on Diet.* Churchill.

"Fell sorrow's tooth doth never rankle more
Than when it bites, butlanceth not the sore."—RICHARD II.

the organs demand a considerable and regular amount of nourishment.

311. *Why is chicory a bad substitute for coffee?*

Because the cells of the chicory root, unlike the coffee berry, contain *no essential oil;* and it is wholly destitute of the active principle of coffee—*caffeine.**

312. *How may the presence of chicory be detected?*

If coffee containing chicory be shaken up with cold water in wine-glass, the coffee will *float,* while the chicory will *sink to the bottom.*

313. *Why does the coffee float upon the water and the chicory sink?*

Because the quantity of essential oil which the coffee contains, renders it *lighter than the water,* which it at the same time repels, while the absence of the oil causes the chicory to sink.

314. *How can the genuineness of moist sugar be tested?*

Moist sugar, if good, should be perfectly dry to the touch, and should not feel in the least sticky or clammy when pressed between the fingers.

Adulteration of sugar is made apparent by the wet and stained paper in which it is wrapped, the paper having absorbed a portion of the moisture, such as treacle, &c., which is added to increase the weight.

315. *How may chalk mixed with flour be detected?*

Put a tea-spoonful of flour in a wine-glass containing a little water; a few drops of *hydrochloric acid* are then to be added, when, if chalk be present, a brisk effervescence, arising from the the escape of *carbonic acid gas,* will ensue.

316. *How may genuine lard be known?*

By melting it to about the temperature of 212°, and if it *dissolve without ebullition,* or without the occurrence of *deposit,* it may be relied upon as genuine.

* Hassall on *Food and its Adulterations.* Longman & Co.

"You do but bar the door upon your own liberty,
If you deny your griefs to your friend."—HAMLET.

317. *How may the presence of copper in pickles be detected?*

By immersing for a few hours a piece of thick iron wire, having a smooth and polished surface, in the vinegar. If the smallest quantity of copper be present, it will be *deposited on the surface of the iron.*

CHAPTER XV.

318. *What is the difference between human milk and cow's milk?*

Human milk contains only *half as much caseine* as that of the cow, but a much *larger quantity of the sugar of milk;* and it also contains *butyrine,* or butter fat, in large proportion.

319. *Why does milk turn sour in thunder storms?*

Because in thunder storms, *ozone* is generated in the atmosphere; ozone is believed to be oxygen in a state of great intensity; and oxygen is the great acidifier throughout nature. The excess of oxygen in the air imparts acidity to the milk, by the formation of lactic acid.*

320. *Why does boiling prevent milk from becoming sour?*

Because *oxygen* is expelled from milk at the boiling point.

321. *Why does sour milk become curdled?*

Because the *lactic acid* formed in the milk has the property of coagulating caseine.

322. *Why does the milk of cows disagree with weak stomachs?*

Because of the large amount of *butter* which it contains. For such persons *skimmed milk* is most suitable.

323. *Why does sub-carbonate of potash prevent milk from turning sour?*

Because it combines with, and neutralizes the acid of the milk. The product is the acetate of soda, which is not injurious.

* See *The Reason Why*—General Science. Houlston and Wright.

"Mine honour's such a ring;
My chastity's the jewel of our house."
ALL'S WELL THAT ENDS WELL.

324. An excellent method of preserving milk from turning sour, or coagulating, is to add to every pint of it about ten or twelve grains of carbonate of soda. Milk thus prepared may be kept for eight or ten days in temperate weather.*

325. *Why does the churning of milk produce butter?*

Because the force of stirring, supported by a moderate heat, *causes the cells* in which the butter is confined *to burst;* the disengaged fat collects in flakes, and ultimately coheres in large masses.

326. *Why is milk more digestible when taken with other food?*

Because milk becomes instantly coagulated in the stomach, and when taken alone is *digested in a mass;* but a mixture of other food, such as bread or potatoes, breaks up the curd into small masses, and multiplies the surfaces of digestive action.

327. *Why is the cream that accumulates upon the sides of lead milk-pans especially dangerous?*

Because sometimes the cream becomes a little sour, and then its acid property, acting upon the lead, *dissolves it* freely. Dr. Darwin mentions the case of a farmer's daughter who was seized with colic and paralysis, and eventually died, from licking the cream so collected.

328. *Why does the milk last drawn from a cow yield the most cream?*

Because the light globules forming it float on the surface of the milk in the udder, and therefore come out towards the end of milking.†

329. *Why have cheese distinctive characteristics, and to what are they owing?*

Because the pastures on which the cows feed have local peculiarities; and also because different modes are adopted in the manufacture of cheese.

* Cooley's *Encyclopædia of Practical Receipts.* Churchill.

† See the *Gardener's and Farmer's Reason Why.* Houlston and Wright.

"True hope is swift, and flies with swallow's wings,
Kings it makes gods, and meaner creatures kings."—RICHARD III.

330. *Why is Gloucester cheese called "single" and "double?"*

Single Gloucester is made of skimmed milk, from which half the cream has been taken away. *Double* Gloucester is made of milk with all its cream.

331. *Why is Stilton cheese so called?*

Because it was first made at *Stilton*, in Leicestershire.

332. *Why is Stilton cheese so rich?*

Because it is made by *adding* the cream of one day to the entire milk of the next.

333. *Why is Cheshire cheese generally so rich?*

Because it is made of *entire new milk*, the cream not being removed.

334. *What is the blue mould which appears upon cheese?*

It is a species of *fungus*, or minute vegetable, which may be distinctly seen when examined by a magnifying glass.

335. *Why does old cheese rapidly decay after it is cut or broken?*

Because the action of free air, and especially of oxygen, on the various properties contained in the cheese, changes its constituents and hastens its putrefaction.

336. *Why is cheese rendered easier of digestion when grated?*

Because in this state it is *more readily mixed* with other alimentary matters, and is thus more quickly dissolved by the gastric juice.

337. *Why does old and decayed cheese promote digestion?*

Because, when cheese is in a decaying state, it possesses the property, in certain circumstances, of inducing a species of *chemical change* in other moist substances with which it is brought in contact. It has, in fact, a *soluble power*, and thus assists in softening and melting the food.

338. *Why does inferior cheese emit a bad smell?*

Because, during the decomposition or putrefaction of the caseine certain fetid products are generated containing *sulphur.*

339. *How do maggots get into cheese?*

The fly called *musca putris* deposits its eggs in cheese, which afterwards become the maggots.

340. *What causes the holes seen in Swiss and American cheese?*

In the making of these descriptions of cheese, a part of the whey is retained. The sugar of milk of the whey undergoes decomposition, and one of its products is *carbonic acid,* the expansion of which into *gas* causes the holes.

341. *Why is Dutch cheese less aromatic than other descriptions?*

Because a large proportion of *salt* is added to them, which prevents the formation of the peculiar *acids* that impart the distinguishing *aroma* to cheese.

342. *Why is cheese frequently eaten with bread?*

Because, like butter, it *increases the digestibility of the starch* of the bread; while the bread modifies the concentrated richness of the cheese.

CHAPTER XVI.

343. *What are the effects of a moderate use of ardent spirits?*

They directly *warm the body,* and, by the changes they undergo in the blood, supply a portion of that carbonic acid and watery vapour which as necessities of life, are constantly being given off by the lungs. They also stimulate the various organic functions, and thereby assist the operations of nature.

344. *Why have intoxicating liquors so speedy an effect on empty stomachs?*

Because the stimulus received by the nerves of the stomach is propagated to the brain, and in these instances the organs *having no other substance to act upon*, the communication between the stomach and the brain takes place more speedily.

345. *Why is habitual wine drinking injurious?*

Because, by inducing perspiration, and stimulating an excess of bile, it provokes an artificial and inordinate appetite, which, being indulged in, injures and ultimately destroys the digestive organs.

346. *Why is drinking spirits, after eating fat or strong food, injurious?*

Because spirits, instead of rendering such food soluble, only tends to harden and retain it in the stomach. We have an illustration of this fact, by inanimate substances being preserved from dissolution and putrefaction in spirits.

347. *Why is the froth of beer, &c., unwholesome?*

Because it contains the disengaged gas from the beer, which being introduced into the stomach, alternately expands and contracts the alimentary canal, producing flatulence, spasms, and cholic.

348. *Why is excessive tea drinking injurious?*

Because the warm fluid relaxes the coats of the stomach, weakens the bowels, and thus in process of time destroys the energy of the digestive organs.

349. *Why is the paleness of port in some instances a test of its age?*

Because, when it has remained long in the cellar, a portion of its colouring matter *becomes solidified*, and thrown down in small flakes, causing the wine to become paler.

350. *Why should bottles of wine be laid quite horizontally for preservation?*

Because the wine, coming in contact with the cork, *keeps it moist and air-tight*. But if the neck be laid too low, the lees

"The best quarrels in the heat are curs'd
By those that feel their sharpness."—LEAR.

accumulate in the neck, and produce *muddiness* when the wine is required for use.

351. *Why does beer induce a disposition to sleep?*

Because hops contain a *narcotic* principle, which they impart to the beer, and which has the effect of inducing drowsiness.

Narcotic.—From a Greek word meaning *to stupefy.*

352. Narcotics are generally stimulating in small doses, but stupefying in large doses. Cullen believed that the stimulating effect is owing to the resistance offered by the natural organs to the sedative influence of the narcotic agent; and hence that a large dose is immediately sedative, because the resistance of the system is overpowered. Brown, on the contrary, maintained that narcotics are in reality highly diffusible stimuli, which exhaust the system by the rapidity of their action. Thus, Cullen regarded them as directly sedative, and indirectly stimulant; and Brown, directly stimulant and indirectly sedative.*

353. *Why are spring and autumn the best times for brewing?*

Because cool dry weather facilitates the cooling of the wort; therefore *March* and *October* are the most favourable months. Extremes, either of heat or cold, are unfavourable; in hot weather the fermentation is *too rapid* to be properly controllable; and in cold weather it is *too sluggish* to be perfect.

354. *Why should a portion of the saccharine matter remain unfermented?*

Because, by its slow fermentation, the liquor is *fed by slow and gradual additions of alcohol and carbonic acid gas.* This prevents the flatness and heaviness that would otherwise ensue.

355. *Why are the lungs such important agents in the nourishment of the body?*

Because they act as *filters to the blood,* which originally enters the lungs of a black colour, and every time we draw our breath a portion of the blood so taken in is sent out of a bright vermilion colour.† Excess of wine retards this filtration.

356. *What occasions the different colours in wines?*

The colours arise from the various description of grapes, and the proportions in which their skins are employed in the manu-

* Hooper's *Medical Dictionary.* Longman and Co.

† Dr. E. Johnson on *Life, Health, and Disease.* Simpkin.

facture of the wines. But artificial colouring matters are sometimes used.

357. The colour of wine is owing to the following causes :—If the skins of the grapes, or marc, are entirely excluded from the fermenting vat, a *white wine* is always obtained, the juice of almost all grapes, black and red, as well as green, being colourless. *Champagne* is made from a red grape, so deep in colour as to approach to black, and *sherry* is made from a mixture of white and coloured grapes. The colour of *red wine* is derived from permitting the wine to ferment in contact with some of the marc, the colouring matter of the grape residing altogether in the skin, with the exception of the grape called Tintilla, from which *Tent wine* is made, in which the juice is coloured. This colouring principle is soluble in alcohol; therefore, when the alcohol is developed by the fermentative process, the must becomes coloured in consequence of the action of the spirit upon the marc. The wine is also more deeply coloured from a higher degree of pressure given to the husks of the grapes. The colour of *red wines* varies from a light pink to a deep purple tint, approaching to black; the *clarets* hold the intermediate rank between these two extremes. Dr. Henderson observes that "on exposing red wine in bottles to the action of the sun's rays, the colouring matter is separated in large flakes without altering the flavour of the wine. The colour derived from the skins of the grapes alone is not generally very deep; the high-coloured wines of France and Portugal are often rendered so by colouring ingredients, particularly by mixture with an intensely deep red wine, called *vino tinto*, and sometimes by elderberries and colouring drugs.

358. *Why is it found advantageous to store fermented liquors in cellars and vaults?*

Because the temperature of the ground is *more even* than that of the air; hence wines and ales stored in cellars do not suffer from the atmospheric changes that so frequently occur above ground.

359. *Why does beer which has become frozen never regain its original state?*

Because in freezing *the elements of the beer separate;* the spirit does not freeze, the watery portion therefore divides from the spirituous, and forms a sort of frozen mucilage. The process of freezing changes, in some unknown manner, the conditions of the atoms of this mucilage, and they will never again combine as before with the spirit, nor regain their original flavour.

360. *Why do fermented liquors improve by bottling?*

Because a slow fermentation goes on, which developes an *increased quantity of spirit* and of *carbonic acid gas.* This gas, being well confined, is absorbed by the liquor, giving to it the peculiar *freshness* of bottled drinks.

361. *Why does grape juice produce the best wine?*

Because the grape contains a larger proportion of *tartaric acid* than any other fruit. The tartaric acid exists in the grape, not in a free state, but in a state of combination, peculiarly suited to the vinous fermentation.

CHAPTER XVII.

362. *Why does the mouth sometimes "water" at the sight of agreeable food?*

Because the glands of the mouth are placed *under the influence of the mind,* so that the very thought and still more the taste of grateful food, acting upon them as a stimulus, causes a flow of their secretion.

363. *Why are jockeys, when their weight needs to be reduced, fed chiefly upon fish?*

Because, being less nourishing than other kinds of food, it *adds less to the solid structure* of their bodies.

364. *Why do our tears taste salt?*

Because salt (*chloride of sodium*) is one of the natural secretions of the blood, and imparts a degree of saltness to our secretions.

365. *Why is not the saliva salt?*

It is said that a remarkable exception is made in the case of the saliva, *for the purpose of perfecting the sense of taste.* The vessels of the tongue which absorb its nourishment *do not absorb salt from the blood.* Hence the saliva of the mouth is *neutral as to taste,* and the tongue can receive the most delicate impressions through its gustatory nerves. Therefore it is that meat, taken without salt, tastes insipid.

"All solemn things should answer solemn accidents."—CYMBELINE.

366. *Why are potatoes less mealy in spring than at other seasons?*

Because, when the vegetation of the plant is the most active, the amount of starch deposited is least, *the buds growing at the expense of the starch.**

367. *Why are some of the limbs of birds more tender than others?*

Because the tenderness or toughness of the flesh is determined *by the amount of exercise the muscles have undergone.* Hence the *wing* of a bird that *walks*, and the *leg* of a bird that *flies*, are the most tender.

368. *Why is cod fish, salmon, &c., flaky when cooked?*

Because the masses of muscular fibres *contract by boiling*, and on separating from the adjacent muscles, the interstices are filled up with *coagulated albumen*, exuding from the muscular layers.

369. *Why is thirst increased in fever?*

Because a larger proportion of water is carried off by the lungs from the quickened respiration, and also from the skin by insensible perspiration. On the same principle, violent and excessive exercise causes thirst, *owing to the accelerated breathing and increased perspiration.*

370. *Why, in making toast-and-water, should the bread be cut into thin slices, and be slowly and thoroughly browned?*

Because it is then better fitted to give out the *aromatic principle* developed by the toasting; and will also not yield too much of its *starchy principle,* by which the drink is made heavy and unpleasant.

371. *Why are condiments moderately used wholesome, especially to weak digestions?*

Because they excite the inner surface of the stomach, and

* Wilson's *Household Medical Science.* Churchill.

increase the secretions which are naturally formed by it, and thus an additional supply of gastric juice is thrown into this organ, to counterbalance its deficiency in natural vigour.

372. *Why is soup eaten at the commencement of dinner?*

Because it operates on the exhausted system *by transfusion*, by which the dormant energies of the system are quickly aroused, and the digestive organs agreeably stimulated.

373. *Why does tea frequently cure headache?*

Because, by its stimulant action on the general circulation, in which the brain participates, the *nervous congestions* are dissipated.

374. *Why do persons about forty years of age complain of biliousness and headache?*

Because, notwithstanding that their systems have undergone change, *they keep up the same habits of living* as when they were more active, and before their systems became consolidated. Hence there is about them a *repletion* which produces oppression.

375. *Why does bread retain so much water in its composition?*

Because, during the baking, the *starch* is converted into *gum*, which holds water more strongly than starch does. And also because the *gluten* of flour, when once thoroughly wet, is very difficult to dry again, forming a tenacious coating round every little hollow cell in the bread, which coating does not readily allow the gas to escape, or the water to dry up, and pass off in vapour. A third reason is, that the dry crust, which forms round the bread in baking, is nearly impervious to water, and, like the skin of a potatoe which we bake in the oven or in hot cinders, prevents the moisture within from escaping.*

* Johnston's *Chemistry of Common Life*. Blackwood & Sons.

"Modest doubt is call'd
The beacon of the wise."—TROILUS AND CRESSIDA.

376. The following are the component parts of 100 lbs. of English flour, and 150 lbs. of bread respectively:—

	The flour contains	The bread contains
Dry flour	84	84
Natural water	16	16
Water added	...	50
	100 lbs.	150 lbs.

377. *Why is rice of an astringent and binding nature?*

Because it contains a comparatively small proportion of *gluten,* and but little fat; hence its properties are *less laxative* than other cereal grains.

378. *Why, at about the age of fifty, should diet be carefully regulated?*

Because at that period the power of the digestive organs, and the capacity of the stomach, become *weakened and relaxed,* accompanied with a tendency to organic disorders; an excess of food produces corpulency, increases the fulness of the blood-vessels, and renders the body liable to disease.

379. *Why should we observe regularity in taking our meals?*

Because the stomach requires stated intervals in which to furnish the gastric juice to *convert the food into chyme,* and if this process is interrupted, the stomach becomes overloaded, and is unable to perform its functions.

380. *Why is dining at a late hour injurious?*

Because the exertions during the day, combined with the too long interval of fasting, produce *an exhaustion in the system* which renders it incapable of digesting food with comfort.

381. *Why should corpulent persons not drink fermented liquors and ardent spirits?*

Because they contain a large proportion of *carbon,* which is readily converted into *fatty matter.*

382. *Why does much sleep favour obesity?*

Because *less carbon* is consumed by the lungs, skin, &c.,

during the period of inactivity from the comparative inaction of the functions connected with those organs.

383. *Why is water a necessary constituent of animated beings?*

Because without it the circulation of the blood could not be carried on. The watery portion of the blood is constantly escaping from the body, by various channels, in the form of vapour from the lungs and perspiration from the skin; water is therefore necessary to *supply the waste* occasioned.

384. *Why ought we to regulate the quantity of liquor taken during our meals?*

Because, according to individual constitutions, a greater or less amount of liquid is salutary. Persons of a *dry and bilious habit*, and whose temperature is high, require *much* water and fresh liquid; while in constitutions of an opposite tendency, a *small* supply of moisture will suffice.*

385. In connection with this subject the following general principles may be laid down. A quantity of drink which exceeds the natural and individual want, enervates the digestive powers, and favours the spontaneous and chemical changes which are apt to take place in aliment when the digestive organs possess little energy or activity. An insufficient quantity of drink, on the contrary, prolongs the sojourn of aliment in the stomach beyond the due time, causing feelings of fulness and oppression. But it is safer, in these respects, to err on the temperate side, and to keep in mind that the mastication of dry aliment is apt to cause a great, yet a momentary dryness in the throat and mouth, which, if we seek to remove it on the instant, we may inundate our stomach with an inconvenient supply of fluid, thereby retarding and impairing the digestive process.

386. *Why are liquids more grateful and refreshing in the mornings and evenings than at other times?*

Because we part with a large portion of the fluid contents of our bodies during the night in perspiration and transpiration. And as three or four hours after a solid meal the fluids have been absorbed in digestion, an *appetite is then felt for a fresh supply*.

* Dick *On Diet and Regimen*. Symington & Co.

"A golden mind stoops not to show of dross."—MERCHANT OF VENICE.

CHAPTER XVIII.

387. *Why should we avoid eating heartily during the hottest part of the day?*

Because at such times the stomach is *languid and feeble,* and liable to be overcome rather than stimulated by a repast.

388. *Why do some persons possess inordinate appetites?*

Because excessive eating is habitually indulged in, by which means the vital and nervous energy *being directed continually on the stomach,* begets a *craving* for a repetition of such ample meals, and a feeling of unemployed digestive energy is experienced, constantly demanding new materials for exercise. In some cases, however, an inordinate appetite arises from a peculiar state of the stomachic nerves.

389. Tarrara, a Frenchman by birth, while but seventeen years of age, and weighing one hundred pounds, was already able, in the space of twenty-four hours, to eat a quarter of beef of as many pounds weight. One day he eat in a few minutes, by way of exhibition, a pannier of apples, the expense of which a bystander offered to defray. At the commencement of the war Tarrara entered a company, and he disposed of his services to his comrades in return for any rations they could not consume. Notwithstanding this, famine gained upon him; he fell sick, and was removed to the military hospital. On the day of his entrance he received for his share four rations; yet, besides these, he devoured everything refused by the other invalids, and the remains of the general cooking—yet was his hunger unappeased. He loved the flesh of serpents, ate adders, and swallowed living eels without mastication. He ate in a few minutes a dinner prepared for fifteen German labourers; and on another occasion devoured thirty pounds of liver and lights. He resorted to shambles and secret places, to dispute with dogs the possession of bones and raw flesh. Suddenly his career was arrested by a species of consumption, and the same disease which induced his voracity, caused his voracity to cease. He soon after died, and, on a post-mortem examination, his liver and stomach were found to be of an enormous size.

390. *Why does eating impart a pleasurable sensation?*

Because the whole of the organs called into operation by this action are *endowed with sentient nerves,* which enable them to impart pleasurable emotions to the system.

"All the world's a stage,
And all the men and women merely players."—As You Like It.

391. The tongue especially, one of the most active agents in the operation of eating, is supplied with no less than six nerves derived from three different sources. These nerves, spread out upon this organ, give to its upper surface a complete covering, and some of them terminate in sentient extremities visible to the naked eye. These sentient extremities, with which every point of the upper surface, but more especially the apex, is studded, constitute the bodies termed *papillæ*, the immediate and special seat of the *sense of taste*. This sense is also diffused, though in a less exquisite degree, over the whole internal surface of the mouth. Close to the sense of taste is placed the seat of the kindred sense of smell. The business of both these senses is with the qualities of the food. Mastication at once brings out the qualities of the food, and puts it in contact with the organs that are to take cognizance of it. Mastication, a rough operation, capable of being accomplished only by powerful instruments which act with force, is carried on in the very same spot with sensation, an exquisitely delicate operation, having its seat in soft and tender structures, with which the appropritate objects are brought into contact only with the gentlest impulse. The agents of the coarse and the delicate, the forcible and the gentle operations are in close contact, yet they work together not only without obstruction, but with the most perfect subserviency and co-operation.

392. *Why should all kinds of excess be avoided?*

Because every excess in life *acts upon and impairs the bodily system*. If you force the heart to gallop as fast during the second, as it does during the first stage of life, and make the steady fire of forty-two blaze as brightly as the flame of twenty-one, it will soon be burnt out.

The pulse in a newly-born infant while sleeping—

Beats in a minute	140
Towards the end of first year	124
Towards the end of second year	110
Towards the end of third and fourth years	96
When the first teeth drop out	86
At puberty	80
At manhood	75
At sixty about	60

393. *Why have we a keener appetite during winter?*

Because, from the greater density of the atmosphere in winter, more *oxygen* is inhaled during this period, and as this promotes respiration and a more energetic chymification (digestion), a greater quantity of food can be eaten.

394. *Why does venison require to be kept?*

Because *the fibre is coarse, hard, and dense*, and if eaten fresh would be very difficult of digestion.

"A light wife doth make a heavy husband."—MERCHANT OF VENICE.

395. *Why should eggs not be placed near any odoriferous substance?*

Because the shell possesses the power of absorption, and the meat of the egg would become *impregnated with any exhalation* it came in contact with.

396. *Why are potatoes unsatisfactory food when eaten alone?*

Because a large quantity must necessarily be consumed *to extract a small supply of sustenance;* in consequence the digestive organs become weakened and impaired, and the stomach becomes permanently distended.

397. *Why do we eat bacon with veal, liver, fowl, &c.?*

Because these meats are naturally destitute of the usual amount of fat; persons, therefore, who can digest a richer food, find it agreeable to *supply in the fat of bacon* the elements of which such flesh is deficient.

398. *Why is not a chicken, when being hatched, suffocated in its apparently impervious shell?*

Because the shell is penetrated by numerous *holes, or pores,* through which the air is capable of passing, and is thus conveyed to the young bird.

399. *Why is butter usually eaten with bread?*

Because, as well as making the mastication of bread more easy by its superior mobility, the starch of the bread is *much more easily digested* if combined with a fatty substance, than if taken alone; and so obvious is this by daily experience, that the poor man, who cannot afford butter, supplies its place by dripping, *or some other form of grease,* without knowing the reason that impels him to do so.

Butter on bread acts in the same manner as olive oil mixed with salads. For the same reason, potatoes are improved by being eaten with fat.

400. *What chemical change takes place in bread-making during the process of fermentation?*

The fermenting process, when once commenced, is *kept up*

"The purest treasure mortal time affords
Is spotless reputation."—RICHARD II.

by the gluten, forming the body of the paste, through which the fecult and saccharine matter are diffused; and when the slight fermentation which it suffers from changes in the saccharine matter, and supported by the presence of the gluten, has commenced, the paste becomes spongy and porous from the disengagement of *carbonic acid gas*, while it retains in some measure its elasticity. Hence the lightness and porosity of well-baked wheaten bread.

401. *Why, when wheat is kept in damp storehouses, does it lose its property for making good bread?*

Because by being thus deteriorated, it is *unable to afford any gluten*, the meal forms no longer a tenacious ductile dough, and the bread produced is harsh, heavy, and indigestible.*

402. *Why is bread adulterated with rice-flour?*

Because rice-flour enables the bread to absorb and retain a *larger quantity of water* than it otherwise would do, and this consequently *increases its weight*.

403. *Why is the mixture of alum with bread injurious?*

Because it *acts chemically on the fibres and small vessels of the body*, contracting them, and temporarily stopping exhalation and secretion, producing paleness by diminishing the diameter of the blood-vessels.

404. *How may chocolate be tested?*

Genuine chocolate should dissolve in the mouth *without grittiness;* it should leave a peculiar sensation of *freshness*, and after boiling it with water, the emulsion should not *form a jelly* when cold; if it does, *starch or flour* is present. The presence of flour or starch may also be recognized by the blue colour which is imparted to the decoction after cooling.

405. *What is fermentation?*

Fermentation or putrefaction represents *the first stage* of the

* Accum's *Art of Making Bread*. T. Boys.

resolution of complex atoms into more simple combinations: the process of decay completes the circulation of the elements by transposing the products of fermentation and putrefaction into gaseous compounds. Thus it is with the elements constituting all organized beings, which, previously to participating in the vital process, were in the form of oxygen compounds. *The process of decay is a process of combustion taking place at the common temperature,* in which the products of fermentation and putrefaction of plants and animal bodies combine gradually with the oxygen of the atmosphere.*

Combustion is the *rapid oxygenation* of bodies that combine with oxygen; decay (called by Liebig *eremacausis*) is the *slow oxygenation* of similar bodies.

Eremacausis—from two Greek words signifying *gently* and *burning*.

406. *Why does dryness and cold prevent fermentation and decay?*

In the decomposition of bodies there is a *motion of the particles* which undergo decay. The transmission of decomposition from one particle to another gives rise to a change of place, and the *presence of moisture* imparts to the particles of matter that superior mobility which facilitates the motion of decay. Hence, also, why *warmth* promotes fermentation, while *cold* below the freezing point prevents it, by *locking the atoms of matter in a fixed position.*

Mobility—susceptibility of motion.

407. *Why when an apple is bruised does it begin to decompose at the injured part?*

The decomposition arises from the action of the *oxygen* of the air upon the substance of the apple.

If we cut an apple, a potatoe, or a beetroot, the cut surface in the course of a few minutes loses its white colour, and assumes *a brown tint.* The colour imparted by oxygen to bodies with which it combines is generally brown, or red. Hence we recognise the redness of rust, the brownness of decay-

* Liebig's *Letters on Chemistry.* Walton and Maberly.

"Triumphs for nothing, and lamenting toys,
Is jollity for apes, and grief for boys."—CYMBELINE.

ing wood, the auburn tints of decaying leaves, the redness of blood exposed to the air, &c., &c.

408. *Why do mustard poultices cause the skin to blister?*

Because mustard, when made into a paste, decomposes and produces a *volatile oil* (consisting of sulphur and other matters), which causes irritation. This stimulates an *increased flow of blood* to the part, the blood *throws out water to allay the irritation*, and this water, accumulating under the skin, forms blisters.

CHAPTER XIX.

409. *Why are clothes of a smooth and shining surface best adapted for hot weather?*

Because they reflect, or *turn back* the rays of the sun, which are thus prevented from penetrating them.

410. *Why is loose clothing warmer than tight articles of dress?*

Because the loose dress encloses a *stratum of warm air*, which the tight dress shuts out.

411. *Why should we put on our cloaks, great coats, &c., in a warm room, a few minutes previously to going into the cold air?*

Because the garments imbibe *warm air*, which we carry with us from the room, and which being imprisoned in our garments will not admit the *cold external air*.

412. *Why is a piece of flannel worn next the stomach efficacious in the case of colds?*

Because the seat of many colds is in the stomach, and the warmth of the flannel *dissolves the phlegm* which the cold produces.

413. *Why are waterproof articles unhealthy in their tendency?*

Because they confine the heat of the body too much, and *increase perspiration without permitting evaporation;* a great part of the impure matter emitted from the body is thereby again thrown back and imbibed by it, and dampness and chills produced.

414. *Why may clothing be regarded as the guardian of the body?*

Because, from the properties that it possesses, it has the power of preventing *animal heat from being conducted from the body,* and also keeps an *excessive temperature from without* from being conducted *to the body.*

415. *Why are cotton socks or stockings objectionable?*

Because *the feet perspire* more freely than any other part of the body, and require to have their moisture as freely absorbed and carried away, whereas cotton socks or stockings *absorb the perspiration slowly, and retain it long.*

416. *Why should great care be taken in clothing the feet?*

Because the feet are important *conductors of perspiration* from the body, and the regulation of their pores acts upon the motion of the fluids in the upper parts. It has been observed that persons with very hot or very cold feet seldom enjoy a good state of health.

417. *Why are woollen stockings preferable to silk or cotton ones?*

Because silk or cotton stockings, instead of allowing the perspiration to *escape, retain it* in close contact with the skin, increasing the putrescent tendency, and causing the re-absorption of the matter already perspired.

418. *Why are tight boots and shoes injurious?*

Because they *impede the circulation,* and the noxious matter that ought to be perspired is driven back into the system, they also compress the skin, causing corns, bunions, and other painful disorders of the feet.

"There's a divinity that shapes our ends.
Rough hew them how we will."—HAMLET.

419. *Why is the use of goloshes productive of bad effects?*

Because they are only worn at the caprice of the wearer; and being *sometimes used* and *at other times disused,* without any practical rule, the feet are rendered more susceptible to cold than they otherwise would be.

420. *Why do persons in the prime of life require less clothing than the aged?*

Because in manhood the circulation of the blood is more equal and vigorous, and consequently the *generation of heat* in the body is quicker.

421. *Why are cotton shirts preferable to linen ones?*

Because linen ones *retain the perspiration,* and by that means impede the action both of warmth and air on the body.

422. *Why are tight clothes injurious?*

Because they impede the circulation of the blood, and *check muscular development;* thereby depriving the frame of its nourishment and support, and generating a variety of diseases.

423. *Why is too much clothing detrimental to health?*

Because, with every exertion, an *excess of perspiration* is exacted, which weakens the frame, and occasions coldness and deadness in the extremities.

424. *Why is wearing flannel next the skin particularly adapted for infants and aged people?*

Because as neither infants nor aged people can *take sufficient exercise to promote the requisite amount of warmth* for their bodies, flannel acts as an auxiliary to nature.

424. Of all the customs of clothing, the most extremely absurd is the usual arrangement of bed clothes, which, in order, as the chambermaid fancies, to make the bed look pretty in the daytime, are left long at the head, that they may cover the pillows. When they are turned down you have an objectionable load on your lungs, and that part of the body which is the most exposed during the day, is smothered at night with double the quantity of clothes than any other part has.

"Love talks with better knowledge, and
Knowledge with dearer love."—MEASURE FOR MEASURE.

426. *Why does wearing apparel retain heat?*

Because it is made of materials which are *bad conductors of heat*, so that they have little tendency to remove the heat from the body, but on the contrary hold what they receive.

427. Silk, wool, hair, feathers, and leather, are chiefly employed as articles of clothing. They all retain within their tissues or meshes a certain quantity of air, and so become depositories of warm atmosphere.

428. *Why is linen unfit to be worn habitually next the skin?*

Because, in addition to its being an active conductor of heat, its fibre is very attractive of moisture, so that when the body perspires, it *absorbs the perspiration* speedily, and displaces the air which in a dry state it held with its meshes.

429. *But why is linen applied to sores and wounds in preference to cotton?*

Because linen possesses *an organic freshness* which cotton does not; and also because linen is composed of fibres which are perfectly rounded, whereas the fibres of cotton are flat and have sharp edges, which latter are apt to excite and irritate the wound.

430. *Why ought clothing always to be warm enough to prevent a sense of chilliness?*

Because the *constant impression of cold on the surface* causes a greater determination of blood to the internal parts of the body by which the lungs and bowels become so excited, as to lay the foundation for cough, consumption, and other diseases.

431. Intelligent persons who reflect on the modern custom of turning delicate and tender children out into the open air, with their necks and shoulders, and sometimes their legs and thighs exposed, will surely give credence to the physician who tells them that thus are laid the foundations for many formidable complaints in after-life. So general is the fashion now of only clothing one part of the body, while the others are left either scarcely covered, or wholly uncovered, that we everywhere meet in the streets the children of weakly parents, themselves also weakly, dressed like the hardy children of a sturdy race, exposed to the cold winds, in the garb of little Highlanders, with bare legs; and whether with nursery-maids or in carriages, the same insufficiency of clothing is manifest.

"There is no tune so miserable but a man may be true."—TIMON OF ATHENS.

CHAPTER XX.

432. *What is air?*

Air chiefly consists of two gases, *oxygen* and *nitrogen*. Besides these component parts, air contains a variety of other substances, as water, carbonic acid gas, animal and vegetable perspirations, exhalations from water, from the earth, and from different minerals, saline particles, and products from burning.

433. *Why is air necessary to human life?*

Because it *imparts oxygen* to the blood, *takes carbonic acid from it*, regulates the circulation, and enables the body to throw off substances destructive to health.

434. *How does atmospheric air act upon the colour and the stimulus of the blood?*

The food we eat is ultimately converted into a soft milky juice called *chyle;* this substance, in the course of circulation, passes through the lungs, and comes in contact with the atmospheric air which is drawn in by those organs. By that contact it receives, from the oxygenous part of the air, that *florid colour* which distinguishes arterial blood; and by the same process the *large vessels of the heart, the lungs, and the arteries, are stimulated into action.*

435. *Why is blood so important an agent in the economy of life?*

Because it is from blood that all the various parts of the body are repaired; the waste made in the fleshy or muscular parts of the body, is reinforced by the tissues formed from the blood.

436. *Why are broad-chested persons generally the strongest?*

Because the *size of the lungs* depends upon that of the *chest;* and in proportion to the capacity of those organs, so is the quantity of blood conveyed to every other part of the body, to impart its vitalising influence.

"Silence is the perfectest herald of joy."—MUCH ADO ABOUT NOTHING.

437. *Why is the air of crowded rooms unhealthy?*

Because every person breathing in a room contributes to *impoverish* the air by depriving it of *oxygen*, and to pollute it by exhaling *carbonic acid gas*. Carbonic acid gas, which is thrown off from the lungs, cannot be again inhaled, without injury to the system.

438. Churches, chapels, and theatres, when they are much crowded, may be productive of injury, owing to the impurity of the air. The celebrated Lavoisier found at a theatrical entertainment, that before the play began, the air contained the following proportion of its usual substances :—

Oxygen	27
Nitrogen	73
Total	100

But towards the conclusion of the piece the air of the theatre was as follows :—

Oxygen	21
Nitrogen	76½
Carbonic acid gas	2½
Total	100

Hence the oxygen or vital air was diminished in the proportion of from 27 to 21, or nearly *one-fourth*, and in the same proportion was less fit for respiration than before, having a considerable quantity of *carbonic acid gas* accumulated in it.*

439. *What amount of oxygen gas does an adult person consume daily by breathing?*

During ordinary respiration for twenty-four hours, the quantity of oxygen gas consumed amounts to about *forty thousand cubic inches*.

440. *What amount of carbonic acid gas is thrown off in the same period?*

The same volume (40,000 cubic inches) of *carbonic acid gas* is thrown off.

Forty thousand cubic inches of carbonic acid gas weighs about 18,600 grains, of which, according to the proportions of oxygen and carbon in carbonic acid gas, carbon would constitute 5070 grains ; thus rather more than *eleven ounces and a half of pure carbon* are

* Sir John Sinclair's *Code of Health and Longevity*. Nicol.

"One good deed dying tongueless
Slaughters a thousand waiting upon that."—WINTER'S TALE.

separated from the blood, and thrown off with the breath, in twenty-four hours.*

441. *What gases do vegetables give off when they undergo decay?*

The chief products of decaying vegetable matter are *carbonic acid gas, carburetted hydrogen gas,* and *sulphuretted hydrogen gas.* These gases are prejudicial to health; therefore every care should be taken to remove decaying vegetable matter from our dwellings.

442. With the life of the vegetable, as with that of the animal, all the functions of nutrition and digestion cease, and the organic body becomes subject to the laws of chemical attraction. The sap no longer moves through the several vessels; nor is it altered any more into sugar or into starch. The body, whether tree or herbaceous plant, being no longer itself part of the living world, passes into that state in which it becomes fit for the nourishment and support of animated beings. Even then it remains but a short time in the same condition; the minute atoms or particles of which it consists exhibit a strong tendency to separate from each other, and finally it is doomed to decompose. The proximate principles, sugar, starch, gluten, &c., are, under the influence of moisture, air, and warmth, resolved into elements of which they are formed, oxygen, hydrogen, carbon, and, in a few cases, nitrogen, which, absorbing oxygen from the atmosphere, again unite into new compounds, as carbonic acid gas, carburetted hydrogen gas, aqueous vapour, &c. If these changes happen while the dead vegetable continues upon the surface of the ground, the new combinations being gaseous, are volatilised, disappear, and mingle with the atmosphere; nothing remaining except a small quantity of *carbon,* which composes a part of the black vegetable mould, together with a minute portion of *earths, alkali,* and *metallic oxides,* that were constituents of the plant. It is to this natural decomposition that we apply the terms *decay* and *rotting* of these bodies.†

443. *Why are the atmospheric gases absorbed by various bodies?*

The smallest amount of gas—atmospheric air for instance—can be compressed into a space a thousand times smaller by mere mechanical pressure, and then its comparative bulk must be as a grain of sand to a mountain.

By the mere effect of mass—the force of gravity—*gaseous molecules are attracted by solids and adhere to their surfaces;* and when to this physical force is added the feeblest *chemical affinity,* the liquefiable gases cannot retain their gaseous state.

* Grisenthwaite's *Essay on Food.* Crofts.

† Webste and Parkes's *Encyclopædia of Domestic Economy.* Longman and Co.

"Small cheer and great welcome make a merry feast."—COMEDY OF ERRORS.

When a solid body, presenting, by means of its pores, several hundred square feet of surface within the space of a cubic inch, is brought into a comparatively small volume of gas, we may understand why that volume is diminished—why all gases, without exception, are absorbed. A cubic inch of beech-wood charcoal must have, at the lowest computation, a surface of one hundred square feet.*

444. *What causes the decomposition of organic bodies after death?*

The principal cause which we can recognise is the action of the *oxygen* of the air on many of their constituents. This action only takes place when moisture is present, and it requires a certain temperature.

445. *How far may fungi and animalcula be regarded as the agents of fermentation and putrefaction?*

By the presence of fungi or animalcula in putrefying bodies, their decay is *greatly accelerated.* The nutrition of these minute organisms is derived from the consumption of particles of the decaying matter. Its more rapid destruction must therefore be the consequence. But Liebig is of opinion that the microscopic creatures found in decaying matter are the *effect,* and not the *cause,* of the putrefactive process; and that the great operations of change, fermentation, and putrefaction, are the result of purely chemical agencies.

446. It is impossible to adopt this opinion (that decay is caused by fungi and animalcula), when we reflect that the presence of microscopic animals in putrescent substances is quite accidental; that their appearance, in most cases, may be prevented by the exclusion of light; that putrefaction and decay may go on without the least assistance from them; that in a thousand cases—in putrescent wine, cheese, bile, or blood—no such animals are observed; and that, in other cases, they appear for the first time in a certain stage long after fermentation has begun.

To ascribe putrefaction to the presence of animalcula is as irrational as it would be to ascribe to the beetles, whose food is derived from animal excreta, or to the mites in cheese, the state of decomposition of the excreta or of the cheese.*

* Liebig's *Letters on Chemistry.* Taylor and Walton.

"A woman's thought runs before her actions."—As You Like It.

CHAPTER XXI.

447. *Why, if the blood is continually undergoing chemical change, does its weight remain the same?*

Because the weight of *carbon*, which is discharged by the blood, is precisely compensated by the united weight of *oxgyen* and *nitrogen* which it absorbs.

448. The time in which a circuit of blood is performed is identical with the time in which the whole volume of air in the lungs is decomposed.

The quantity of blood that flows to the lungs to be acted upon by the air at one action of the heart is two ounces.

The quantity of blood is acted upon by the air in the five-sixth part of one second of time.

One circuit of the blood is performed in 160 seconds of time. Three circuits are performed every eight minutes; 540 circuits are performed every twenty-four hours.

The quantity of blood in the whole body of the human adult is 24 pounds avoirdupois, or 20 pints imperial measure.

In the space of twenty-four hours 24 hogsheads of blood are presented in the lungs to 57 hogsheads of air.

In the mutual action that takes place between these quantities of air and blood, the air loses 328¾ ounces of oxygen, and the blood 10 ounces and 116 grains of carbon.* The *excess* of *oxygen* over *carbon* is returned to the air as carbonic acid gas, the remainder is absorbed by the blood.

449. *What other beneficial results are owing to respiration?*

The *expulsion of noxious substances*, which if allowed to accumulate, would prove pernicious. It is calculated that the lungs of a full-grown person emit, in the course of one day, *thirty-seven ounces of carbonic acid gas.* By this process also superfluous moisture is extracted from the blood, and a proper consistency, neither too fluid nor too dense, is thus preserved.

450. *Why is the air of hot climates unhealthy?*

Because, when the air is extremely hot, it promotes perspiration, and dissipates the thinner, watery, and volatile parts of the blood, which, becoming thicker in an inverse ratio, *lay the foundation of fevers and bilious disorders.*

* Southwood Smith's *Philosophy of Health.* C. Knight and Co.

"The honour of a maid is her name,
And no legacy is so rich as honesty."
ALL'S WELL THAT ENDS WELL.

451. *Why are elevated aspects more salubrious than low and flat situations?*

Because the air *being agitated,* and not suffered to become *stagnant,* it contains fewer particles of noxious matter, and a larger portion of that which is favourable to the vital principle; and also because air, at a certain height from the ground, becomes purified by dilation and combination.

452. *Why is there such a large proportion of aged persons living in the neighbourhood of the lakes of Westmoreland and Cumberland?*

Because water is of a more steady temperature than the earth, promoting, at the same time, a free circulation of air, and tempering the extremes of atmosphere.

453. Dr. Priestley observes that large bodies of water are important resources for supporting the salubrity of the corrupted atmosphere. He found that all kinds of noxious air were restored by continued agitation in a trough of water, the baneful effluvia being imbibed by the water.

454. *Why is a marshy soil pernicious to health?*

Because, from vegetable substances undergoing decay in moisture, it emits, in large quantities, *carbonated hydrogen gas,* which is the most deleterious of all airs.

455. *Why should ventilation be provided in the upper portion of a room?*

Because the air admitted will then *strike the ceiling previous to reaching the body,* by which means the air acquires some warmth, and the sudden chill which would otherwise be felt is avoided.

456. *Why should bed-rooms not be occupied as sitting-rooms?*

Because during the day the bed and bed-clothes gradually part with the *exhalations* which they have imbibed *during the night,* and which no amount of morning ventilation is sufficient to immediately neutralize.

457. *Why should bedsteads not be placed against walls?*

Because, firstly, the heat of the bed has a tendency to absorb

"How quickly Nature falls into revolt
When gold becomes her object."—HENRY VI., Part II.

any *dampness* that may be in the wall; and, secondly, because in thunder-storms *lightning* frequently strikes the wall and anything close to it.

458. *Why is air, containing a moderate degree of moisture, most conducive to old age?*

Because such air, being in part already saturated, has less attractive power over bodies, or, in other words, consumes less, and by this means *the organs are rendered more pliable,* and longer retain their youthful nature.

459. *Why is living in large towns or cities frequently the cause of delicate health?*

Because a certain amount of *pure oxygen* is necessary for every person, and over-crowding tends to diminish the supply of oxygen, and to vitiate the air.

460. *Why should the air within doors be warmer than that without?*

Because within doors persons are in a state of comparative *inactivity,* and are more *thinly clad.*

461. *Why should a room be ventilated after persons have dined in it?*

Because the steam of the food, and the very active respiration of persons dining, render the atmosphere unusually warm and tainted.

462. *Why is it necessary that bedrooms should have a free supply of air?*

Because it has been ascertained that, supposing the duration of sleep to be *eight hours,* in an unventilated bedroom, during more than one-third of that time *the same stagnant and impure air* has been breathed by the sleeper.

463. *Why does cold air impart vigour and elasticity to the frame?*

Because the air being drier, and generally purer, the fluids are *more strongly condensed,* and the fibres sensibly braced. Dense air also imparts a larger amount of oxygen to the blood.

"He that is giddy thinks the world turns round."—TAMING OF THE SHREW.

464. *Why are coughs, rheumatics, &c., produced by cold air?*

Because the *fibres of the skin being contracted*, the blood in those vessels most exposed to the air becomes too much cooled, and acrid or saline particles of the perspirable matter, which evaporate in warm weather, are *retained and stagnated* in the cold. The blood becomes, therefore, impure, and a general prostration of the system follows.

465. *Why is dry air productive of contagious diseases?*

Because air which is too dry contains a number of saline and other particles, which, by rain, might have been carried down to the surface of the earth. It also imbibes *animal* and *vegetable effluvia*, which are obnoxious to health.

466. *Why is sea air more wholesome than inland air?*

Because sea air is *constantly agitated* by the winds and tides; it is also free from the deterioration to which land air is subject by the putrefaction of animal and vegetable substances, respiration of animals, support of combustion, and exhalations of many descriptions.

CHAPTER XXII.

467. *Why is asses' milk suitable for invalids?*

Because it contains *less butter* than cows' milk, and is therefore more *readily digested*.

468. *What are the dietetic principles of tea, coffee, and chocolate?*

They all three contain a *nitrogenised basis*, to which they owe some of their most important chemical properties. Tea and coffee contain the self-same basis; in tea it is called *thein*, in coffee *caffein*. The cocoa principle, or *theobromin*, is richer in *nitrogen* than the *thein*, or *caffein*, which latter very nearly correspond in their composition with the flesh basis.*

Nitrogenised basis, a substance containing *nitrogen*. *Base*, or *basis*, in chemistry s that with which an acid unites to form a compound.

* *Orr's Practical Chemistry*—Chemistry of Food. Houlston and Wright.

"Hasty marriage seldom proveth well."—HENRY VI., PART III.

469. *What imparts the agreeable smell to roasted coffee?*

In the process of roasting, the *tannin*, or bitter principle of the coffee, unites with the *caffein*, and forms *tanno-caffeic* acid, from which the aroma of coffee arises.

470. A friend entering our study while we were writing, took up some portion of the manuscript, and scanned it over. "Dear me," said he, "how learned our housewives will become! We shall no more be asked, 'Do you take coffee or tea?' but 'Shall I send you some *aqueous solution of thein*, or *caffein?*' 'A little *saccharine infusion?*' '*Lactiferous fluid!*' At dinner it will be 'Will you allow me to send you some *albuminous concentration of sheep*,' or 'Would you prefer the *gelatinous attachments* of calf's head, with a slice of *albuminous tongue*, and a little of the *cerebral phosphoric fat!*'" Our friend seemed to enjoy the idea very much; so did we. He was not, however, serious. It is evident that the explanations included in THE HOUSEWIFE'S REASON WHY are offered to the *mind* of the reader, to make every process which she undertakes intelligible and pleasing; and to render the performance of her duties all the more perfect. Our friend, after he had perpetrated his joke, continued to read on until a late hour; and when, at last, he put down the manuscript, he said, "That book will make more sensible women than any work that ever undertook to instruct them upon their domestic duties."

471. *What produces the peculiar aroma of tea?*

The leaves of tea contain a peculiar *volatile oil*, which, although the essential principle of tea is identical with that of coffee, imparts to it a distinguishing odour and flavour.

472. *Does chicory possess any properties identical with those of coffee?*

The favour which chicory finds with coffee drinkers appears to suggest that it does contain some identical principles. *Science* frequently follows in the wake of *custom*, and finds *a reason* for what at first appeared allied to folly. Tea and coffee were accepted and regarded as essential by mankind, long before the chemist had discovered *caffein* or *thein*. Hence it is not improbable that the chemist will some day discover in chicory an element that will justify the favour it has found. At present it is known to possess a *bitter principle*, similar to that of coffee; but nothing similar to *caffein* has been found in it.

473. *What is the difference between black and green tea?*

The difference is not unlike that which exists between *raw* and *roasted* coffee. The leaves are turned black by being dried at a higher temperature than that to which green tea has been subjected. The heat exercises a decomposing action; the albumen of the leaf is more perfectly coagulated, the *tea oil* and *tannic acid* are changed or dissipated.

474. *Why should the water poured upon tea be at the boiling point?*

Because it requires the temperature of *boiling* water to dissolve and extract the *tea oil* and *tannic acid.*

475. *Why should not the boiling of tea be continued?*

Because if tea were to be boiled, *after being steeped,* the tea oil would *escape.* The tea would appear to be stronger, because the *tannic acid* would be more fully extracted, but the *aromatic principle* of tea would be *driven off,* and a muddy and bitter extract would remain.

476. *Why does the first infusion of tea possess more aroma than the second?*

Because the *first* infusion, if the water used is at the boiling temperature, *takes up the essential oil* of the tea, while the *second* water receives only the bitter extract supplied by the *tannic acid.*

477. *Why should coffee after dinner be taken without cream?*

Because coffee when taken *without cream* is a gentle *stimulant* to the stomach; but when mixed with the *fat of milk,* the latter retards, by its oily nature, the action of the gastric juice upon the *albuminous substances taken at dinner.* The fat floats upon the surface of the digesting food, the solution of which is thereby retarded.

478. *Why does green tea prove too exciting for some persons?*

Because it contains a *much larger quantity* of the *essential oil* of tea, in consequence of the mode of its preparation.

"Scorn at first makes after-love the more."—TWO GENTLEMEN OF VERONA.

479. *In purchasing tea, why should a small quantity of high-priced green be added to ordinary black?*

Because the high-priced green tea being in all probability pure and well prepared, will be *rich in the essential oil of tea,* and a small quantity of it will impart to ordinary black tea a *richness of flavour,* without being *too exciting* to those who drink it.

480. *Why do tea and coffee excite the nervous system?*

Because the volatile oil which they contain is a *diffusible stimulant,* which passes into the blood and quickens the action of the nervous centres.

481. Tea and coffee excite the activity of the brain and the nerves. Tea increases the power of digesting the impressions we have received; we become disposed for thoughtful meditation, and, in spite of the movements of thought, the attention can more easily be fixed upon a certain object; a sensation of comfort and cheerfulness ensues, and the brain is set in motion. Through the greater collectedness and the more closely confined attention, the thoughts are not so apt to degenerate into desultoriness. Educated persons will assemble at tea for the purpose of investigating a certain subject by a regular conversation; and the higher spirits produced by the tea tend to secure with more facility a successful result. If tea is taken in excess, an increased irritability of the nerves takes place, characterised by sleepiness, by a general feeling of restlessness, with trembling of the limbs. Spasmodic attacks, even with difficulty of inspiration in the cardiac region, may arise. The volatile oil of the tea produces heaviness in the head, and, in fact, a real tea-intoxication, first manifesting itself in dizziness, and finally in stupefaction, takes place.

While tea generally revives the faculty of judgment, and adds to this activity a sensation of cheerfulness; coffee acts also on the reasoning faculty, but without communicating to the imagination a much higher degree of liveliness. Susceptibility to sensuous impressions is intensified by coffee; the faculty of observation is therefore increased, while that of judgment is sharpened, and the enlivened imagination causes the perceptions more quickly to adopt certain forms; an activity of thoughts and ideas is manifested; a nobility and ardour of wishes and ideals, which are more favourable to the shaping and combination of already premeditated ideas, than to a calm examination of newly-originated thoughts.

Coffee, taken in excess, causes sleeplessness, and a state of excitement similar to intoxication, in which images, thoughts, and wishes rapidly succeed each other. A sensation of restlessness and heat ensues, together with anxiety and dizziness, trembling of the limbs, and a strong desire to go into the open air. Fresh air is commonly the best means of throwing off this condition, which, whilst it continues, exercises a really consuming power over man.

"There is nothing either good or bad, but thinking makes it so."—HAMLET.

CHAPTER XXIII.

482. *What causes the deposition of tartar on the teeth?*

It is the *earthy matter of the saliva.* When we discharge our warm breath we not only exhale water from the lungs, but we drive out, in the form of vapour, some of the watery secretion of the mouth. This *constant evaporation* produces a deposit of the small residue of earthy matter which the saliva contains, just as the evaporation of water from a kettle causes an incrustation upon its sides.

But in saliva, the proportion of solid matter is much smaller than in water generally; the evaporation is for ever going on, yet the amount of tartar deposited is very insignificant, though sufficient to be obnoxious, if allowed to accumulate.

483. Washing the mouth frequently with cold water, or with water only very slightly warmed when the teeth are tender, is much to be commended, as it strengthens the teeth by invigorating the gums. A few drops of spirit or essence of camphor in the water thus used will be found beneficial. The juice of the common strawberry is very effective in cleansing the teeth and removing tartar. Of the various tooth powders, those consisting of prepared chalk, powdered cuttle-fish, and charcoal, are the best.*

484. *Why is reading when walking injurious to the eyes?*

Because the motion of the body causing the focus of sight to be continually shifted, the delicate muscles of the eye become strained and fatigued.

485. *Why should the head and bosom not be exposed to the cold air after dancing?*

Because the exertion of so many muscles, and the quick inspiration of an intensely warm atmosphere, accelerate the circulation of the blood, and propel it to the head and breast. When cold air strikes suddenly upon these parts, it either *stagnates the blood* in them, or suddenly *drives it upon the internal organs*, causing *inflammatory action.*

* In *Enquire Within upon Everything*, there are numerous useful receipts for the cleansing and preservation of the teeth.

"Let our finger ache and it indues
Our other healthful members e'en to that sense of pain."—OTHELLO.

486. *Why is the use of fans, when applied to the face and neck, injurious?*

Because the cold air, acting on the pores of the skin, checks the perspiration, designed by nature to *relieve the undue heat of the body*.

487. *Why is singing a healthy exercise?*

Because the lungs are exercised by the free inspiration and vibratory motion of the air which singing produces; and the circulation of the blood being thus promoted, the organs are strengthened, and the function of breathing more perfectly performed.

488. *Why is washing the mouth with cold water every night and morning necessary?*

Because the viscid juices, and small particles of food which settle about the interstices of the teeth, *are apt to putrefy*, and if not removed, will infect the breath, and gradually injure the teeth.

489. *Why should the water in which feet are washed not be too hot?*

Because it *relaxes the fibres, draws the blood downwards*, and occasions *headaches* from the abstraction of blood. The proper degree of heat is somewhat more than that of the hand.

490. *Why is sea-bathing particularly bracing and invigorating?*

Because after sea-bathing an incrustation of very fine atoms of salt forms on the skin, which, coming into contact with the apparel, excites healthily the action of the vessels of the skin.

491. *Why is a sense of oppression at the chest felt on first going into cold water?*

Because the vessels of the skin, and those diffused over the internal surface of the lungs, are both liable to be affected by diminished temperature at the same time. Hence a *sympathetic action* is established between them, so that when the heat of the surface of the body is considerably lowered, the vessels of the lungs participate in the same temporary torpor occurring in those

"Inconstancy falls off ere it begins."—TWO GENTLEMEN OF VERONA.

of the skin; the circulation of the blood through them is performed with difficulty, which the efforts of voluntary breathing are exerted to overcome.

492. *Why do we feel a glowing warmth after emerging from a cold bath?*

Because the air *is a worse conductor of heat* than water; when, therefore, the water ceases to draw off the heat of the body, the *air appears warm.*

493. This perception of increased warmth is not real, for the heat of the body is not augmented above that which it had previous to bathing. The following are a few illustrations of this truth:—After handling snow, or having been exposed to a very cold air, our hands and face glow on coming into the house. When walking or riding against a keen north-east wind, if we turn our face the contrary way, it feels immediately warmer, which is owing to the sudden cessation of the previous impression. After remaining for some time in a dark room, the ordinary light of day appears brighter than usual. To a person who has long been deprived of food, a cup of warm soup hastily swallowed will produce effects similar to intoxication. When abroad in the open air in winter, the hands feeling cold and benumbed, notwithstanding gloves are worn, if one glove be taken off and the hand exposed during some minutes to the cold air, on replacing the glove that hand will soon glow, and feel much warmer than the other.

494. *Why is autumn the most suitable season for sea-bathing?*

Because as land is capable of receiving warmth more readily than water, the earth contiguous to the sea continues to impart to it the influence accumulated under the summer sun for a considerable length of time after the solstice is passed. The sea is therefore found to be much warmer some weeks after Midsummer, than at an equal distance of time previous to that period of the year.*

495. *Why does the human body experience the sensations of heat and cold?*

Because the temperature of the human body is fixed at about 98°, and if it comes in contact with any substance of a *higher* or *lower* temperature than its own, the sensations of heat and cold are felt accordingly.

* Buchan's *Practical Observations Concerning Sea-bathing.* Cadell and Davies.

"When devils will their blackest sins put on,
They do suggest at first with heavenly shows."—OTHELLO.

496. *Why, after the first sensation of chilliness experienced in plunging into cold water, does the body regain its natural warmth?*

Because a *reaction* takes place in the system, caused by an effort of the vital principle to resist the further abstraction of heat.

497. *Why after a lengthened immersion does a sense of chilliness again recur?*

Because the vital energy becomes in time *exhausted* by the efforts it makes to sustain the natural temperature of the body.

498. *Why do we require more sleep in winter and summer than in spring and autumn?*

Because the vital spirits are *more exhausted* in those seasons and the blood circulates less uniformly, being either too much retarded, or too greatly accelerated.

499. *Why are beds artificially warmed, injurious?*

Because the heat imparted is only of a temporary duration, and, on evaporating, leaves a chilliness in the body. Whereas in the coldest weather the natural heat of the body soon renders the bed warm, and *retains it so* during the whole night.

500. *Why should not gas, candles, nor rush-lights be burnt in bedrooms during the night?*

Because, by stimulating the brain and the nervous system, light is a preventative of sleep; and also because the flame of the gas, candle, or rush-light vitiates the air, and renders it unwholesome to breathe.

The little night-lights now used, if set in a proper situation, can scarcely be said to be objectionable.

501. *Why is the light of candles, lamps, &c., detrimental to weak eyes?*

Because the flame *too powerfully illumines the eye in one point*, and does not uniformly stimulate the retina.

502. *Why is writing less fatiguing to the eyes than reading?*

Because in writing, the letters which we form on paper are *previously imprinted on the imagination,* and consequently require much less acuteness of sight than the series of letters and words that we read. And also because the letters and lines in writing are more distinguishable by the lower part of the blank paper, than the lines in a printed book, in which they appear to flow together, and are only separated by an *exertion of the eye.*

503. *Why, when writing, is an oblique position of the desk most suitable?*

Because it presents to us the writing materials in that position in which we are habituated to *hold a book* in our hands; they then occupy our *accustomed focus* of sight, from which the rays of light diverge *more gradually* that from a horizontal table.

504. *Why ought quack medicines never to be had recourse to?*

Because as *various disorders* arise from *various causes,* it is obviously impossible that any *one* medicine is capable of curing a number of diseases.

505. It would undoubtedly be rendering a great benefit to society, if medical men were able to convince the ignorant of the pernicious consequences of their reliance on advertised nostrums; but unfortunately the situation in which medical men stand is such, that their best intentioned and most disinterested exertions to this end, would be but little regarded, and frequently be imputed to base and invidious motives, those to whom such admonitions would be applicable being unhappily devoid of reason or common sense. "Doctor," said an old acquaintance to a celebrated empiric who was standi g at his door, "how is it that you whose origin I so well know, should have been able to obtain more patients than almost all the regular-bred physicians?" "Pray," says the quack, "how many persons have passed us, while you put your question?" "About twenty." "And pray how many of those do you suppose are possessed of a competent share of common sense?" "Perhaps one out of twenty." "Just so," says the nostrum monger, "and that *one* applies to the regular physician, whilst I and my brethren pick up the other *nineteen.*"

506. "*Shall we have gas in the house?*"

This is a question very frequently asked. We quote it, just as a starting point for our explanations upon *gases,* and we intend to answer it by saying that *we have gas in the house already!*

507. *Why may it be said that we have gas in the house?*

Because the air which we breathe consists of three gases,

> "All delights are vain, but that most vain
> Which with pain purchased, doth inherit pain."
>
> LOVE'S LABOUR LOST.

called respectively *nitrogen, oxygen,* and *carbonic acid.* Our rooms are full of these gases, and the world is surrounded by them. They form the atmosphere.

508. "*But shall we not have gas to burn?*"

We *do* burn gas already. The tallow of the candle is *converted into gas;* and coals are resolved into gas *before they are burnt.*

509. *What gases do we burn in the fire, and the candle flame?*

Hydrogen gas, the same gas which is supplied to our houses by gas companies through pipes. When gas is introduced to our rooms, and burnt from pipes, it is supplied *ready made;* but when we burn it from coals, candles, or lamps, we make and consume it at the same moment.*

510. When we purchase a candle, we in fact buy a gas apparatus; every candle is a kind of retort, from which gas is evolved, and the wick a gas-pipe supplying a jet, at which the gas is consumed. But in this kind of gas-making we burn the gas, and also the apparatus which produces it—all except the candlestick, which is the permanent reservoir, to be re-filled from day to day for the purposes of illumination when night arrives.

511. *Do we burn any other gas besides hydrogen?*

In a *popular* sense, we do; in a *scientific* sense, we do not. Scientific men set up a distinction between *burning,* and *supporting combustion.* They say that hydrogen *burns,* and that oxygen *supports combustion.* It is scarcely necessary here to go into an explanation of these particular distinctions.

It will be sufficient to explain that in the burning of hydrogen gas, *oxygen gas is consumed;* that is, it ceases to be oxygen gas, and unites with the hydrogen, *forming water.*

512. *What is the other result of burning?*

The *carbon* of the solid body which is burnt unites with a certain portion of the *oxygen* of the air, and forms *carbonic acid gas.*

* For a more scientific account of the gases, the composition of the air, and of the processes of combustion, see *The Reason Why*—General Science. Houlston and Wright.

"Fortune brings in some boats that are not steer'd."—CYMBELINE.

Burning, therefore, consists of the *combination of oxygen and hydrogen, forming water;* and the *combination of carbon and oxygen forming carbonic acid gas.*

These results are caused by *heat,* and by the *tendency which oxygen and hydrogen,* and *carbon and oxygen,* have to *combine with each other* in certain proportions *when raised to a high temperature.*

While we are applying a flame to light a candle or a fire, we are simply *raising the temperature of the bodies* which have a tendency to combine, *to that degree which dissolves their union in one state, and promotes their re-union in another.* Thus we are gas makers and gas consumers.

513. *Is the gas used to illuminate our streets hydrogen gas?*

It is; but it is combined with carbon, derived from the coals from which it is made. It is, therefore, called *carburetted hydrogen,* which means *hydrogen with carbon.*

514. *How is hydrogen gas obtained from coals?*

It is driven out of the coals by heat, in closed vessels, which prevent its union with *oxygen.*

515. *What becomes of the water which is formed by the burning of hydrogen in oxygen?*

It passes into the air in the form of watery vapour. Frequently it condenses, and may be seen upon the walls and windows of rooms where many lights or fires are burning. Sometimes, also, portions of it become condensed in the globes of the glasses that are suspended over the jets of gas. *A large volume of these gases forms only a very small volume of water.*

516. *Which kind of combustible used for lighting tends most to vitiate the air?*

Assuming all the lights to be of the same intensity, the degree in which the substances burnt would vitiate the atmosphere may be gathered from the number of minutes each would take to exhaust a given quantity of air. This has been found to be: rape oil, 71 minutes; olive oil, 72; Russian tallow, 75; town tallow, 76; sperm oil, 76; stearic acid, 77; wax candles, 79; spermaceti candles, 83; common coal gas, 98; cannell coal gas, 152. Thus it is shown that rape oil is *most destructive* of the atmosphere, and that coal gas is the *least destructive.*

517. *Is an escape of hydrogen gas from a gas-pipe dangerous to life?*

It is dangerous, first, by *inhalation.* There are no less than six deaths upon record of persons who were killed by sleeping in rooms near to which there was a leakage of gas.

It is dangerous, secondly, by *explosion.*

518. *What proportion of hydrogen gas with atmospheric air will explode?*

According to the researches of Sir Humphry Davy, *seven* or *eight* parts of *air,* to *one* of *gas,* produce the greatest explosive effect; while *larger* proportions of gas are less dangerous. A mixture of *equal parts* of gas and air will burn, but it will not explode. The same is the case with a mixture of *two* of *air,* or *three* of *air,* and *one* of *gas;* but *four* of *air,* and *one* of *gas,* begin to be explosive, and the explosive tendency increases up to *seven* or *eight* of *air,* and *one* of *gas,* after which the increased proportion of gas diminishes the force of the explosion.

519. *What is the best method of preventing the explosion of gas?*

Observe the rule, *never to approach a supposed leakage with a light.* Fortunately, the gas which threatens our lives warns us of the danger by its pungent smell. The first thing to be done is to open windows and doors, and to ventilate the apartment. Then turn the gas off at the main, and wait a short time until the accumulated gas has been dispersed.

520. *Does hydrogen gas rise or fall when it escapes?*

Being *twelve times lighter than common air,* it *rises,* and, therefore, it would be better for ventilation to open the window at the *top* than at the *bottom.* But all gases exhibit a strong tendency to *diffuse themselves,* and, therefore, they do not rise or fall in the degree that might be anticipated.

"He lives in fame that died in Virtue's cause."—TITUS ANDRONICUS.

521. *What portion of hydrogen in the air is dangerous to life, if inhaled?*

One-fiftieth part has been found to have a *serious effect* upon animals. The effects it produces upon the human system are those of depression, headache, sickness, and general prostration of the vital powers. It is, therefore, advisable to observe precautions in the use of gas.

522. *What proportion of gas in the air may be recognised by smell?*

By persons of acute powers of smelling it may be recognised when there is *one* part of *gas* in *five hundred parts of atmospheric air;* but it becomes very perceptible when it forms *one* part in *a hundred and fifty*. Warning is, therefore, given to us long before the point of danger arrives.

523. *May the use of gas for purposes of illumination be considered highly dangerous?*

Not if it is intelligently managed. The appliances for the regulation of gas are so very simple and perfect that accidents seldom arise, except from neglect. In England, 6,000,000 tons of coal are annually consumed in the manufacture of gas, producing 60,000,000,000 cubic feet of gas. And yet accidents are of very uncommon occurrence.

524. In 1848, an explosion of gas occurred in Albany-street, Regent's-park, London. The gas accumulated in a shop for a very short time only. It had been escaping from a crack in the meter for about one hour and twenty minutes. The area of the room was about 1620 cubic feet. When the gas exploded, it blew out the entire front of the premises, carried two persons through a window into an adjoining yard, and forced another person on to the pavement on the opposite side of the street, where she was killed. The effect of the explosion was felt for more than a quarter of a mile on each side of the house, and most of the windows in the neighbourhood were shattered. The iron railings over the area of the house directly opposite were snapped asunder; and a part of the roof, and the back windows of another house, were carried to a distance of from 200 to 300 yards. The pavement was torn up for a considerable length, and the damage done to 103 houses was afterwards reported to amount to £20,000. Other serious explosions have taken place. The explosions of "*coal damp*," which frequently occur in mines, are of a similar character.

"Good words are better than bad strokes."—JULIUS CÆSAR.

525. *Why is there such a continuous heat given out of a fire?*

Because a *fresh supply* of oxygen is conveyed to the fire in the currents of air that move towards it.

It is from the oxygen that the heat chiefly emanates; hence the heat *will continue* as long as the combustible body lasts and maintains a temperature sufficiently high to *decompose oxygen gas*.

526. *What becomes of the oil that is burnt in lamps?*

The carbon of the oil unites with the oxygen of the atmosphere, and forms *carbonic acid gas;* while its *hydrogen* unites with another portion of oxygen, and forms *water*. Every 100 ounces of oil thus burnt produce 130 ounces of water.

527. *Are any substances annihilated by being burnt?*

When bodies are *burnt* they are not *destroyed;* they had previously formed together one kind of compound, and they now separate from each other, at the high temperature to which they are exposed, in order to form others with the vital air in contact with them; and such of the principles as cannot unite with the vital air—viz., the earth, and some saline or metallic particles, compose the *cinder*.

528. *Does heat actually exist in steam, although it may be imperceptible?*

As much heat is contained in one gallon of water, in the form of steam, as would bring five and a-half gallons of cold water to a boiling heat.*

CHAPTER XXIV.

529. *Why do we blow the fire?*

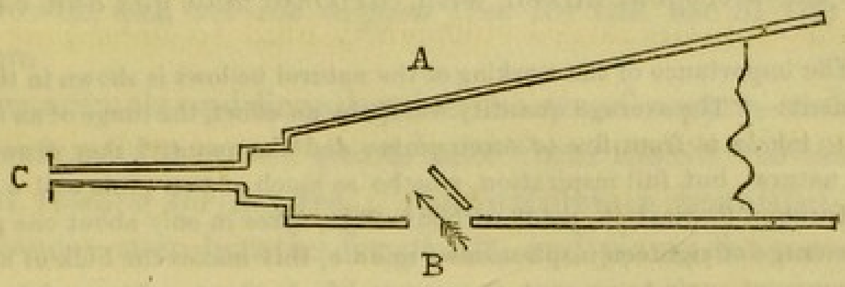
When we blow the fire we fancy that it is *the current of wind* that improves the burning. But the mere motion of the wind over

* Black's *Lectures*.

"Nature craves
All duties to be rendered to their owner."—TROILUS AND CRESSIDA.

the coals would not improve the fire, if the oxygen of the air did not *separate from the nitrogen,* and combine with the substances undergoing combustion.

A bellows is a kind of *forcing pump,* for supplying *oxygen* to the *carbon* and *hydrogen* of the *coals.*



530. Upon raising the upper handle of the bellows, A, the space between the upper and the lower boards is increased, and air, pressing upon the bellows in every direction, finds an entrance through the valve, B, at the bottom, which it forces up. You then press the handle downwards, and the air within the bellows being compressed, closes the valve, so that the air can only escape through the nose, C. The bellows, when thus filled, is full of two gases, *nitrogen* and *oxygen*—the proportion of nitrogen to oxygen being about *four to one.* If the bellows were filled with nitrogen alone, it would put the fire out; but the oxygen *quits* the nitrogen, and *supports the fire,* the nitrogen *flies up the chimney,* together with the smoke and other volatile matters that escape.

If, while blowing the fire, you hold the bellows on your lap so that your dress covers the valve, you find it *difficult to raise the handle,* because the nose cannot admit air fast enough to fill the increasing space, and counterbalance the pressure of the air on the outside. You then feel the *weight of the air* pressing upon the bellows.

531. *What is the use of the nitrogen of the air?*

If it were not for the nitrogen, the oxygen of the air would be too intense, the candle would blaze and melt away too rapidly, and the coals of the fire would burn with such violence that their whole mass would instantly burst into a vivid blaze; even the bars of the grate would be melted by the heat, and the house would be destroyed.

Without nitrogen in the air we could not live; even a slight increase of oxygen produces feverish excitement in animals that are made to breathe it.

The use of nitrogen is therefore to moderate the effects of the oxygen, and to adapt its proportions to the uses for which it was created.

"All places that the eye of heaven visits,
Are to a wise man ports and happy havens."—RICHARD II.

532. *When we breathe, what part of the air do we consume?*

We consume the *oxygen* of the air, *just as the fire does*. The lungs are a kind of bellows, through which air is drawn in and presented to the blood, which *separates the oxygen*, and then returns the *nitrogen*, mixed with *carbonic acid gas and vapour*.*

533. The importance of the working of the natural bellows is shown in the following statement:—"The average quantity which, by an effort, the lungs of an adult can be made to inhale is from five to seven pints; and the quantity they draw in at an ordinary, natural, but full inspiration, *may* be as much as two pints and a half; an ordinary tranquil inspiration, made without effort, takes in only about one pint. At the easy average of eighteen inspirations a minute, this makes the bulk of air drawn in and thrown out again to amount, in common life, to about eighteen pints a minute —a thousand pints an hour, or three thousand gallons a day, for an average man in average circumstances, and as high as five thousand seven hundred gallons a day for an athletic man undergoing severe exertion."† This calculation enforces two things upon our attention: First, the amount of air we have to provide to secure adequate ventilation; and next, the degree of injury which must result if all these thousands of gallons of air pass into the lungs tainted with an admixture of poisonous exhalations.

The deteriorated air from the fire passes *up the chimney*, and flies away in the open air; but that from our lungs *passes into our rooms*, and accumulates (unless removed by ventilation) until we breathe impure air, and lay the foundation of disease in our bodies.

534. *What other gases surround us in our dwellings?*

Various gases arise from the decay of animal and vegetable matters. These are chiefly *sulphuretted hydrogen* and *phosphuretted hydrogen gases and ammonia*, which arise from *drains;* and *carbonic acid gas*, which arises from the *decay of animal and vegetable substances* that may negligently be allowed to accumulate.

☞ *It is obvious that we should use every endeavour to keep down as far as possible those unhealthy agencies, since whatever tends to corrupt the air, must injure those who breathe it.*

* For the structure of the human body, the circulation of the blood, &c., see *The Reason Why*—General Science. Houlston and Wright.

† Johnston's *Chemistry of Common Life*. Blackwood and Sons.

"He's truly valiant that can wisely suffer
The worst that man can breathe."—TIMON OF ATHENS.

535. *How is oxygen restored to the air that has been deprived of it?*

Plants purify the air; they *take from it* carbonic acid gas, from which they separate the carbon, which they use in their own growth, and *set the oxygen free* for the use of the animal kingdom.

Thus animals and fires deprive the air of *oxygen*, and add to it *carbonic acid gas*, and plants take from the air *carbonic acid gas* and *restore the oxygen*. This exhibits a beautiful mutual dependence—men breathe for plants, and plants for men.

CHAPTER XXV.

536. *What causes the unpleasant smell of the rotten egg?*

The offensive smell arises from the *sulphuretted hydrogen gas*, formed by the decomposition of the egg, and which, being confined within the shell, becomes very intense.

537. *From what does the offensive smell of cesspools and drains arise?*

From *sulphuretted hydrogen gas*, caused by the decomposition of animal matter.

538. Where night-soil ferments in close places, such as cesspools and common drains, this sulphurous gas sometimes accumulates in sufficient quantity to strike down instantly the workman who is incautious enough to place himself within its reach. The best and most ready antidote, when sulphuretted hydrogen has been inhaled, is chlorine gas, prepared by wetting a thin towel with vinegar, sprinkling chloride of lime between its folds, and causing the patient to breathe through them.

539. *Why does placing pieces of charcoal beneath the wing of a fowl keep it from putrefying?*

Because charcoal possesses, in a very high degree, the power of *absorbing gases*. A cubic inch of light wood charcoal will absorb nearly 100 cubic inches of gaseous ammonia, between 50 and 60 of sulphuretted hydrogen, nearly 10 of oxygen, and lesser proportions of other gases.

"He jests at scars who never felt a wound."—ROMEO AND JULIET.

When once putrefaction begins, its first products accelerate its extension, *just as a ferment spreads from the point where it first commences.* Charcoal may preserve animal substances—1st, by the absorption of oxygen, which is the active agent of decay; 2nd, by absorbing the gases when putrefaction has commenced, and thence staying the putrefactive ferment.

540. *Why do the coal cinders thrown into our ash-pits assist to counteract the effects of decaying matter?*

Because, like charcoal, they absorb and imprison some of the noxious gases, which they confine in their numerous pores.

541. *Enquire Within upon Everything* contains important information upon the uses of charcoal as a disinfectant, with simple directions for making the charcoal respirator suggested by Dr. Stenhouse. Of this respirator Dr. Johnston says, in his *Chemistry of Common Life*—"Whether, as in the case of cesspools, laboratories, hospitals, dissecting-rooms, and the holds of ships, these vapours be perceptible and offensive to the smell; or whether, like the miasms and malaria which marshes and festering ponds exhale, they be imperceptible to the senses, still the charcoal, it is alleged, will arrest them, and thus secure the wearer of the respirator from their irritating and unwholesome influences. After awhile the charcoal powder becomes saturated, or too old to act with efficiency; but an ounce of powdered charcoal renews it, or the old charcoal heated to redness in a close vessel, and the instrument is itself again.

"To a certain extent there is no doubt that this charcoal respirator will produce the effects anticipated from it, and its cost and easy construction are great recommendations to it. It has already found its way into hospitals, sick-rooms, chemical manufactories, and many laboratories. It is also one of those cheap applications of scientific discovery to which the least regarded of our labouring population, the humble gravedigger, the despised sewer-cleaner, and the Irish drudge in our filthiest factories, may owe hereafter hours of happy health and painless sleep."

542. *Why does burning sulphur purify the air?*

Because it produces *sulphurous acid gas* (formed by sulphur and oxygen) which *destroys sulphuretted hydrogen* and *phosphuretted hydrogen gases,* that frequently poison the air; it combines with various vapours, such as those of *ammonia,* and other exhalations of decaying animal bodies; and produces changes upon the numerous particles of organic matters floating in the air.

543. The occasional burning of sulphur was found very efficacious during the prevalence of cholera. A curious effect of sulphur may be observed by holding a

"Full oft 'tis seen]
Our mean secures us, and our mere defects
Prove our commodities."—KING LEAR.

dark-coloured dahlia or rose over a sulphur match while burning ; the fumes of the sulphur will immediately change the colour of the flower in those parts which they may happen to touch, frequently imparting a curiously variegated appearance.

544. *Why does chlorine gas purify the air?*

Because, *like sulphur*, it decomposes sulphuretted and phosphoretted hydrogen gases, and other offensive gases and vapours.

Chlorine gas is evolved when spirit of salt is poured upon finely-powdered black oxide of manganese. This gas may be employed for disinfecting purposes without the inconvenience that attends the use of sulphur. It may be breathed in a diluted form without injury.

545. *Why does chloride of lime form an efficient disinfectant?*

Because the lime which forms a part of its substance *combines with all the acid bodies* represented by sulphuretted hydrogen, while the chlorine *either combines with, or decomposes the alkaline compounds* represented by ammonia.

546. This is one of the most useful disinfectants that can be employed for domestic purposes. Sprinkled upon heaps of fermenting matter, it will destroy the noxious gases as they arise. Dissolved in water it forms a good disinfecting fluid, and may be sprinkled on the floors (not on the carpets or furniture) of rooms. A pound of the chloride of lime, dissolved in a large pail of water, will prove efficacious in disinfecting drains. It should be poured slowly down the drain, and some of it be thrown over the stones and gutters that surround the grating. When not wanted for use, the chloride of lime should be kept in an earthen jar, with the air excluded, otherwise it will absorb moisture from the air, and, becoming liquid, will gradually lose its efficacy.

547. *Why does quicklime purify the air?*

Because, like the previous disinfectants, *it changes the chemical nature of the gaseous exhalations* that come under its influence. But it is a less efficacious disinfectant than either of the preceding, and, though cleanly and salubrious in its application as a lime-wash to walls, it is scarcely suitable to be employed where *immediate purification* becomes urgently necessary.

548. *What causes the peculiar odour of snuff?*

Two-thirds of the snuff that is taken owes its fragrance to *ammonia*, the tobacco-leaf merely serving as a *medium* to bring the

"He who the sword of heaven will bear,
Should be as holy as severe."—MEASURE FOR MEASURE.

ammonia to the nose. The moist tobacco-leaf certainly imparts a peculiar odour to the snuff that is made from it, but still it is to the ammonia that it owes its peculiar pungency. In this respect, then, we can only compare the *snuff-box* to the *ladies' smelling-bottle;* they are both mediums for conveying ammonia, either plain, or modified by certain other odorous bodies for the purpose of disguising its real smell, to the olfactory nerve.*

CHAPTER XXVI.

549. *What is the formation of the human skin?*

Skin is composed of two layers, the outward, called *scarf-skin,* protecting the inward, which is called *sensitive.*†

550. *Of what are the nails of the hands and feet composed, and what is their use?*

They are a form of scarf-skin *hardened to an extraordinary degree,* for the purpose of protecting the hands and feet from any opposing obstacles they are apt to come in contact with, and for giving precision and perception to the touch.

551. *Why is the skin pliant and elastic?*

Because it is composed of *small scales* closely matted together, which yield freely with the movements of every member of the body.

552. *Why is the skin wrinkled and withered by age?*

Because with age it ceases to receive that nourishment from the juices of the body which was imparted by youth, and consequently the *vessels of the skin collapse,* and becomes deprived of its elasticity and pliancy.

553. *Why does soap cleanse and purify the skin?*

Because the skin chiefly consists of *albumen,* which is *soluble*

* Piesse's *Art of Perfumery.* Longman and Co.

† Erasmus Wilson on *Healthy Skin.* Churchill.

"Virtue is bold, and goodness never fearful."—MEASURE FOR MEASURE.

in alkali, and as soap contains an excess of alkali in its composition, so, on being applied to the skin, it *dissolves the superficial stratum* that has been formed, and causes its impurities to disappear.

554. *Why do the nails grow?*

Because the lower portion of them are *embedded in cells*, which, as they enlarge, deposit matter and press the nail forwards.

555. *Why does the skin assume a flushed appearance in cases of fever?*

Because the blood is accelerated in its circulation, and causes the vessels of the pores of the skin to be over-distended.

556. *Why has the skin when exposed to intense cold frequently a purple tinge?*

Because the cold acts upon the nervous energy of the blood, and causes it to *circulate so languidly*, that the change from bright-red to deep black-red has time to be established before it completes its circuit, and reaches the veins.

557. *Why does not the perspiration from our bodies pass off freely on a close damp day?*

Because the air is already *overcharged with moisture*, and unable to receive watery exhalations, so that the perspiration becomes condensed on the skin.

558. *Why is free perspiration necessary to health?*

Because, when perspiration is checked, the noxious excresences of the pores, instead of passing off, are *retained and circulated* through the system by the blood.

559. To arrive at something like an estimate of the value of the perspiratory system, in relation to the rest of the organism, I counted the perspiratory pores on the palm of the hand, and found 3528 in a square inch. Now each of these pores being the aperture of a little tube about a quarter of an inch long, it follows that in a square inch of skin on the palm of the hand there exists a length of tube equal to 882 inches, or 73½ feet. Surely such an amount of drainage as seventy-three feet in every square inch of skin, assuming this to be the average of the whole body is something wonderful, and the thought naturally intrudes itself:—What if this drainage were obstructed? Could we need a stronger argument for enforcing the necessity of attention to the skin?

"Sleep seldom visits sorrow, when it doth
It is a comforter."—TEMPEST.

On the pulps of the fingers, where the ridges of the sensitive layer of the true skin are somewhat finer than the palm of the hand, the number of pores on a square inch a little exceeded that of the palm; and on the heel, where the ridges are coarser, the number of pores on the square inch was 2268, and the length of tube 567 inches, or 47 feet. To obtain an estimate of the length of tube of the perspiratory system of the whole surface of the body, I think that 2800 might be taken as a fair average of the number of pores in the square inch, and 700, consequently, the number of inches in length. Now the number of square inches of surface in a man of ordinary height and bulk is 2500; the number of pores therefore is 7,000,000, and the number of inches of perspiratory tube 1,750,000; that is, 145,833 feet, or 48,600 yards, or nearly twenty-eight miles.*

560. *Why has bathing in milk been sometimes adopted as a means of supporting life?*

Because the pores of the skin, which are of a tubular form, will, in certain states of the body, draw in fluid, and transmit it to the blood.

561. *What is scurf?*

Scurf is the refuse *or superficial scales* thrown off by the scarf-skin in the process of formation.

562. This excresence is commonly regarded as a disease. *It is not so*, but is, in fact, a natural and healthy formation, and though it may and ought to be kept from accumulating, its formation cannot be prevented. It is produced on every part of the body where hair is formed, although from the active growth of hair on the scalp, the facility for collecting, and the contrast of colour, it strikes the eye more conspicuously in that situation.

563. *What is the use of the hairs that grow upon our bodies?*

Hair, being a bad conductor of heat, tends to preserve the warmth of the body, and with regard to the head serves to equalize the temperature of the brain. It also acts as a defence against irritation and violence.

Over the brows that mark the intellectual front of that fine form, there fall the auburn locks of youth, or the grey hair of venerable age. Each of those hairs is curiously organized. If you take a branch of a tree, and cut it across, you will find curious markings caused by vessels of various structure, all necessary to the existence of the plant. In the centre will be found either a hollow tube, or a space occupied by a soft substance called pith. Each hair of your head is as curiously formed as the branch of a tree, and in a manner not dissimilar, though its parts are so minute that the unaided eye cannot discern them. Every hair has a root, just as a tree has, and

* Erasmus Wilson, on *Healthy Skin*. Churchill.

"He that stands upon a slippery place
Makes nice of no vile hold to stay him up."—KING JOHN.

through this root it receives its nourishment. As the vessels which feed a plant are always proportionate to the size of the plant itself, how fine must be those vessels which form the roots of the hair, being in proportion to the size of the hair, which is in itself so small that the eye cannot see its structure! The hair is, in fact, an animal plant, growing upon the body in much the same manner that plants grow upon the surface of the earth. But how does the hair grow? Not alone by the addition of matter at its roots, pushing up and elongating its stem: nourishment passes up through its whole length, and is deposited upon its end, just as the nourishment of a tree is deposited upon its extreme branches. If, after having your hair cut, you were to examine its ends by the microscope, you would discover the abrupt termination left by the scissors. But allow the hair to grow, and then examine it, and you will discover that it grows from its point, which, in comparison with its former state, is perfect and fine. The reason why the beard is so hard is, that the ends of the hair are continually being shaved off. The hair of the beard, if allowed to grow, would become almost as soft as the hair of the head.

But why is man's head thus covered with hair? For precisely the same reason that houses are thatched—to keep the inmates warm. We might add, also, to give beauty to the edifice. The brain is the great organ upon which the health, the welfare, and the happiness of the system depend. The skull, therefore, may be regarded as analogous to the "strong box," the iron chest in which the merchant keeps his treasure. There is no point at which the brain can be touched to its injury, without first doing violence to the skull. Even the spinal cord runs down the back through a tunnel or tube, formed in a number of strong bones, so closely and firmly jointed together, that they are commonly termed the "back-bone."

Look at the eyebrows. What purpose do they fulfil? Precisely that of a shed, or arch placed over a window to shelter it from rain. But for the eyebrows the perspiration would frequently run from the brow into the eyes, and obscure the sight; a man walking in a shower of rain would scarcely be able to see; and a mariner in a storm would find double difficulty in braving the tempest.*

564. *Why is a glossy head of hair an indication of health?*

Because it has absorbed from the blood a nutritive juice *containing its proper proportion of oils and albuminous elements,* which it would be deprived of if the blood-vessels were defective.

565. *Why does the hair change from a dark colour to white or grey?*

Because the fluids by which the hair has been nourished undergo *a chemical alteration,* and acquire the power of imparting new conditions to the structure into which they enter.

566. *Why does hair drop out of curl in damp weather?*

Because the hair absorbs the moisture of the atmosphere,

* *The Reason Why*—General Science. Houlston and Wright.

> "Sorrow concealed, like an oven stopp'd,
> Doth burn the heart to cinders where it is."
> TITUS ANDRONICUS.

which causes it to become soft, and to relax and unfold its spiral curls.

567. *Why is sitting in a draught productive of cold?*

Because the current of cold air, striking against an exposed part of the body, *contracts and closes up the pores of the skin*, through which the blood then ceases to circulate, and being driven inward is determined on the lungs, producing cough and inflammation, on the throat causing soreness, or on the kidneys, exciting severe pains in the loins, &c.

> "When the wind finds you through a hole,
> Go make your will and mend your soul."—OLD PROVERB.

568. *Why has exercise a healthy influence on the skin?*

Because it *stimulates its functions*, increases its temperature, and subjects it to a current of atmosphere favourable to its respiratory offices.

569. *Why is daily ablution necessary to health?*

Because *the scarf-skin is constantly being cast off*, in the form of minute powdery scales, which are retained against the surface of the skin by the contact of the clothing. The skin also produces oily and saline particles, which attract dust, soot, &c., and the whole forms into a crust, which, if suffered to remain, would effectually *close the pores*. The skin, thus deprived of its respiratory functions, becomes irritated, and the poisonous gases which the noxious particles generate are ultimately absorbed by the body.

570. *Why are wash-powders injurious to the skin and inefficacious in their purifying effects?*

Because their peculiar chemical composition renders them liable to *clog the apertures of the skin*, and to *obstruct the pores*.

571. *Why does washing in warm water in winter produce chaps and irritation of the skin?*

Because the heat excites the circulation, and stimulates the nerves to an unnatural degree, so that the skin being exposed to

"Present fears
Are less than horrible imaginings."—MACBETH.

a colder temperature, is, from its tender state, speedily *pierced by the bleak air.*

572. Cosmetic gloves, for the preservation of the hands, and for preserving their general beauty, may be strongly recommended. They cure chaps, and prevent chilblains. *To make them,* take of wax 4 drachms; spermaceti, 4 ditto; white soap, 4 ditto; mutton suet, 7 ditto; mince up each of these substances separately, melt them over a water bath, and add olive oil, 1½ oz.; pomade rosat, 1½ oz.; benzoin, 1 drachm; Peru balsam, 1 drachm; a few drops of essence of roses; honey-water, ½ oz; stir together until completely mixed, and while the mass is still melted, apply it with a brush to the wrong side of the gloves. The gloves being re-turned, are blown up and put by in a warm place to dry. They are worn during the night, and each pair should last two weeks. A simpler method than making the above preparation, is to buy of a chemist a similar cosmetic, and, melting it, rubbing it over the insides of old kid gloves. Another method is to beat up the yellows of two fresh eggs, with two spoonfuls of oil of sweet almonds, adding thereto half an ounce of rose-water, and 2 drachms of the tincture of benzoin. Use as previously directed.*

CHAPTER XXVII.

573. *Why does perspiration sometimes become visible in drops on the skin?*

Because, in such cases, it generally arises from some violent exercise or excessive heat, and is produced *too copiously and freely to be immediately absorbed by the atmosphere.*

574. *Why is a person less apt to catch cold from being wetted by salt water than fresh?*

Because water impregnated with salt *evaporates more slowly than fresh water,* in consequence of which the heat of the body is more gradually abstracted. And also because the saline particles have *a stimulating effect on the skin.*

575. *Why is the hand better adapted for applying soap to the face than a towel or a sponge?*

Because the hand is not only *soft and smooth,* but is also endowed with properties which render it capable of imparting

* Morfit's *Perfumery, its Manufacture and Use.* Carey and Hart.

a gentle friction to the skin, more effectually than any other agent.

576. *Why should a moderately rough towel be used for drying purposes?*

Because the skin requires a *moderate amount of friction*, which too rough a towel would exceed, and too soft a one be inadequate to produce.

577. *Why should persons not suffer their bodies to cool previously to going into a cold bath?*

Because the temperature of the body being lowered, it possesses less nervous energy *to resist the depressing influences of cold.*

578. *Why should sea-bathing not be had recourse to when the frame is greatly debilitated?*

Because the organs have become too feeble to produce that *reaction* which gives rise to the glowing warmth on the surface of the body after immersion. And hence the shivering and sense of chilliness, which persons under such circumstances commonly experience.

579. *Why is the appetite keener by the sea-side than under ordinary circumstances?*

Because the unusual degree of *exercise* in the open air, together with *bathing*, augments the amount of insensible perspiration, and occasions *a greater waste of the body*, which must be proportionately supplied.

580. *Why is a sensation of thirst, especially for the first few days, generally felt at the sea-side?*

Because the sea spray impregnates the atmosphere with *saline particles*, which are inhaled and communicated to the blood.

581. *Why is it erroneous to suppose that exposure to the air after having taken a warm bath produces cold?*

Because, when clothed, the body is surrounded by *a medium* *of nearly its own temperature*, so that the heat of the system is prevented from escaping, and has a tendency to accumulate rather than otherwise; consequently it is better calculated to resist the action of cold.

582. Dr. Franklin says—"I myself had formerly a prejudice against the effects of air—this *aerophobia*, as I now account it, and dreading the supposed effects of cool air, I considered it as an enemy, and closed with extreme care every crevice in the rooms I inhabited. Experience has convinced me of my error: I now look upon fresh air as a friend: I even sleep with an open window. I am persuaded that no common air from without is so unwholesome as the air within a close room that has been often breathed and not changed. Moist air, too, which formerly I thought pernicious, gives me now no apprehensions: for considering that no dampness of air, applied to the outside of my skin, can be equal to what is applied to and touches it within, my whole body being full of moisture; and finding that I can lie two hours in a bath twice a week, covered with water, which certainly is much damper than any air can be, and this for years together, without catching cold, or being in any other manner disordered by it, I no longer dread mere moisture, either in air, or in sheets, or shirts; and I find it of importance to the happiness of life the being freed from vain terrors, especially of objects that we are every day exposed inevitably to meet with."

583. *Why is bathing injurious after a full meal?*

Because the process of digestion requires a *uniform degree of heat*, which is rendered irregular by the alternate chill and glow which bathing produces.

584. *Why, when high water occurs in the afternoon, is the temperature of the sea much higher than it was at low water in the morning?*

Because the early retiring tide leaves the sand uncovered, which continues for many hours to be *exposed to the rays of the sun*. During this period it acquires a considerable degree of heat. As the tide rises, the particles constituting the lower stratum of the advancing thin sheet of water, as they successively come in contact with this heated sand, are warmed, expanded, and rise to the surface.

585. *Why, on a second immersion in the water, does the body feel colder than it did on the first?*

Because, on leaving the bath, the sudden transition to a cold and dense medium *creates an effort in the body to produce heat or resist cold*, and the continuance of this action, for some time after leaving the bath, occasions a second immersion to feel colder than the first.

586. *Why, after cold bathing, should the clothes be resumed as speedily as possible?*

Because the body is not restored to its accustomed temperature *until it is clothed*; and by exposure to the air is liable to become chilled.

587. *Why is violent exercise after bathing injudicious?*

Because the pores of the skin having been recently cleared, their functions are thereby stimulated, and calculated to *throw off perspiration more copiously* than ordinarily.

588. *Why is bathing sometimes succeeded by headache?*

Because the blood-vessels of the surface of the body become contracted by the diminished temperature of the bath, and *impel an unusually large portion of the vital fluid towards the head*; but the thick substance of the brain prevents its interior vessels from being influenced by the variations of the external temperature, and hence a fulness, or congestion, is caused.

589. *Why, during a course of sea bathing, do the ankles sometimes swell and retain the mark of the impressed finger?*

Because the coldness of the bath occasions a temporary *torpor of the absorbent vessels* of the extremities.

CHAPTER XXVIII.

590. *Why, when the perfume of flowers is unusually perceptible, may wet weather be anticipated?**

Because, when the air is damp, it *conveys the odours of flowers* more effectively than when dry.

* Foster's *Encyclopædia of Natural Phenomena.* Nichols and Son.

"Society is no comfort to one not sociable."—CYMBELINE.

591. *Why, if various flowers close, may rain be expected?*

Because plants are highly sensitive to atmospheric changes, and *close their petals to protect their stamens.*

592. *Why, when distant objects appear to be unusually near, may rain be looked for?*

Because, when the air has nearly reached saturation, there is a *cessation of those vapour movements* by which the air is rendered in some degree obscure. Sir Isaac Newton observed that the stars seem nearer and better adapted for observation in the clear intervals of rain, or before showers, than at any other time.

593. *Why, when sounds and noises are heard more distinctly than usual, may rain be expected?*

Because damp air is a *better conductor* of sound than dry air. Water is a better conductor of sound than air, and hence the conducting power of air may be improved when it contains a large admixture of aqueous vapour. The clouds have been supposed to act as "sounding boards," but that explanation cannot be relied upon, since, at the distance that clouds fly from the earth, if they influenced sounds, they would produce *echoes.*

594. The sound of distant church bells is greater before rain than at any other time; clocks afar off then appear to strike louder, and consequently to be nearer than usual. Other noises, such as sawing, hammering, the whetting of the mower's scythe, or the whirling sound of mills, and the murmuring of the sea, are all heard further than usual; as are the crowing of cocks, human voices, and music of all kinds.

595. *Why may change of weather be anticipated when domestic animals are restless?*

Because their skins are exceedingly sensitive to atmospheric influences, and they are oppressed and irritated by *the changing condition of the atmosphere.*

"Too light winning makes the prize light."—TEMPEST.

596. *Why, if cocks crow at uncommon hours, or clap their wings a great deal, may rain be expected?*

Because they are *sensitive* of atmospheric changes—perhaps even more so than human beings. Their crowing at uncommon hours is simply from restlessness, probably caused by the changing atmosphere.

597. *Why is the appearance of the Robin Redbreast near houses a sign of wet or snow?*

Because the little creature feels an instinctive impression of the coming storm; and being in some respects a domesticated bird, draws near to our homesteads *for shelter or for food.*

598. *Why, when sparrows chirp more than usual, may rain be expected?*

The same atmospheric causes of irritability operate upon sparrows as upon other birds; chirping is their mode of expressing that irritability; hence, as they generally assemble in *numbers,* they make a great noise.

599. *Why, when swallows fly low, may wet weather be expected?*

Because the insects which the swallows pursue in their flight are flying low, *to escape the moisture of the upper regions of the atmosphere.*

600. *Why do ducks and geese go to the water, and dash it over their backs on the approach of rain?*

Because, by wetting the outer coat of their feathers before the rain falls, by sudden dashes of water over the surface, they *prevent the drops of rain from penetrating to their bodies through the open and dry feathers.*

601. *Why do horses and cattle stretch out their necks and snuff the air on the approach of rain?*

Because they smell the *fragrant perfume* which is diffused in the air by its increasing moistness.

"Small showers last long, but sudden storms are short."—RICHARD II.

602. *Why, when toads come from their holes, may rain be expected?*

Because toads *like moisture;* they also live upon *insects,* which either crawl from the soil, or descend from the air to the earth, in damp weather.

603. *Why may fine weather be expected when spiders are seen busily constructing their webs?*

Because those insects are highly sensitive to the state of the atmosphere, and when it is setting fine they build their webs, knowing instinctively *that flies will be abroad.*

604. *Why is wet weather to be expected when spiders hide?*

Because it shows that they are aware that the state of the atmosphere does not *favour the flight of insects.*

605. *Why may wet weather be expected when spiders break off their webs and remove them?*

Because the insects, anticipating the approach of rain, remove their webs for preservation.

606. *Why, when flies and other insects become troublesome and sting, may rain be expected?*

Because those insects, feeling instinctively the approach of damp, *seek their food* before taking shelter. When the skin of animals is moistened by a damp atmosphere flies can more easily pierce it.

607. *Why, if gnats fly in large numbers, may fine weather be expected?*

Because it shows that they feel the state of the atmosphere to be favourable, which induces them to *leave their places of shelter.*

608. *Why, when hens dust themselves in holes, may rain be expected?*

This is the manner in which hens display the *irritability* which they feel from the changing atmosphere. The *parasites* which live upon them also become more active, and the hens dust themselves to get rid of them.

609. *Why, if owls scream during foul weather, will it change to fine?*

Because the birds are pleasurably excited by a favourable *change in the atmosphere.*

610. *Why is it said that the moping of the owl foretells death?*

Because owls scream when the weather is on the change; and when a patient is lingering on a death bed, the alteration in the state of the atmosphere frequently induces death, because the faint and expiring flame of life has not strength enough *to adapt itself to the change.*

611. *Why, if birds cease to sing, may wet, and probably thunder, be expected?*

Because birds are depressed by an unfavourable change in the atmosphere, and *lose those joyful spirits which give rise to their songs.*

612. *Why, if cattle run around in meadows, may thunder be expected?*

Because the electrical state of the atmosphere has the effect of making them feel uneasy and irritable, *and they chase each other about to get rid of the irritability.*

613. *Why, when ants are seen busily carrying their eggs, may rain be expected?*

Because, feeling instinctively the increasing dampness of the atmosphere they remove their eggs to *places of greater safety.* The first thing they do, when disturbed or alarmed by any cause, is to remove their eggs.

614. *Why, if birds of passage arrive early, may severe weather be expected?*

Because it shows that the indications of unfavourable weather have set in, in the latitude from which the birds come, and that they have *taken an early flight to escape it.*

615. *Why, if the webs of the gossamer spider fly about in the autumn, may east winds be anticipated?*

Because an east wind is dry and dense, and suitable to the flight of the gossamer spider; the spider feeling instinctively the dryness of the air, throws out its web, and finds it *more than usually buoyant upon the dense air.*

616. *Why, when moles throw up their hills, may rain be expected?*

Because the moles know instinctively that on the approach of wet, worms move in the ground; the moles therefore become active, *and form their hills.*

617. *Why may we expect a continuance of fine weather when bees wander far from their hives?*

Because the bees feel instinctively that from the state of the atmosphere they may wander far in search of honey, without the danger of being overtaken by rain.

618. The following lines, by Dr. Darwin, sets forth various weather prognostics in a pleasing manner:—

The hollow *winds* begin to blow;
The *clouds* look black, the *glass* is low;
The *soot* falls down, the *spaniels* sleep;
And *spiders* from their cobwebs peep.
Last night the *sun* went pale to bed;
The moon in *halos* hid her head.
The boding shepherd heaves a sigh,
For, see, a *rainbow* spans the sky.
The *walls* are damp, the *ditches* smell,
Closed is the light red *pimpernel.*
Hark! how the *chairs* and *tables* crack,
Old Betty's joints are on the rack;
Her *corns* with shooting pains torment her,
And to her bed untimely send her.
Loud quack the *ducks*, the *sea-fowls* cry,
The distant *hills* are looking nigh.

How restless are the snorting *swine!*
The busy *flies* disturb the kine.
Low o'er the grass the *swallow* wings;
The *cricket* too, how sharp he sings!
Puss on the hearth, with velvet paws,
Sits wiping o'er her whisker'd jaws.
The *smoke* from chimneys right ascends;
Then spreading, back to earth it bends.
The *wind* unsteady veers around,
Or settling in the south is found.
Through the clear stream the *fishes* rise,
And nimbly catch the incautious flies.
The *glowworms*, numerous, clear, and bright,
Illum'd the dewy hill last night.
At dusk the squalid *toad* was seen,
Like quadruped, stalk o'er the green.
The whirling wind the *dust* obeys,
And in the rapid eddy plays.
The *frog* has chang'd his yellow vest,
And in a russet coat is drest.
The *sky* is green, the *air* is still,
The mellow *blackbird's* voice is shrill.
The *dog*, so alter'd is his taste,
Quits mutton bones on grass to feast.
Behold the *rooks*, how odd their flight,
They imitate the gliding kite,
And seem precipitate to fall,
As if they felt the piercing ball.
The tender *colts* on back do lie,
Nor heed the traveller passing by.
In fiery red the *sun* doth rise,
Then wades through clouds to mount the skies.
'Twill surely rain, we see with sorrow,
No working in the fields to-morrow.

619. *Why, when the smaller stars look dull, or are imperceptible, may rain be expected?*

Because those stars, being duller in light than others, they become *the soonest obscured* by the condensing vapours.

620. *Why, if people feel their corns ache, and their bones rheumatic, may rain be expected?*

Because the dampness of the atmosphere affects its pressure upon the body, and causes a temporary disturbance of the system. All general disturbances of the body *manifest themselves in those parts which are in a morbid state*—as in a corn, a rheumatic bone, or a decayed tooth.

621. *Why is a ringing or singing noise in the ears indicative of change of weather?*

Because the change in the pressure of the atmosphere *affects the fine blood-vessels of the ear*, and causes a greater or lesser flow of blood therein. These noises may indicate either a change from foul to fair weather, or from fair to foul.

622. *Why does the setting in of an east wind cause bodily aches and derangements?*

Because east winds are generally dry and irritating. Those winds reach us across the *plains of Northern Germany*, which are frequently cold and dry. The sudden arrival of an east wind produces great atmospheric changes which disturb our bodily system.

623. *Why do feathers, pieces of flue, and dry leaves, playing about on the surface of ponds indicate rain?*

Because just before the setting in of rain, the changes which are caused by the rapid condensation of moisture causes *eccentric currents and motions of the wind* by which the eddies are produced.

624. *Why does the snapping of the flame of a candle or lamp indicate rain?*

Because the dampness of the air probably *settled upon the wick* before the candle was lighted; or it may be drawn to the flame in the current that flies towards it. In either case excess of moisture would cause a crackling noise.

625. *Why does the brightness and heat of the fire in winter indicate frosty weather?*

Because it shows that the air is dry and dense, and that the

"The most forward bud
Is eaten by the canker ere it blow."—Two Gentlemen of Verona.

amount of oxygen conveyed to the fire is considerable *in consequence of that density.*

626. When London was lit with oil lamps, which were left to burn themselves out, it was observed that on damp nights they continued to burn a much longer time than when the air was dry and favourable to rapid combustion.

627. *Why does a black excrescence upon the wicks of candles and lamps foretell rain?*

Because, as the oxygen of the air is considerably *rarefied by vapour* it does not so readily consume *carbon;* therefore the unconsumed carbon accumulates upon the wick.*

628. The following are the far-famed weather predictions of the ancient "Shepherd of Banbury:"—

If the sun rise red and fiery, wind and rain;
If cloudy, and it soon decrease, certain fair weather.
Clouds small and round, like a dapple gray, with a north wind, fair weather for two or three days.
Large clouds like rocks forebode great showers.
If small clouds increase, much rain.
If large clouds decrease, fair weather.
Mists, if they rise in low ground and soon vanish, fair weather.
If mists rise to the hill-tops, rain in a day or two.
A general mist before the sun rises, near the full moon, fair weather.
If mists in the new moon, rain in the old;
If mists in the old, rain in the new.

Observe, that in eight years there is as much south-west wind as north-east, and consequently as many wet years as dry.

When the wind turns to north-east, and it continues two days without rain, and does not turn south the third day, nor rain the third day, it is likely to continue north-east for eight or nine days, all fair, and then to come to the south again.

If the wind turns again out of the south to the north-east with rain, and continues in the north-east two days without rain, and neither turns south nor rains the third day, it is likely to prevail north-east for two or three months.

After a northerly wind for the most part two months or more, and then coming south, there are usually three or four fair days at first, and then on the fourth or fifth day comes rain, or else the wind turns north again, and continues dry.

If the wind returns to the south within a day or two without rain, and turn northward with rain, and return to the south in one or two days more, two or three times together, after this sort, then it is likely to be in the south or south-west two or three months together, as it was in the north before.

* For the chemical phenomena that attend the burning of a candle, the colour of flame, &c., see *The Reason Why*—General Science.

"A man may see how this world goes with no eyes; look with thine ears."
KING LEAR.

Fair weather for a week, with a southern wind, will produce a great drought if there has been much rain out of the south before. The wind usually turns from north to south with a quiet wind without rain, but returns to the north with a strong wind and rain. The strongest winds are when it turns from south to north, by west.

CLOUDS. In summer or harvest, when the wind has been south two or three days and it grows very hot, and you see clouds rise with great white tops, like towers, as if one were upon the top of another, and joined together with black on the nether side, there will be thunder and rain suddenly.

If two such clouds arise, one on either hand, it is time to make haste to shelter.

Sudden rains never last long; but when the air grows thick by degrees, and the sun, moon, and stars shine dimmer, then it is likely to rain six hours, usually.

If it begin to rain from the south, with a high wind for two or three hours, and the wind falls, but the rain continues, it is likely to rain twelve hours or more, and does usually rain till a strong north wind clears the air. These long rains seldom hold above twelve hours, or happen above once a year.

If it begin to rain an hour or two before sunrising, it is likely to be fair before noon, and so continue that day; but if the rain begin an hour or two after sunrising, it is likely to rain all that day, except the rainbow be seen before it rains.

If the last eighteen days of February and ten days of March be for the most part rainy, then the spring and summer quarters will probably be so too.

If the latter end of October and beginning of November be for the most part warm and rainy, then January and February are likely to be frosty and cold, except after a very dry summer.

If October and November be snow and frost, then January and February are likely to be open and mild.

629. *Why, when soot falls down the chimney, or comes down in blacks on the outside of houses, may rain be expected?*

The soot probably *absorbs moisture*, and becoming heavier, its loose flakes fall down. It is said that soot takes fire more readily on the back of the chimney, or on the surfaces of pots and kettles on the fire, upon the approach of rain. This may arise from the fact that substances which are of slow combustion, such as soot, burn the better for being previously wetted. *The moisture absorbs heat*, and elevates the temperature of the mass, and when the temperature is sufficiently high to cause the water to fly off in vapour, the dried and heated mass which remains, the more readily takes fire.

630. *Why does a sensation of chilliness foretell rain?*

Because the increased moisture in the air *bears away the heat of the body*, and causes depression and shivering.

"Care keeps his watch in every old man's eye,
And where care lodges, sleep will never lie."—ROMEO AND JULIET.

631. *Why do headaches foretell a change of weather?*

Because the state of the atmosphere exercises, as well as a *mechanical influence*, by its pressure upon every part of the body, *a chemical and vitalizing influence* upon the blood. When these influences are disturbed, pain arises in that part which is most liable to disturbance.

632. *Why do floating specks in the eyes foretell rain?*

This effect, the appearance of spots on any subject we may look at, or when we turn our eyes upward to the sky, seems to be produced by some peculiar irritation in the retina, or other part closely connected with the vision, and which has its remote cause in the electric state of the air before rain. It may otherwise arise from a similar effect upon the blood-vessels of the eye, to that which causes the singing noises in the ear.

633. The following lines by Longfellow afford a beautiful meditation upon

"A RAINY DAY.

"The day is cold, and dark, and dreary,
It rains, and the wind is never weary;
The vine still clings to the mouldering wall,
But at every gust the dead leaves fall,
And the day is dark and dreary.

"My life is cold, and dark, and dreary;
It rains, and the wind is never weary;
My thoughts still cling to the mouldering Past,
But the hopes of youth fall thick in the blast,
And the days are dark and dreary.

"Be still, sad heart! and cease repining;
Behind the clouds is the sun still shining;
Thy fate is the common fate of all,
Into each life some rain must fall,
Some days must be dark and dreary."

634. *Why does the moon influence the state of the weather?*

Because the moon exerts the *influence of attraction* over the earth, as is manifest by the movements of the tides. Since the moon exerts such an influence over the *water* of the earth, it cannot be doubted that it exerts an equal influence over the *atmosphere*.

635. It is certain, however, that the influences of the moon in changing the state of the atmosphere are of short duration, and take place gradually, according to constant laws. They are, consequently, quite incompetent to the production of those sudden and irregular changes to which the atmosphere is subject. Nevertheless, reason and observation concur in showing that atmospheric conditions may be influenced by the positions of the moon, and modified by the increase or decrease of her attractive force. Dr. Samuel Clarke founded the following table upon a long series of observations:—

NEW OR FULL MOON.	SUMMER.	WINTER.
If it be new or full moon, or the moon enters into the first or last quarters at the hour of 12.	Very Rainy	Snow and Rain.
Or between the hours of		
2 and 4	Changeable	Fair and Mild.
4 and 6	Fair	Fair.
6 and 10	Fair if wind N. W.... Rainy if S. or S. W.	Fair and Frosty if N. or N. E. Rainy if S. or S. W.
10 and midnight	Fair	Fair and Frosty.
midnight and 2	Ditto	Hard Frost unless wind S. or S. W.
2 and 4	Cold, with frequent Showers	Snow and Stormy.
4 and 6	Rain	Ditto.
6 and 8	Wind and Rain	Stormy.
8 and 10	Changeable	Cold, Rain, if wind W., Snow if E.
10 and noon	Frequent Showers	Cold, with high wind.

636. *Why does the "harvest moon" rise several successive times at the same hour?*

It is remarkable that the moon, during the week in which she is full about the time of harvest, rises sooner after sunset than she does in any other full-moon week in the year. By this means she affords an immediate supply of light after sunset, which is very beneficial for the harvest, and for gathering in the fruits of the earth; and hence this full moon is distinguished from the others in the year by calling it the *harvest moon*.

"How oft the sight of means to do ill deeds
Makes deeds ill done."—KING JOHN.

Instead of rising *fifty-two minutes later* every day, the harvest moon appears for several days at nearly the same hour. This is caused by the increase of declination in the moon's motion over the line of the equator; which, in more simple language, implies that the relative positions and motions of the earth and moon at that time are such that the moon appears not to progress upon her orbit, although she really does so, and hence she rises for several successive days at nearly the same hour.

The harvest moons of the years 1858, 1859, 1860, and 1861 will be very fine.

637. *Why do we sometimes see "the old moon in the young moon's arms?"*

Because the light from the new moon being very feeble, we are able to discern the dark surface of the moon by the light which our planet reflects upon it. This light is what the inhabitants of the moon, if there were any, might be supposed to consider as moonlight.

638. The light which makes the dark part of the moon visible to us may be said to perform three journeys—first from the sun to the earth, then from the earth to the moon, and finally from the moon to the earth.*

639. *What originated the popular idea of "the man in the moon?"*

This is one of our most ancient superstitions; it is supposed to have originated in the account given in the book of Numbers, chapter xv., of the man who was stoned to death for picking sticks on a Sabbath-day. The marks on the face of the moon, *arising from the shadows of her mountains, or the hollows of her craters,* presenting a resemblance to a human face, favoured the superstition.

640. *Why does the moon influence the state of health, especially of persons afflicted with mental disorders?*

The fact that the moon does materially influence the state

* *Chambers's Information.* W. and R. Chambers.

"Affliction may subdue the cheek,
But not take in the mind."—WINTER'S TALE.

of health of persons who are *hypochondriacal* or *insane*, is generally admitted by medical authorities; and the explanation may be, that whatever influences the atmospheric conditions of our globe must affect, in the highest degree, those of its inhabitants whose constitutions are *most sensitive to physical impressions*.

CHAPTER XXIX.

641. *What is sleep?*

Sleep is understood to be that state of the body in which *the relation of the brain to some parts of the body is temporarily suspended*.

There are certain organs that *never sleep*—such are the heart, the lungs, the organs of circulation, and those parts of the nervous system that direct their operations.

But when sleep overtakes the system, it seems as if the *relations* of those parts under the control of the will were temporarily suspended—as if, for instance, those nerves which move the arms, the legs, the eyes, the tongue, &c., were all at once unfastened, just as the strings of an instrument are relaxed by the turning of a key, or the throwing down of a bridge over which they were stretched.

642. What is meant by the temporary suspension of the relation of the brain to some parts of the body may be thus explained:—Notice a man when he sits dosing in a chair; at first his head is held up, his brain controlling the muscles of the neck, and keeping the head erect. But drowsiness comes on, the brain begins to withdraw its influence, and the muscles of the neck becoming as it were "unstrung," the head drops down upon the breast. But the sleep is unsound, and disturbed by surrounding noises. The brain is therefore frequently excited to return its influence to the muscles, and draw up the head of the sleeper. He gives a sudden start, every muscle is tightened in an instant, up goes the head, the eyes open, the ears listen, until a feeling of security and composure returns; the sleep again deepens, *the nervous connection is again withdrawn*, and then down drops the head as before.

"Heat not a furnace for your foe, so hot
That it do singe yourself."—HENRY VIII.

643. *Why are we refreshed by sleep?*

Because while we are sleeping the functions of the body are performed in a *uniform and steady manner*, and as the senses are comparatively inactive, and the nervous energy allowed to repose, a new supply of mental and bodily vigour is accumulated.

644. *Why do we feel a desire to stretch our limbs on awaking from sleep?*

Because during sleep the *extensor*, or straightening muscles, become unduly extended, and the *flexor*, or bending muscles, proportionately contracted. When we stretch our limbs, we *adjust the relations of the muscles* before commencing to exercise them.

645. *What is supposed to be the proximate causes of sleep?*

An *impeded motion of the nervous fluid to the brain*, produced by a mechanical compression or collapse of the nerves.

646. Hence we can explain how causes so totally opposite are able to produce sleep, when they either *exhaust* the nervous fluid, or *compress* the tubes of the nerves. Of the former kind is every *violent* and *fatiguing* species of labour, a considerable loss of blood, perspiration increased by external heat, and everything that withdraws the blood from the head; for instance, warm bathing of the lower extremities, a stomach filled with much food, &c. Of the latter kind of incitements—those that act by *compression*—is every mechanical pressure on the brain, whether it proceed from water accumulated in its ventricles, from a local depression or fracture of the cranium, or from extravasated blood. In like manner, the impeded regress of the blood from the brain, or the increased access of it to that organ, may effect such a pressure by distending the blood-vessels, as is the case in using narcotics, or wine, and other spirituous liquors. And lastly, an *intense degree of cold*, as well as the state of an approaching apoplexy.

647. *Why may we know that the mind retains its reasoning powers equally during sleep as when we are awake?*

Because any impression, or train of thought which occupied us *when we fell asleep* usually revisits us on our *awaking*. And we have a stronger illustration still in the fact, that if upon going to rest we make a resolution to rise earlier than usual, we are almost sure to succeed: proving that during sleep the mind computes the duration of time, so that it makes an impression on the body, and enables us to awake at the appointed hour.

Schoolboys, who fall asleep upon lessons half learned

"Direct not him whose way himself will choose."—RICHARD II.

remember them more perfectly in the morning. This has given rise among children to a superstition that if they place their school-book under their pillow, they will know their lessons in the morning.

648. *Why will pillows, stuffed with hops, frequently afford sleep to persons who cannot otherwise obtain it?*

Because the volatile narcotic principle of the hop escapes and surrounds the head of the sleeper with a most refined narcotic ether, which induces sleep.

649. *Why do we dream?*

Dreams appear to arise *from the excitement of the brain during those hours when its connection with the other parts of the living organism is suspended.* For instance: a man dreams that he is pursued by a furious animal, and the mind passes through all the excitement of flying from danger; but the *connection* between the moving power, and the machinery of motion being suspended, no motion takes place. The same impressions upon the brain when the nerves were "strung" to the muscles, would have caused a rapid flight, and a vigorous effort to escape from the apprehended danger.

650. In speaking of dreams we must be careful to distinguish betweeen *sensations* and *ideas*. That the feelings composing dreams, although believed to be sensations, are not sensations but only ideas—that we *do not* see, hear, smell, touch, and taste, but that we have only the *ideas* of these respective sensations cannot need proof. The dreamer knows that at the time of his dream he was so situated that it was impossible he should have any other than the *ideas* of seeing, speaking, hearing, smelling, tasting, or locomotion. Dreams must, then, be assumed to be *trains of ideas passing through the mind*, while the body is more or less quiescent.*

651. *Why do suppers, when indigestible substances are eaten, produce dreaming?*

Probably because, as the digestive organs are oppressed, and those parts of the nervous system which stimulate the organs of digestion are *excited by excessive action*, those portions of the brain which are not immediately employed by the digestive

* *Penny Cyclopædia.* C. Knight and Co.

process are disturbed by that *sympathy* which is observed to prevail between the relative parts and functions of the body.

652. *Why do we dream in a few minutes of a succession of events that would occupy days, months, and even years?*

The discrepancy between our notions of time when we are asleep and when we are awake, may be thus explained:—

The conception of time is *only an idea* of so many successions of events, or of ideas, whether called up by these events or otherwise. But it must be remembered that we may pass very rapidly *in idea,* during our waking moments, through a succession of events equally long with those in which we fancy that we are actors during sleep.

In dreams we require neither ships to convey us, nor time to travel to the farthest antipodes; one flash of the mind is sufficient.

653. Events in dreams are, to a certain extent, like maps, which at a glance present to us both hemispheres. A somewhat similar act of the mind to that exercised in dreams is performed when *we reflect.* It takes but little time, indeed, to pass by a retrospective glance from our earliest memories to the present moment. To this act of the mind the bodily senses and organs are not necessary, but neither do they present to it any impediments.

654. *Why are dreams wild and inconsistent?*

Because the brain, which is their seat, is in a state of unguardedness, and, like a school without the schoolmaster, in a sort of uproar. The vigilance which *it exerts over itself,* in waking moments, slumbers; and the vibrations of the stomach, pleasant or otherwise, being conducted to the brain, produce successions of ideas, dependent indeed upon associations, but very different from those which would take place in a state of vigilance.

655. *Why are the greater number of our dreams forgotten when we awake?*

Because of their incoherence, and of the change which takes place in the brain in passing from sleep to vigilance. Hence dreams presented in the earlier part of the night are more confused and irregular than morning dreams, for in the first case we approach to sleep—in the latter to vigilance.

656. *Why do we dream principally of persons of whom we had some previous acquaintance, and of places that either in mind or body we have previouly visited?*

Because of what is termed the *association of ideas*—some philosophers affirming that in dreams we exercise only a *reflective* power—employing those images alone that had previously been received into the mind during our waking hours.

657. This theory is to be received with some reservation. Certain *innate* ideas are common to every organized intelligence, whether rational or irrational. It is not necessary to prove here that every human being is born with certain innate ideas; but it is indisputable that the lower animals have them—as for instance, the kitten needs no experience to teach it that the mouse is its appointed prey, nor does the fly require any previous acquaintance with spiders to teach it to dread them.

658. But, ordinarily speaking, our dreams are for the most part composed of ideas *collected through the outward senses*, and are very much influenced by the degree of importance we may happen to attach to particular scenes or individuals.

659. In exemplification of this we may adduce the instances of Condillac, the French metaphysician, who used to carry on his abstruse reasonings in his dreams, and, as he says, often brought to a conclusion long chains of ratiocination upon which he had been engaged during the day, but upon retiring to rest had left unfinished; of Franklin who did the same thing; and of Coleridge who composed in a dream some hundreds of lines of the poem of *Kubla-khan*.

660. *What effect have the five external senses upon dreams?*

Each of the senses has a certain effect varying with the activity of those senses in individual cases.

661. A strong light brought before the eyes of a person sleeping, generally affects the nerves concerned in the sensation of *Sight;* a sensation of a light is generally felt; and whilst its ultimate effect is almost always to awaken the sleeper, a train of ideas, associated with the sensation of a light, is first called up and passes before the mind in the interval between the sensation and waking. The sleeper probably awakes from a dream of some conflagration, whether one which has actually taken place (for instance, the conflagration of Covent Garden Theatre, or any other which may have been recently impressed upon his mind), or else a conflagration of some house well known to him, perhaps even his own.

662. With regard to *Taste*—the least excitable of the senses after sight—the circumstances under which we sleep are such as to preclude almost entirely the

"Every time
Serves for the matter, that is then born in't."—ANTONY AND CLEOPATRA.

possibility of its being brought into action. When, however, from ill health, or in consequence of something which we have eaten shortly before going to bed, there is an unpleasant taste in the mouth, this may have its effect on dreams.

663. *Smell* is less productive of effects upon dreams; but, as with the sense of sight, there can be no doubt that a strong smell of burning matter would awaken the idea of a fire.

664. The sense of *Hearing* frequently acts upon the mind in dreams, of course differently with persons variously constituted. The sound of a flute in the neighbourhood may awaken a thousand beautiful and delightful associations. The air is perhaps filled with the tones of harps and all other varieties of music; nay, the performers themselves are visible; and while the cause of this strange scene is one trivial instrument, he may be regaled with a rich and melodious concert. A loud noise taking place near the sleeper, heard by him, and eventually waking him, calls up ideas of various loud noises, and these again various other ideas connected with them.

665. But the sense of *Touch* is perhaps the most excitable during sleep. On continually altering our position, the contact of the bed clothes produces a number of varying sensations; we are most easily awakened by being touched, the slightest tickling in the nose or the sole of the foot being sufficient. And by means of the rapidity with which ideas are engendered in the mind, the interval between the touch and the complete awaking is amply sufficient to enclose a dream of some length—reckoned according to the events supposed to occur.

666. The following curious instance, which exemplifies the tendency of ideas, that have been most frequently and most recently present to the mind, to recur in dreams, is related by Dr. Abercrombie. At a time when the inhabitants of Edinburgh were all in constant alarm of a French invasion, and when every preparation had been made for the landing of the enemy, it was arranged that the first notice thereof should be given by a gun from the castle. A gentleman, who had been a most zealous volunteer, was in bed between two and three o'clock in the morning, when he dreamt of hearing the signal gun. He was immediately at the castle, witnessed the proceedings for displaying the signals, and saw and heard a great bustle over the town, from troops and artillery assembling. At this time he was roused by his wife, who awoke in a fright, in consequence of a similar dream, connected with much noise, and the landing of an enemy, and concluding with the death of a particular friend of her husband, who had served with him as a volunteer upon a previous occasion. The origin of this remarkable concurrence was ascertained in the morning to be *the noise produced in the room above by the fall of a pair of tongs*, which had been left in some very awkward position, in support of a clothes screen. Many amusing stories have been related of the effects produced by whispering in the ears of sleeping persons, an experiment which, if it fails to awake the sleeper, will almost invariably raise images in the mind, and become embodied in dreams.

667. *Why do we feel so little surprise in dreams, although we may find ourselves in the most unlikely places, and discoursing*

with persons with whom, waking, we seldom or ever come in contact?

Because the ideas of time and distance are dormant, and but seldom called for in dreams. From what we have already said, it will be understood that dreaming is only *thinking*, with a slight difference; and as it is easy to imagine ourselves in the company of, and conversing with, every possible variety of intelligent being, so it is easy to dream of doing so; especially when it is considered that the ideas of time, distance, &c.—those which would cause the sense of incongruity—are almost always absent from our dreams.

668. *Why are children supposed to dream less than adult persons?*

Because their minds are less active in proportion to their age, and the bodily functions, generally in greater activity, thereby causing sounder sleep.

669. It is, however, far from certain that children do not dream to a greater extent than is commonly supposed. It is highly probable that they dream very often, but that they fail to remember their dreams, or are deficient in the power of adequately describing them. Moreover, with children, the present almost invariably banishes all thoughts of the past, and hence a dream is no sooner dreamt than forgotten by them.

670. *Why are elderly persons supposed to be more than others the subjects of dreams?*

Because they are more susceptible of most of those impressions upon the external senses that cause or influence dreams; their minds are more stored with images; and their sleep generally less sound than that of younger persons.

671. It is to be considered that the *faculty of memory* is in age more perfect, and the power of *describing* in the same ratio; and the very leisure which accompanies age, joined to the consideration which the family circle must always extend to its seniors, tends to the *relating* of dreams by them; which relating is not to be confounded with a predisposition to dreaming.

672. *Why should we put no faith in the predictive or admonitory class of dreams?*

Because experience proves that dreams are generally the offspring either of our *wishes* or our *fears;* and have to be regarded as little else than a *reflection of our waking thoughts.*

673. This observation in no way affects our reception as truths the several accounts of "dreams and visions of the night" recorded in the sacred writings. Certainly the Creator of all things can inspire, and beyond a doubt has inspired, his chosen instruments through the medium of dreams; and it would be the height of immodesty, to say the least, in us to slight the evidence upon which the records of these come down to us. But the ablest, and, indeed, all spiritual writers are loud in condemnation of the practice which obtains very commonly, of ordinary persons seeking in dreams for revelations of the future, or guidance for their present conduct.

674. With regard to what are called "well authenticated dreams," wherein events that afterwards occurred would seem to have been foreshadowed (some instances of which we shall adduce), we must reflect—

1. That we ought to be sure the dream really took place *before* and not *after* the event. The accounts of such visions are very seldom made public until the circumstance has "verified" them.

2. That, when the witness is otherwise trustworthy, we ought to be certain that the dream, and the event said to verify it, are not *adapted*—fitted on to each other, so to speak—afterwards.

675. The following instance of a dream is said to have occurred to a person of very respectable position, living near Redruth, in Cornwall. The circumstance to which it relates took place on the 11th of May, 1812:—"On the night of the 11th of May, 1812, Mr. Williams, of Scorrior House, near Redruth, awoke his wife, and, exceedingly agitated, told her that he had dreamt that he was in the lobby of the House of Commons, and saw a man shoot with a pistol a gentleman who had just entered the lobby, who was said to be the Chancellor. Mrs. Williams replied that it was only a dream, and recommended him to go to sleep again as soon as he could. He did so; but shortly after he again awoke her, and said that, a second time, he had the same dream. The dream was repeated a third time, on which, notwithstanding his wife's entreaties that he would be quiet, and endeavour to forget it, he arose (then between one and two o'clock) and dressed himself. At breakfast, the dreams were the sole subject of conversation; and in the forenoon Mr. Williams went to Falmouth, where he related the particulars of them to all of his acquaintance that he met. On the following day, Mr. Tucker of Tremalon Castle, accompanied by his wife, a daughter of Mr. Williams, went to Scorrior House on a visit. Mr. Williams then related to Mr. Tucker the circumstance of his dreams; on which the latter observed, that it would be very well *for a dream* to have the Chancellor in the lobby of the House of Commons, but that he would not be found there in reality. Mr. Tucker then asked what sort of a man he appeared to be, when Mr. Williams described him minutely. Mr. Tucker replied, "Your description is not at all that of the Chancellor, but is very exactly that of *Mr. Perceval*, the Chancellor of the Exchequer." He then inquired whether Mr. Williams had ever seen Mr. Perceval, and was told that he had not, nor ever had anything to do with him; and, further, that he had never been in the House of Commons in his life.

"Brevity is the soul of wit,
And tediousness the limits and outward flourishes."—HAMLET.

At that moment they heard a horse gallop to the door of the house; and immediately after, a son of Mr. Williams entered the room, and said that he had ridden out from Truro, having seen a gentleman there who had been in the lobby of the House of Commons on the evening of the 11th, when a man called Bellingham had shot Mr. Perceval. After the astonishment which this intelligence created had a little subsided, Mr. Williams described most minutely the dress and appearance of the man he saw, in his dream, fire the pistol at the Chancellor, as also of the Chancellor. About six weeks after, Mr. Williams having business in town, went, accompanied by a friend, to the House of Commons, where, as already observed, he had never before been. Immediately that he came to the steps at the entrance of the lobby, he said, "This place is as distinctly within my recollection from my dream, as any room in my house," and he made the same observation when he entered the lobby. He then pointed out the exact spot where Bellingham stood when he fired, and which Mr. Perceval had reached when he was struck by the ball, where he fell. The dress, both of Mr. Perceval and Bellingham, agreed with the description given by Mr. Williams, even to the most minute particulars.

676. A lady dreamt that an aged female relative had been murdered by a black servant, and the dream occurred more than once. She was then so impressed by it, that she went to the house of the lady to whom it related, and prevailed upon a gentleman to watch in an adjoining room during the following night. About three o'clock in the morning, the gentleman, hearing footsteps on the stairs, left his place of concealment, and met the servant carrying up a quantity of coals. Being questioned as to where he was going, he replied, in a confused and hurried manner, that he was going to mend his mistress's fire—which, at three o'clock in the morning, in the middle of summer, was evidently impossible; and, on a further investigation, a strong knife was found concealed beneath the coals.*

677. The murder of the unfortunate Maria Marten, by William Corder, is said to have been discovered in the first instance by a dream. The circumstances are detailed at considerable length in a work entitled *An Authentic and Faithful History of the Mysterious Murder of Maria Marten.*†

The unhappy victim of this murder was the daughter of a farm labourer residing in the village of Polstead, in Suffolk, the murderer being a farmer's son, also resident in the parish. William Corder had promised Maria marriage, and seduced her, but being already married, and anxious to get rid of the difficulty, he resolved upon the assassination of Maria Marten. He induced her to leave home on the 18th of May, 1828, attired in male apparel, and was last seen in her company close to a barn known as the Red Barn, situated on the declivity of a field called Barnfield Hill, about a mile from Polstead Church. Corder endeavoured for some time to account for her disappearance in various ways; but towards Christmas the Marten family became exceedingly alarmed, in consequence of the absence of Corder, who also disappeared, after having given false representations respecting Maria.

The mysterious absence of Maria Marten having continued for about ten months, and Corder himself having also been absent for the greater part of the time, the

* Abernethy's *Enquiries concerning the Intellectual Powers.*
† Kelly and Co.

subject became the constant theme of conversation in the family and neighbourhood. At length Mrs. Marten one day said to her husband, "I think, were I in your place, I would go and examine the Red Barn." He inquired the reason why this suggestion was held out by her, to which she replied, "I have very frequently dreamt about Maria, and twice before Christmas I dreamt that she was murdered, and buried in the Red Barn." "Why," said her husband, "did you not tell me this before?" Mrs. Marten replied that she did not like, fearing to be considered superstitious. After this disclosure, some little time was suffered to elapse; but at length the wife, renewing her importunities, Marten was induced to make a search. The result is well known. Accompanied by a neighbour, the father proceeded to the barn in question, removed the litter from the floor, found that a portion of the ground was rather looser than the rest, dug, and discovered the body of his unfortunate daughter.

We may add, that no reference was made to dreams in any part of the evidence given by William Marten or his wife. He simply stated that he was induced to search the Red Barn "in consequence of what his wife had said to him." In a sermon preached by the vicar of the parish, after Corder's conviction, the only reference to the dreams was, that "there had been some vague rumours respecting dreams."

It is not, however, improbable that Mrs. Marten did dream about her daughter, in connection with the Red Barn, since she knew that William Corder had taken her there to await the conveyance by which he expressed his intention to convey her away, and that she was never seen afterwards.

678. *Why does a person sometimes doze off and again awake several times in a few minutes?*

Because the power of the will, and the fatigue of the nervous system, appear to be *evenly balanced,* and subject to momentary variations arising from external or internal influences.

679. The singular facility and rapidity with which the sleeping and the waking state succeed each other, may be illustrated by the familiar instance of a man on horseback, when much wearied for want of rest. Here, at every few moments, the mind lapses into sleep, from which the loss of balance of the body as frequently and suddenly arouses it. Neither the sleep, nor the waking consciousness, is perfect; but the mind is kept in a state which is a rapid shifting to and fro of conditions of imperfect sleep and imperfect waking.*

680. *Why does a person when dozing, or passing from a state of wakefulness to sleep, relax his grasp of things?*

Because the *power of the muscles is dependent upon the will;* as this ceases in sleep, the power so communicated ceases also, and the muscles relax.

* Holland's *Medical Notes.* Longman and Co.

"Men must endure
Their going hence, e'en as their coming hither.
Ripeness is all."—LEAR.

681. *Why does the head of a person dozing droop upon the chest?*

Because the *power of the will* which maintains the head in an erect position being withdrawn, the muscles of the neck cease to act in their usual manner.

682. *Why does excess of mental or bodily exertion prevent sleep?*

Because the brain, which is the centre of sensation, is thereby excited to an unhealthy degree, and rendered *unnaturally active.*

683. What seems most needful for obtaining sleep is the disengagement of the mind from any strong emotion, or urgent train of thought. Great anxiety to bring on sleep retains those very conditions, and is therefore more or less preventive of it. The various artifices of thought and memory used for the purpose often fail from this cause—a desultory state of mind, without emotion, being apparently one of the conditions most favourable to the effect desired.

684. *Why do we awake after a certain time spent in sleep?*

Because, as by the exhaustion of the *nervous powers* we sink into sleep—during the intervals of which those powers are gradually repaired—so, upon its resumption in a sufficient degree by the senses and bodily organs, do they *acquire renewed activity and wakefulness.*

685. *Why do some dreams wake us more readily than others?*

Because they arise more immediately from some *excitement of the bodily organs,* which, becoming painful, dissipates the dream, by awaking us.

686. Any excessive excitement of either of the five senses will suffice to awaken an ordinary sleeper; an illustration of which may be here adduced. When we dream of *money,* and particularly of any sudden or unlooked for acquisition of it, it will have been within the experience of most persons, that a too eager desire, in the dream, to *realize the possession,* by passing it through the hands, feeling it, sounding it, &c., has often resulted in dissipating the illusion and awakening us.

687. *Why is there so great a difference between the dreams of various persons, and also between the dreams of the same person at different periods of life?*

Because dreams depend so much upon the *mental conformation,* which differs with each individual, and is continually undergoing changes. Because, also, the senses have various *degrees of activity*, and are variously affected according to circumstances.

688. *Why is excessive sleep injurious?*

Because, by being kept too long in a state of rest, the brain is liable to pass, by insensible gradations, into debility, in the same way that *disuse of the limbs* will lead gradually to the loss of their functions.

689. *Why is it injurious to awaken a person too suddenly from a state of sleep?*

Because an ill effect is apt to be produced upon the brain, by a current of blood being directed suddenly towards it—the result of surprise. Because, also, the change from sleeping to waking should be *gradual*, as are the approaches to sleep.

690. *Why, if sleep is indulged in after dinner, should it be taken upright in a chair, and not in a recumbent position?*

Because in a chair sleep is generally short, and never very profound; but when the body is lying at full length with the stomach full, the sleep is too heavy and prolonged, and the sleeper awakes drowsy and unrefreshed, with a sense of fulness and weight in the head, the body chilled, and the whole frame disorganised.*

691. *Why do somnambulists walk over difficult and dangerous places in safety?*

Because, although some of the faculties of the somnambulist's mind are in action, the power of reasoning is at rest. The somnambulist, therefore, estimates no consequences, realizes no fear, but possessing a clear and calm *idea* of the places over which he walks, he moves mechanically and safely over dangerous spots, whereon, in his waking and reasoning moments, he would fear to tread.

* Wright's *Headaches; their Causes and their Cure.* Churchill.

"Care's an enemy to life."—TWELFTH NIGHT.

692. *Why should we place no faith in stories of ghosts and apparitions?*

Because they are even more conflicting than stories of dreams, and, like dreams, are *more reasonably explained* upon the hypothesis of *natural causes*, than upon the supposition of supernatural agencies, of spiritual communication with mankind, or of Divine interference.

693. This does not cast a doubt upon the accounts of apparitions which have been handed down to us by the sacred historians, and which rest upon sufficient evidence. In the examples of ghost stories which we shall give, it will be very easy to detect the clue by which any apparent mystery may be unravelled, even where we have not appended the explanation.

694. The ghostly pranks recorded by Sir Walter Scott in his *Woodstock* are familiar to most readers. The following account of what was called *The Stockwell Ghost*, as being of more recent date, and occurring in the immediate vicinity of the metropolis, will prove an excellent case in point.

In the year 1772, a train of transactions, commencing upon Twelfth Day, threw the village of Stockwell, a suburb to the south of London, into a state of the wildest consternation, impressing upon many of its denizens the inevitable belief that they were the production of supernatural agents.

The plates, dishes, china, crockery, glass-ware, and small moveables of every kind, contained in the house of Mrs. Golding, an elderly lady, seemed suddenly to become animated, shifted their places, flew through the room, and were broken to pieces. The particulars of this commotion were as curious as the loss and damage occasioned in this extraordinary manner were alarming. Amidst this confusion, a young woman, Mrs. Golding's maid, Anne Robinson, was walking backwards and forwards, nor could she be prevailed on to sit down for a moment, excepting while the family were at prayers, during which time no disturbance happened. Anne Robinson had been but a few days in the old lady's service, and it was remarkable that she endured with great composure the extraordinary displays which others beheld with terror, and coolly advised her mistress not to be alarmed or uneasy, as those things could not be helped.

Alas! for poor Mrs. Golding, such appeared to be the case indeed. In the middle of the night, her gentle slumbers would be broken by the rattle of the dancing furniture and china in a neighbouring apartment. The afflicted lady invited neighbours to stay in her house; but they soon became unable to bear the sight of these unnatural proceedings, which went so far, that not above two cups and saucers remained whole out of a valuable set of china. She next abandoned her dwelling, and took refuge with a neighbour, but finding his moveables were seized with supernatural vitality, her landlord reluctantly refused to shelter any longer a woman who seemed to be persecuted so unremittingly. Mrs. Golding's suspicions against the servant Anne Robinson, as the cause, or as connected with the mysterious movement, now took the shape of a dismissal. She was discharged, and *thenceforth the ghosts disappeared from the premises.*

"By bad courses may be understood
That their events can never fall out good."—RICHARD II.

Anne Robinson was induced, subsequently, to admit that she was the sole cause of the mysterious movements in question. Possessed of considerable dexterity in the use of *horse-hair*, by means of various lengths of this material, which she contrived to attach to the plates, cups, and dishes, she could throw them down without touching them. Other things she adroitly threw about. In the absence of the family, she loosened the hold of the strings by which the hams, bacon, and similar articles were suspended, so that they fell by the slightest motion. What her motive could be, except the love of mischief, it is impossible to imagine.

695. The following account of an apparition, is related by Sir D. Brewster, in his *Letters on Natural Magic*:—

On the 30th December, 1831, about four o'clock in the afternoon, a Mrs. A—— came down stairs into the drawing-room, which she had quitted only a few minutes before, and on entering the room she saw her husband, as she supposed, standing with his back to the fire. As he had gone out to take a walk about half an hour before, she was surprised to see him there, and asked him why he had returned so soon. The figure looked fixedly at her with a serious and thoughtful expression of countenance, but did not speak. Supposing that his mind was absorbed in thought, she sat down in an arm-chair near the fire, and within two feet at most of the figure, which she still saw standing before her. As its eyes, however, continued to be fixed upon her, she said, after the lapse of a few minutes, "Why don't you speak?" The figure immediately moved off towards the window at the farther end of the room, with its eyes still gazing on her; and it passed so very close to her in doing so, that she was struck with the circumstance of hearing no step or sound, nor feeling her clothes brushed against, nor even any agitation in the air. She was now convinced that the figure was not that of her husband, but a spectral illusion. She advanced towards the figure, which retreated before her, and almost immediately afterwards vanished from sight.

In explanation of the foregoing, it is only necessary to consider that in certain states of bodily indisposition, ideas or recollections in the mind are rendered more vivid than actual impressions, the "mind's eye" perceiving more distinctly than that of the body; which appears to have been the case with the lady alluded to.

696. *Why is practical joking in connection with the subject of ghosts or apparitions reprehensible?*

Because, besides evidencing a *mean and ungenerous tone of mind*, it is calculated to lead to the most *fatal consequences*.

697. The night of the 19th of May, 1847, may be still remembered as one of the most terrible of that year, on account of a violent and long continued thunder-storm, which swept over the southern portion of the State of Alabama, U.S. In the memory of the inhabitants of Booker town it is rendered even more terrible by the occurrence of a tragedy which we shall relate:—Three young men, relations, belonging to one of the most respectable families of Booker, found themselves in company at the inn known as the White Horse, where cirumstances had compelled them to put up for the night. Their conversation, in the course of a long evening, whether induced by the storm or not, had turned upon the subject of ghosts and

"Virtue itself turns vice being misapplied,
And vice sometimes by action dignified."—ROMEO AND JULIET.

supernatural visitations. John and James (as we shall designate the two elder members of the party) affirmed their perfect belief in spectres and spectral appearances; Henry, the younger, disavowing the slightest belief in such matters. The conversation grew warm, and ended by a proposal on the part of the two elder friends that Henry should put his incredulity to the test by passing the night at an adjacent villa—at that moment unoccupied, and bearing a very bad reputation, as a haunted house. Henry assented with ardour to the proposal, the preliminaries were easily arranged—the villa in question being kept in a state of repair and ventilation by an old pensioner and his wife, upon the consideration of living in its lower floors rent free; and the three friends adjourned to the Haunted House. Within the space of another hour, behold the sleeping apartment prepared for its tenant. The adventurous ghost-defier standing confident and brave before its blazing hearth, his pistols polished and carefully loaded, lying upon a side table, and his two friends taking their leave for the night with many a shrug at what they affected to consider the foolhardiness of their young companion.

It was now eleven o'clock. Henry, in order to divert his mind, had resolved to pursue some algebraical calculations connected with his college course, and without more ado sat down to them, tablets in hand. Scarcely had he done so, ere a tap at the chamber door arrested his attention. He heard his name called. His friends had returned under the pretext of having repented of their proposal, and offering to withdraw it, or to remain with him during the night. He left the apartment to assure them that they need not trouble themselves on his account, and, after an absence of about three minutes, returned and resumed his studies.

Time wore on. The hour of midnight approached. What was that? A footstep upon the stair is heard, accompanied by a hollow moaning sound. Henry felt a slight derangement of his equanimity. But again all was quiet. After the lapse of a very brief interval, the footsteps were again audible, and the watcher, directing his attention to the entrance to the apartment, saw its latch move and the door open.

A figure, arrayed completely in a white sheet, stood in the doorway. Henry started up, and seizing his pistols exclaimed, "Away! this is but a trick! but beware; I will stand no nonsense. One step nearer, and I will fire."

The spectre, uttering a most unearthly groan, took a step forward. The young man raised his hand and fired. Strange to say, the ghost stood still and scatheless, and immediately afterwards advanced a step nearer. The poor youth, unable to utter a word from intense excitement, seized the second pistol, and again fired. Again the apparition stood unharmed, and, raising its hand, threw at the feet of its assailant the two pistol bullets with which the weapons had been charged. This was too much for the nerves of the young man, operated upon as he had been by the previous discussion, and by long watching. He swooned and fell to the floor; and upon being restored, it was found that he had sustained a shock from which he never recovered.

This ghost-story is thus explained :—The two *friends* had resolved to play a practical joke upon their incredulous companion—of course little foreseeing the terrible consequences that would ensue—by assuming the appearance of a supernatural visitant. To obviate any serious results from the use of the pistols, one of the party, during the temporary absence of their friend from the apartment, had extracted the bullets, which, placed in the hands of the supposed ghost, and returned to the affrighted youth, had the lamentable effect of upsetting from its throne the divine faculty of reason.

698. *Why should the thought of a spectral appearance create no fear in the mind?*

Because, even admitting the probability of such appearances, they should be regarded as phenomena to be witnessed with the same kind of emotions that might arise from observing the Aurora Borealis, or any of the unusual phenomena of nature.

699. A lady had ordered an arm-chair which stood in her room to be sent to a sick friend, and thought it had been sent conformably to her orders. Waking, however, in the night, and looking by the light of her night-lamp at the furniture in her room, she cast her eyes on the place where the said chair used to stand, and saw it, as she thought, in its place. She at first expressed herself to her husband as being vexed that the chair had not been sent; but as he protested that it was actually gone, she got out of bed to convince herself, and distinctly saw the chair, even on a nearer approach to it. What now became very remarkable was, that the spotted chair-cover which was over it assumed an unusual clearness, and the pattern had the appearance of being studded with bright stars. She went close up to it, and putting her hand on it to touch it, found her fingers go through the spectrum unresisted. Astonished, she now viewed it as an illusion, and presently saw it vanish, by becoming fainter until it disappeared. This instance is an illustration of the mode by which spectra are introduced, namely, by *local association*. The lady had anticipated seeing the chair in its place, from its always being associated with the rest of the furniture; and this anticipation of an image of perception was the basis of a corresponding image of spectral illusion.

700. *Why are persons in an indifferent state of bodily health more subject than others to spectral illusions?*

Because the healthy action of the mind, or ideal faculty, depends upon the right exercise of the bodily functions. Any disturbance of the one almost always affecting the other in a greater or lesser degree.

701. *Why should children never be frightened, or threatened, by ghost stories, or by reference to hobgoblins?*

Because their undeveloped minds are *keenly susceptible of impressions of terror*. Having little reasoning power to fortify them against the tales with which they are impressed, they suffer most acutely, and every hour of solitude or darkness is made to them *a period of indescribable suffering*.

"He tires betimes who spurs too fast betimes."—RICHARD II.

CHAPTER XXX.

702. *Why, when we touch a substance that is hotter than the hand, does it create a sensation of heat?*

Because heat *passes from the substance into the hand.* Heat is a subtile fluid, which moves from one body to another, and seeks to diffuse itself.*

703. *Why, when we touch a substance that is of a lower temperature than the hand, does it feel cold?*

Because heat *quits the hand,* and enters the substance.

704. *Why do wood, glass, marble, iron, cloth, &c., feel of different temperatures?*

Because they differ in their powers of conducting heat. Supposing them all to be *hotter* than the hand, then those would impart the keenest *sensation of heat* which are the best conductors; iron would feel the hottest, then marble and glass, then wood, then cloth.

But if they were *colder* than the hand, then the best conductors would draw off the heat of the hand most rapidly, and impart the keenest *sensation of coldness;* iron would feel the coldest, then the marble and glass, then the wood, and the cloth.

705. *Why does money in our pockets feel hotter than the clothes which contain it?*

Because metal is a *better conductor* of heat than cloth, and freely imparts to the hand the heat which it receives from the body.

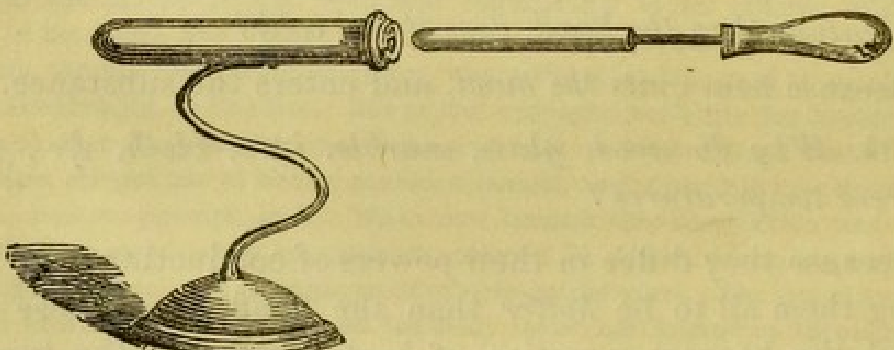
706. *Why, when a heated body is brought into a room, does heat depart from it, while the temperature of other bodies surrounding it becomes raised?*

Because heat always exhibits a *tendency to an equilibrium.* In no instance will a body continue hot, unless it has within

* For a more comprehensive explanation of the laws of heat, see *The Reason Why*—General Science. Houlston and Wright.

itself the elements which continue to generate heat, such as the burning of fire.

707. When an urn of hot water is set upon the tea-table, it radiates heat in every direction, which may be felt by the sensation of warmth it imparts to the faces of persons who surround it; some of the heat flies away in steam, and in circles of cold air, that pressing towards the urn, become warmed, and fly upwards; another portion of the heat is conducted through the feet of the urn to the mat upon which it stands. In these ways all the objects surrounding the urn, the cups, saucers, plates, spoons, sugar, bread and butter, 'and people, all are raised in temperature, while the urn becomes cool. These processes continue until the heat has *found its equilibrium.*



708. *Why does the heater of an Italian iron sometimes become too large for its case when made red hot?*

Because heat *insinuates itself between the particles of iron,* and drives them further apart. Every atom of iron in the heater being repelled more forcibly from the atoms that surround it, by the repulsive force of heat, the whole body becomes swelled, just as a piece of gelatine, when steeped in water, becomes swelled by the water which insinuates itself among the particles of the jelly.

709. Let A represent the case of an Italian iron, and B its heater. Let them be supposed to be cold, and that B at its present temperature is capable of being passed freely into A. The moment B is put into the fire it begins to absorb caloric, which repels particle from particle of the iron, until it is diffused throughout the mass in a state of great intensity, manifesting itself by the redness which the iron displays. While B has been thus expanding, A has remained at the same temperature, and therefore when A is returned to B it is found that their relative sizes have changed, and that the iron will not enter the case.

710. *Why do currents of air improve the burning of a fire?*

Because, when the air is still, it is not intimately mixed with the flames of the burning body, but merely acts upon them on their *outer surface;* when the air is agitated, by being set in motion through the medium of a bellows, or a blower, it becomes intimately mixed with the flames, and acts upon them externally and internally at the same time.*

711. *Why should bellows not be blown violently in the direction of flame?*

Because the force of the current of air, *when too violent,* carries off the caloric with undue rapidity, and so extinguishes the flame; and also because the oxygen is, by this means, forced away from the fuel instead of into it.

712. Burning is *the combination of the body, which is said to be burnt, with oxygen.* The direct oxidation of organic compounds takes place in two distinct forms. The first is the familiar one of combustion, in which the action of the atmospheric oxygen is aided by a high temperature. The results differ according to the supply of oxygen. If there be an excess of air, or of *oxygen,* from any source, the whole of the *carbon* and *hydrogen* are converted into *carbonic acid gas* and *water,* which, along with uncombined *nitrogen,* are the ultimate products of the action of *oxygen* on organic matters. But if the supply of air be deficient, the *hydrogen,* from its superior attraction for *oxygen,* is *oxidized* in preference to the *carbon,* which is deposited as smoke, soot, and lampblack.

The second form of direct oxidation is that *which is commonly called decay,* and which takes place when organic matter is exposed to air and moisture. In dry air it does not occur. One of the most familiar examples of this kind of oxidation is that *decay of wood* by which it is slowly converted into a dark brown powder. In this process, the wood *absorbs oxygen,* and produces an equal volume of *carbonic acid gas.*†

713. *How does the fire send its heat to us?*

By *radiation:* by the same law which brings to us the heat and light of the sun.

714. When the fire burns brightly in the grate, let the arm be extended in a straight line towards the centre of the fire, with the hand *open,* and all the fingers extended and *pointing to the fire.* If the hand is not nearer the fire than the distance of two or three yards, except the fire be very large indeed, the heat will scarcely be perceptible; but if, without moving the arm, the wrist be bent upwards, so as to present the inside or flat of the hand perpendicularly to the fire, the heat will not only be very sensibly felt, but if the fire be large, and if it burns clear and bright, it will

* Buchannan on *Economy of Fuel.* Longman and Co.

† Gregory's *Handbook of Organic Chemistry.* Walton and Maberley.

be found to be so intense as to be quite insupportable.* The reason of this is, that the hand, when held perpendicularly before the fire, receives a larger number of the innumerable *rays of heat*, than when it is pointed towards it; although the same degree of temperature prevails in the air surrounding the hand in either position.

715. *Does heat radiate with a degree of force from radiating bodies?*

It has been found by experience that it required *three thicknesses* of flannel to resist the force of rays of heat issuing from a hot body.

716. *What is coal?*

Coal is considered to have been formed from decayed vegetable matter, mineralized by the pressure and influence of the earth.

717. *What is coke?*

Coke is to *coal* what *charcoal* is to *wood;* it is prepared from coal by depriving it of its *hydrogen*, consequently it can give neither flame nor smoke.

718. *What is peat?*

Peat is a vegetable production, having its growth in places where the water cannot run off, such as mosses and bogs, by reason of which it decays, and is then converted into peat.

719. *Of what does common coal consist?*

It consists of *carbon* and *bitumen* or pitch, of which pitch is *another form of carbon*, and these are combined with *hydrogen*, which in its separate state is a gas.†

720. *Why is it erroneous to suppose that coke is more sulphurous than coal?*

Because the very process by which coke is made, dissipates the sulphur which previously existed in it. Coke, however, like *charcoal*, throws out *carbonic acid gas*, which, if the current or draught up the chimney is not sufficient, is driven back into

* Count Rumford's *Essays*.

† Arnott, *On the Smokeless Fire-place*. Longman and Co.

"Delay leads impotent and snail-paced beggary."—RICHARD III.

the apartment, and it is this that produces the suffocating effect attributed to sulphur.

721. *Why does coke, when heated to redness, throw out such a powerful heat?*

Because, when coal is converted into coke by the expulsion of its watery and gaseous parts, its *radiating power* is greatly improved. It is an interesting fact connected with coals, that when it has given off the gas which yields a beautiful *light*, its power of giving *heat* is very considerably improved.

722. *Why should fuel always be kept dry?*

Because, if damp, a great deal of its material, when burning, is employed in *converting the water it contains into vapour*, which escapes up the chimney, carrying with it the heat that was necessary for its conversion, and which might have been employed in giving warmth where it was wanted.

723. *Why, when lighting a fire, if the paper is laid at the bottom of the grate will the wood not kindle rapidly?*

Because the iron of the grate, being a good conductor, *abstracts the heat* so much from the commencing flame, that it will not have sufficient strength to kindle the wood.

724. *Why should a few pieces of coal be laid at the bottom of the grate on lighting a fire?*

Because, as they contain *hydrogen gas*, which readily inflames, they will take fire by the time the wood is nearly burnt out, and so keep the fire alight.

725. The following *plan of lighting and managing a fire* has been attended with great comfort and convenience to myself (particularly at the beginning and the end of winter, when a very small fire is sufficient), and I think a considerable saving of coals.

Fill your grate with fresh coals *quite up to the upper bar but one*, then lay in your faggot of wood in the usual manner, rather collected in a mass than scattered, that a body of concentrated heat may be produced as soon as possible; over the faggot place the cinders of the preceding day, piled up as high as the grate will admit, and placed loosely in rather large fragments, in order that the draught may be free; *a bit or two of fresh coal may be added to the cinders when once they are lighted*, but no small coal must be thrown on at first. When all is prepared, light the wood, when

"'Tis gold
Which makes the true man killed, and saves the thief,
Nay, sometime, hangs both thief and true man."—CYMBELINE.

the cinders, becoming in a short time thoroughly ignited, the gas rising from the coals below, will now be affected by the heat, which will take fire *as it passes through them*, leaving a very small portion of smoke to go up the chimney. The advantage of this mode of lighting a fire is, that small coal is better suited to the purpose than large—except a few pieces in front to keep the small from falling out of the grate—large pieces may be put on afterwards if wanted. I have frequently known my fire, lighted at eight o'clock in the morning, continue burning till eleven at night, without anything being done to it. When apparently quite out, on being stirred, you have in a few minutes a glowing fire. It will sometimes be necessary to loosen, or stir slightly the upper part of the fire if it begins to cake; but the lower part must not be touched, otherwise it will burn away too soon.—*Dr. Kitchner.*

726. *Why is throwing large quantities of coal on a fire at a time wasteful?*

Because, by that means, a large portion of hydrogen, *which would otherwise have served the purposes of combustion*, is distilled off, and escapes up the chimney unburnt.

727. *Why should the front of a fire be kept bright and clear?*

Because, as the warmth of a room depends upon *radiation*, a red glowing condition is that in which the most radiant heat is thrown out.

728. *Why does not the carbon of the coals disappear as rapidly as the hydrogen?*

Because carbon is *less combustible* than hydrogen, and in the process of burning a much longer time is required to combine the carbon of the coals with the oxygen of the air.

729. *Why does no flame appear in the burning of coke or charcoal?*

Because the flame produced by burning wood and coal arises from the *hydrogen* of the vegetable matter, and that having been exhausted by the first combustion, no more remains to cause flame.

730. *Why is charcoal adapted for preserving meat, cleaning the teeth, &c.*

Because it has a tendency to *absorb various gases*, and by doing so, to arrest the progress of putrefaction.

731. *Why, in order to obtain a good fire should the coals not be packed too closely together?*

Because air is essential to combustion, and it is by the *decomposition of air* through this process, that heat is evolved. The air, therefore, should have *free access* to every part, and the coals so be laid that there is a perfect current through them.

732. *Are crooked chimneys superior to straight ones?*

Eckstein says:—" I have known many chimney shafts to have been taken down and rebuilt *in a zigzag form*, evidently with a view to give extra power to the flue: but I cannot see upon what principle the builders found their theory. If they argue that bends cause the chimney to be longer, I must admit the argument; but I still have to learn that the length so produced gives *additional power*. For, as a column of water exerts a force agreeable to its altitude, without reference to the pipe that conveys it being straight or crooked, the power of the chimney depends upon its *altitude, size, and difference of temperature* between the heat of the flue and the heat of the room; for, the more the air in the flue is heated, the more freely will the air in the room press forward towards the mouth of the chimney, exerting its force upon the rarefied air, and thus giving power; if a chimney be sloping or zigzag *it will add to the length, but will not add to the altitude.*"

733. *Why, in building houses, should the chimneys be built in the interior rather than the exterior walls?*

Because a greater portion of heat is *retained within the house;* and from the greater degree of heat contained in the mass of brick-work or masonry through which the flues are carried up, the smoke always *ascends faster*—" the flues draw better."*

734. *Why does smoke ascend the chimney?*

It is carried up by the *heated air*, which, being lighter than the surrounding atmosphere, is pressed upwards.†

* Bardwell's *Healthy Homes.* Dean and Son.

† Franklin, *On the Causes and Cure of Smoky Chimneys.*

"Every good servant does not all commands;
No bond, but to do just ones."—CYMBELINE.

735. *Is not smoke itself lighter than air?*

Smoke is not, as many persons imagine, lighter than air, but it ascends because it is *intermixed with vapours, gases, and warm air.*

736. A simple experiment may serve to illustrate this. Having lit a pipe of tobacco, plunge the stem to the bottom of a decanter half filled with cold water; then putting a rag over the bowl, blow through it, and make the smoke descend in the stem of the pipe, from the end of which it will rise in bubbles through the water; and being thus cooled will not afterwards rise to go out through the neck of the decanter, but remain spreading itself, and resting on the surface of the water. This shows that smoke is really heavier than air, and that it is carried upwards only when attached to, or acted upon by, air that is heated, and thereby rarefied and rendered specifically lighter than the air in its neighbourhood.

737. *Why are tall chimneys attached to manufactories?*

Because the smoke is by this means conveyed to a distance, and the dilution which it undergoes in its passage through the air renders it less injurious, when it ultimately falls upon the ground.

Because, also, a *greater draught* is obtained by an increased column of warm air.

738. *Do chimneys "draw up" the smoke?*

Chimneys do not *draw* up the smoke; though there are many persons who think so, and who put themselves to a great deal of trouble and expense to obtain fanciful forms of chimneys for that purpose.

739. *Then why do long chimneys induce a greater draught than short ones?*

Because, when the chimney becomes warm, the column of air within it is so much lighter than the outer air, *that the cold air rushes in at the base of the chimney with increased force.* When the chimney is a short one, the column of warm air is limited, and there is not then the same force exerted by the cold air to displace it.

740. *Why are chimneys in new houses generally smoky?*

Because the workmanship of the rooms being all good, and

"Praising what is lost
Makes the remembrance dear."—ALL'S WELL THAT ENDS WELL.

just out of the workman's hands, the joints of the boards of the flooring, and of the panels of wainscoting are *all tight;* and the walls not being thorougly dry, keep the wood-work swelled and close; the doors and sashes, too, fit with exactness. The smoke, cannot rise through the chimney, because *there is not a sufficient supply of cold and heavy air to force it up.*

741. Dr. Franklin says :—"Those who stop every crevice in a room to prevent the admission of fresh air, and yet would have their chimney carry up the smoke, require inconsistencies, and expect impossibilities. Yet, under this situation, I have seen the owner of a new house in despair, and ready to sell it for much less than it cost, conceiving it uninhabitable, because not a chimney in any one of its rooms would carry off the smoke, unless a door or window were left open. Much expense has also been made to alter and amend new chimneys which had really no fault. In one house that I knew, of a nobleman in Westminster, that expense amounted to no less than three hundred pounds, after his house had been, as he thought, finished, and all charges paid; and, after all, several of the alterations were ineffectual, for the want of understanding true principles."

742. *When the opening of a door or window improves the draught of a chimney, what does it indicate?*

It shows that the room is *too air-tight,* and that some means of ventilation should be adopted.

743. *How may the degree of ventilation required to improve a smoky chimney be ascertained?*

To discover the *quantity* of air required to supply the draught of a chimney, close the door gradually while a middling and smoky fire is burning, till you find that before it is quite shut the smoke begins to come out into the room; open it a little until you perceive that it comes out no longer; then hold the door, and *observe the width of the open crevice* between the edge of the door and the rabbet it should close into. Suppose the distance to be half an inch, and the door eight feet high, you find thence that your room requires an entrance for air equal in area to forty-eight square inches, or a passage of six inches by eight.

744. *Why do pipes inserted in chimneys above the fire, prove ineffectual?*

Because cold air enters through them, and *chills the column* *of air in the chimney;* it therefore becomes heavier, and impedes the ascent of the smoke.

745. *Where should the air be introduced to supply the draught?*

The best point for its introduction is *below the fire*, so that it may not only contribute its *oxygen* to the burning coals, but that, being heated, it may fly upwards and bear away the smoke.

746. *Why do chimneys smoke when their openings are too large?*

Because the volume of air surrounding the fire *does not become sufficiently heated* before it passes into the flue. It therefore curls upwards until it meets with a cooler stratum of air, when it whirls around and re-enters the room at the other side of the opening.

747. *How may we ascertain whether a chimney smokes through the opening being too large?*

By placing *moveable boards*, so as to lower and narrow it gradually, till the smoke no longer issues into the room.

748. *When a chimney smokes through being short, what is the best remedy?*

To *contract the opening considerably*, so that the air shall pass very close to the fire, and acquire an additional degree of heat. This remedy is based upon the supposition that the chimney cannot be elevated.

749. *Why, in some instances, will a chimney smoke when a fire is lighted in another room, but not otherwise?*

Because, in a house where different fires are lighted, if the supply of air is insufficient, *the larger fire will overpower the lesser one*, and draw air from the chimney of the smaller fire at its base, causing it to smoke.

750. *Why will a chimney sometimes smoke when the door is opened, but not otherwise?*

Because the heat of a fire in another room acts upon it, and *directly the door is opened* draws air from the room, causing smoke to enter. A large fire in a kitchen will frequently cause this effect upon the fires of drawing rooms and parlours. The remedy is, to provide the kitchen fire with sufficient ventilation, and to keep the kitchen door closed.

751. *Why do chimneys that draw well sometimes, smoke at others?*

In ill-contrived buildings, instead of having a funnel for each room or fire-place, it is not uncommon to turn or bend the flue of an upper room, so as to make it enter the side of a funnel coming from below. By this means the funnel or chimney of each fire is shortened, and *when the different fires are lighted,* they interfere with each other. The only easy remedy is to remember to *close those flues which are not being used.*

752. *Why do chimneys sometimes smoke when they are surrounded by higher buildings, or by hills?*

Because the wind blowing over such eminences *falls like water over a dam,* sometimes almost perpendicularly, on the tops of the chimneys that lie in its way; and thus it beats down the smoke contained in them.

753. *What is the best remedy in these cases?*

To surmount the chimney with a *funnel and cowl,* the latter being moveable, so that it may turn from the irregular and downward currents.

754. *Why do chimneys frequently smoke when the door and the fire-place are on the same side of the room?*

Because then the opening or the shutting of the door causes a gust of wind to *sweep along the front of the fire,* and to impel some of the smoke into the room. This is very unpleasant to persons sitting by the fire, as every time the door is opened or closed, a puff of smoke comes out into their faces.

755. *What is the best remedy in such cases?*

To have a *large screen* interposed between the fire-place and the door; or to shift the hinges of the door, so that it may *open the opposite way*, and throw the air along the other wall.

756. *Why do chimneys which generally draw well, sometimes give smoke into rooms?*

Because the smoke is driven down by occasional cold winds *passing over the tops of their funnels.* This is most frequent where the funnels are short. In such cases a turn-cowl proves the best remedy.

757. *Why do chimneys, where no fires are burning, sometimes smoke, or give a smell of soot?*

When, in changeable weather, the outer air suddenly becomes warm, and of course lighter, the column of air in the chimney, remaining cool, *descends from its greater weight* into the room, diffusing either the smoke of neighbouring flues, or imparting a sooty odour.

758. When the temperature of the air and of the funnels is nearly equal, the difference of the warmth in the air between day and night is sufficient to produce currents; the air will then begin to ascend the funnels as the cool of the evening comes on, and this current will continue till perhaps nine or ten o'clock the next morning, when it begins to hesitate; and as the heat of the day approaches, and continues so till towards evening, it again hesitates for some time, and then goes upwards constantly during the night, as before mentioned. Now, when smoke issues from the tops of the neighbouring funnels, close to those which are at the time drawing downwards, as they often are in the middle part of the day, such smoke is of necessity drawn into these funnels, and descends with the air into the chamber.

759. *What is the best remedy in such cases?*

To *have the chimneys swept* on the approach of summer, when the burning of fires ceases, and to *close the flues,* either by a board fitted to them, or by letting down the plate, where a flue is provided with one.

760. In the time of Queen Elizabeth chimneys were considered among the modern improvements. Prior to their introduction, there was in each dwelling-house only one place for a fire, and the smoke went out through a hole in the roof. In one of Elizabeth's parliaments a motion was made by a member, reciting, "that many dyers, brewers, smiths, and other artificers of London, had of late taken to the use of pit coal for their fires, instead of wood; which filled the air with noxious vapours and smoke, very prejudicial to the health, particularly of persons coming out of the country; and therefore moving that a law might pass to prohibit the use of such fuel (at least during the session of parliament) by those artificers."

"Wives may be merry and yet honest too."—MERRY WIVES OF WINDSOR.

761. *Why does a fire smoke when fresh coals are thrown upon it?*

Because the *pitch*, becoming heated, *evaporates*, and forms a cloud of smoke.

762. *Why does the new coal burst into flame as its heat increases?*

Because the increased temperature converts the pitch into an *inflammable gas*.

763. *Why is it a waste of fuel to lay on much coals at a time?*

Because, before the heat can raise the temperature of the coals to a sufficient height to produce flame, a great portion of the combustible material is *driven away* in the form of *smoke*.

764. *How much of the fuel is thus wasted?*

Count Rumford, a scientific authority, estimated that *five-sixths* of the *heat* produced by English coal fires, flies away to waste. The waste of *fuel* is nearly *fifty per cent*.

765. *What is the best method of making a fire?*

Instead of laying in expended coals, or ashes, at the bottom, as is the common practice, lay in small nubs of coal, to the extent, say, of four or five inches, then add paper and wood, as in the ordinary method; then lay on a little coal again, and on the top the cinders, &c. (See 725.)

766. *Why should coals be laid in the bottom?*

Because, as its gaseous matter is driven out by heat, it passes up through the fire, where, being consumed, it is converted into flame, *producing heat*, instead of flying away unconsumed.

767. *What other advantages of economy attend the formation of a fire in this manner?*

As it produces less smoke, it deposits little soot upon the chimney, which therefore *requires to be swept less frequently*.

It promotes *cleanliness*, by the diminished quantity of smoke;

"Let's teach ourselves than honourable stop,
Not to outsport discretion."—OTHELLO.

and it promotes *health*, by relieving the air from a large proportion of the ordinary exhalations of fires.

It *more completely consumes the coals* than other fires, leaving less waste in the form of ashes and small cinders, to be thrown away.

It *requires less attention*, as it burns more evenly, and needs to be fed only at considerable intervals.

768. *Do fires, when they are placed in low grates, give out increased heat?*

Dr. Arnott says that *they do not.* He explains that heat radiates in all directions, and states that it is the *radiated heat* almost alone which warms a room, while the air, heated by contact with the fire, passes up the chimney, without contributing to the warmth of the room.

769. The rays of the sun pass through the air without imparting heat thereto. The upper regions of the atmosphere are intensely cold; mountains are covered with snow, while the surface of the earth, in its lower parts, receives the heat brought by the rays of the sun, and glow with warmth under its influence.

770. *Why do polished fire-irons remain cooler before a fire than those which are dull?*

Because bright metal *reflects the rays of heat* which fall upon it; but dark metal *absorbs the heat*, and therefore becomes hotter. The little dull poker, used for poking the fire, frequently becomes so hot that it cannot be held, while its polished neighbour remains cool.

771. *Why does the sunlight diminish the intensity of fire?*

Because of the *rarefaction of air* by the sun's rays, and also the effect of the *chemical rays* of solar light, which are unfavourable to ordinary combustion.

772. There is a common opinion that the direct action of the rays of the sun diminishes the combustion of a common fire. This notion has often been ridiculed as erroneous; and, with a view to put it to the test of experiment, Dr. M'Keever ascertained the actual rate of combustion of well-known bodies in different circumstances. It appears, from these trials, that the quantity of wax taper consumed in broad sunshine, in the open air, is less than that consumed in a darkened room in the same time, in the proportion of ten to eleven. When the experiment was made

"Vice repeated, is like the wandering wind;
Blows dust in others' eyes to spread itself."—PERICLES.

with a common mould candle, an inch in length was consumed in fifty-nine minutes in strong sunshine, temperature eighty degrees; in fifty-six minutes, in a darkened room, temperature sixty-eight degrees. Other trials were made to ascertain the effect of the different coloured rays of the prismatic spectrum on combustion, and it was found to proceed most rapidly in the verge of the violet ray. The times of consuming the same length of taper in the different portions of the spectrum were, in the red ray, eight minutes; green ray, eight minutes twenty seconds; violet ray, eight minutes thirty-nine seconds; verge of the violet ray, eight minutes, fifty-seven seconds. The common opinion is therefore correct; but the difference is not so considerable as might be expected.*

773. *Why is it imprudent to "rake out fires" at bed-time?*

Because fires, if allowed to remain, *would go out of themselves safely*. Moreover, by continuing the warmth of the walls of the apartments in which they are burnt, they maintain a higher temperature, which *requires less heat in the morning* to raise the warmth of the room to the necessary point. The "raking out" of a fire throws hot cinders loosely about, and to this cause the destruction of many buildings may be attributed.

774. *Why, when a fire breaks out, should we keep the doors and windows of the room in which it occurs closed?*

Because, by letting in the air, *the flames are fed*, and the force of the fire increased. Accidental fires will frequently *suffocate themselves* if the access of air is cut off from them.

775. *Why should persons whose clothes take fire, instantly throw themselves down?*

Because flames spread in an upward direction. To stand up and run about, *feeds the flames*, whereas lying down and rolling over, *suffocates them*.

776. *If the grate were high, why would the fire then give forth more heat?*

Because the rays of heat would then have *more freedom to spread themselves* in the downward direction, and the substances upon which they fell, becoming warmed, would reflect the heat again in every direction.

* Timbs's *Popular Errors Explained*. Kent.

"Let determined things to destiny
Hold unbewail'd their way."—ANTONY AND CLEOPATRA.

777. Dr. Arnott says that as the rays of a morning sun are less intense, because they fall obliquely on the earth, than when the sun has reached the meridian, so the rays of a fire placed near the floor are less heating than when they are allowed to spread from an elevated point, and fall more directly on the surfaces below.

778. *What is the use of screens in large rooms?*

Screens are generally used under the idea that they keep away the cold draughts of air from the backs of persons sitting in front of a fire. This they do; but they also render another important service; *they radiate back the heat of the fire* upon the bodies of the persons sitting between them and the fire, and they also prevent the distant and cold parts of the room from absorbing the heat which the fire throws out.

779. *Why do chimneys sometimes produce a draught, though no fire is lighted beneath them?*

Because they run through a stack, and *partake of the heat* of those chimneys whose fires are lighted.

780. *When chimneys smoke upon first lighting a fire, what is the best method of remedying the evil?*

The best remedy is to *shut the door*, by which you cut off the influence of the other fires burning in the house; to *open the window*, by which you let in a free supply of air, and to apply some lighted paper to the mouth of the chimney, so as to *rarefy the air* within it, and thereby cause an upward current before lighting the fire.*

781. *Why do chimneys sometimes smoke from having too small chimney-pots?*

Because, when the opening of the fire-place is large, the air enters over so great a space, that unless the smoke can find an outlet at the top, it will *escape at the bottom.*

782. *Why do poor persons living in huts put bushes, or old baskets, on the tops of their chimneys?*

Because they *moderate the currents* of air that sweep over the chimney tops, and prevent their driving down the smoke.

* Eckstein on *Chimneys*. Weale.

"Light vanity, insatiate cormorant,
Consuming means soon preys upon itself."—RICHARD II.

783. We conclude our remarks upon smoky chimneys, by quoting from Dr. Franklin's work a humorous account of a puzzling case he met with at a friend's country house near London :—"His best room had a chimney in which, he told me, he never could have a fire, for all the smoke came out into the room. I flattered myself I could easily find the cause and prescribe the cure. I had a fire made there, and found it as he said. I opened the door, and perceived it was not for want of air. I made a temporary contraction of the opening of the chimney, and found that it was not its being too large that caused the smoke to issue. I went out, and looked up at the top of the chimney; its funnel was joined in the same stack with others, some of them shorter, that drew very well, and I saw nothing to prevent its doing the same—in fine, after every other examination I could think of, I was obliged to own the insufficiency of my skill. But my friend, who made no pretension to such kind of knowledge, afterwards discovered the cause himself. He got to the top of the funnel by a ladder, and looking down, found it filled with *twigs and straw cemented by earth and lined with feathers*. It seems the house, after being built, had stood empty some years before he occupied it, and he concluded that some large birds had taken the advantage of its retired situation to make their nest there. The rubbish, considerable in quantity, being removed, and the funnel cleared, the chimney drew well, and gave satisfaction."

CHAPTER XXXI.

784. *Why should stimulants be avoided during pregnancy?*

Because the vascular and nervous systems are already *too highly excited;* and though the sensations consequent upon this state of excitement are those of lassitude, recourse to wine and other stimulants, although affording temporary relief, leave behind them an augmented weariness and languor.*

785. *Why should a new-born infant not have aperients administered to it?*

Because experience has proved that Nature supplies the infant with a provision sufficient to sustain it until the mother has power to afford nourishment. The *first milk* drawn by the babe from its parent, being the *only purgative* which, in ordinary cases, it stands in need of.

786. If, however, the mother is unhappily prevented from fulfilling this duty, and the infant is consequently deprived of its natural remedy, a gentle purgative is

* Dr. Conquest's *Letters to a Mother*. Longman and Co.

"Fire that is closest kept burns most of all."—TWO GENTLEMEN OF VERONA.

necessary. Half a tea-spoonful of castor oil is an advisable aperient in such a case; the dose to be repeated if necessary. The following recipe will also be found useful:—

Best Manna, 1 drachm.
Syrup of Buckthorn, 2 drachms.
Aniseed water, 5 drachms.

To be mixed together. A teaspoonful for a dose, to be repeated in four hours, if necessary.*

787. *Why is it wrong to urge an infant to take the breast immediately after it is born?*

Because at that period the muscles of the stomach are weak, the membranes very thin, and the stomach slimy, which render *the digestive functions weak and slow.*†

788. *Why can a new-born infant exist longer without espiration than an adult?*

Because the heat of a new-born infant is *three degrees* less than that of an adult, and the less heat a body produces the longer it can exist without respiration.‡

789. *Why is milk from the breast best adapted for infant digestion?*

Because in infancy the mucous membrane is so irritable that its contact with *any other food* than that which has been adapted by Nature to this organ, prevents the due performance of the function, and *endangers health and life.*

790. *Why should a new-born infant be kept in constant and unvarying warmth?*

Because, previously to the infant's birth, both its external and its internal surfaces have been *shielded from the contact of foreign bodies.* But at the moment of its birth, both surfaces are exposed to influences of which it is *acutely sensitive.* Air surrounds the external skin, and rushes to the lung and expands it; while cold acts simultaneously and powerfully on both organs.

* Chalice's *Medical Advice to Mothers.* Renshaw.

† Schieferdecker on *The Rational Treatment of Children.*

‡ Dr. Underwood's *Treatise on the Diseases of Children.* Churchill.

"Sweet flowers are slow, and weeds make haste."—RICHARD II.

791. *Why is there so large a portion of fluid in the nourishment of infants?*

Because it is taken into the stomach more slowly, being procured by the act of suction, which excites the secretion of *a great quantity of saliva* with which it is diluted, and thus fitted to undergo the process of digestion.

792. *Why are excitability and nervousness in the mother prejudicial to the suckling of infants?*

Because all passions of the mind *act upon the secretion of milk*, at one time rendering it deficient in *quantity*, and at another so depraved in *quality*, as to cause serious disturbance to the infant's health.

793. *Why are children who are suckled by wet-nurses liable to contract diseases?*

Because the poorer people from whom wet-nurses are taken are, in many instances, indifferent as to rules of diet, prone to indulgence, and careless as to the general state of their health; and besides, as the wet-nurse usually disposes of her own infant by "placing it out," she is, if she have any tenderness for it, continually a prey to anxieties on its account, rendering her milk more or less morbidly affected.

794. *Why should new-born infants live on fluids only?*

Because the stomachs of infants can prepare *chyle* only, and not *chyme*; which latter is necessary to decompose *solid food*. This absence of digestive power chiefly arises from a want of muscular force to energetically contract, and to produce such juices and motions as would digest solid substances.

795. *Why, during the first few months of infancy, does the body require more rest and reparation than at any other period?*

Because during that time the infant *grows fastest* (about ten inches in nine months), and consequently the whole of the powers of the body are needed to favour this development of structure.

"A little snow tumbled about,
Anon becomes a mountain."—KING JOHN.

796. *Why, when children begin to "take notice," should they be encouraged in touching and handling various articles?*

Because it not only makes them acquainted with the outward world, but at the same time *exercises and strengthens their tender muscles.*

797. *Why, after the first month, should children not be allowed to sleep immediately they have taken the breast?*

Because, after that period, the milk has acquired a *more gelatinous consistence,* requires greater powers of digestion, with which process sleep, immediately after taking food, interferes. They should not, however, be tossed or moved much.

798. *Why should the breast be administered to infants at regular periods?*

Because the tone and strength of the child's stomach mainly depend upon the *strictest regularity;* failing which, craving and gnawing pains are induced, which render the infant fretful, and consequently feverish.

799. *Why is milk taken by infants from the breast purer than any other?*

Because air has a deleterious effect upon milk, so that coming direct from the body into the infant's mouth, it is *untainted by the atmosphere.*

800. *What is the principal difference between cows' milk and human milk?*

The principal difference consists in the former containing more *caseine* (cheese) and less *sugar of milk* than the latter.

801. *Why is milk, as taken from the cow, unfit for infant food?*

Because it is *too full of sustenance,* and contains a quantity of curd and oily matter which is too heavy for the weak stomach of an infant.*

* Parry *On Diet, and its Influence on Man.* Highley.

"What's in a name, that which we call a rose
By any other name would smell as sweet."—ROMEO AND JULIET.

802. *Why should milk from the cow be sweetened before it is given to infants?*

Because human milk is much sweeter to the taste, and abounds more with sugar than milk from the cow. Hence it requires to be *sweetened,* in order that it may be made like the milk of the mother, and adapted to the infant nature.

803. *Why should food be taken by infants frequently, and in small quantities?*

Because, though in infants the power to digest food is weak, yet the process itself is *speedily completed;* long intervals, therefore, between feeding times, render the child uneasy, and induce it to take food in excess.

804. *Why should we frequently apply our ear to the chest of an infant?*

Because in children respiration, and the pulsation of the heart, are sure indications of *the state of their health,* and, by accustoming ourselves early to the natural state of pulsation and respiration, we shall then be enabled to detect any change in them.

805. *Why is it necessary to keep the skin of infants well washed?*

Because, if impurities thrown off by perspiration are suffered to remain long in contact with the skin, they not only cause irritation by obstruction of the pores, but, by impeding the natural exhalations, *vitiate the blood,* and act prejudicially on the whole system.

806. *Why should cold baths be used with great caution for infants?*

Because infants *speedily lose* their temperature, and *slowly regain* it; and the sudden coldness of the bath is apt to cause prejudicial results.

"Fair fruit in an unwholesome dish
Are like to rot untasted."—TROILUS AND CRESSIDA.

807. *Why should infants be kept warmly clad?*

Because they are not only susceptible of cold, but their *power of generating heat and resisting cold* is much less in infancy than in adult life.

808. *Why should infants not wear night caps during the period of teething?*

Because, in the brain during childhood, there is a predisposition to morbid excitement, which may be allayed by allowing the circulation through that organ to be preserved in as tranquil a state as possible, which can best be done by *keeping the head cool.*

809. *Why should infants not be placed on their backs in their cradles or beds?*

Because, by that means the abundant humour secreted in the mouth, which, in the time of teething especially, is very considerable, *cannot be freely discharged,* and must therefore pass into the stomach, where its excess is productive of various disorders.

810. *How is the goodness and wisdom of Providence shown in bestowing on infants, for the first few months of their existence, the faculty of almost continuous sleep?*

Because, while the infant's body is in a horizontal position, and during sleep, *the circulation of the blood proceeds more equally and calmly,* the respiration is more easy, the function of digestion more steady and effective, and the nutrition resulting from its processes *more perfect,* than when the infant is in an upright position. Repose, therefore, is a protection against an infant's own feebleness, which might render every accident that presented itself an obstacle to the healthy operations of its delicate functions.

811. *Why does food too highly sweetened render infants thin and flaccid?*

Because *improper ferments* are produced in the stomach, "Ill deeds are doubled with an evil word."—COMEDY OF ERRORS.

which unnaturally excite it, and destroy the natural promptings of hunger.

812. *Why should the farinaceous food given to infants be chiefly in the form of rusks, tops and bottoms, &c.?*

Because the two courses of baking which such food undergoes frees the farinaceous matter from its *gluey nature*, and renders it more light and easy of digestion.

813. *Why are strong broths injurious to infant stomachs?*

Because broths, strongly impregnated with meat, are not digested and drawn into the blood, as is commonly supposed, but remain in the stomach for some time, giving rise to flatulence, spasms, &c.

814. *Why does a greater degree of warmth require to be provided for an infant during sleep than at other times?*

Because, during sleep, the motions of the heart and the breathing are less frequent than when awake; and as, upon the frequency of these actions, animal heat chiefly depends, artificial means are requisite *to make good the natural deficiency.*

815. *Why is constant confinement in the nurse's arms injurious to infants?*

Because it compresses the chest, cramps and distorts the limbs, and very often *gives a twist* to their bodies, if great care be not taken to carry them *alternately on either arm.*

816. *Why should infants not be exposed to too strong a light?*

Because light is the stimulant of the eye, and should be regulated according to the eye, *gradually increasing its power*, as the organ becomes more accustomed to it.

817. *Why should infants not be tossed in the air?*

Because the violent motion causes *blood to flow to the head;* and also because the way in which the ribs are clasped by the hands, is likely in time to produce the malformation known as "*chicken breast.*"

"Evils that take leave
On their departure most of all show evil."—KING JOHN.

818. *Why should a child sleep with its mother for a month or six weeks after birth?*

Because a newly-born child has not *sufficient power of generating heat,* especially during sleep, to be consigned to a separate resting-place; and as this deficiency of warmth must for a certain period be conveyed to it from some other body, in order to maintain a sufficient activity of circulation, the animal heat which the babe derives from proximity to its mother, is considered the most beneficial and efficacious.*

819. *Why should children be fed slowly?*

Because it compels them to exert the muscles of the mouth, and renders a child much less disposed to *overfeed* themselves.

820. *Why should not articles of food of a hot stimulating nature be given to children?*

Because they impair the energy of the whole system, and become the predisposing cause of a variety of diseases. Fever and inflammation, which frequently occur in teething, are in many instances attributable to *too heating a diet.*

821. *Why should children not be lifted from the floor by their arms?*

Because the sockets of the joints are very shallow in infancy, and the bones so feebly connected together, that *dislocation* or even *fracture* may be the result.†

822. *Why should children not be fed wholly on farinaceous food?*

Because a diet chiefly composed of starch causes a great deficiency of blood and of *bone-forming matter;* fat accumulates, but the frame is *weak and ricketty* from small muscles and soft bones.

823. *Why ought we not to attribute a child's refusing certain foods to caprice?*

Because the nerves of a child are *more susceptible than those*

* Laurie's *Parent's Guide.* Leath.

† Churchill on *Diseases of Children.* Simpkin and Co.

of an adult; and the nerves of taste and of smell participate in the general sensitiveness. Hence, when a child turns with loathing from food, we may be certain that the organs of taste and smell are sympathizing with the nausea of the stomach.*

824. *Why are down pillows dangerous for children to sleep upon?*

Because in their sleep children are apt to *turn their faces on the pillow,* and their heads becoming buried in the down, respiration is impeded, and suffocation caused.

825. The following case is illustrative of the above statement:—Mr. G. S. Brent held an inquest at the Chalk Farm Tavern, on Stephen Claverly, the infant son of Mr. Claverly, architect, Grove Street. The child had been put to sleep on a down pillow. The nurse, after leaving her charge upon the pillow, returned in a short time, when she found it upon its face quite dead, its head having been buried in the soft pillow, whereby it was smothered. The coroner remarked that he had never met with a clearer case of death through kindness. Verdict, accidental death.—*Journal of Health,* vol. ii., second series, p. 72.

826. *Why, when children wake up in a fretful state, is it probable that they are suffering from the excitement of dreaming?*

Because children are naturally refreshed and invigorated by sleep, and after having shaken off its lingering effects, they become active and cheerful. *When* children *dream,* however, their little minds are *much discomforted* by the strange figures which they see.

"I have seen cases," says Dr. Holland, "where a child, waking afrighted by some imaginations of an unquiet dream, has continued for half an hour or longer in a state of agitation resembling delirium; the unreal ideas or images still possessing the mind, and being only slowly removed by actual impressions on the senses."

827. *Why is too great a fondness for reading in children objectionable?*

Because childhood is the period of observation, and the exercise of the senses; by excessive reading a child has his *reflective* faculties stifled, and instead of deducing opinions for himself, he flies to his book for the solution of every difficulty, and so contracts a habit of esteeming authority before reason.

* Walter Johnson, *Domestic Management of Children.* Simpkin and Co.

828. *Why should neither beer, wine, nor spirits (except medicinally) be given to young children?*

Because by these stimulants no gain is made in the process of nutrition; for by just so much as the nutriment supplied in these may be supposed serviceable, in the same ratio will the *natural appetite be destroyed.*

829. *Why should children not be aroused from their sleep too suddenly or roughly?*

Because their natures are extremely sensitive, and any rude shock at such a time is liable to impress them with sensations of alarm, which may *influence them for years.*

830. *Why should children not be suffered to sit too long on chairs or in swings?*

Because the *pressure on the spine* becomes too continued, the muscles of the lesser limbs and thighs waste rather than increase, and sometimes those limbs become *crooked* in consequence.

831. *Why should children not be allowed to sleep when fastened in their chairs?*

Because the head naturally bends forward, and their *respiration is impeded* by the position of their bodies.

832. *Why should children's head-dresses be made of light materials?*

Because, in order to ensure perfect health and favourable development, *the head should be kept cool;* and heavy head-dresses, by occasioning heat, and pressing on the vessels of the brain, cause headache and fretfulness, and sometimes produce diseases of the brain.

833. *Why should wet shoes and stockings be removed from children's feet as speedily as possible?*

Because the evaporation constantly going on, from the combined effects of the moisture of the shoe and the warmth of the foot, *withdraws so much warmth from the circulation,* as to be extremely weakening and injurious, especially to delicate constitutions.

834. *Why is it unnecessary to lance a child's gums for the purpose of hastening the appearance of the teeth?*

Because nature has provided *means that adapt themselves to the process of dentition.* The chief of which is, that the membranes which cover the hollows and the gum, are absorbed in proportion as the tooth comes forward.

835. The following is the order in which the teeth appear :—

1. First appear in the lower jaw two front teeth, which are immediately followed by as many in the upper jaw. Soon, two more such teeth make their appearance in the lower maxillar, and then in the upper. These *incisors* are generally the work of the eighth, ninth, tenth, eleventh, and twelfth months.

2. At the end of the first, or the beginning of the second year, the four *canine teeth appear*, two in the lower, and two in the upper jaw.

3. In the course of the second year, the four anterior back teeth, or *grinders*, are produced.

4. At the second, or the beginning of the third year, the four other grinders are produced.

After these twenty teeth, eight incisors, four canines, *or eye teeth,* and eight grinders are perfectly formed.

This progression in teething applies as a general rule ; sometimes the teeth appear earlier, and sometimes later. And instances have been recorded of children born with teeth already developed.

836. *Why should children's walks not be too long?*

Because, from the exhaustion produced, *growth and nutrition are arrested,* and fevers and protracted debility may be the consequence.

837. A little girl was left to the care and discretion of a nursery-maid. They left home and gossipped from cottage to cottage for four hours. The child, naturally active, lively, and happy, amused herself with skipping about, and plucking the flowers, but at length said, "I am so tired," and wished to go home. This home was at a considerable distance. On entering the house, she took off her bonnet and lay down, refused her tea, and requested to be taken to bed. Before she was undressed she fell asleep, and did not wake for three hours; she then appeared uncomfortable, refused food, but asked for drink: she became feverish. This febrile state continued for a long time, and even after it had ceased she never in after life regained her colour and strength, but remained pale and feeble.

"Dull not device by coldness and delay."—OTHELLO.

838. *Why are perambulators unhealthy for children unless judiciously used?*

Because, from the ease with which children are conveyed in them, nursemaids are tempted to *keep them out too long*. When children are kept in the air for lengthy periods, the stimulus of light and air proves too much for them. Hence they fall into a state of *exhaustion and stupor*, too frequently mistaken for *sleep*.

839. *Why are perambulators unsuited for very young children?*

Because *their spines being imperfectly developed*, they cannot maintain the erect posture for a lengthy period without injury. Besides, when held in the nurse's arms, they not only have the advantage of frequent *change of position*, but they derive benefit from the *warmth* of their nurse's body, which they are deprived of in a perambulator.

840. *Why should children be suffered to feel their way and walk by their spontaneous endeavours?*

Because Nature *indicates to them when the time has come* to use their feet, and any hastening of the period, or awkward contrivance to make them walk, frequently causes their limbs to become crooked from the involuntary efforts they are compelled to make to support themselves.

841. *Why should children habitually sit on chairs with hard seats in preference to those with soft or hollow ones?*

Because, when sitting in chairs with soft or hollow seats, children find themselves reclining one way or the other, or making exertions to keep themselves upright and preserve their equilibrium; and it is obvious that *either a bending posture*, or the *efforts necessary to avoid it*, often repeated, may become hurtful to weakly children, and produce deformity of the spine and unsightly curves of the shoulders.

842. *Why should children early be taught to stand upright?*

Because when children acquire a habit—as they are fre-

"Some falls are means the happier to arise."—CYMBELINE.

quently disposed to do—of leaning on objects nearest to them, and placing their feet awkwardly, the propensity increases, and the habit when once formed *is not easily broken*.

843. The following methods of remedying deformities in children may be had recourse to with advantage:—Should one of the shoulder-blades *project more than the other*, the child should lie, as much as may be, on the *contrary side*; as the shoulder upon which one lies always projects beyond the plane of the back. When the shoulders themselves happen to be *too high*, a child so disposed should never be suffered to sit in an *elbow chair*; nor should any child sit before a table that is either much *too high* or *too low* for the seat in which he may be placed, especially if it be for the purpose of reading, writing, or any other employment that may engage him or her for any length of time. But if one of the shoulders is *higher than the other*, the child should frequently be induced to stand only on the one foot *of that side*, at least to bear his weight chiefly upon it, by which means the shoulder that is too high must necessarily fall lower, and the other be raised; or a *small weight* may be put upon the shoulder that is too low, which will incline the child to *raise it up*; or he may be caused frequently to carry a light chair, or plaything, in the hand of that side, which will have the same effect. The like means should be used when *one hip is higher than the other*.

844. *Why does a child crawl about on its hands and feet?*

Because the muscles of the legs, and the formation of the spine, are not *sufficiently developed* to enable it to support itself on its feet alone, and by instinct, therefore, the infant adopts the method of crawling, to move from one place to another.

845. *Why are leading-strings and go-carts injurious to children?*

Because they cause the body to *swing backwards and forwards*, and often produce *awkwardness of feet* and deformity of limbs. Besides, they are less liable to fall when they have no such artificial assistance to depend upon; and they cannot be too early made sensible that they are never to expect support and assistance, in doing anything which they are able to do for themselves.

846. *Why should children be allowed to creep about and learn to walk of their own free will?*

Because, by doing so, they gather confidence in their own

"Pride hath no other glass
To shew itself but pride."—TROILUS AND CRESSIDA.

powers, and gradually obtain sufficient strength and reason to guide their steps.

847. An instance is given of a child (in the backwoods of America) *under a year old*, being seen crawling on all fours over a sadly mutilated bridge, with a roaring stream flowing under, and within sight of the mother's house, where she was quietly engaged in washing, and not troubling herself about the apparent danger which startled the traveller so much. On the latter expressing his alarm, the mother quietly replied that the child was accustomed to take care of itself, and knew well what it was about: in confirmation of this, she made him observe the cautious and deliberate way in which it made even the slightest movement; adding that to run anxiously to its assistance would be the sure way to frighten it, and make it fall into the water.

848. *Why can a child run and walk on its legs for a much longer time than an adult, without feeling tired?*

Because, in the muscles of children, *contractility* exists in a very high degree, owing to the process of organization going on more rapidly.

849. *Why ought children to be early accustomed to the use of the bath?*

Because, when it is necessary to order a hot bath for a child, in cases of severe illness, the omission of this custom will cause it to become *so alarmed* at the sight of the water, as to render the intended remedy entirely *inefficacious.*

850. *Why should a child not be put to learning before seven years of age?*

Because until that age the *structure of the brain is not complete in all its parts,* and any demand upon it, therefore, of an extraordinary nature, only tends to exhaust the cerebral power, and to retard its development.

851. *Why is sitting at the piano many hours consecutively injurious?*

Because it *fatigues the muscles and ligaments of the back,* until they become incapable of supporting the spine, which consequently sinks upon itself and contracts a curve.

"The worst is not
So long as we can say, 'this is the worst.'"—LEAR.

852. *Why ought a child, when writing, to be placed at a desk or table, the height of which is proportioned to the seat?*

Because, when the desk or table is too low, it necessitates a continuous stooping, by which in time *the chest becomes contracted*, and the spine curved.

853. *Why ought children in crowded cities to be occasionally indulged in a change of scene?*

Because, independently of the healthy influence derived from change of air, *Nature possesses peculiar charms for children*, which have the power of exercising a beneficial effect on their moral development.

854. *Why ought not children, when two of them sleep together, always occupy the same side of the bed?*

Because, by doing so, they contract *permanent attitudes*, which leads to a *disfigurement of the body*.*

855. *Why do children sometimes squint?*

Squinting sometimes arises from a *natural defect* of the organ of vision; but more frequently is owing to improper practices, and carelessness. Letting *the hair grow over the eyes*, wearing caps with *projecting borders*, and allowing children habitually to view objects *sideways*, instead of in the direct line of vision, are all liable to produce this defect.

856. The mode of correcting squinting, is to close the eye which is perfect, by means of a green patch, and to cover the defective eye with a blind spectacle of pasteboard, having a hole in the centre, through which the eye is compelled to look. The effort to accomplish this, restores the oblique tendency of the vision to its natural position and proper use. The same contrivance will succeed in cases where the child squints with both eyes.

857. *Why is light necessary to the health of children?*

Because it is an active agent in *supplying oxygen to the blood*, and consequently stimulates and invigorates the system. Also because the exclusion of light is *morally injurious* to children,

* Granville's *Catechism of Health*. Richardson.

by checking their active disposition, and causing gloomy and dispirited feelings.

858. *Why are lights from wax or spermaceti most desirable for a nursery?*

Because animal oils and tallow throw out, in their burning, *poisonous vapours* that vitiate the air, and render it peculiarly hurtful for children to breathe.

859. *Why should nurseries have a south-eastern aspect?*

Because it has the advantage of receiving the *morning rays* of the sun, without the drawback of the *sultriness of an afternoon*, thus materially conducing to the health and cheerfulness of children.

860. *Why should nurseries not be situated at the top of the house?*

Because children are *liable to accidents* from falling over the bannisters, or down the stairs; and also because, in *cases of fire* in the night, the remote distance in which they are placed beyond the reach of assistance, renders it difficult to save them.

861. *Why should the foot of a child's bed or cot be turned towards the window?*

Because a child naturally *turns its eyes to the light*, and if that be on either side, it may induce a habit of squinting. The same rule also applies to the position of an infant in the lap.

862. *Why should a nursery have an extensive prospect from its windows?*

Because the eyes of the children will become habituated to looking at objects at a *long distance*, for want of which children frequently become *short sighted*.

863. *Why are children frequently attacked with convulsions, when cutting their teeth?*

Because there is a sympathy established between the *nerves that supply the teeth*, and the *nerves of motion* of the convulsed regions of the body.

"It is the witness still of excellency
To put a strange face on his own perfection."
MUCH ADO ABOUT NOTHING.

864. *Why is the complaint known as "ringworm" so called?*

Because the hair in this affection has the appearance of having been gnawed by a grub or worm, whereas its aspect arises from *the hairs being swollen*, and from granular cells being deposited in the fibres. The disease itself is attributable to *vitiated or deficient nourishment*.

865. *What are the blemishes on the skin known as "mothers' marks?"*

They are caused by a *dilatation of the capillary vessels of the blood*, on a spot of skin, varying in size, and not confined to any particular part of the body.

866. The commonly received notion that "mothers' marks" are impressions produced by the imagination, is wholly an illusion. The fanciful theory has been adopted, because the marks frequently bear resemblance to strawberries, currants, cherries, &c., and a connection between the mark on the child and a previous longing of the mother for the fruit represented, is easily imagined and established. The truth is, that these marks assume a form according to the eccentric current of the blood; and their resemblance to definite objects is just as accidental as the fantastic shapes we frequently trace in the fire and in the clouds.

867. *Why are mothers' marks, of currants, cherries, &c., said to ripen and languish simultaneously with the fruit they represent?*

Because those marks are generally slightly raised above the level of the surrounding skin, and are subject to much variety in tint of colour, in accordance with the *quantity of blood flowing through them*; and as the circulation of the blood is *active in summer* and *sluggish in winter*, the skin becomes flushed and pale accordingly, with the change of seasons.

868. *By what outward signs does a baby make known that it is affected with inflammation of the chest?*

Every few minutes, especially after drawing a deeper breath than before, or after each short hacking cough, it gives a little cry, which it checks apparently before it is half finished; and this is either *because it has no breath to waste* in cries, or because the effort *makes its breathing more painful*.*

* *How to Nurse Sick Children*. Longman and Co.

"Ignorance is the curse of God;
Knowledge the wing wherewith we fly to heaven."—HENRY VI., Part II.

869. *What are the general signs by which a child may be known to be ill?*

It loses its *appetite*, is *fretful*, and *soon tired*, and either *very sleepy* or *very restless*, while most likely it is thirsty, and its skin is hotter than natural. In many instances, too, it feels sick, and actually vomits, while its bowels are either much purged or very bound. It loses its merry laugh and cheerful look; it ceases to watch its mother's or the nurse's eye as it used to do, though it clings to her more closely than ever, and will not be out of arms even for a moment; and if at length rocked to sleep in her lap, will yet wake up and cry immediately on being placed in its cot again.

870. *In what manner does the presence of measles make itself known?*

A number of dark red spots appear in many places, running into each other, and they are usually *seen first about the face, and on the forehead near the roots of the hair*. This is also usually preceded by a discharge from the eyes and nose, similar to those caused by a severe cold.

871. *How may scarlet fever be predicted?*

The rash does not appear in separate spots, but shows itself more *in a general bright red colour of the skin*, not unlike that of a boiled lobster. It appears first about the neck and chest in greater degree than about the face, and is usually preceded and accompanied by sore throat.

872. *What indications does the existence of chicken-pox manifest?*

The spots which appear are *small separate pimples*, which come out generally over the whole body, as well as about the head and face. They appear earlier, by a few hours, on the body than elsewhere; and are seen in a day or two, having much enlarged in size, to transform themselves into little bladders of water as big as the head of a large blanket-pin. The discharge

"What viler thing upon the earth than friends
Who can bring noblest minds to basest ends."—TIMON OF ATHENS.

from these bladders becomes milky in appearance, and then the bladders themselves shrivel and dry up into small yellowish-brown scabs, which soon fall off.

873. *Why, when children are affected with disease of the lungs, should their bodies be propped up?*

Because, when the lungs are inflamed, *some of the air tubes become stopped*, and these are *pressed upon* by the unnatural flow of blood to that part, in a recumbent position, therefore the admission of air is rendered still more difficult, and the blood flowing towards the inflamed part of the lungs returns with difficulty, whereas a partially upright position diverts the flow of blood from the diseased channels, and by relieving the air-vessels enables the child to breathe more freely.

874. This principle may be illustrated by the following fact. If we have a whitlow on our finger, we know that when the hand is hung down, the inflamed part will become redder than before, and will heat and throb to such an intense degree that we can scarcely bear it; but if we raise our hand, the pain at once abates, and the swelling and redness speedily diminish.

875. *Why should a warm bath, when ordered for a sick child, be prepared out of its sight?*

Because the preparations of the bath, and the steam arising from it, are apt to occasion the child so much alarm, that he struggles violently, and cries passionately to escape what he so much dreads, and consequently more harm than good is effected. In all cases, the bath should be quietly brought into the sick child's room, covered with a blanket, which should not be removed until the moment of immersion.

876. *Why is the habitual use of soap in the washing of infants injudicious?*

Because the alkali which soap contains is liable to irritate the tender surface. A thin solution of starch will not only serve as a substitute for every purpose of cleanliness, but also soothe the skin.

877. If there be already any soreness, after drying a child as carefully as possible, the parts may be dusted over with a little zinc powder, and afterwards zinc ointment, spread on soft linen rag, may be applied to the parts.

"Courage mounteth with occasion."—KING JOHN.

878. *Why should a child, exhausted by illness, be lifted as seldom as possible out of its bed?*

Because in a state of great weakness, fainting or convulsions are sometimes produced *by suddenly moving a child,* lifting it up, or taking it out of bed.

879. *How may various necessary offices be administered to a child without removing it from its bed?*

The child's body may be sponged all over, by *merely turning* it, first on one side and then the other. And when it is necessary to change its linen, the bed-gown may be *torn up the back,* and run together afterwards with a few stitches.

880. *How may sickness and vomiting in a child be checked?*

When the sickness is troublesome, *no food or drink should be given for an hour or two.* After the stomach has thus had complete rest for a time, a single tea-spoonful of cold water may be given, and if this be not thrown up, it may be succeeded in ten minutes or a quarter of an hour, by a second and third. If this be borne, a little water thickened with isinglass, a little cold barley-water, or cold milk and water, may be given; and then with the same precautions, and in very small quantities, beef-tea, or chicken-broth. The smallness of the quantity of food given at a time, and the administering that cold, are the two chief points to attend to.

881. *What are the symptoms of small-pox?*

It first indicates its approach by severe *pains in the loins* and *stomach,* increased by pressure, accompanied with vomiting, giddiness, and headache, and an unnatural desire for sleep. In general the eruption commences in *forty-eight hours from the commencement of the shivering.* In some cases it does not make its appearance for seventy-two hours, but in no case does it appear sooner than forty-eight.*

882. The eruption of small-pox, in almost all cases, occurs upon the forehead and wrists, and gradually extends itself over the whole body. It is usually completed in twenty-four hours, or thirty-six at the latest. On the eighth day the disease is at

* Andrew's *Cyclopædia of Domestic Medicine.* Blackie.

"In nature there's no blemish but the mind,
None can be called deform'd but the unkind."—TWELFTH NIGHT.

its height, and on the eleventh the matter suppurates, and forms in crusts on the skin; these fall off on the fourteenth day, leaving the skin of a brownish red colour, and studded with slight depressions or pits.

883. *What is vaccination?*

Vaccination is the introduction of a virus into the human system, derived from a specific sore on the teats and udders of cows, and capable of being communicated by contact.

884. *Why does vaccination prevent or lessen the chances of future attacks of small-pox?*

Because, it produces a similar disturbance, only in a *milder degree*, in the animal economy, as the small-pox itself; and as that disease rarely attacks the same individual *more than once*, the liability to after contagion is thus lessened.

885. *Why are some persons marked or "pitted" after an attack of small-pox, and others not?*

Because in cases where the pustules are large, and late in becoming dry, the skin, by the protracted action of the eruptions, *becomes permanently deranged*, and, when healing, is thus marked or pitted. But where the pustules are small, few in number, and suppurate quickly, they leave no marks behind them.

886. To preven t pitting with small-pox, Mr. Waddington, surgeon to the Sea Bathing Infirmary, Margate, lances the pustules with a needle, and thus allows the poisonous matter (which is the cause of the disfigurement) to escape, and also *orders the room to be kept dark*. Others apply a mask, prepared with medicated ointments, which the medical practitioners supply. But Mr. Waddington states that, during twelve years' practice, he has not known one case out of twenty of a person being marked by the small-pox, when this simple expedient has been resorted to.

887. *What are convulsions?*

Convulsions are caused by disturbing influences acting immediately upon the *motor nerves*, or upon that portion of the *spinal cord* with which the motor nerves are in direct communication.

888. A person seized with convulsions should be immediately surrounded, as completely as possible, with fresh cool air. If he be seized in a small, heated, crowded room, he should be removed into a spacious apartment, the windows of

"Men do their broken weapons rather use
Than their bare hands."—OTHELLO.

which should be thrown open, and every one whose assistance is not absolutely required, should be excluded from the room. In the male, the neckcloth should be immediately untied, and the face, neck, and bosom freely exposed to the air; in the female, the stays should be unlaced, and everything tight about the body should be removed. If the skin be cool, and the face pallid and sunk, the patient should be placed in a *horizontal posture*. If the skin be hot, and the face flushed, he should be sustained in a *sitting or erect posture*, in order, in the former case, to favour the flow of blood to the spinal cord and brain, and in the latter to retard it.

889. *Why is sickness in children frequently an indication that the brain is affected?*

Because there are nerves *passing from the brain to the stomach*, so that in these cases, the disease of the one member irritates and disorders the other.

890. *Why are people generally right-handed?*

The preference of the right hand is not the effect of habit, but is a *natural provision*, and is bestowed for a very obvious reason.

This natural provision has been aided and confirmed by numerous artificial arrangements, such as the *opening of doors to the right*, the arrangement of reading from *left to right*, causing the right hand to turn over each leaf, and the construction of various tools and hand-machines, upon the principle of right-handed use.

The occasional deviation from this natural provision, by which some persons manifest from birth a tendency to *left-handedness*, is one of those variations of nature which have their analogies in the rarer colours of the hair, eyes, formation of features, &c., which cannot be accounted for.

891. The question has been much discussed among anatomists, whether the properties of the right hand, in comparison with those of the left, depend on the course of the arteries to it. It is affirmed that the trunk of the artery going to the right arm passes off from the heart so as to admit the blood directly and more forcibly into the small vessels of the arm. This is assigning a cause which is unequal to the effect, and presenting, altogether, too confined a view of the subject—it is a participation in the common error of seeking in the mechanism the cause of phenomena which have a deeper source.

For the conveniences of life, and to make us prompt and dexterous, it is pretty evident that there ought to be no hesitation which hand is to be used, or which foot is to be put forward; nor is there, in fact, any such indecision. Is this taught, or have we this readiness given to us by nature? It must be observed, at the same time, that there is a distinction in the whole right side of the body, and that the left side is not only the weaker, in regard to muscular strength, but also in its vital or constitutional properties. The development of the organs of action and motion is greatest upon the right side, as may at any time be ascertained by measurement, or the testimony of the tailor or shoemaker. Certainly, this superiority may be said to result from the more frequent exertion of the right hand; but the peculiarity extends to the constitution also, and disease attacks the left extremities more frequently than the right. In opera-dancers we may see that the most difficult feats are performed by the right foot. But their preparatory exercises better evince the natural weakness of the left limb, since those performers are made to give double practice to this limb, in order to avoid awkwardness in the public exhibition; for, if the exercises be neglected, an ungraceful performance will be given to the right side. In walking behind a person, it is very seldom that we see an equalized motion of the body; and if we look to the left foot, we shall find that the tread is not so firm upon it, that the toe is not so much turned out as in the right, and that a greater push is made with it. From the peculiar form of woman, and the elasticity of her step, resulting more from the motion of the ankle than of the haunches, the defect of the left foot, when it exists, is more apparent in her gait. No boy hops upon his left foot unless he be left-handed. The horseman puts his left foot in the stirrup, and springs from the right.

We think we may conclude that everything being adapted, in the conveniences of life, to the right hand—as, for example, the direction of the worm of the screw, or of the cutting end of the auger—is not arbitrary, but is related to a natural endowment of the body. He who is left-handed is most sensible of the advantages of this adaptation, from the opening of a parlour-door, to the opening of a penknife.*

CHAPTER XXXII.

892. *Why is hard water not adapted for the purposes of washing?*

Because, in its passage through the earth, it has imbibed a quantity of *neutral salts*, the acid of which, dissolved in the water, *decomposes the soap*, by having a stronger attraction for its alkali than for the oil or tallow which the soap contains; the soap therefore *curdles*, and proves ineffective.

893. *Why should spring water, before being used for washing, be left for some time exposed to the air in an open tub?*

Because the *carbonic acid* to some extent flies away, and

* Sir Charles Bell's *Bridgewater Treatise*. Pickering.

"Our remedies oft in ourselves do lie
Which we ascribe to Heaven."—All's Well That Ends Well.

part of the *carbonate of lime* settles at the bottom. The more a spring is drawn from, the softer its water becomes.

894. *Why is rain water considered pure?*

Because, being free from the contaminations of the earth, it does not hold in suspension extraneous matters. Yet even rain water, in passing through the air, and over house-tops, acquires some impurity; but it is free from *matters of a mineral nature,* and hence arises its peculiar softness.

895. *Why does spring water appear warmer in winter than in summer?*

Because it rises from some depth in the earth, *where an even temperature prevails.* In the summer, therefore, its temperature is lower than that of the heated air, and in the winter it is higher than that of the cold air. Hence it appears to be *cold* in *summer,* and *warm* in *winter.*

896. *How may hard waters be softened?*

When the hardness of water results from the presence of the *carbonate of lime,* the water may be considerably improved by merely boiling.

897. *Why does boiling improve water hardened by the carbonate of lime?*

Because the heat drives off the *carbonic acid gas,* and the lime *falls down to the bottom.*

898. Professor Johnston says, in his *Chemistry of Common Life*, "although hard waters are generally made much softer by boiling, yet should much of the lime be in a state of *gypsum*, mere boiling will not alone soften it; but if a little *soda* be added to it during the boiling, this will separate the lime of the gypsum also." Another method of softening hard water, is to add to the water some quicklime, formed into the consistence of cream with water. Diffuse this through the water which is to be purified; the quicklime attracts the carbonate, and both fall to the bottom. In adopting this remedy, however, great care should be taken that the amount of quicklime used is not excessive, as the superabundance will remain in solution in the water, and thus render it noxious and hurtful, both for culinary and washing purposes. *Gypsum* is a compound of sulphuric acid and lime.

"Every fault's condemned ere it be done."—MEASURE FOR MEASURE.

899. *Does the boiling of water purify it, and render it better for dietetic purposes?*

No; it is a mistaken idea that such is the case. The boiling of water *drives off the carbonic acid gas,* which is one of its most salubrious constituents, and it *concentrates the impurities* of water, by driving off some portion of pure water as steam.

900. *Why should water not be allowed to continue boiling?*

Because, when water is required for *alimentary use*, the more it is boiled the less pure it becomes, since some portion of pure water is driven off as steam, but all the impurities remain.

901. It is not unfrequently the case that two gallons of water are allowed to boil, until only a gallon of it remains. As all the extraneous matters remain in the single gallon that were at first diffused in the two gallons, it follows that the gallon of water which remains, must be doubly as impure as the water of the original two gallons.

902. *Why are water-casks frequently charred on the inside?*

Because one of the most valuable properties of charcoal is that of destroying the smell and taste of a variety of vegetable and animal substances, and the wood of the cask being charred, will have the greater tendency to preserve the water sweet.*

903. *What are the symptoms of poisoning by water contaminated with lead?*

The more common symptoms are irritability of temper, soreness of the body, nervous and spasmodic affections, a blue appearance of the gums, pains in the bowels, yellow skin, and, in more advanced stages, colic and paralysis.

904. *Why are lead covers to cisterns especially dangerous?*

Because the pure water, which rises in the form of vapour, possesses *a great solvent power*. This vapour condenses upon the under surface of the leaden cover, and becoming charged with the lead which it dissolves, *drops down into the water of the cistern.*

* Tomlinson's *Useful Arts and Manufactures.* Virtue.

"A victory is twice itself when the achiever brings home full numbers."
MUCH ADO ABOUT NOTHING.

905. *Why should great care be observed when bottles are cleaned with shot?*

Because, if a few of the shot remain sticking to the sides or corners, they will *impregnate with lead* the liquid afterwards put into the bottle, especially if that liquid be wine, cider, vinegar, or any of a similar nature.

906. To obviate the dangers arising from the use of lead shot, bottles may be cleaned equally as well with small round pebbles, or with small pieces of coal.

907. *Why is the water of wooden pumps sometimes contaminated by lead?*

Because, although the box of the pump is formed of *wood*, the pump may be internally fitted with *leaden pipes*, &c., and the spout, though painted and disguised, may be of lead.

908. The following case is related by Sir G. Baker, in the *Medical Transactions*, page 420, vol. ii.:—"A gentleman was the father of a numerous offspring, having had one-and-twenty children, of whom eight died young, and thirteen survived their parents. During their infancy, and, indeed, until they had quitted the place of their usual residence, they were all remarkably unhealthy, being particularly subject to disorders of the stomach and bowels. The father, during many years, was paralytic; the mother for a long time was subject to colics and bilious obstructions. She died at last of an obstinate jaundice. The disease had been several times removed by the use of the Bath water, *but it always came on again soon after her return to Worcester*, and at last eluded every medicine and method which were tried. After the death of the parents, the family sold the house which they had so long inhabited. The purchaser found it necessary to *repair the pump*. This was made of *lead*, which, upon examination, was found to be so corroded, that several perforations were observed in the cylinder in which the bucket plays; and the cistern in the upper part was reduced to the thinness of common brown paper, and was full of holes, like a sieve." The impregnation of the water with lead had been, in this case, the cause of the paralysis of the father, the death of the mother, and the illness of a numerous family.

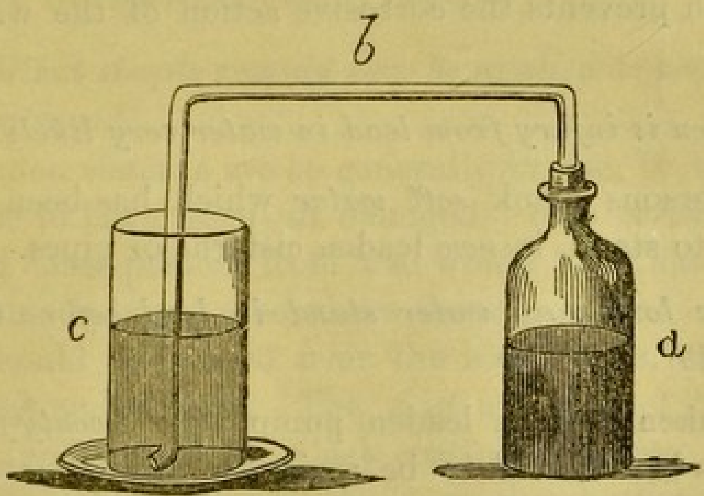
909. *What forms the white lines frequently seen on the sides of lead cisterns?*

Those lines are produced by the formation of *minute crystals of lead*, by the action of the moist air over the water. These crystals are very poisonous, and they frequently *drop into the water*.

"What cannot be eschew'd must be embraced."—MERRY WIVES OF WINDSOR.

910. So many unsuspected evils arise from the impregnation of water with lead, that we transcribe, from Mr. Accum's work on Adulterations of Food, an easy method by which the father or mother of any family may detect the presence of lead in suspected water, and thus relieve a whole household from serious consequences, or otherwise set their minds at rest upon the existence of a supposed evil. The apparatus and the ingredients required may be obtained for a mere trifle :—

Take a bottle (*a*) or Florence flask, adapt to the mouth of it a cork furnished with a glass tube (*b*), bent at right angles; let one leg of the tube be immersed in the vial (*c*) containing the water to be examined; as shown in the following diagram :—



Then take one part of sulphuret of antimony of commerce, break it into pieces of half the size of split peas, put it into the flask, and pour upon it four parts of common concentrated muriatic acid (spirit of salt of commerce). Sulphuretted hydrogen gas will become disengaged from the materials in abundance, and pass through the water in the vial (*c*). Let the extrication of the gas be continued for about five minutes; and if the minutest quantity of lead be present, the water will acquire a dark-brown or blackish tinge. The extrication of the gas is facilitated by the application of a gentle heat. The action of the sulphuretted hydrogen test, when applied in this manner, is astonishingly great; for one part of acetate of lead may be detected by means of it in 20,000 parts of water.

Another test for readily detecting lead in water, is sulphuretted chyazate of potash, first pointed out as such by Mr. Porret. A few drops of this re-agent, added to water containing lead, occasion a white precipitate, consisting of small brilliant scales of a considerable lustre.

911. *Why is hard water less liable to contamination of lead than soft water?*

Because the soft water, being *more solvent* than the hard, readily dissolves its particles in a greater degree.

"In the reproof of chance
Lies the true proof of men."—TROILUS AND CRESSIDA.

912. If a piece of lead be scraped until its surface is bright, and then put into soft water, it will soon be blackened by the action of the water; but if a similar piece of lead be placed in hard water, it will not be found to be acted upon to the same extent.

913. *Why is old lead less likely to render water impure than new?*

Because old lead becomes *encrusted* by the action of the *salts* contained in water, and thus a protecting surface is formed over it, which prevents the corrosive action of the water upon the lead.

914. *When is injury from lead in water very likely to occur?*

When persons drink *soft water* which has been collected, and allowed to stand, in *new* leaden cisterns or pipes.

915. *How long may water stand in lead before it becomes contaminated?*

Water taken from a leaden pump after *twenty-four hours* standing, has been found to be seriously contaminated; while that which has been taken from the pump after it had been used frequently, was but slightly impregnated.

916. *Why does one member of a family sometimes feel the effects of impure water more than the others?*

Because that member may be *constitutionally more susceptible* of the effects of lead; or may use the poisonous water to a larger extent than the others.

917. *What kind of constitution is most likely to be affected by lead?*

Persons of pale appearance, having a white bloated skin, and those of a dropsical habit of body.

918. *In what other way does water become contaminated by lead?*

The *carbonic acid gas* of the air forms a crust of the carbonate of lead upon those portions of cisterns and pipes which are *not covered by water;* and this incrustation, separating from the lead, *falls into the water*, or is washed away by occasional streams of it, and becomes dissolved.

919. *Why are domestic servants more liable to attacks from poisoned water than other persons?*

Because, as they remain more at home than the other persons of a household, and have less variety of drinks, they are more confined to the poisonous water, and are, therefore, most likely to experience its ill effects.*

920. *What simple remedy may be applied to prevent the evils of lead cisterns?*

As leaden cisterns are so generally in use, it would be impracticable to have them all changed. One *certain* corrective of the bad consequences from lead would be to have a moveable zinc bottom, in every case where there is a lead cistern. The bottom should be placed over the leaden one, and taken out once a week and cleaned. The zinc will attract the lead from the water, and will form a black coating upon it. This should be carefully rubbed off, and the clean zinc bottom be returned to the cistern.†

921. *Why should the waste-pipe of a cistern be bent?*

Because it is necessary that all direct communication should be cut off between the *drain* and the *cistern*, to prevent the water from being contaminated with the exhalations conveyed from the drain by the pipe.

922. *How may we distinguish good water?*

To some extent we may judge of the qualities of water by the following method:—A quantity of it should be poured into a *deep* glass vessel, the larger the better, so that we can look down perpendicularly into a considerable mass of the fluid; we may then readily discover the slightest degree of muddiness, much better than if the water be viewed *through* the glass

* Harrison *On the Contamination of Water by the Poison of Lead.* Churchill.

† *Healthy Homes, and How to Make Them.* Dean and Son.

placed between the eye and the light. It should be perfectly colourless, devoid of odour, and its taste soft and agreeable. It should send out air-bubbles when poured from one vessel to another; it should boil peas soft, and form with soap an uniform opaline fluid, which does not separate after standing for several hours.*

Opaline—resembling the tints of the opal.

923. *Why has water a sanitary influence on the body.*

Because it possesses the power of solution, and attracts impurities to it in its passage through the body. It may be said literally to *wash the blood,* and consequently to freshen and purify the whole system.

924. The most effectual method of applying water to the body, when it is required to act both on the blood and the skin, consists in combining its action with steam and warm air. The skin should previously be well washed with hot water, to which a very little caustic potash is added, that the pores of the external surface may be free from all external covering. The patient then sitting on a chair placed in a bath box, and subjected to a current of warm air mixed with steam, perspires freely, the heat and moisture accelerating the circulation, and relaxing the skin. A warm shower-bath placed above him washes the surface from time to time, and removes all sensible perspiration. By giving warm palatable diluents, the action may be maintained with energy as long as may be requisite. In this manner individuals labouring under an *offensive breath,* having the symptoms of that observed in fever, restore it to its natural character in a quarter or half an hour, and escape the attack which has otherwise been threatening them.

925. *What is the use of the animalcula that abound in stagnant waters?*

Liebig is of opinion that they *purify water* by removing from it substances injurious to life, and by *expiring oxygen gas.* Among other proofs in support of this opinion, he cites the following:—

926. I myself took an opportunity of verifying this remarkable fact, upon finding in a trough of water in my garden, the fluid coloured green by the presence of various species of *infusoria.* I filtered it through a very fine sieve, in order to separate all vegetable matters, and then exposed it to the light of the sun in an inverted glass completely full, the aperture of which was confined by water. After the lapse of a fortnight more than *thirty cubic inches of gas* had collected in the glass, which proved to be so *rich in oxygen* that a glowing splinter at once burst into flame in it.

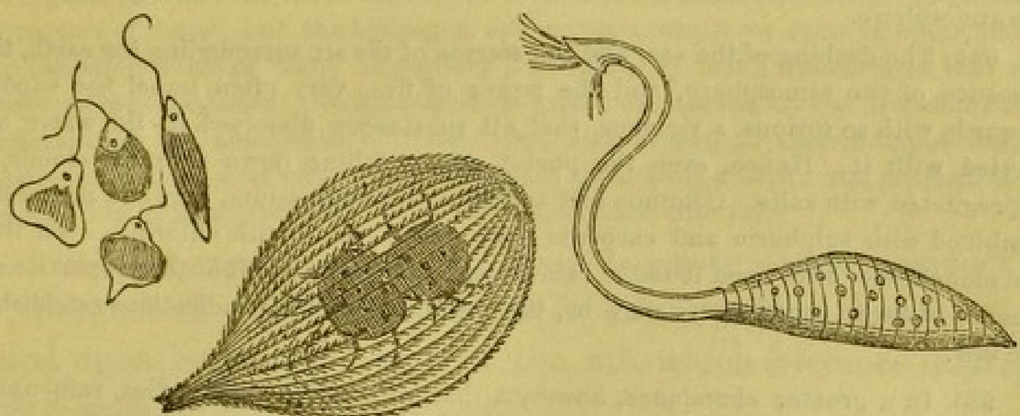
* Accum's *Treatise on Adulterations of Food.* Longman and Co.

"He that wants money, means, and content, is without three good friends."
As You Like It.

927. Without venturing to draw any inference from these data with regard to the mode of nutrition of these creatures, it is certain that the water in which infusoria exist, under the influence of the solar light, contains a source of pure vital air; it is certain that, from the moment these animals are perceived in the water, the water ceases to act injuriously upon the higher orders of plants and animals, for it is impossible to conceive that water should evolve pure oxygen, while it contains putrefying or decaying substances—that is, matters which are capable of combining with oxygen.

928. Now, if we suppose some animal matter in a state of putrefaction or decay added to water of this kind, this matter must, of course, be resolved into its ultimate products, in the presence of such a source of oxygen, in an infinitely shorter space of time than would be the case were these infusoria not present.

929. In the most extensively diffused animalcula, namely, the green and red infusoria, we recognise a most admirable cause which removes from water all substances injurious to the life of the higher classes of animals, and creates in their place nutritive matters for the sustenance of plants, and the oxygen indispensable to the respiration of animals.*



A FEW MICROSCOPIC FORMS OF INFUSORIA, OR WATER PURIFIERS, INVISIBLE TO THE NAKED EYE.

930. Another illustration of the agency of animalcula in purifying water, is afforded by the following:—On the surface of the waters of ponds and ditches is often seen a kind of green scum, from which people are accustomed to turn with disgust, and ascribe it to some injurious property. When this is brought under the powers of the microscope, the water is seen to be pure and clear, and the green scum found to consist of innumerable slender cylindrical-formed animalcula, whose interiors impart the colour from being distended with vegetable matter. The wise and loving decrees of Providence are here exemplified, as, by the innate wants of this living speck, varying in size from 1-400th to 1-1200th of an inch, the decaying and putrefying matter is removed, and the noxious effects on man and beast prevented.†

* *Letters on Chemistry.* Walton, and Maberly.

† *The Microscope*, by Jabez Hogg, M.R.C.S.

"'Tis not the many oaths that make the truth,
But the plain single vow that is vow'd true."
ALL'S WELL THAT ENDS WELL.

931. *How may impure water be rendered pure?*

By filtering it through *charcoal;* the reason being that charcoal, which is *porous* in its structure, and *antiputrescent* in its quality, absorbs the gaseous and organic matters with which the water is impregnated, and thus arrests decomposition.

932. *Is water nourishing?*

Water can scarcely be said to be in itself nourishing, but it is the *means* by which nourishment is liquefied and diffused throughout the system. It may therefore be said to nourish indirectly.

933. And yet drinking water is nutritious not alone because it is a solvent fluid. The warmth of the earth incessantly raises water into the air. From brooks, rivers, and seas, from plants also, and animals, there arise uninterruptedly through the action of the heat, vapours which are condensed into clouds in the higher strata of the atmosphere.

934. The dashing of the sea, and the storms of the air surrounding the earth, the pressure of the atmosphere, and the power of fire, very often impel the vapour upwards with so furious a violence, that all substances dissolved in the water are carried with it. Hence, even the purest water, falling down from the clouds, is impregnated with salts. Common salt and chloride of potassium, lime and magnesia, combined with sulphuric and carbonic acids, magnesium with chlorine, even iron and manganese, have been found in rain-water; and however slight the proportionate amount of these constituents may be, the regularity of their indications establishes the law.

935. In a greater abundance, however, than with these solid bodies, rain-water is impregnated with air. Oxygen and nitrogen, and the most important nutriments of the plants, carbonic acid, and ammonia, are taken up by the falling rain watering the thirsty earth, and fertilizing the fields; and even the lightning renders its assistance in enriching the verdant clothing of the ground. Its spark unites nitrogen and oxygen into nitric acid, and the thunder-shower supplies to the plant the nitrate of ammonia.

936. To ammonia especially, rain-water owes its softness; while lime renders the water, containing a greater proportion of salts, hard, as we have it in our wells and springs. The carbonic acid of the water dissolves the chalk of the earth, and the water itself dissolves the gypsum or sulphate of lime, which forms the deposit when in the process of boiling a considerable quantity of water is evaporated.

937. The quality of spring-water is as various as the earth through which it oozes. Earths and alkalies, combined with chloride or sulphuric acid, with carbonic or nitric acid, with iron and manganese, are contained in the water of wells and springs in the most varying proportions. One or the other of these substances is often absent. Phosphoric acid never forms a constituent of water, notwithstanding the predominance of the lime-salts in wells and fountains.

"Diseases desperate grown
By desperate appliance are relieved."—HAMLET.

938. That which causes the water of swamps and lakes, of rivers and seas, to be almost always unfit for drinking, is the admixture of putrefying organic substances, besides the common salt of the sea, which imparts a putrid taste to it. It is the bottom of the sea, which, like a retort, sends the water up into the air, from which, as if distilled into rain, it streams down again in a potable condition; it is the earth, forming as it were a strainer, through which the water, though not entirely purified, bubbles out of the wells. Even the skin of man possesses some of the properties of a filter. Cast upon a rock where not a drop of fresh water refreshes the languishing tongue, the shipwrecked mariner bathes in the sea, in order to escape the most tormenting death from thirst; and from the sea-water itself, a refreshing moisture, with a smaller proportion of salt, penetrates the thirsty body.

939. Since the last result of the whole process of digestion is a liquefaction of the alimentary principles, the formation of blood is impossible without water; but not only the formation, but the continual exercise of the organs, depends upon their receiving a due amount of water. Without it, no digestion or formation of blood, no nutritition or excretion can exist. Even this statement, however, by no means exhausts the importance of water; for it is essential, not only as the medium for the movement of all dissolved substances, not only as the humidity necessary for the organs, of which the most active, the brain and the muscles, contain the greatest proportion of water; but the hydrogen and oxygen which we take in water, enter into the composition of many alimentary principles, by being transformed into the constituents of the blood. When starch or gum becomes sugar, the transmutation is effected by the absorption of water; for, with regard to their composition, a greater proportion only of water distinguishes sugar from starch, and separation of oxygen from sugar causes the latter to be transformed into fat.*

940. *Why is it dangerous to sleep in newly painted rooms?*

Because the *lead* that is employed in making the *paint*, is acted upon by the moisture of the air, which becomes *impregnated with the properties of lead.*

941. *Why are earthen vessels, which are glazed with lead, dangerous?*

Because the glaze is liable to impart poisonous properties to substances, especially to *stewed or preserved fruits*, if allowed to remain in those vessels. Such matters, when cooked in vessels glazed with lead, should be removed from them *as soon as the cooking is finished.*

942. *Why, when the glaze is cracked, is it more dangerous?*

Because then the lead is *more easily acted upon* by the acid of the substance contained in the vessel. The lead glaze is frequently found to be full of cracks; and when in this state it should be used with greater care.

* *Orr's Practical Chemistry*—Chemistry of Food. Houlston and Wright.

"Better have none
Than plural faith which is too much by one."
TWO GENTLEMEN OF VERONA.

943. It has been found that the handling of lead vessels and tools, especially when they are warm, has produced symptoms of poisoning by lead. Standing upon sheets of lead has also produced similar effects. The use of diachylon plaster, in the preparation of which lead is employed, has been known to produce lead colic. Such an effect, however, would only be likely to arise when the plaster was applied to a large ulcer or wound.

944. *Why will a pail of water, set in a newly painted room, remove the smell of paint?*

Because water has a tendency to absorb gases; hence those which are emitted by paint are *drawn from the atmosphere* by the water.

CHAPTER XXXIII.

945. *Why do stone buildings in England crumble and decay?*

Because the stone has, for one of its component parts, clay or alumin, which has so great an *affinity for water* as to absorb moisture from the air, and to destroy its own aggregation.

946. Some species of stone lose their aggregation from opposite causes to the above; such as marbles of particular kinds, also crystallized carbonate of lime, or stones composed of an acid and earth combined with water, called the water of crystallization. Chalk only differs from marble in having lost that water, advancing thereby more rapidly to decay; which is also the case with several species of limestone, after atmospheric exposure, especially when the air is frequently saturated with water, in the presence of carbonic acid. Gypsum, also, though durable when dry, is so easily soluble in a quantity of water, that it is imprudent to use it. In other countries, with a drier atmosphere, many of these rejected species will last for ages, and even in England these stones may be rendered artificially durable, by the application of casing with cements.

947. *Why are bricks better adapted for building houses than stone?*

Because mortar *adheres more tenaciously to bricks than to stone.* Bricks absorb moisture readily, and therefore seldom give rise to *damp walls;* and also because bricks are worse conductors of heat than stone, and consequently promote a *warmer interior.*

"Before the curing of a strong disease
Even in the instant of repair and health
The fit's the strongest."—KING JOHN.

948. *Why are tubular bricks and tiles preferable for building?*

Because, being hollow, they are *worse conductors of heat* than solid bricks; therefore they are proof against fire. They do not conduct *cold, wet,* or *noise* in the same degree as other bricks, consequently, the buildings made of them are warmer in winter, cooler in summer, and always dryer.

By the difficulty with which they are penetrated by sound, places of worship, and public buildings made of them, reflect remarkably the voice of the speaker, and the notes of music.

949. *Why are bricks sometimes covered with a white efflorescence?*

Because there is a species of clay abounding with *sulphate of magnesia* in its composition, which undergoes a chemical change when acted on by the atmosphere.

950. *Why are walls sometimes covered with fungi?*

Because the sand which is mixed with the lime and cement contains *animal and vegetable matter,* which, by an irregular application of paint or distemper, are allowed to remain, and rain and damp being admitted, the walls become saturated, and the vegetative power of the fungi is called into action.

951. *Why do we frequently see the painted walls of new houses discoloured and blistered?*

Because a sufficient time has not been allowed for the plaster to dry; the water enclosed within the walls cannot escape by evaporation, and is therefore, by the swelling of the mortar, forced through the paint.*

952. *Why are apartments sometimes damp?*

Because cold and damp air penetrate the walls, and upon a change of temperature evaporate again, producing general moisture.

* Loudon's *Encyclopædia of Architecture*. Longman.

"Many can brook the weather that love not the wind."—Love's Labour Lost.

953. A few lime shells, placed in a damp apartment, will in many cases remove moisture so freely that it may be occupied without those injurious consequences which it is otherwise apt to induce.

954. *Why do damp walls occasion expense, in addition to causing discomfort and ill health?*

Because the constant evaporation that is going on, demands a greater amount of heat than is otherwise necessary, and consequently entails the expense of keeping larger fires.

955. Damp walls may be readily prevented, and rendered perfectly water-tight and dry, by painting or oiling them externally. If colour is not an object, a coat or two of common anti-corrosive paint will effect a cure. If the colour of the bricks is an object, one or two coats of common linseed oil, applied by the paint-brush, will render the entrance of moisture impossible. This may be applied slightly warmed, selecting a dry and warm day. The wall should, of course, be in as dry a state as possible, since, when it is full of water, the entrance of the oil is prevented; even one coating of oil, carefully applied, will produce a very good effect, and on a second application—which should be about a fortnight after the first—the filling up of the pores of the brick by the linseed oil will be evidenced by the considerably diminished quantity of oil which the wall requires. Damp walls may also be covered with thin sheets of gutta-percha, used as paper-hangings, and afterwards papered.

956. *Why should new outside walls be painted in water colours in preference to oils?*

Because water colours allow the *evaporation of moisture* from the wall, and the absorption of carbonic acid gas by the mortar, which hardens and renders it durable; but oil colours, by *closing up the pores* of the surface on the outside, retain the moisture beneath them, and render apartments damp within.

957. *Why is a house situated on a gently rising eminence, the most suitable for habitation?*

Because in valleys we inhale more *hydrogen* than is consistent with health; and on hills the house is exposed to every breeze, and the air is habitually pure.

958. *Why ought shelves in pantries, closets, &c., to be painted?*

Because many kinds of wood are liable to *communicate their flavour* to the articles placed on them, a disadvantage which the properties of paint obviates.

959. *Why are clayey soils unhealthy?*

Because, as clay is comparatively *impervious to moisture,* water, instead of being absorbed, remains on the surface of the ground until evaporated by the action of the sun and air, and the surrounding atmosphere is, consequently, generally more or less loaded with moisture.

960. *Why are slates most suitable for roofing houses?*

Because, not being porous, they *do not absorb either water or other impurities,* and consequently they keep the interior of houses dry and clean.*

961. *Why is allowing moss, &c., to grow on slate roofs in summer, injurious to them in winter?*

Because the moisture which has been absorbed in the nourishment of the plants will become frozen, and *split the slates.*

CHAPTER XXXIV.

962. *Why do some combinations of colours produce an agreeable effect on the eye, whilst others fail to do so?*

Because of what are called the laws of *harmony, relation,* and *contrast.*

963, There are three *primary,* and four *secondary* colours. The first are *red, blue,* and *yellow;* the second *orange, indigo, violet,* and *green.* Belonging to these colours are certain relations or affinities. Thus

RED has an affinity	for	GREEN.
BLUE	for	YELLOW.
GREENISH YELLOW	for	VIOLET.
INDIGO	for	ORANGE.

Colours, when in juxtaposition according to these affinities, are said to *harmonize.* But their *tone* has also to be considered, by which term is to be understood their strength or density. A very *strong red,* for instance, harmonizes but imperfectly with a very *pale green.* This is a result of *the absence of tone.* When the laws of harmony, contrast, and relation are nicely observed, the eye of the spectator is pleased, and *vice versa.*

964. Some of the most ordinary illustrations of these affinities may be observed :—

1. In the sky, where clouds of a warm golden-yellow colour produce so lovely a contrast with azure; and especially at sunset, when violet and orange at first harmoniously contrast, and then insensibly mingle their tints.

* *The Domestic Economist.*

"Men prize the thing ungain'd more than it is."—TROILUS AND CRESSIDA.

2. In foliage, the green tints of which not only find their proper complement and contrast in red, whether in stems or blossoms, but finally melt into it in autumn.*

965. *What are the "complementary colours?"*

Each of the colours has some other colour which is said to be *complementary* to it. The term arises from certain optical laws which it is unnecessary to explain here.

Each *colour* produces *harmony* with its *complementary colour*.

Harmony of colour is such an arrangement of colours as produces on the eye a pleasurable sensation, just as *harmony of sounds* produces the delightful excitement of *music on the ear*.

It is desirable, therefore, to know what are the colours and their complementary attendants, in order that we may exercise good taste in the selection of dress, in the decoration of rooms, and the laying out of gardens.

966. BLACK	is the complementary of	WHITE.
YELLOWISH RED	,,	BLUE.
VIOLET	,,	YELLOW.
BLUE	,,	RED.
WHITE	,,	VIOLET.
YELLOW	,,	BLUE.
RED	,,	GREEN.
GREEN	,,	PURPLE.
GREENISH BLUE	,,	RED.
BLUISH GREEN	,,	RED.
ORANGE	,,	INDIGO.

And *vice versa*.

Black and *white* may be said to contrast, and yet they *harmonize*. Two rosettes, one of white, and the other of black ribbon, placed a slight distance from each other, would *contrast*. But let the ribbons of the two be intermixed in one rosette, and the white would look purer, and the black more intense, by their reciprocal action. Thus they would produce an *harmonious contrast*.

967. When any person gazes upon a *red* wafer strongly

* Chevreul on *Colour*. Longman and Co.

"Moderate lamentation is the right of the dead,
Excessive grief the enemy to the living."
ALL'S WELL THAT ENDS WELL.

illuminated, for some seconds, and then suddenly turns the eye to a white surface near it, a spectral image of the wafer, but of *green* colour, will become visible. If the wafer be yellow, and placed on a black surface, the spectral image will be deep violet, when viewed on a white ground; in the same manner, a white wafer is attended by its black spectral figure. Thus wafers, or other coloured objects, produce spectra of colours complementary to their own. The complementary tints thus produced are termed accidental colours.*

968. ☞ *When making a dress, to ascertain the complementary colour that will harmonize with it, cut a piece of the size of a large wafer, and lay it on a black ground as above. The spectral tint that will afterwards be seen upon the white paper, though faint, will indicate the colour that will produce an agreeable effect.*

969. If the sun shines through a chink in a *red* window, its light will appear *green*; if the curtain had been *orange*, the stream of light would have been deep *blue*; if *yellow, indigo*; if *green, reddish violet*; if *blue, orange red*, &c.; and if we look at the image of a candle reflected from the water in a *blue* finger-glass, it will appear *yellow*.†

970. *Why do stuffs of a bright red, or crimson colour, assort ill with mahogany chairs?*

From the want of harmonious *contrast*—the tint of the mahogany resembling too nearly that of the stuff, and hence losing that sharpness of appearance which is the chief beauty of furniture.

971. *Why do stuffs of the various kinds of green assort agreeably with mahogany furniture?*

Because the *red* colour of the wood *has an affinity with green*—its complementary colour—and contrasts well with it.

972. *Why do violet or blue stuffs combine well with light woods, such as maple, satin-wood, ash, citron, &c.?*

Because both of the *analogy* between them, and of the

* Golding Bird's *Elements of Natural Philosophy*. Churchill.

† Brewster's *Natural Magic*. Murray.

"The mind much suffering doth o'erskip
When grief hath mates, and bearing fellowship."—LEAR.

agreeable contrast; blue or violet and yellow being relative or complementary to each other.

973. But in all these assortments, to obtain the best possible effect, it is necessary to take into consideration the contrast resulting from *height of tone;* for a dark blue or violet stuff will not accord so well with a yellow wood as a light tone of the same colours; and it is for this reason that yellow does not assort so well with mahogany as with a wood of the same colour, but not so deep.

974. *Why does ebony, when used in furniture, produce so pleasing an effect?*

Because its dark hue, by *contrast* of tone, sets off to advantage even the most brilliant colours.

975. *Why are dark red stuffs, notwithstanding the inferior effect they produce with mahogany chairs, so frequently used?*

Because of the *durable nature* of that colour.

976. *Why do gilt frames harmonize better with old pictures than with new?*

By *contrast*—the tones of ancient pictures being generally deeper and more sombre than those of pictures recently painted.

977. *Why do black or bronze frames harmonize badly with old paintings?*

Because the use of a frame is to *isolate a picture* from surrounding objects. The black or dark browns of the picture are apt to be merged into the black or bronze of the frame, and so to hinder the isolation.

978. A picture of a conflagration, or of any similar subject, where *reds* predominate, would harmonize well with a bronze frame, wherein the greenish tint was prevalent; also all scenes lighted by artificial light, such as candles, torches, fires, &c.

979. *Why are gilt frames the most suitable for engravings and lithographs?*

Because, besides the *isolation,* they afford a good contrast with the white and black of the print?

"Many strokes, though with a little axe,
Hew down and fell the hardest timbered oak."—HENRY VI., Part III.

980. *Why are frames of a black, dark brown, or grey coloured wood, less suitable for prints?*

Because they interfere with the *tones* of the shadows in the print, and impair their effect.

981. *Why is a white border of paper interposed between the print and its frame advantageous?*

Because it further *isolates* the print, and serves as a scale by which the eye judges of the shadows in it.

982. *Why should light hangings, such as wall papers, curtains, &c., be preferred to dark ones?*

Because an apartment can never be too light *of itself*, it being always possible, by blinds and shutters, to exclude light, but never to create it.

983. *Why are red and violet hangings to be avoided?*

Because they are exceedingly unfavourable to the colour of the skin.

984. *Why are orange-coloured hangings unfavourable?*

Because they fatigue the eye too much by their intensity. For the same reason all simple colours are unfavourable in hangings; *light tones* and *mixed tints* being always preferable.

985. *Why is a light green tint the best adapted for hangings?*

Because it is favourable to pale complexions, as well as to rosy; to mahogany furniture, and to gilding.

986. *Why are small patterned paper-hangings preferable to large ones?*

Because the effect is always better when the eye is able at all times to take in the *whole pattern at once;* irrespective of the pictures or furniture.

987. Where the pattern is large, and includes figures of men and animals, as we see in some of the old mansions, the interposition of a picture or other object often produces an unfavourable and even a ludicrous effect. A pair of legs, for instance, attaching themselves to a bust, or portrait; or a bird's plumage seeming to issue from the body of a warrior; with other undesirable combinations.

"Pleasure and revenge
Have ears more deaf than adders to the voice
Of any true decision."—TROILUS AND CRESSIDA.

988. *Why are the lower parts of walls covered with wainscoting?*

To conceal the walls, and to preserve the furniture from damp, which might arise from them. They receive paint which could not be durably applied on a humid wall; and they preserve the paper-hangings from the blows of the chairs and other furniture placed before it.

989. *Why should the door of a room be distinguished in its colour from the wainscoting?*

From a principle of truth in art, which should *make everything appear to be what it really is.*

990. The contrary practice, it must be admitted, is now generally followed, and the door and wainscot painted the same colour; but this is an error, a door is no part of the wainscot or walls, but a means of entrance and exit, and should be distinguished as such.

991. *Why are light-coloured carpets more serviceable than dark ones?*

Because, in wearing, the gradual disappearance of the dyes from the threads or web is less discernible.

992. *Why are the brightest-coloured carpets best for large apartments?*

Because the amount of space covered tends to *soften and harmonize tints,* which, in a small room, would be too glaring.

993. *Why, in selecting a pattern for a carpet, should the brightest colours be in the centre?*

Because the gradual softening off towards the borders of the tints affords a better ground for the furniture.

994. For a carpet to produce the best possible effect, it is not enough that it be made in the best manner, that the pattern is excellent, and that the distribution of the colours leaves nothing to be desired; it is also requisite that it be in harmony with the decorations of the apartment into which it is put; or, in other terms, that it possesses certain relations of *suitability,* not only of size proportionate to the nature of the ornaments, the facility with which the eye seizes the *ensemble* of the composition, the skill which has governed the distribution of the large masses of colours, but also in the harmony of these same colours with those of the objects which concur with the carpet to furnish an apartment.*

* Chevreul *On Colours.* Longman and Co.

"A stirring dwarf we do allowance give
Before a sleeping giant."—TROILUS AND CRESSIDA.

995. *Why is a sombre-coloured carpet, such as one of green and black, best suited to a room very full of furniture?*

Because such a combination controls the brilliancy of the furniture, and gives solidity and tone to the whole.

996. *Why is a carpet of the above colours best with mahogany furniture?*

Because the green and black are *complementary to the furniture*, and form the best harmony.

997. *Why is a carpet of the most brilliant hues best adapted to furniture made of yellow woods, such as maple, satin-wood, or light oak?*

Because it establishes a *harmony of contrast*.

998. *Why should the carpet of a room not be of the same colour as the walls?*

Because the sameness, and absence of contrast, produces a deficiency of force, and fails to strike the eye with any pleasing effect.

999. The principles of the art of painting supply the principles for the art of distributing colours in furnishing. Thus, the colours of the carpet should neither be so brilliant as to destroy the effect of those of the paper, nor the contrary; and, with regard to the curtains, they should always be of a colour suitable to both. It is not necessary that they should be of the same colour, but that their hues should harmonize; or, in other words, look well together. A very brilliant colour, such as crimson, in the carpet, may have a drab or other subdued colour in the curtains and paper; but then there should be some of the brilliant colour introduced in both, as bordering or ornaments. Thus a room, with a bright blue or crimson carpet, may have white, yellow, or drab curtains and paper; but blue or crimson bordering or ornaments should be introduced in them to harmonize the effect. It would not do, in the case of the blue carpet, to have green curtains or paper, or with the crimson to have scarlet; because these colours do not accord. A green carpet may have black, red, or white curtains, with green borders and ornaments. A yellow carpet may have black curtains and a dark grey paper, with yellow borders and ornaments.

1000. *Why should great judgment be exercised in buying painted furniture?*

Because cabinet-makers, in order to meet the desire for cheapness, give a coat of size to such articles as they wish to paint, and put on this a coat of water-colour of any required

"Beggars mounted run their horse to death."—HENRY VI., Part III.

shade, and finish it off with a coat of varnish to give it the appearance of oil colour. The size prevents the paint from penetrating the wood, and, consequently, after the furniture has been a short time in use the varnish rubs off, and the water-colour soon follows.*

1001. *Comfortable people will have comfortable things about them;* their furniture and household appointments being even the reverse of what is stigmatised as "gimcrack." You may lean back against their chairs, or lean forward on their tables, and neither will "give way," though you do. Their sofas, if not of the very newest fashion, are infinitely preferable to any invented either before or since—their grates draw to admiration—their fenders are just the right make and height for putting one's feet on; and, although from a very early period of your acquaintance, you have had an inward consciousness that you *might* stir their fire unblamed, your remembrance of the fire of comfortable people for seven times seven years is connected with the conviction that no poke of yours could ever have improved it.†

1002. *Why should not paintings and engravings, nor frames of different kinds, occupy the same room?*

Because the opposing characteristices that are thus presented to the eye, *destroy the individual merits of works of art,* and render the whole inharmonious.

1003. *Why are curtains serviceable in preserving the warmth of rooms?*

Because as the glass is kept cool by the air on the outside of the house, the air of the room is *chilled* by coming in contact with it, and descends in a steady current from the ceiling to the floor. The curtains prevent this chilling of the air.

1004. *Why are blinds and curtains necessary to a house in summer time.*

Because the sun's rays *cause the colours to fade* from the carpet, chair-covers, &c., and also dry the wood of furniture so that it cracks and warps.

1005. *Why, when hanging window-curtains to low rooms, should the top of the valance be placed close to the ceiling?*

Because this arrangement not only has the effect of *making*

* *How to Furnish a House.* Groombridge.

† *Home Truths for Home Peace.* Longman and Co.

"Better a little chiding than a great deal of heartbreak."
MERRY WIVES OF WINDSOR.

the room appear higher, but also prevents any of the *light from being shut out* from the window.

1006. *Why is it injudicious to have one conspicuous article of furniture new when the remainder has been in use some time?*

Because the *violent contrast* destroys the harmony of the whole, and causes the old furniture to appear more worn and faded than it really is.

1007. *Why are designs designated "up and down" most suitable for hangings?*

Because such designs naturally accord with a *perpendicular position*, and also adapt themselves to the flutes or *folds of the drapery*.

1008. *Why are low-priced draperies, as a rule, more suitable than high-priced?*

Because the best quality of drapery will last a life-time, while, on the other hand, a commoner quality may be purchased two or three times in the same period for the same cost. By this means we not only have the gratification of *seeing our rooms decorated periodically*, but, on the score of *cleanliness* and consequently *health*, we rid ourselves of articles which, by constant absorption for a number of years, must have become somewhat impure.

1009. *Why should the patterns of paper-hangings be chosen with a view of suitableness to the room?*

Because by association and combination paper-hangings influence the appearance of the *height* and *extent* of apartments materially.

1010. Large pattern papers are suitable only for large rooms. In low rooms a striped paper will give the effect of height, and the stripe may be either straight or irregular. Patterns with lines crossed so as to form squares are unsuitable for low rooms. And borders should not be used in low rooms as they detract from the appearance of height.

1011. *Why is it necessary to exercise taste in the colours chosen for each apartment?*

Because, unless the colours are in keeping with the *character*

"Teach thy necessity to reason thus,
There is no virtue like necessity."—RICHARD II.

of the apartment, and regulated according to the *degree of light* which it admits, an incongruous and disagreeable effect is produced.

1012. When the tone of an apartment is fixed by the choice of the furniture, such tints should be introduced upon the ceiling, walls, and wood-work, as will unite the whole in perfect harmony. Apartments lighted from south to west, particularly in a summer residence, should be *cool* in their colouring; but the apartments of a town house ought all to approach towards a *warm* tone, as also such apartments as are lighted from the north and east of a country residence.

1013. In a *Drawing-room* vivacity, gaiety, and light cheerfulness should characterize the colouring. This is produced by the introduction of light tints of brilliant colours, with a considerable degree of contrast and gilding, but the brightest and strongest colours should be upon the furniture, the effect of which will derive additional value and brilliancy from the walls being kept in due subordination, although at the same time partaking of the general liveliness.

1014. In a *Dining-room* the characteristic colour should be warm, rich, and substantial; and when contrasts are introduced, they should not be vivid. This style of colouring will be found to correspond best with the massive description of the furniture. Gilding should be avoided, unless in a very small proportion, for the sake of relief.

1015. *Parlours* should be painted in a medium style, between that of a drawing-room and dining-room.

1016. *Libraries* and *Studies* should have subdued and grave tints, and no higher colouring should be employed than is necessary to give the effect of grandeur, which can scarcely be achieved where a monotonous tint prevails. At the same time, care should be taken not to disturb the quiet and solemn tone which ought to characterize the colouring of all apartments of this description.

1017. In *Bed-rooms*, a light, cleanly, and cheerful style of colouring is the most appropriate. A greater degree of contrast may here be admitted between the room and its furniture than in any other apartment. There may also be admitted gayer and brighter colours upon the carpets.

1018. *Staircases*, *Lobbies*, and *Vestibules* should all be rather of a cool tone, and simple in their style of colouring, which will much enhance the effect of apartments entering therefrom. The effect to be produced here, is that of architectural grandeur, which owes its beauty more to the effect of light and shadow, than to any arrangement of colours yet there ought not to be an entire absence of colour, as the exterior of a mansion should form a link between exterior simplicity and interior richness.*

1019. *Why, in papering a room, should regard be had to the freshness of the size used?*

Because the disagreeable smell, arising from putrid size, is

* Hay's *Laws of Colouring*.

"Beauty is bought by judgment of the eye,
Not uttered by base sale of chapmen's tongues."
LOVE'S LABOUR LOST.

imparted to the walls and permanently retained, and bad size is also liable to render the walls damp.

1020. *Why is it better to paint a wall than to plaster it?*

Because plaster *absorbs moisture*, and gives it out again, whereas paint *resists moisture*, and a dry cloth will at any time restore its surface to its wonted character.*

CHAPTER XXXV.

1021. *Why do simple colours in a dress worn with white appear more vivid.*

Because, while the colours are heightened, their respective complementary colours ally themselves to the *white*.

1022. Thus *green*, the complementary of *red*, is extracted from it, so to speak, by the *white*. The latter takes a *greenish tinge*, and the red, in consequence, appears *redder*.

1023. An undesirable tinge in a *white dress* may be lowered considerably by wearing *violet trimmings*, or a *scarf* of that colour.

1024. A yellow tint is removed by association with *bright orange*, whose complementary *blue* is added to the *white*.

1025. The assortment of the primitive colours with white are favourable in the ollowing scale; the first arrangement being the most advantageous, and the last the least so:—

LIGHT BLUE......and WHITE.
ROSE ....and WHITE.
DEEP YELLOW and WHITE.
BRIGHT GREEN and WHITE.
VIOLET ....and WHITE.
ORANGE............and WHITE.

1026. *Why do dark coloured clothes whiten at the seams?*

Because the dye disappears soonest from those parts which are exposed either to friction, or to the action of the atmosphere.

1027. *Why is this whitening at the seams less observable in clothes of different coloured materials?*

Because the *contrast of different colours* fixing the attention

* *How to Furnish a House.* Groombridge.

"Death remembered should be like a mirror
Who tells us life's but breath, to trust it, error."—PERICLES.

of the spectator, prevents the eye from perceiving the inequalities which would be visible in a garment of one colour only.

1028. *Why do new white clothes look better with coloured clothes that are faded, than with new black ones?*

Because white *improves the tints,* while black, presenting a kind of positive scale of comparison, *brings out their faded character.*

1029. *Why is black most generally becoming in dress?*

Because it is the best of all grounds, bringing out favourably almost *all colours,* and acting as a sort of frame or foundation to the rest.

1030. *Why does a head-dress of sky blue become a fair person?*

Because *light blue is the complementary colour* of the pale orange, which is the *foundation of the blonde complexion and hair.*

1031. *Why are bright yellow, orange, or red flowers becoming in the head-dress of a person of dark hair and complexion?*

Because those colours, by contrast with the black in the hair and eyes, show to the greatest advantage themselves, while they *enhance the hue of black,* giving to the latter an exceedingly deep tinge.

1032. *Why is pink-red unfavourable for the head-dress of a blonde?*

Because, by contrast, *it lowers the hue of the complexion,* and has the tendency to reflect upon it *a greenish tinge.*

1033. *Why is dark red less unfavourable for such complexions than pink-red?*

Because, being higher in tone than the latter, it *brings out* the white by contrast.

1034. *Why is a* ruché *of tulle advantageously used in a fair person's head-dress?*

Because the effect of *grey* is produced by the mixture of the white threads which *reflect light*, and the interstices which *absorb it*.

1035. *Why is delicate green favourable to blonde complexions of a pale cast?*

Because it *imparts a rosiness* to such complexions—red, its complementary colour, being reflected from the green.

1036. *Why is light green unfavourable to ruddy complexions?*

Because it *increases the redness*, and has the effect of producing an over-heated appearance.

1037. *Why is yellow disadvantageous to a very fair complexion?*

Because it *reflects a violet hue*, giving to the features a faint, death-like tinge.

1038. *Why are violet draperies the least favourable for every kind of complexion?*

Because, reflecting yellow, they *augment that tint* when it is present in the skin or hair, change blue into green, and give to an olive face a *jaundiced look*.

1039. *Why is blue not suitable to brunettes?*

Because it *reflects orange* and *adds to the darkness* of the complexion.

1040. *Why are tulle, muslin, and similar white fabrics the best of that colour for head-dresses?*

Because the threads which *reflect white light*, and the interstices that *absorb it*, produce together a kind of *grey*, which is the most generally favourable tint for all complexions.

1041. *Why are pink bonnets generally unfavourable to fair complexions?*

Because, although the amount of colour reflected, except upon the forehead, is generally but trifling, what *is* imparted to the face is of a *greenish cast*.

"Cure is no cure, but rather corrosive,
For things that are not to be remedied."—HENRY VI.

1042. *Why is a green bonnet preferable to a pink one for a pale complexion?*

Because whatever colour is reflected from it to the features is of a *roseate tinge*.

1043. *Why are yellow or violet bonnets unfavourable to fair complexions?*

Because the first-named *reflects* a *violet*, and the latter a *yellow* hue to the features and hair.

1044. *Why do white flowers, or a blonde* ruché, *in a pink bonnet improve it?*

Because it *isolates the face and hair*, and interposes between them and the green reflected from the bonnet.

1045. *Why does a black bonnet with white feathers, flowers, or other trimmings, suit a fair complexion?*

Because both the black and the white afford good contrasts—the black of the bonnet *isolating*, and the white *heightening the colour* of the features and hair.

1046. *Why does a black bonnet adapt itself less to a dark complexion than to a fair one?*

Because of the *want of contrast* and the absence of a ground for the hair, which white or coloured trimmings will supply.

1047. *Why is a white bonnet preferable for a brunette?*

Because it supplies a *good contrast*, and affords the best *setting* for the features and hair, especially if trimmed with pink, red, orange, cerise, or saffron-coloured flowers or ribbons,

1048. *Why are white veils injurious?*

Because, by *increasing the effect of the sun's light*, the skin is submitted to undue action, and freckles, &c., are liable to be produced. The eyes also suffer, losing their natural brilliancy and powers of vision.

1049. *How should caps and bonnets be worn so as to conform to the face?*

When the face is *round*, the cap or bonnet should come so

"Through tatter'd clothes small vices do appear:
Robes and furr'd gowns hide all."—LEAR.

far forward as to *cover part of the cheeks;* and should the lower part of the face be *broad,* this defect may be entirely concealed by bringing the corner of the bonnet in a *sloping direction* towards the point of the chin.

When, on the contrary, the face is *thin,* the cap or bonnet should be so worn as to display *as much of the cheeks* as possible.

Tall ladies should be careful not to increase their height by the adoption of *elevated* trimmings; while ladies of low stature, on the contrary, may take advantage of such accessories.

1050. *Why do blue veils preserve the complexion?*

Because they diminish the effect of the scorching rays of light, just as the blue glass over photographic studios diminishes the effect of certain rays that would injure the delicate processes of photography.

1051. *Why are bonnets more becoming when worn slightly off the head?*

Because, when the oval of the face and the oval of the bonnet occupy the same lines of sight, the result is a stiffness which is extremely unfavourable. But when the two ovals intersect each other, an harmonious combination of lines is produced.

1052. This is not intended to justify that extreme "slouchiness" of style which induced Mr. Spurgeon to make the following remark. He said—"My beloved sisters, I have been requested to reprove the present style of bonnets; but, upon my word, *I don't see any!*"

1053. *Why are the hues produced by figured or spotted prints or muslins better than those arising from one pervading colour?*

Because the order of *natural colouring* is therein imitated.

1054. *Why is the hue of black velvet so much deeper than any that can be imparted to silk or other fabrics?*

Because colour depends to a great extent upon the *external fibre or grain* of the material receiving it, and that of velvet is the best adapted to the *absorption* of the rays of light.

1055. Besides which, it is the practice with dyers to apply oil to the surface by means of brushes slightly imbued with it. This heightens the black, and imparts a softness to the material.

"One doth not know
How much an ill-word may empoison liking."
MUCH ADO ABOUT NOTHING.

1056. *Why do clothes made of different coloured materials maintain their appearance longer than those made of one colour only?*

Because of the *mutual support* which the colours give to each other.

1057. Let us suppose a garment to be composed of red and green of the same tone. By the law of contrast the two colours, being complimentary, mutually strengthen each other; *the green renders the red redder, and the red renders the green greener.*

CHAPTER XXXVI.

1058. *Why should a short female not wear flounces?*

Because the extra dimensions of the lower part of the attire give a *breadth* to her person, which is out of proportion to her *height.*

1059. *Why should ornaments of dress be appropriate, and appear designed to answer some useful purpose?*

Because all ornamentation that has a studied appearance, has a *too conspicuous and constrained look,* which renders the effect painful rather than pleasing. A brooch, or a bow of ribbon, therefore, should *fasten some part of the dress;* and a gold chain should support a watch, an eye-glass, or other useful object.

1060. *Why is it wiser economy to select the best materials for dress (if the income will allow it) than to choose inferior fabrics?*

Because, as the lining and making up of every dress *costs much the same* whatever its materials may be, it is evident that one good dress will cost less than two inferior ones, while, in point of appearance, there is no comparison between the superiority which the better material has over the inferior.

"Every cloud engenders not a storm."—HENRY VI., Part III.

1061. *Why are plain dresses more economical than figured ones?*

Because, as patterns are the result of *novelty of fashion,* and as fresh patterns are springing up every day, a dress may probably become *old fashioned* before it is worn out. Besides, in dresses of varied colours, they may not all be equally fast, and if one of them fades, the dress will lose its beauty.

1062. *Why are certain colours less durable than others?*

Because of the different effect which *air* and *light,* the various *alkalies, soap, acids,* &c., have upon them; this difference varying with the *colour* itself, as well as the *material* coloured.

1063. *Why do water, the alkalies, soap, and acids, affect the hues of dyed clothes?*

Because a solution of the colours is effected by means of those agents, or a small portion of acid or alkali *unites to the combination which forms the colour.*

1064. *Why do air and light injure the dye of clothes?*

Because the *oxygen* of the former unites with, and produces a combustion of the *hydrogen* contained in the colours; the light of the sun accelerating that action.

1065. Colours composed of *vegetable extracts* suffer most readily from the action of light. Ribbons, for instance, dyed with extract of brazil-wood, have been found by experiments to lose their colour much more rapidly than those dyed with cochineal.

1066. *Why do faded clothes, when re-dyed, last longer?*

Because the newly applied colouring substances resist, to a certain extent, the *action of the atmosphere and light* upon the fabric.

1067. Those parts of a window curtain exposed to the action of the sun's rays will be found, after a time, to have become not only *discoloured* but *rotten,* or at least liable to be easily frayed and torn, compared with the shaded parts, in which the original colour has remained intact.

"The web of our life is of that mingled yarn, good and ill together."
ALL'S WELL THAT ENDS WELL.

1068. *Why are silk and cloth made from wool differently affected by the same dye?*

Because different *degrees of affinity* exist between the fabrics dyed, and the particles composing the dye.

1069. Wool, hair, and silk are *animal* substances—cotton, linen, and hemp *vegetable*. The two kinds differ very materially in their tendency to *combine with colouring matters*. But there are degrees of difference between one animal substance and another; hence silk, partaking in some degree of a vegetable nature, differs from wool in its affinity for colouring substances.

1070. *Why is soap sometimes injurious to the dye of cloths?*

Because, being formed of an *alkali* and fat, it *unites with the acids in the colours,* forming an acid with them, and decomposing them.

1071. *Why is the process of boiling sometimes injurious to the dye of clothes?*

Because the heat dissolves the *hydrogen,* which is their colouring agent.

1072. *Why is sea water injurious to the dye of clothes?*

Because of the *chlorine* contained in sea water, which has the property of bleaching all animal and vegetable colours.

1073. *Why are mixed or secondary colours, such as green purple, orange, more evanescent than simple primitive colours—red, blue, and yellow?*

Because, being composed of *two colours* differing somewhat in their nature, the *particles are differently affected* by various agencies. Consequently, in these secondary colours, a greater number of influences operate to destroy them.

1074. The colours resulting from a mixture of two primitive colours, as green from blue and yellow, are only a delusion of the eye. Both the components are *present* and *distinct,* but they are so *blended* that we *cannot separate them by the sight.* For instance, a grey hair when seen through a microscope is not actually *grey,* but a composition of *small black points on a whitish ground.**

* *Chemistry applied to the Arts.* Chambers.

"Nought so vile upon the earth doth live,
But to the earth some special good doth give."—ROMEO AND JULIET.

1075. *Why is alum useful in fixing the colours of dyed cloths?*

Because it acts as a "mordant"—a word formed from the Latin *mordere*, to bite; it has the quality of biting-in, or uniting chemically the *dye* with the *tissue of the cloth*.

1076. *Why are yellow dyes the most durable?*

Because the *arnatto* commonly used to impose those tints is the least affected by the *sun's rays*, and best resists the action of *acids* and *alkalies*.

1077. *Why do linen and cotton fabrics become bleached?*

Because, when they are moistened with water and exposed to the light of the sun, a slow process of *combustion*, or *decay*, immediately begins upon the whole surface; the *oxygen* of the atmosphere in immediate contact with the fabric is incessantly converted into carbonic acid. The weight of the fabric imperceptibly diminishes, because it is in a state of change; the colouring matters gradually disappear, and with them a considerable amount of fibre, their elements being converted into gaseous compounds.

1078. *Why does not the colouring matter in well-printed linens and cottonswash out?*

Because, when the substance to be dyed has either no affinity for the colouring matter, or not sufficient power to retain it, the combination is effected or strengthened by the intervention of a third substance, called a *mordant*, or basis. The mordant has a *strong affinity both for the colouring matter and the substance to be dyed*, by which means it causes them to *combine*.*

1079. *Why may vegetable stains be removed by holding them over a burning match?*

Because, by the burning of the sulphur, sulphurous acid is

* Mrs. Marcet's *Conversations on Chemistry*. Longman and Co.

formed, which *decomposes the vegetable matter* causing the stains.

1080. *Why is it necessary to wet the stain before igniting the match?*

Because the moisture *absorbs the sulphurous acid*, and makes it *more effective* upon the stain. It also prevents the fabric from being injured by any other product of the flame.

1081. *Why does chlorine remove stains from printed engravings without injuring them?*

Because printers' ink is made of *oil and lampblack*, substances which are not acted upon by the *chlorine*.

1082. *Why will silk and worsted take vegetable dyes more readily than linen or cotton?*

Because vegetable colours have a stronger affinity for animal than for vegetable substances, owing to their containing a small quantity of *nitrogen*.

1083. *Why does ink produce iron-moulds on linen?*

Because the *red oxide* of iron which ink contains, has an affinity for the fibre of the fabric, and is *left by itself* after the vegetable blackening matter of ink has been removed by washing.

1084. *Why will salts of lemon and other acids remove iron-moulds?*

Because whatever *dissolves iron* will destroy the *iron-moulds*, and certain acids possess this property.

The following is the method of taking out iron-moulds with salts-of-lemon:—A small quantity of the salt is pounded and applied to the spot; and then some hot water is dropped on it, and rubbed in upon a pewter plate placed upon a stone, or on a water plate containing boiling water. If the stains are of long standing, and difficult to remove, the spots may be wetted for five minutes with sulphuret of potash or muriate of tin, and, after this is washed out applying the citric acid.

1085. *Why do potash and soda, when mixed with water, extract grease spots from clothes?*

Because *alkalies*, which potash and soda both are, possess

"Tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."
AS YOU LIKE IT.

the property of *uniting with grease.* Hence much unnecessary labour and friction is spared, when these ingredients are mixed with the fluid in which clothes are washed.

1086. *Why are dark-coloured shoes more suitable for wear than light-coloured ones?*

Because they serve to *diminish the apparent size of the foot* from the outlines losing themselves, as it were, in those of the carpet, earth, &c.; light-coloured shoes, on the contrary, making them more prominent.

1087. *Why do high-heeled shoes produce pain and distortion?*

Because the whole weight of the body is pressed forward upon the toes, and the strain over the instep and the contraction of the muscles at the back of the heel are considerable; the contraction of the latter generally *becomes habitual,* so that those who have accustomed themselves to wearing high-heeled shoes are compelled to wear them for ever afterwards.*

1088. *Why was the "bloomer" costume a failure?*

Because, as it diminished the apparent height of the figure, it was only becoming to *tall persons.* And also because it exposed the *whole of the foot,* which, in this country, is so frequently distorted by wearing shoes that are tight, and of a different shape from the foot.

1089. *What description of slippers are the best?*

Either *old shoes,* or *light leather slippers.* The thick *woollen* slippers which are frequently worn, make the feet hotter in-doors than they are when we go out. The reverse should be the case.

1090. *Why are dark and brilliant coloured clothes not adapted for summer wear?*

Because they attract and preserve the *heat of the sun,* much more powerfully than colours of a lighter hue.

* Mrs. Merrifield's *Dress as a Fine Art.* Arthur Hall, Virtue and Co.

"In the sweetest bud
The eating canker dwells."—TWO GENTLEMEN OF VERONA.

1091. *Why is there danger in wearing damp clothes?*

Because, when a liquid passes into the state of vapour there is a great *absorption of heat.* In the animal economy, heat is generated in the system and given out by the body. If the clothes are damp this heat is *abstracted faster than a new supply is formed* by the process of respiration, and the result is what we term a cold.

1092. *Why are rouge, paint, &c., injurious?*

Because they contain mineral and metallic substances, which interfere with the secretions of the pores of the skin, and in the course of time destroy its natural hue, and change its characters.

CHAPTER XXXVII.

1093. *Why is the tight lacing of stays injurious?*

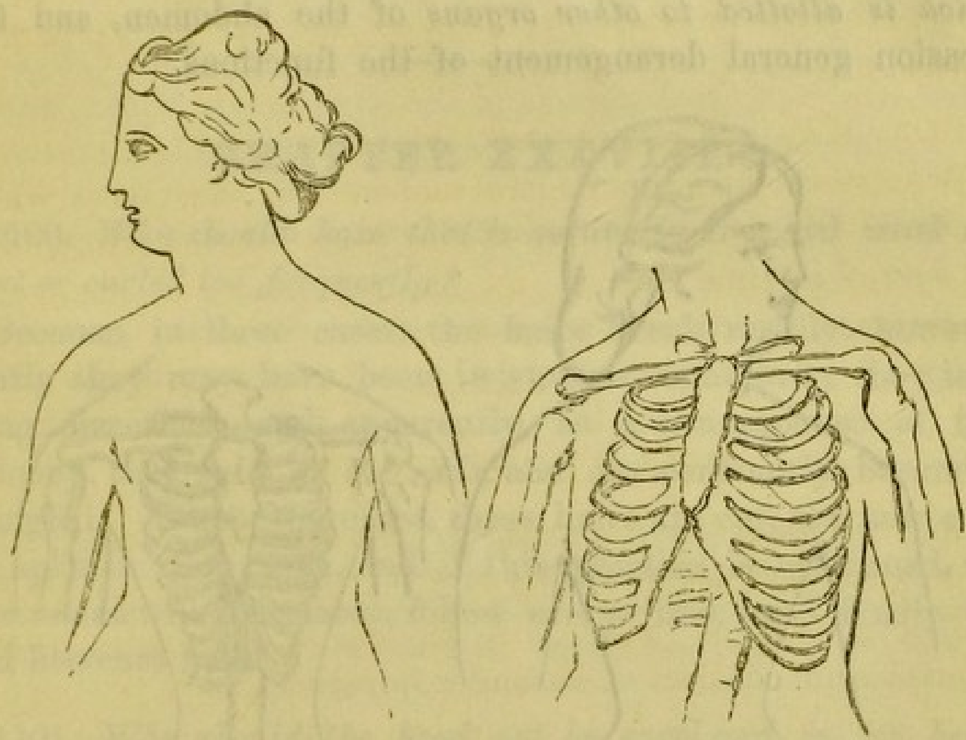
Because the Creator has formed the chest in the shape of a cone, the base of which is capable of being alternately widened and contracted during inspiration and expiration, but this wonderful and pèrfect mechanism *cannot be carried into full play* if any external compression, such as tight lacing causes, is applied to it.

1094. *What are the injuries which tight lacing generally occasions?*

The first is an obvious impediment to the motions of the ribs, by which *respiration is impeded.* In proportion as this obstruction to respiration takes place, the *blood is imperfectly vitalized;* and in the same ratio are the *nutrient and other functions* dependent on the blood *inadequately performed;* from this arises a source of *debility,* which affects the whole frame, reducing every part *below the standard of healthful vigour.*

1095. *Why do the heart and lungs become affected by tight lacing?*

Because, as each inspiration of air is insufficient, the wants of the system require as a compensation increased frequency; thus quickened respiration commences, *disturbing the lungs*, and creating in them a tendency to *inflammatory action*. From the same causes the heart also *becomes excited*, the beatings accelerated, and palpitation in time superadded.



OUTLINE OF THE STATUE OF THE VENUS DE MEDICIS, AND THE SKELETON OF A SIMILAR FIGURE, WITH THE BONES IN THEIR NATURAL POSITION.

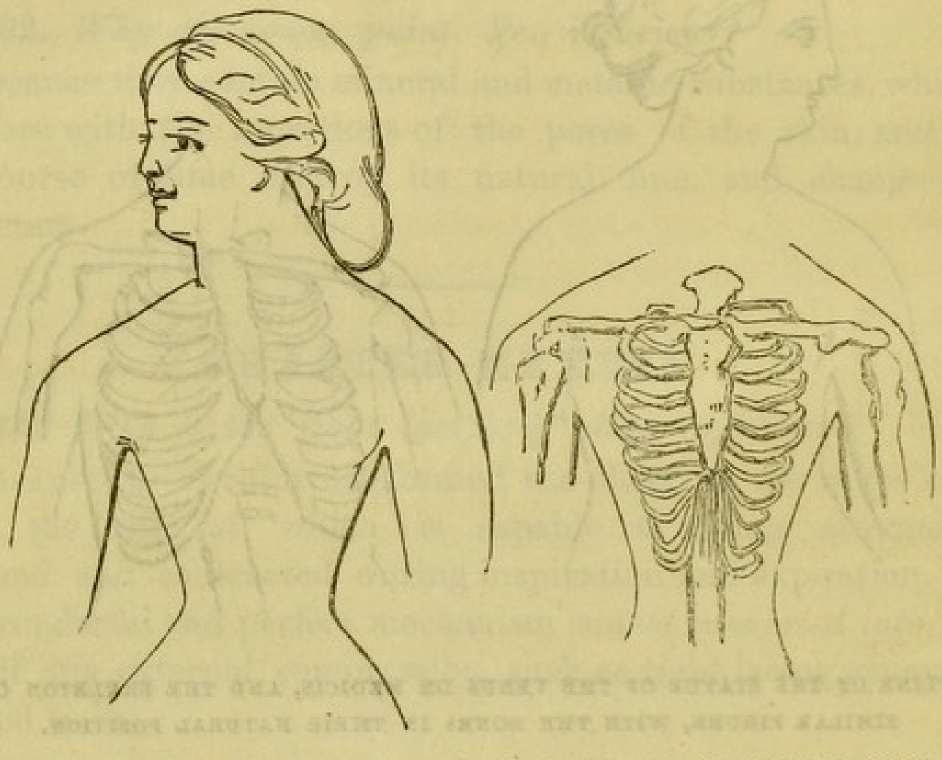
1096. *Why is it an error to imagine that a small waist is symmetrical?*

Because the painful and irksome process by which a waist is rendered small, proves that the form which nature designed the body to take is totally opposed to the artificial disorganization of its principles. And this is confirmed by the fact that *sculptors* who are the closest observers of nature, and who transfer to their statues every beauty presented to the eye, have invariably given ample dimensions to the lower part of the chest. This characteristic is particularly remarked in the celebrated statue of the *Venus de Medicis*, which is universally regarded as a *perfect model of female beauty*.

"The quality of mercy is not strained;
It droppeth as the gentle rain from Heaven
Upon the place beneath."—MERCHANT OF VENICE.

1097. *Why are the stomach and liver deranged by tight lacing?*

Because the pressure extends to those parts, which, in process of time, are partially displaced from the cavity of the diaphragm, and being pressed downwards, *trespass on that space which is allotted to other organs* of the abdomen, and thus occasion general derangement of the functions.



OUTLINE OF A FIGURE COMPRESSED BY TIGHT-LACING, AND SKELETON APPERTAINING TO SUCH A FIGURE.

1098. Dr. Hodgkin, whose connexion with Guy's Hospital has given him extensive opportunities of observation, says, "In examining the bodies of the dead, I have frequently found the lower ribs of females greatly compressed and deformed. I have repeatedly seen the liver greatly misshapen, by the unnatural pressure to which it had been subjected, and the diaphragm or midriff very much displaced."

1099. *Why are external injuries and malformations caused by tight lacing?*

Because the body, which can only bear this excessive compression occasionally, such as at balls, evening parties, &c., demands relaxation at other periods. Under this reaction the muscles of the back, deprived of their accustomed support, and incapable of themselves to sustain the incumbent weight, yield, and the column of the spine bends, at first anteriorly, causing *round shoulders* and an *arched back*, and eventually inclines to one side or the other, giving rise to the well-known, and too frequently-occurring state of *lateral curvature*.

CHAPTER XXXVIII.

1100. *Why should hair that is naturally dry and weak not be cut or curled too frequently?*

Because, in these cases, the hairs break readily, however slightly they may have been twisted or tightened; they take wrong directions, and apparently, as a consequence of this tendency, they *split at the ends*, and are constantly becoming entangled. When, therefore, these hairs are cut, the new ends will split in their turn, and if this practice is continued, the same result will invariably follow every time, until finally the head becomes bald.

1101. *Why should the head not be enveloped in too heavy and too warm a covering?*

Because a *superabundant perspiration* is induced, causing a greasy matter to accumulate on the scalp, which becomes rancid, and occasions the eruptions peculiar to that organ, ending frequently in loss of hair.

Or, if the irritation do not produce those effects, it will at least occasion an *excess of the secretion of the parts*, which, drying in the form of scurf, necessitates, during the operation of the toilet, the adoption of means which tear out more or less of the hair.

1102. *Why are "depilatories," or compositions for removing superfluous hairs, injurious?*

Because the ingredients from which they are compounded (quicklime, soda, sulphur, and arsenic) excite *inflammation in*

"The brain may devise laws for the blood; but a hot temper leaps o'er a cold decree."—MERCHANT OF VENICE.

the skin when suffered to remain on it. Nor are they, generally speaking, efficacious, the roots of the hair, which are *too deeply implanted to be reached by such means,* remaining behind, so that the hairs speedily grow again.

1103. *Why is it unadvisable to dye the hair?*

Because the natural colour of the hair has been *designed to harmonize with the features,* and the introduction of dye destroys the equilibrium, and produces absurd and palpable contrasts.*

1104. *Why is the immoderate use of oils and pomatums to the hair injurious?*

Because, by *clogging the pores of the skin,* they prevent the escape of natural secretions which are necessary to the growth and nourishment of the hair, and so produce weak hair, baldness, &c.

1105. The following recipe for hair-oil is one of the best;—Boil together half a pint of port wine, one pint and a half of sweet oil, and half a pint of green southernwood. Strain the mixture through a linen rag several times, adding at the last operation two ounces of bear's grease. If fresh southernwood is added each time it passes through the linen, the composition will be improved.

1106. *Why is the white of an egg, beaten up, an excellent medium for cleansing the hair?*

Because the *albumen* of the egg, without depriving the hair of its *natural oil,* takes hold of all adventitious and *excreted matter,* and being brushed away, and the hair afterwards washed with cold water, leaves it beautifully *moist and glossy,* requiring no oil or other preparation.

1107. *Why should particular care and attention be given to the disposition of the back-hair?*

Because the arrangement of the bulk of hair, conformably or adversely to the shape of the head, will considerably influence the apparent phrenological character of the head.†

* Cazenave on *The Human Hair.* Renshaw.

† Rowland on *The Human Hair.* Piper.

"Flattery is the bellows blows up sin,
The thing the which is flatter'd, but a spark
To which that blast gives heat and stronger glowing."—PERICLES.

1108. *Why should the dressing of the hair be regulated by the formation of the face?*

Because the contour of the face, and the lines of the features generally, are intimately associated with the arrangement of the hair. That style which becomes a *short, round face*, would give a *ghastly expression* to a long, *thin visage*, and *vice versa*.

1109. How often (remarks a writer in *Blackwood's Magazine*) do we see a really good face made quite ugly by a total inattention to lines. Sometimes the hair is pushed into the cheeks, and squared at the forehead, so as to give a most extraordinarily *pinched shape* to the face. Let the oval, where it exists, be always preserved; where it does not, let the hair be so humoured that the deficiency shall not be perceived. Nothing is more common than to see a face, which is somewhat too large below, made to appear grossly large and coarse, by contracting the hair on the forehead and cheeks, and then bringing it to an abrupt check; whereas such a face should have its forehead and cheek enlarged, and the hair dressed to partially fall over, so as to shade and soften the lower exuberance.

1110. *Why does combing and brushing the hair promote its growth and nourishment?*

Because, by combing the hair, we *free the fluid* which is secreted from the roots, from those obstructions which must arise in consequence of the hair being bent in all directions, and by brushing we promote the *circulation of the blood* through the bulbs, and free it from those secretions, which, if allowed to remain and increase, become of serious inconvenience.*

1111. *Why is the head most effectually cleansed from scurf with a moderately hard brush?*

Because the scurf which collects arises from the hardening of the secretions which pour out of the cells of the scalp; *brushing*, while it *removes these secretions*, also supplies the necessary amount of *circulation* for the free action of the pores.

1112. *How should curls be worn with a long, thin face?*

Care should be taken that the tresses should cluster *near the temples*, and fall gracefully *over the cheek*, taking care, however, not to conceal the latter, and thus to render the length still more apparent.†

* *The Toilet.* S. Lingham. † Howard's *Art of Dress.* Bogue.

"Let never day nor night unhallow'd pass,
But still remember what the Lord hath done."—HENRY VI., Part II.

1113. *In what manner should flowers be arranged in the hair?*

They must, on the one hand, be neither *numerous* nor *large* enough to appear to *encumber* the head; nor, on the other, so *few* in quantity, and insignificant, as entirely to *lose their individuality* of character among the tresses by which they are surrounded.

1114. When worn in wreaths, flowers ought not to be placed so low as to fall down upon and conceal the forehead. An air of stiffness is the certain accompaniment of an ill-arranged wreath, however suitable the materials of which it is composed. It ought not, therefore, to cross the head in a straight line, or be exactly uniform on both sides; but, on the contrary, traverse the head in a *slightly slanting direction*, with here and there a bud or a blossom peeping through, amongst a cluster of ringlets, or nestling amid a group of curls. There are few styles of beauty to which a judiciously assorted wreath of flowers will not give an additional charm. Wreaths ought not to be worn, unless when the hair is arranged in what may be called the ornate style; when simply braided they are out of place, although a bouquet is in some cases admissible.

Ornate.—Adorned. The state of being dressed for a party or ball.

1115. *Why should persons who are short in stature, and also those who have small features, not wear a profusion of tresses?*

Because, in the one case, it adds to the *appearance of dwarfishness*, and gives an *unnatural size to the head;* and in the other, it makes the face seem *less than it actually is,* causing what was merely *petite* to appear *insignificant.*

1116. *Why, when the hair is too distant from the eyebrows, should it be parted only in the centre?*

Because the hair is generally *lower in the middle* than at the *sides*, so that this arrangement serves to contract the too great distance between the hair and the eyebrows.

1117. *By what means can the teeth best be preserved?*

By keeping them in a *perfectly clean state.* In order to do this, they should be brushed *inside* and *out*, and on the *surface*, night and morning; the mouth should also be rinsed out after *every meal.* The tooth-brush must not be too hard, nor too broad; it should be moved in a *vertical* direction, or up and down, as well as *across* the surface of the teeth, so that the bristles may

"Have more than thou showest,
Speak less than thou knowest,
Lend less than thou owest."—LEAR.

penetrate the interstices, wherein particles of food are very likely to remain. The water for rinsing the mouth must never be *too cold*.*

1118. *Why should great caution be observed in using tooth-powders recommended as making the teeth look white?*

Because they mostly contain *tartaric* and other *acids*, which, though by their violent action they impart a temporary brilliancy to the teeth, cause them subsequently to become *discoloured*, and ultimately *decayed*.

1119. *Why should artificial teeth be inserted in the place of those that are lost?*

Because the remaining teeth, being *deprived of their support on either side*, depart from their natural position, and thus, in addition to having their masticatory powers more heavily taxed through the loss of their fellows, they loosen, and either drop out, or are so troublesome and painful, as to require extraction.

1120. *Why should no hard substance be used as a toothpick?*

Because it is apt to *chip away a part of the enamel* which shields and preserves the teeth, the removal of the smallest particle of which will endanger the health of a tooth.

1121. *Why do sympathetic pains in the body frequently accompany toothache?*

Because toothache frequently arises from general debility of the system. Bodily derangement manifests itself most intensely in the weakest part, and a decayed tooth becomes a kind of centre of morbid irritation. This irritation re-acts upon the nervous system; as one string set in vibration will impart vibrations to other strings, the excitement of one set of nerves is frequently transmitted to another set, causing sympathetic pains.

1122. Toothache may be divided into two kinds—the one is caused by *exposure of the dental pulp* or *nerve*, and creates a pain of a sharp, darting character. It may sometimes be temporarily relieved by placing in the cavity of the decayed tooth

* Saunders's *Information on the Teeth.* Skeffington and Southwell.

"When the sun shines let foolish gnats make sport,
But creep in crannies when he hides his beams."—COMEDY OF ERRORS.

a piece of wool dipped in camphorated spirit, or creosote; at others ice, or iced water held in the mouth, affords ease. These, and other remedies, however, are but palliatives; for as long as the tooth remains in a defective state, so long will the paroxysm recur.

1123. The other kind of toothache arises from *inflammation of the membranes investing the root of a tooth and its socket,* which thus become thickened, and cause the tooth to be slightly protruded; in closing the mouth, it therefore strikes against the upper tooth before the others meet, occasioning thereby severe pain.

1124. *Why does creosote relieve the toothache?*

It acts by coagulating the secretions, and thus forms an albuminous film, which affords a covering to the nerve.

1125. *Why does an impure state of the breath frequently originate from neglected teeth?*

Because the tartar which exists in the fluids of the mouth and forms in crusts on the teeth, affords a lodgment for *particles of food,* which not only corrupt, but *unite with the phosphate of lime* in the saliva, and tend much to increase the disagreeable smell.

1126. The following is a remedy for this unpleasant malady. Mix five to ten drops of muriatic acid in an ale-glassful of barley-water, and add a little lemon-juice and lemon-peel to flavour: this to be taken three times a day, for a month or six weeks.

CHAPTER XXXIX.

1127. *Why do we feel that air-beds or cushions become too hot?*

Because, being *bad conductors of heat,* the enclosed air, when made warm by contact with the body, retains its temperature, and produces an unpleasant sensation of dry heat.

1128. *Why are water-beds objectionable?*

Because, being made of waterproof material, *perspiration* is apt to accumulate upon them, and give *dampness to the bedding.*

1129. *Why are spring mattresses preferable to other kinds?*

Because, as well as being comfortable, they are *salubrious;*

"Repent what's past, avoid what is to come,
And do not spread the compost on the weeds
To make them ranker."—HAMLET.

they allow the perspiration of the sleeper to *escape freely;* and do not harbour insects, nor stagnate the air, like other kinds.

1130. *Why is it necessary to turn mattresses at frequent intervals?*

Because, when they are left unturned, the damp absorbed, by the side nearest the floor is *communicated through the other side*, and the bed to the bodies of the sleepers, and it also occasions the mattresses themselves to contract an unpleasant smell, and eventually to rot.*

1131. *Why is a hair mattress the most suitable to sleep on?*

Because, it is light, elastic, and durable, and from its peculiar properties passes off the matters it absorbs more freely than mattresses made of other materials.

1132. *Why is a lath bottom for a bedstead more desirable than one of sacking?*

Because the lower part of the bedstead being generally covered, *the air does not circulate so freely through sacking as through laths*, and also because sacking harbours *dust* and encourages *insects* to collect and propagate.

1133. *Why should a bed-room have an eastern aspect?*

Because it receives *the first rays of the sun*, and has time to become *cool again* before the time of retiring to rest.

1134. *Why, when fires are lit in bed-rooms for invalids, should they be lit some hours before bed-time?*

Because the fire warms the apartment prior to its being required for use; and prevents the cold and moist evening air from *acquiring possession of it;* when the fire is only just lit, it makes a *crackling noise*, and a fitful light, which prevents repose; and it is apt to throw *fumes* into the room which are prejudicial to health.

1135. *What position of lying in bed causes mal-formation?*

When the pillow is very *high*, and the bed *soft*, as in the case of feather and down beds, the attitude into which the body

* *How to Furnish a House.* Groombridge.

"Here's flowers for you,
Hot lavender, mints, savory, marjoram."—WINTER'S TALE.

falls during sleep is that of the loins *sinking in the bed*, the upper shoulder pushed out of its natural place, the back twisted, and the neck turned awry.*

1136. *Why should not flowers be suffered to remain in sleeping rooms during the night?*

Because at night-time they absorb *oxygen*, which is necessary to animal life, and emit *carbonic acid gas*, which is noxious.

1137. This opinion, which has hitherto been a popular one, is now open to doubt. It is found that the function of plants in the decomposition of air goes on most actively under the stimulus of *light*, and that, therefore, by day they purify the air by absorbing *carbonic acid*, and exhaling *oxygen gas*. By night this function is either *less active*, or *wholly suspended*; but it is very doubtful whether the reverse action takes place, *and that the plants by night give off carbonic acid gas*. Certainly the effects of a few cut flowers in a bed-room could not be pernicious. The chief danger from flowers in rooms arises from *neglect to change the water* in which they are placed. Vegetable decomposition occurs very rapidly in water, and *carbonic acid gas*, and *sulphuretted hydrogen* are both evolved by *decomposition*.

1138. Plants *when gathered* have a different property from that which they possess *when in a growing state*. While a plant lives, it absorbs in day-time *carbon* and gives out *oxygen*, but when separated from its soil or from the root the action is *reversed*. The vegetable substance then *consumes oxygen*, which is employed in burning or decaying the vegetable particles; *carbonic acid* gas is then evolved, which pollutes the air.

1139. In a series of very curious and interesting experiments made by Mr. W. White, it has been found that the medium state of the air of the atmosphere, or *good air*, being represented by from 60 to 64:—

Flowers of Ulmaria diminished the purity of air from	63	to 52
,, Ten-week Stocks	63	53
,, Mignonette	60	54
,, Calendula vulgaris	60	54
,, French ditto	60	55
,, Nasturtium indicum	60	55
,, Carnations	60	56
,, Tree Primrose	60	56
,, Antirrhinum	60	57
Leaves of Sage	61	55
,, Thyme	61	56
,, Mint, common	61	57
,, Ditto, pepper	61	57
,, Parsley	61	57

* *Art of Beauty*. Knight and Lacey.

"Bugle bracelet, necklace amber,
Perfume for a lady's chamber."—WINTER'S TALE.

In these experiments the air only stood in contact with the vegetables *half an hour;* but after 16 hours of standing together the purity of air was found diminished by—

Flowers of Ulmaria from		60 to	2
,,	Ten-week Stocks	60	1
Leaves of Sage		61	9

The vegetable substances were at the end equally sweet as when first gathered, and subjected to the experiment. Thus, vegetables, whilst fresh and free from the least degree of putrescency, have such a noxious tendency as to spoil the air, and render it not only useless but fatal to animal life. This is *most remarkable* in the *flowers*, next in the *leaves*.

1140. *Fresh fruits* have, in common with other vegetable matters, a great power in depriving air of its respirable good elements. The air being put to the test of ripe *gooseberries*, its purity was found to be diminished from 62 to 40.

1141. In order to find whether any part of the pernicious effects of vegetables upon air might be owing to their *odorous particles*, the following experiments were made:—

10 grains of Musk reduced the purity from		63 to	62
Half a drachm of	Camphor	63	62
	Assafœtida	62	62
	Saffron	62	62
	Opium	60	58
	Volatile Salt Ammoniæ	60	58

Musk and camphor were selected as examples of essential oils; the first of the animal, the second of the vegetable kind. The assafœtida as an instance of the fœtid odour; opium of the narcotic. Saffron, from its mode of preparation, is incapable of corruption whilst kept dry, and could give nothing but pure odour. The volatile salt was an example of the volatile odour.

Hence it appears that *pure odour* has little, if any, effect in polluting the air; and that the *odorous parts of vegetables, when separated by art from the putrescent, are by no means hurtful.**

1142. *Why are chimney boards in bed-rooms unhealthy?*

Because the chimney acts to the room as the wind-pipe does to the human body; when, therefore, the chimney place is stopped up, the room is, as it were, *incapable of breathing*, or of passing off the vitiated air which has been generated.†

1143. Next to the regular admission of air, the furniture of a bed-room deserves attention. The free circulation of the air should never be impeded by large sofas, easy chairs, or heavy draperies, composed of absorbent materials, with which we see bed-rooms so often encumbered. Let us rather take the chamber of the illustrious Duke of Wellington as a model bed-room, and arrange our own somewhat in the following manner:—An iron bedstead, or one of wood, it matters but little so

* *Philosophical Transactions*, vol. lxviii., pl. i., p. 194.
† *Hints on Domestic Sanitation.* Churton.

"Ingratitude, thou marble-hearted fiend,
More hideous when thou show'st thee in a child
Than a sea monster."—King Lear.

that it is of a simple form, placed nearly north and south, with the feet set in glass cups—the common thick glass salt-cellars answer the purpose exceedingly well—not nearer to any wall than from twelve to eighteen inches, and not in contact with any chair, table, or other thing. The curtains should not be of a thick material, gathered up into elaborate festoons and folds, but should rather be thin and loosely hung, so as to be easily removable. Conveniencies of every description of course there should be; particularly a large wash-hand stand, and *plenty of water*. Paint the woodwork of a light colour, but warm bird's-eye maple always looks pleasant and clean; it hides spots well. The floor should be covered with a plain drugget, not one of those staring, flowery patterns, but of a light, cheerful, yet warm design; it will throw out the rest of the room, and give a freshness to it, which is the great charm of a bed-room. Keep the windows well open, and have a sharp eye for dirt.*

1144. *Why should carpets not be nailed down in bed-rooms?*

Because in bed-chambers *dust and flue* are more liable to accumulate than in any other apartments, which render the frequent removal and beating of the carpets necessary to cleanliness and health.

1145. *Why should the whole body be cleansed with soap every morning.*

Because it is impossible, by any other means, to keep *the pores of the skin* free from the ever-accumulating result of perspiration. If the pores be not constantly kept free from this accumulation, the evaporative processes are interrupted, and *the liver* is immediately called upon to do a great deal of the work that should be performed by the skin. Now it takes this additional labour in dudgeon, and shortly becomes disordered, giving notice thereof by that "*pain in the side*," of which such numbers complain.†

CHAPTER XL.

1146. *Why should we strictly abide by the advice and directions of medical men?*

Because their knowledge and experience render them the *best guides*. We should aid them by open and intelligent com-

* Bardwell's *Healthy Homes*. Dean and Son.
† Cleve's *Domestic Sanitation*. Churton.

"Thus hath the candle singed the moth."—MERCHANT OF VENICE.

munications; but should never deceive them by pursuing a system of treatment varying from that which they advise, otherwise we may negative all the good they endeavour to do.

The medical men of the present day are greatly in advance of those of even a few years ago. Respecting the state of physic and philosophy in the seventeenth century, the following example may be quoted from a learned work of the time, "by Sir Kenelm Digby, Chancellor to the late Queen-mother of England," entitled "Chemical Secrets and Rare Experiments in Physic and Philosophy," published in 1683.

The following is therein given as "a very efficacious remedy against the epilepsie, or falling sickness, wherewith Sir Kenelm Digby cured a minister's son, named Mr. Lichtenstein, at Franckfort, in Germany, in the year 1659, certified by an eye-witness:—Take the skull of a man that died of a violent death, of the parings of nails of man, ʒij. Reduce this to a subtil powder, and grind it upon a marble stone; then take polybody of the oak very dry, ʒij.; mistletoe of the oak, gathered in wain of the moon, ℥ij.; mistletoe of the hasle-tree, mistletoe of the tile-tree, of each ʒij.; piony-root, ℥. Reduce all into a subtil powder," &c. In another part of the same work, an infallible cure for the toothache is said to be, for the person suffering therefrom to drive an iron nail into a post, and as the nail became covered with rust, the pain would pass away and never more return! What would the housewives of the present day say to the "philosophers" of that age?

1147. *Why is it obvious that some predisposed state of the body must exist in order to favour the communication of contagious diseases?*

Because, if it were not so, all persons brought into contact with an infected body, would suffer from the same epidemic; whereas it is well known that *some persons* may remain a long time with a patient who has a contagious disease and escape wholly *free from all taint;* while others, who simply *approach the bedside* of the sufferer for a moment, are soon afterwards *stricken with the same disease.*

1148. *Why are persons attacked with headaches and pains in their limbs on the approach of thunderstorms?*

The superabundance of *electric fluid,* with which the air is charged, acts upon the current of the blood in the human body by urging it forward with undue rapidity towards the brain, and depriving the limbs of their regular nourishment of the vital principle.

"The glow-worm shows the matin to be near,
And 'gins to pale his uneffectual fire."—HAMLET.

1149. *Why do healthy persons become infected with disease from being in proximity with a contagious distemper?*

Because the *exhalations emitted from the body* of the diseased person impregnate the air with poison, which is absorbed by the pores of the healthy person, and so contaminate his blood.

1150. *Why are persons more liable to contagion when the stomach is empty?*

Because the system is thus rendered languid and exhausted, and *unable to resist* the inroads of the noxious poison.

1151. *Why does any material change of diet produce a powerful impression on the system?*

Because, upon the quantity and quality of the aliment taken, depend the *quantity* and *quality of the blood;* and on the quantity and quality of the blood depend, in a great measure, the *energy of the functions* of all the organs.

1152. *Why is abstinence a powerful remedy in cases of fever and inflammation?*

Because abstinence, by the withdrawal of the fluids and solids, diminishes one of the main stimulants of the system which *excites and feeds inflammatory disorders.*

1153. *Why, when invalids seek change of air, should it be ascertained as quickly as possible whether the change is favourable to convalescence?*

Because, owing to peculiar properties in the atmosphere, the locality which is invigorating to one patient may be enervating to another; so that, in some instances, there is danger of the illness being *aggravated* instead of *alleviated.*

1154. A few examples will illustrate this meaning. Madeira is generally considered favourable to consumptive patients, but there are mady exceptions to the rule. Others have derived no benefit from Penzance, who have got well at Paris. Hastings suits some weak and tender subjects, while others fall a prey to an autumnal cholera that often prevails there. Some cannot live in the south of France where the gentle air blows; others who can bear that are compelled to fly the hot winds. To some patients the air of Bath is too relaxing; and to others the breezes on the Hampshire coast too bleak. These peculiarities are well known and yet inexplicable.

"As thick as honey-combs each pinch more stinging
Than bees that made them."—TEMPEST.

1155. *Why are persons who eat an excess of animal food peculiarly susceptible to disease, and likely to be short-lived?*

Because the *superabundance* of nourishment, which they introduce into their systems, stimulates their blood unnaturally, and produces an excitement too great for the powers of their constitutions.

1156. During the use of animal food the blood requires more frequent purifying by exposure to the air in the lungs, or by respiration. To effect this, not only is more frequent respiration necessary, but also the heart's action is increased, so that the blood is propelled with greater frequency and force, and consequently the distension of the vessels is increased. The greater frequency of respiration, occasioned by a greater demand for oxygen, during the use of animal food is illustrated by the experience of workmen in diving-bells, who require the air to be renewed much more frequently when living upon animal food, than when eating only vegetables. For this reason the pearl-divers of Ceylon, who live exclusively on rice and other vegetables, can remain much longer under water, without requiring to come to the surface to breathe, than any Europeans who live on a mixture of animal and vegetable food.

1157. *Why is the health of persons affected by a change of weather?*

Because the irregular distribution of *atmospheric electricity* occasions an irregular distribution of it in our bodies. Thus persons already weak, being deprived of a portion of their electricity, have their nervous systems affected; while those already in robust health feel in a relative degree the deprivation of this active agent of vital energy.

1158. Not only the functions of the body, but the operations of the intellect, as hey depend on the state of the brain, may suffer from any cause which disturbs the animal machine. We find that the mind generally partakes of the irritability of the nervous system in general; and that in particular kinds of weather, which affect the functions of the brain, persons find themselves incapable of the same clear and powerful exercise of the mental faculties, as they enjoy at other times.

1159. *Why do we catch cold sometimes from imprudent exposure, &c., and yet at other times, under precisely the same circumstances, escape the consequences?*

The probability is, that there are different conditions of the atmosphere, which act as specific stimuli, and excite corresponding diseased nervous actions, which are varied *according to the predisposed state of the body.*

"In food, in sport, and life preserving rest,
To be disturbed, would mad or man or beast."
COMEDY OF ERRORS.

1160. *Why are similar complaints apparently cured by different doctors by remedies of the most opposite character?*

The atmosphere exercises a much greater influence over health than is usually imagined; thus, during the slow and tiresome course of medicine to which patients frequently submit, it happens that, in the natural order of things, *obscure changes take place in the qualities of the atmosphere,* which, in reality, effect the cure.*

To this cause may also be attributed many of the "wonderful cures" effected by quack medicines.

1161. *Why may many diseases of the blood be cured more by moral influences than by medicines?*

Because, as those complaints frequently arise from *mental disturbances,* which have acted like a shock on the *animal fluid;* so by change of thought, occupation, and scene, the system is once more conducted into its regular current and *brought back to a state of calmness.*

1162. The following is confirmative of the efficacy of moral treatment:—A gentleman, engaged in duties involving considerable responsibility and anxiety, consulted Mr. Abernethy for the cure of a string of ailments, that rendered him incapable of performing the duties of his office. Mr. Abernethy reflected a moment, and then said he knew but one doctor who could effect a cure, and he lived in one of the most remote towns of Scotland. The gentleman, on hearing this, declared that from the nature of his engagements, it would be utterly impossible for him to leave town; but, upon repeated assurances of the promised cure from Mr. Abernethy, he at length determined upon quitting his business, and going in search of the Scotch doctor. He started by mail, full of hope and cheerful anticipations; and business, with its attendant cares, was entirely forgotten. The town was reached, but, after much search, the physician named was not to be found; no such person, no such house, no such street. Enraged at this piece of practical pleasantry on the part of the eccentric surgeon, the gentleman returned to London. Thoughts of a totally opposite nature to those which had previously engaged him now occupied his mind, and in the midst of his rage and disappointment all considerations of business were as effectually drowned as before. After a week thus spent in travelling, he arrived in London, hastened to Mr. Abernethy, and overwhelmed him with reproaches for the trick which had been played him. By way of answer, the surgeon smiled, and asked after the ailments about which he had been consulted a week previously. Thus questioned, the patient suddenly remembered that all his complaints had vanished in the course of the journey, and with many thanks he acknowledged the wisdom and tact of his adviser.

* Foster's *Atmospherical Origin of Epidemic Diseases.* Underwood.

"My brain more busy than the labouring spider,
Weaves tedious snares to trap mine enemies."—HENRY VI., Part II.

1163. *Why are aromatics active agents in digestive disorders?*

Because they act *directly upon the stomach* and intestinal canal, increasing the *vital* force of the former, and quickening the *muscular action* of the latter. They also communicate to the stomach a greater power of resistance to unpleasant sensations; as under their influence many articles can be borne by it which would otherwise be rejected.

1164. *Why should an invalid not see many visitors?*

Because speaking increases the exercise of the *respiratory organs*, quickening the circulation, and fatiguing the patient, and also because the respiration of the visitors *vitiates the air of the sick chamber*, which should be kept as *pure* and well ventilated as possible.

1165. *Why does a violent fit of anger frequently render persons ill?*

Because it occasions *an undue secretion of bile*, alters its quality, and often causes it to be absorbed into the blood.

1166. *Why do persons "tremble with fear?"*

Because passion excites the *irregular extension and collapse of the voluntary muscles*, and also produces relaxation of certain muscles called sphincters, which are usually contracted.

1167. *Why does pressing any part of the body affected with cramp against a resisting substance, relieve the pain?*

Because cramp arises from *one portion of the muscular fibre acting independently of the other*, and thus rising above its ordinary level, so that pressure of the part restores it to its level again.

1168. *Why do bitters act as a stimulant to the appetite?*

Because they heighten the vitality of the stomach by *causing an increased secretion of the juices essential to digestion;* and impart a *tone* to the muscular fibres of the stomach.

"As humourous as winter, and as sudden
As flaws congealed in the spring of the day."—HENRY IV., Part II.

1169. *Why should bitters not be taken habitually?*

Because they have a great tendency to increase the quantity of blood, both by *augmenting the appetite*, owing to which more food is taken, and from which a more nutritive and stimulating chyle is extracted, by which a *plethoric* state of the blood-vessels is induced, and all the attendant evils brought about.

1170. *What is the cause of fœtid breath in persons of a sickly constitution?*

In some, and probably in most cases, the *lacteals*, which are vessels that *absorb nutrition* from the alimentary canal, being in a morbid condition, they lose that selecting power by which in health they take up only the nutritive and reject the excrementitious matter. They absorb indiscriminately, and hence the sallow complexion and fœtid breath, since corrupt matter is carried into the blood, and ultimately thrown off by the lungs.

1171. *Why should the seeming caprices of invalids with regard to their diet be considerately attended to?*

Because their powers of *taste and judgment are impaired* with their health; and sometimes even in disease, the manifestation or cessation of appetite is the result of uncontrollable influences.

1172. It is well observed, by Dr. Percival, that the prejudices of the sick should never be contemned with wantonness, nor opposed with harshness; for, silenced by authority, they will operate secretly and forcibly on the mind, creating fear, anxiety, and watchfulness. If feelings of aversion are excited by the repast, the stomach will never act with healthy energy on the food; and in cases of extreme disgust, it is either returned, or it passes through the alimentary canal almost unchanged; on the other hand, the gratification which attends a favourite meal is in itself a specific stimulus to the organs of digestion, especially in weak and debilitated habits.*

1173. *What is the "crisis" of a fever?*

That state of the body, when the pores of the skin overcome their temporary obstructions, by which the fever has been occasioned, and perform their functions *agreeably to the exigencies of nature.*

* Dr. Paris's *Pharmacologia*. Highley.

"How sometimes nature will betray its folly,
Its tenderness, and make itself a pastime
To harder bosoms."—WINTER'S TALE.

1174. *Why should persons keep their bodies in motion in a warm bath, in order to derive the greatest benefit?*

Because, whenever a body is allowed to rest in water, that space of water will *acquire the same temperature as the body itself,* and consequently no further degree of heat is imparted or felt.

1175. *Why do we perspire freely after a warm bath?*

Because, while in the bath, the water has *prevented the access of air,* which is the most active solvent of the perspired fluid, so that exposure to the air again brings about a reaction, and causes perspiration to exude with increased force.

1176. *Why is cod-liver oil prescribed in cases of consumption?*

Because the emaciation of the body occurs from an excessive waste of the vital principle, and oily matters are calculated to *protect and nourish the tissues* through which the exhalations are emitted.

1177. *Why is the simple inhalation of prussic acid frequently productive of death?*

Because, at every point of the pulmonary tissue, there is a vascular tube ready to receive any substance imbibed by it, and to *carry it at once into the general current of circulation,* the potent vapour of prussic acid, therefore, *at once finds its way to the vital organs,* and arrests life.

1178. *Why is the action of poisons less hurtful and slower when applied externally, than when taken internally?*

Because, over the whole surface of the skin there is spread *a thin layer of solid inorganic, insensible matter,* like the varnish of Indian rubber, which acts as a barrier between the *external* surface of the body and *external* objects.

1179. *Why does the inhalation of ether produce unconsciousness?*

Because it is received into the flow of blood during respira-

"O still thy deaf'ning,
Thy dreadful thunders; gently quench thy nimble
Sulphureous flashes!"—PERICLES.

tion, which soon diffuses itself over the whole system, and the brain becomes wrapt as it were in a cloud of insensibility.

Mr. Erasmus Wilson states that he once amputated the thigh of a wagoner when under the influence of chloroform. The man was unconscious during the whole of the painful process, and seemed like a person in a deep sleep. When the operation was completed water was dashed in his face in order to arouse him, and he was asked how he felt. He replied that he was well and comfortable, and thought he must have been dreaming, for he had fancied that he was leading his horses into a river, and that one of them had splashed the water in his face.

1180. *Why can fat persons bear cold better than lean persons?*

Because fat is a *bad conductor of heat*, consequently the layer which is spread over the external surface, preserves the heat of the body.

1181. *Why should great care be observed in the selection of spectacles?*

Because, if the magnifying power of the spectacles chosen is *too powerful*, the eye, which passes naturally through a gradual series of changes, will be *too rapidly brought to its ultimate and final powers*—will be aged prematurely.

1182. *Why, in cases of deafness, is the hearing or not hearing the ticking of a watch pressed against the teeth a test of the extent to which the ear is affected?*

Because the solid bones interposed between the sonorous body and the nerve are *excellent conductors* of vibration. So that if the ticking be distinguished, the nerves of the ear are not affected, and if it be not, the nerves assuredly are.

1183. *Why is the human body shorter in stature at night than it is in the morning?*

Because the cartilages between the bones of the spine possess *yielding properties*, which are affected by the weight they bear. These cartilages become more close and compact from the perpendicular pressure they sustain during the day. But when this weight is removed by the body being laid in a horizontal posture,

"Thus are my blossoms blasted in the bud,
And caterpillars eat my leaves away."—HENRY VI., Part II.

the *elastic power of the cartilages* causes them to regain their expansion.*

1184. The following is an extract of a letter from the Rev. Mr. Wasse, of Northamptonshire:—"I have observed the difference in human stature in the morning and at night, both in sedentary people and day-labourers of all ages and shapes, and find the difference to be nearly an inch. I tried this experiment on myself, and at eleven in the morning fixed an iron pin in the wall, so as to barely touch it. After that I fatigued myself with a garden roller, and at half-past twelve I could not touch the nail, by about half an inch. Another morning, at half-past six, I touched the nail fully; and after the above-mentioned exercise for only a quarter of an hour, I fell short almost as much as before. On another occasion I sat up late with some friends, and at nine the next morning I could not reach the nail, though I had used no exercise; I rode out, but could not reach it that day. If I study closely, though I never stir from my desk, yet in five or six hours I lose nearly an inch. All the difference I find between labourers and sedentary people is, that the former are longer in losing their morning height, and on the whole, sink rather less than the latter. I cannot perceive that when the height is lost it can be regained by any rest that day, or by recourse to bathing, or other stimulating means.

1185. *Upon what principle does the human body grow old?*

The membranes, the ligaments, the tendons, and the cartilages gradually *increase in firmness*, proportionably diminish in flexibility and extensibility; and this change takes place in the *muscular fibre* also, as is manifest from the toughness of the flesh of animals used for food, the degree of which is in proportion to the age of the animal.

1186. Among other changes induced in the body by the progress of age, none is more remarkable, or has a greater influence in diminishing the energy of the system, than the change that takes place in the minute blood-vessels. These agents of animal vitality are numerous and active in the first stages of life, while they are organizing and building up the frame. But from infancy to childhood, from childhood to youth, from youth to manhood, and from manhood to old age, the number and activity of these vessels progressively diminish. Their coats, like other soft solids, increase in density and rigidity; their diameter contracts, and many of them become completely impervious, and finally disappear.

1187. *Why does the body grow so rapidly in the early stages of life?*

Because at that period the blood contained in the capillary *arteries*, whose immediate office it is to nourish the body, is much

* *Philosophical Transactions*, vol. xxxiii., p. 91.

greater than the blood contained in the capillary *veins*, and this disproportion of the distribution of blood in the two sets of vessels gradually diminishes, becomes balanced, and ultimately, in advanced age, is totally reversed.

1188. *Why is the body feeble in old age?*

Because the heart being diminished in energy no longer possesses the power of propelling the blood into the several organs at the same rate that it did in maturity. Hence the blood is sent into its various channels in *less quantity*, and at *longer intervals*, than formerly, and the materials of life which derive their source from the blood, become *vitiated and diminished*.

1189. *Why do persons lose something of their stature with advancing age?*

Because, in the progress of years, the cartilages gradually become *harder*, till many of them arrive to the *solidity of bone*. So that their expansive power is at length compressed into a continuous state of rest.

1190. *What are the expectations of life at any age?*

It is generally calculated that if you subtract the age of a person from 86, *half the remainder* will be the average expectation of life.

1191. *Why do bodies decay after death?*

Because the *oxygen* of the air, no longer opposed by the vital force, attacks the blood and tissues. The first effect is a degree of decay, and by contact of the decaying albuminous matter (now a ferment) with the entire albuminous compounds remaining, these putrefy, and are finally, by the process of decay and putrefaction, resolved into the organic food of plants, *carbonic acid, water, ammonia, and sulphuric acid*, while the *ashes* are restored to the soil.

1192. *Why should the chamber of a sick person have a northern aspect?*

Because the heat of the *mid-day and afternoon sun* is avoided. And the degree of air and light may be regulated, which cannot be done if the windows face any other quarter.*

1193. *Why should the sick chamber be furnished with a sofa?*

Because in many diseases the erect or sitting posture is injurious; and in every instance an occasional change from the bed to the sofa *admits of the bed being aired, refreshes the patient*, and makes the bed feel doubly comfortable when the patient returns to it.

1194. *Why should the bed of a sick person be placed in an unobstructed position, and have no curtains?*

Because in all illnesses it is of the utmost consequence that the body should be kept cool, and the most *perfect freedom given to breathing*, which can only be done by permitting no obstacle to intervene between the air and the patient's body.

1195. *Why should the greatest attention be paid to the bedding of a sick person?*

Because, as he *passes the most of his time in bed*, and the body is more susceptible during the period of sickness than any other, his present comfort and future recovery may be most materially influenced by the regulation of this matter.

1196. In all cases of disease, the mattress should be placed over the feather bed, and the pillows be firm and elastic. The Marseilles coverlets, which are spread upon beds during the day, and often retained at night, are heavy, and calculated rather to increase than subdue fever; consequently they should be discarded from the sick bed. If the room is sufficiently large, two beds should be placed in it, so that the patient can be moved from one to the other every morning and evening. The bed clothes of the bed from which the patient is removed should, on his removal, be immediately turned down and fully exposed to the air; a precaution which will set aside the necessity of so frequent a change of linen as would be otherwise required. When there is only one bed, and when the disease is fever (unless the patient is too ill to allow of his being removed), the sheets which have been used at night should be replaced by others in the morning, and hung up in the free air during the day, to be again used at night. But when it can conveniently be done, in every case of con-

* Dr. A. T. Thomson's *Domestic Management of the Sick Room*. Longman.

tinued fever, especially of an infectious kind, the sheets should be changed once in every twenty-four hours, which will prevent the fumes of infection from being communicated to the blankets, or to any of the furniture of the room.

1197. *Why should attendants upon persons suffering under contagious diseases, wear glazed gowns and aprons of oiled silk?*

Because textures of *wool, fur, cotton,* or any loose or downy substance, have capabilities of *receiving and retaining the air,* which, being charged with the *poisonous exhalations,* the infection is by this means communicated to the body.

1198. *Why should the curtains of the sick-bed, or the paper of the sick-room, not have patterns of a prominent or monotonous character?*

Because, when the eye of the sick person is *constantly meeting with certain figures,* his brain becomes *disturbed,* and his mind wearied, by tracing and following them.*

1199. A gentleman who was ill of a low nervous fever, accompanied by fits of mental aberration, would lie in his bed, with his eyes fixed intently on the opposite wall, continually muttering to himself, "Fourteen up, thirty-three across—fourteen up, thirty-three across." Notwithstanding the best medical advice, and every other effort that was made for his recovery, he still continued to lie in the same dreamy state, uttering repeatedly the same words. At length it struck the physician that the incessant reiteration of these words must be connected with some image presented to the mind through the eye. And it further occurred to him, that the paper of the room might afford a solution. The pattern of the room consisted of lozenge-shaped figures, which followed each other at regular intervals. On counting these, the physician found that the number exactly tallied with the patient's ceaseless refrain, namely, fourteen lozenges from the floor to the ceiling, and thirty-three from one end of the room to the other. Acting upon this discovery, he immediately ordered the removal of the patient to another room, where the paper was of a totally different pattern. This was done while the patient was asleep, and when he awoke he commenced mechanically with "Fourteen," but suddenly stopped, looked puzzled, and then smiled. From that moment he never uttered the old burden, his recovery came gradually and slowly, and he finally became convalescent. This gentleman used afterwards to relate that he had an indistinct recollection of certain figures which commenced with the lozenge form, but afterwards assumed a variety of shapes and colours, never, however, losing the identity of number, namely, fourteen up and thirty-three across.

* *Practical Suggestions for the Sufferings of the Sick.* Hatchard.

"When like the bees, toiling from every flower,
Our thighs pack'd with wax, our mouths with honey,
We bring it to the hive."—HENRY IV., Part II.

1200. *Why is wetting the floor of a sick-room injurious?*

Because the *slow evaporation from the boards* operates in the same manner upon the surface of the body as exposure to damp or foggy weather, and the increased sensitiveness of the body, to outward influences, during sickness, renders every evil doubly dangerous.

1201. *Why should glasses from which medicines have been taken be cleansed when they are done with?*

Because many medicines, *when they are exposed to the air*, rapidly *undergo changes* which *alter their properties*, and this alteration having been undergone by the small portion which is always left in the glass or cup, *communicates the tendency to decomposition* to that which may be next poured into the cup; and thus the properties of medicines may be altered, and their efficacy wholly neutralized.

1202. *Why is speaking distinctly better than whispering in a sick-room?*

Because whispering *stretches the attention to listen*, or else gives the trouble of *asking what is said;* and it may be *injurious to the sufferer* by exciting many inquiring ideas.

1203. *Why is it necessary that nurses should be able to read?*

Because, from the want of that knowledge, they are liable to *administer the medicines contrary to the written instructions;* many instances being on record where lotions and embrocations have been given instead of draughts, and thus caused instantaneous death.

1204. *Why is it necessary that nurses should be intelligent persons?*

Because invalids, owing to peculiarities of disposition and temper, demand different treatment. An excitable person has his natural irritability *augmented by disease*, and requires

"A stomach and no food,
Such are the poor in health; or else a feast,
And takes away the stomach, such are the rich."—HENRY IV., Part II.

gentle and soothing treatment. While, on the other hand, a mild and gentle disposition becomes by illness *over-sensitive*, and should experience a treatment in which firmness and cheerfulness are combined.

1205. It is sometimes politic for the nurse to be a stranger. Those with whom the patient is constantly familiar present no motives for composure, or suppression of irritation. There is frequently a sort of deference—an attention to—an expectation of help from—strangers, which is beneficial to the patient, and not so readily inspired by those whom he sees habitually and daily employed in other occupations. A patient sometimes observes, "Such a one does better for me, because I cannot make so free with her." "I never think of being impatient with her," &c.

1206. *Why should the looking-glass be removed from a sick person's sight?*

Because, when he is able to see himself, his altered features and attenuated form *distress his mind*, and awaken sad recollections of the past, and melancholy forebodings of the future.

1207. *Why should the sick-room be furnished with every article that is likely to be wanted?*

Because, from the want of having things *ready at hand*, the operations of the doctor are frequently impeded, the nurse flurried and disconcerted, and the patient irritated and worn out.

1208. The sick-room should be furnished with two tables. One of them may be small, to stand near the bed, for the immediate use of the patient, namely, to hold his jug of barley-water or other beverage; a small tea-pot, or, what is preferable, a half-covered cup with a spout, to enable fluids to be administered without raising the sufferer from his bed; his medicines for the day, and anything else which he may frequently require. The other table should be large, for the accommodation of medicines not in immediate use, and also for spare jugs, glasses, spoons, &c. This table should have a large drawer, furnished with the following articles:—broad and narrow tape; two or three half-worn ribbons; a bundle of old, soft linen; a sponge; a few ounces of lint; scissors, large and small; a bone spatula for spreading ointment; a roll of calico and flannel bandages two inches broad; a pincushion well supplied with pins; needles and thread; and adhesive plaster.

1209. *Why should persons in a sick-room be careful not to jostle the furniture, disturb the curtains, rustle the leaves of a book, &c.*

Because, trifling as these accidents may appear to a person

"You are like one that superstitiously
Doth swear to the gods, that winter kills the flies."—PERICLES.

in health, *to an invalid* they impart the *acutest pain;* disease has awakened in him a high degree of nervous sensibility, which extends the personality or identity of the invalid to everything which he touches, or which is nearest him; so that if, for instance, the sofa on which he may be lying is rudely pushed against and shaken, he feels just as though he himself had been struck.

1210. *Why should a sick person not see too many visitors during the day?*

Because, independent of the exertion which talking to them occasions, the patient becomes unduly excited while they are present, and when they are gone, a *reaction comes,* which impresses the invalid with sensations of *feebleness and loneliness.*

1211. *Why should the visitors to a sick person not appear in too high a flow of spirits?*

Because, by doing so, the visitor, instead of sympathizing with the patient, is exciting the patient to sympathize with him, which by thus *forcing exertion,* and an unnatural hilarity, begets *a tenfold dejection afterwards.*

1212. *Why should nurses and attendants on sick persons not have needles and pins stuck in their dresses?*

Because, in leaning over the patient, and administering various offices to him, the pins and needles are apt to drop into the bed, and ultimately find their way to the invalid's body, occasioning irritation, wounds, &c.

1213. A gentleman who was suffering from acute rheumatism had an application prescribed, which was carefully rubbed in by his wife, but the patient complained that instead of the ointment doing him good, he suffered more and more on each application. The complaint was long discredited, but at length he prevailed on his surgeon to examine the part minutely; this was done, when, in the flesh near the blade-bone, a small thread was perceived, which the surgeon pulled gently, and at length, by the utmost care, succeeded in extracting a long darning needle; and as the wife remembered that she was using one just before the first application, and had missed it immediately afterwards, there is no doubt but that she had stuck it in the

"All impediments in fancy's course,
Are motives of more fancy."—ALL'S WELL THAT ENDS WELL.

bosom of her dress just previously to the application, and that the action of her arm had occasioned it to fall out on to her husband's shirt, or some part of the bedding.

1214. *Why, when persons have infectious diseases, should the attendants stand on that side of the bed from which the current of air comes?*

Because, by standing in the current which has passed over the patient, the infectious exhalations are *blown upon them* in a direct stream from the body of the patient, which in consequence, favours the contagious tendency of the disease.

1215. The influence of infectious matter is evidently exerted on the nervous system, displaying itself by debility, inertness, dislike to motion, great susceptibility to cold, irritability and despondency of mind, and by the production of a disease similar to that of the person from whom the infectious matter has proceeded. The infection may be supposed to have taken effect, and to have produced the actual disease when the person who has been exposed to its influence is attacked with giddiness, pain in the head, irregular heat and chills, and nausea.

1216. *Why should the temperature of the sick chamber be regulated with the greatest care and discretion?*

Because the temperature of the apartment *considerably influences the state of the patient.* Persons labouring under high delirium in a close, ill-ventilated room, will become speedily collected, by lowering the temperature twelve or fifteen degrees. And pulmonary subjects, suffering from severe cough in a moderate temperature, will gain immediate relief by five degrees of additional warmth.

1217. *What is the difference between contagion and infection?*

The term *infection*, in its most extensive signification, implies some deleterious matter, originating from any source, and transmitted through the air, which is capable of causing diseases to the human body. When this matter is emanated from the diseased bodies of men, the term is frequently regarded as synonymous with *contagion;* but, in strictness of language, the latter refers only to the communication of disease by *contact.*

"Things without all remedy
Should be without regard."—MACBETH.

CHAPTER XLI.

1218. *Why are bugs, fleas, &c., so prevalent?*

Because people *do not understand their habits*, and consequently cannot apply *effective remedies.* It is well known that no person thinks of applying bug-preventives until they see the tormenting creatures full grown, and *after* they have deposited thousands of eggs, which, in a short time, give existence to legions of those pests.

1219. The defective information upon a matter of so much importance to domestic comfort is greatly to be regretted. We have done our best to remedy the deficiency. As an instance of the labour we have had to go through, to collect a few popular and useful facts relating to these plagues, we may state that we have referred to all kinds of Encyclopædias, Entomologies, and works of every description likely to afford the necessary information, and that it has been only by collecting one fact from one source, another from another, and so on, that we have been able to produce anything like an intelligible account of the *habits* of these nocturnal depredators.

Referring to an Encyclopædia, the word Bug, we found *see Cimex;* turning to Cimex, we at last arrived at *C. lectularius* (the bed bug). The following was the information derived from this source :—"Ferruginous ochre; thorax deeply emarginate, its sides reflexed; abdomen suborbiculate, acute at the apex, third joint of antennae longer than the fourth; rostrum inflected beneath the thorax; labrum short, broad, subovate, trigonate, and ciliated!"—with some more description in the same style. No wonder our housewives are puzzled how to vanquish the enemy whose armour and entrenchments are thus ambiguously described by those who should supply simple instructions for the best mode of attack.

1220. *When do bugs propagate?*

Bugs propagate in the *early part of the summer;* therefore, to be effective, the means of *prevention* should be adopted just before the *termination of spring;* and the warmer the spring, the earlier should the preventive measures be adopted. They are generated *from eggs*, of which a single female lays a large number. These eggs are of *whitish colour*, and each fixed to a small hair-like stalk, which, when the egg is first deposited, is apparently of a glutinous nature, and readily *adheres to anything* which it touches. *The places generally chosen* to deposit the

"By medicine life may be prolonged, yet death
Will seize the doctor too."—CYMBELINE.

eggs in are crevices of bedsteads and other furniture, or the walls of a room. In about three weeks the eggs hatch, and the young one comes forth.

The female is *larger than the male,* and she continues to deposit eggs during the whole of the summer months.

The young are similar in shape to the old; but they are *very small and white,* and are therefore apt to be overlooked.

1221. It is astonishing what masses of animalcula are engendered in beds. Beds should, therefore, every seven or ten years, be sent to a purifier, who will cleanse the feathers by steam, and return the beds perfectly clean and wholesome. As it is well known that insect life may be destroyed by odours, we have at once the way pointed out by which those domestic nuisances, fleas and bugs, those "terrors by night," may be extirpated. Take the bedsteads to pieces, and brush over the joints with spirits of turpentine, in which a lump of camphor has been dissolved, and you will rid the bedsteads of the nuisance.

1222. If these noxious vermin have effected a lodgment in the floors and walls, chloride of lime is the best remedy; and this may be purchased at the oil shops for fourpence a pound. Mix a pound of the chloride in a basin with cold water, to a pasty consistence, and pour it into a pail of cold water; brush the floor over with the mixture, using an old hair broom or a hearth brush for the purpose. When the boards and walls are well saturated—which must be done quickly, or the eyes and lungs of the operator will be affected by the vapour of the chloride—close the doors and windows of the room, and in a few hours these pests will be annihilated. If, however, any should be suspected to lurk in holes and corners or crevices, repeat the operation in those places in about two or three days, to "make assurance doubly sure." A whole house may be thus cleansed for less than one shilling besides the labour.*

1223. The plan of fumigation by chloride of lime is very efficacious where the bugs have taken possession of the *walls and floors*. But it requires that every article of furniture should be removed from the room, *and treated by a different process*, as the chloride exercises a bleaching effect upon all coloured bodies.

The following preparation is very efficacious when applied to the crevices of furniture; but it is a strong poison, and should be used only by careful persons, and any of the remaining preparation should be put carefully away or destroyed:—Take half an ounce of corrosive sublimate, and six ounces of lard. Rub the sublimate into a fine powder in a marble mortar, adding a few drops of salad oil, until its particles are minutely divided. The lard should then be added little by little, till the whole is well mixed; and, lastly, as much more oil as will make the mixture of the consistence of thick paint. Take the bedstead to pieces, and brush some of this mixture into every crevice. This is a better preparation than the one given (1221),

* *Bardwell's Healthy Homes.* Dean and Son.

" As summer flies are in the shambles
That quicken with the blowing."—OTHELLO.

because it does not evaporate; and moreover it destroys the *nits*, as well as the insects already hatched. The application of these remedies early in the summer, with the general observance of *cleanliness*, will free the most infested apartments from bugs.

1224. *When do fleas propagate?*

Fleas propagate at *all seasons*, but *chiefly* in the summer. They infest the bodies of domestic animals, beds, mats, carpets, crevices filled with dust, and the flock which accumulates under beds; indeed, in any place that will afford them shelter and *protection from light*.

They are bred from *eggs*, of which a single female lays *ten or twelve every day*, for five or six successive days. The eggs are of a whitish colour, and attach themselves to hairs or to woollen surfaces, by their natural adhesiveness. They are generally abundant upon footstools or mats that are resorted to by cats and dogs. These should therefore be frequently beaten out of doors.

The young, when first hatched, are quite unlike fleas. They resemble minute worms, are very slender, and about the sixteenth of an inch in length. In this state they would not be recognised as fleas by persons unacquainted with these facts. They are very active, and frequently coil themselves up.

These larva, when they are about to change into perfect fleas, enclose themselves in a little cocoon of a silky substance, from which they emerge at the end of a few days. The female flea is larger than the male.

1225. As fleas generally attack children, it may be useful to know that *a lump of camphor kept in the water-jugs* from which the water is taken for washing purposes, will protect the skin from the attacks of these troublesome creatures. A stronger camphor water may be used for washing dogs, &c., and a little camphor powder may be sprinkled upon cushions, &c., infested with fleas. Remember that *cold*, *light*, *perfumes*, and *ventilation* are inimical to fleas, and that blankets and clothing infested with them may be freed from them by exposing those articles to the salubrious influence of those agents.

According to Old Tusser, the sprinkling of wormwood powder is an efficacious preventive of fleas. He says—

" While wormwood hath seed, get a handful or twain,
To save against March to make fleas to refrain.
Where chamber is swept, and where wormwood is strown,
No flea for his life dare abide to be known."

"When we have stuff'd
These pipes and these conveyances of our blood
With wine and feeding, we have suppler souls."—CORIOLANUS.

1226. *Why does a bug-bite occasion so much pain and annoyance?*

Because bugs are furnished with organs which act like *lancets;* they make an incision with these, and then insert a tube through which they draw drops of blood.

1227. *When do moths propagate?*

Moths spring from eggs which have been deposited *during the previous summer,* on different articles, by the parent insect. They at first appear in the *caterpillar form,* and in this state, they live for some months in the cloth or fur, where they had their birth.

1228. Furs, shawls, and other articles, when put away for the winter, should previously be well beaten. They should then be put away in boxes or drawers in which *camphor, Russian leather,* or other *odorous substance* has been laid. As odours do not sufficiently penetrate furs and woolly fabrics, *pepper* or *snuff* may be dusted into those articles which will not be injured thereby, and from which it may be beaten in the spring, when the articles are required for use.

1229. *Why is cloth, &c., eaten away by moths?*

Because the *caterpillar of the moth* manufactures its own garment out of the hair, fur, or wool upon which it feeds.

1230. The garment of the caterpillar moth is always of the same colour as the stuff from which its raw material has been taken; if the insect, enveloped in a blue coat, happen to remove to a piece of red cloth, the additions which are immediately afterwards made to its covering will be of a red colour; if it happen to travel over cloth of different colours, its garment will exhibit a corresponding variety of hues.*

1231. *When do lice propagate?*

Lice propagate generally in the *summer;* but in *filth* and *disease* they appear at *all seasons.* They are developed from eggs, which they *gum* to the stalks of hairs.

According to Leuwenhoek, their nits, or eggs, are not hatched till the eighth day after they are laid, and they do not themselves commence laying until a month old. It has been

* *Natural History of Insects.* Murray.

ascertained that a single female may, in eight weeks, give existence to five thousand descendants.

1232. *Why do lice frequently appear upon the human body before an attack of ill health?*

Because they live upon *animal moisture*, and it is supposed that some morbid secretions are more favourable to their development than the more healthy fluids. Hence the appearance of lice upon a cleanly body has been understood to indicate a *bad condition of the blood*, which is the foundation of disease.

1233. *Why are crickets so often found in newly built houses?*

Because, being a thirsty race, they are continually searching after everything that is *wet or moist*, and this moisture is yielded by the walls of new houses. Also because the softness of the mortar enables them to burrow and mine between the joints of the bricks or stones, and to open communication from one room to another.

1234. *How is the peculiar noise made by the cricket produced?*

By the male elevating its *horny wing-cases* and rubbing their rough margins briskly together. The shrill note, "*cree-cree*," being intended, so is supposed, as a call or signal to the female insect.

1235. *Why is furniture frequently perforated with little round holes?*

The holes are chiefly caused by the depredations of a small beetle, commonly called the *death-watch*. These insects live entirely upon wood; they deposit their eggs near some crack in a piece of furniture, or on the binding of an old book. As soon as the *larvæ* are hatched, they begin to eat their way into the furniture on which they have been deposited; and when they have attained a sufficient depth, they undergo their transformations, and return by another passage as beetles.

1236. These insects, when they attack books, are called *book-worms*. Old books that are seldom used are frequently bored through by them. As many as *twenty-seven folio volumes*, standing side by side, have been bored through by this insect.

1237. *How is the sound commonly called the "death-watch" produced?*

It is occasioned by a species of beetle belonging to the timber-boring genus. When spring has far advanced these insects commence their ticking, which is a call to each other, and to which, if no answer is returned, the animal repeats in another place.

1238. This singular sound is thus produced. The animal raises itself on its hind legs, with the body somewhat inclined, it beats its head with great force and agility on the plane of position; and its strokes are so powerful as to make a considerable impression if they fall upon any substance softer than wood. The general number of distinct strokes in succession is from seven to nine or eleven. They follow each other quickly, and are repeated at uncertain intervals. In old houses, where these insects abound, they may be heard in warm weather during the whole day. The noise exactly resembles that produced by tapping moderately with the nail on the table; and when familiarized, the insect will answer very readily the tap of the nail.

1239. *What causes the itch?*

It is an inflammation of the skin, *caused by a mite*, which produces the disease by making its abode in the pores of the skin, and the disease can be communicated from one body to another by continued approach, especially during the night.

1240. *Why is the itch more troublesome by night than by day?*

Because the itch mite is a *nocturnal* animal.

Nocturnal.—Pertaining to night. In this sense, active by night.

1241. The remedy for this disagreeable complaint is repeated applications of *sulphur-ointment* well rubbed in once or twice a day, until a cure is effected; this should be accompanied by taking internally a spoonful of *flower of sulphur* mixed with milk or treacle, every night and morning. Liebig says that the disease can be cured by the simple rubbing in of brickdust.

1242. *Why does sulphur ointment destroy the itch insect?*

Because, under the action of the moisture of the skin, the ointment evolves *sulphuretted hydrogen gas*, which is fatal to the animalcula.

1243. *Why are hams, bacon, &c., frequently perforated?*

Because there is a *similar beetle to the death-watch* which lives by boring through animal substances. They attack hams and bacon, of the skin of which they are fond; but they will also devour the flesh. This insect is called the *bacon beetle*.

1244. *Why are decaying meat and other substances in a short time overrun with maggots?*

Because various flies, and especially the *blow-fly*, which is a hairy, black, insect, with a shining abdomen, deposits its eggs in the flesh, and these eggs in a few hours produce maggots. The maggots, after a few days, turn into *crysalides*, and in ten days more they become *perfect flies*.

1245. These insects are of great service in the economy of nature, their province being the consumption of decaying animal matter, given out in such small quantities that they are not perceptible to common observers, neither removeable by the ordinary means of cleanliness, even in the best kept apartments in hot weather. It was asserted by Linnæus that three of these flies would consume a dead horse as quickly as a lion. This calculation had reference to the offspring of such three flies. A single *blow-fly* has been known to produce twenty thousand maggots. The young begin to eat as soon as they are born, and they continue to eat so voraciously, that in twenty-four hours they increase their weight above two hundred times, and in five days attain their full size. In the body of a dead horse, lying putrefying in the sun, a million of these maggots would be produced in a very short time. Without calculating upon the operations of a greater number, the result of propagation, let us consider the effect of a million of these creatures feeding upon the carcase, and then flying away in the air, thus dispersing harmlessly matter which, if it continued to putrefy, would poison the atmosphere for a considerable space around the neighbourhood where it lay.

1246. *What occasions the hum of flies in their motions through the air?*

The *friction of the base of the wings against the thorax*, the noise from which is louder or lower according to the speed or slowness of flight.

1247. *Why do we see flies walking so slowly in winter?*

Because as their feet are furnished with a *hollow cup*, which is acted upon by the atmosphere in the same manner as a

"There's nothing situate under Heaven's eye
But hath his bound in earth, in sea, in sky."
COMEDY OF ERRORS.

sucker, their diminished strength in winter time is unable to overcome, without much difficulty, the resistance which the air offers to their feet.

1248. The best way to protect gilt frames, and other articles of furniture, from being injured by flies, is to cover them with varnished tarlington before the time the flies make their annual visits.

1249. It is not generally known that *flies will not pass through a netting* made of fine silk, thread, or wire, *even though the meshes be an inch apart*, unless there is a window or light behind it. This affords us a ready means of excluding these insects from all our apartments which have windows only on one side of them, without keeping the latter closed. It is merely necessary to have an ornamental netting stretched across the opening, when, although flies may abound on the outside, none will venture into the rooms so protected. If, however, there is a window on the other side of the room, they will fly through the netting immediately.*

1250. The best preparation as a fly-destroyer is the French "Papier Mouré," which requires only to be laid upon a plate and kept in a damp state, to be highly effective. The flies sip and fly away, apparently unaffected, but they soon afterwards drop dead. These papers are made by steeping in a strong solution of *nux vomica*. They are easily made when they cannot be procured.

1251. *When do beetles, cockroaches, &c., propagate?*

They chiefly propagate in the summer; but more or less all the year round.

The female of the cockroach lays one or two singularly formed capsules, of a long square shape, with one side rounded, and shelving down, with the margin straight and saw-shaped on the other. When fresh it is white and soft, but being exposed to the air, becomes hard and brown. The capsule contains sixteen or eighteen eggs placed in two rows; the young make their escape through a cleft on the left-hand side, and their metamorphoses are very similar to insects of the same order.

Warmth and *damp* are essential to the propagation of these insects, and they are sure to accumulate in great numbers, and prove very destructive, where continual pains are not taken to keep them down.

The following is the easiest and most efficacious method of exterminating them. Take 1 lb. of fine flour, 2 lbs. of the finest plaster of Paris, 3¼ lbs. of fine soft sugar, and mix these ingredients intimately. Have the hearthstone taken up, and lay the above preparation in handfuls in all the spaces underneath. Lay it all down at once, so as to give them a lasting supply. The advantage of this preparation is, that it is cheap, efficacious, and *not poisonous* to other animals. It kills the beetles by drying up their insides, and the amount given will last them for a year or two. If you object to have the hearthstone taken up, fill all the crevices and holes that you can find. But removing the hearthstone, and laying the whole quantity of the preparation underneath, is the best remedy.†

* Cooley's *Cyclopædia of Practical Receipts*. Churchill.

† For methods of exterminating rats, mice, &c., see *Enquire Within upon Everything*. Houlston and Wright.

"I think this be the most villainous house in all the London road for fleas; I am stung like a tench."—HENRY IV., Part I.

1252. *Why does camphor, and other odorous bodies, expel moths from clothes?*

Because the odours given out by those bodies are *noxious to insects of the moth and other tribes.* But such odours are seldom powerful enough to penetrate the whole of the material they are designed to protect, unless those materials are *frequently turned and brushed,* so as to remove the grubs and eggs of the insects, and to submit them more thoroughly to the action of the odours.

CHAPTER XLII.

1253. *What are chilblains?*

Chilblains are occasioned by the *impetuous return of blood* into vessels that have been previously emptied, and weakened and prostrated by the chill.*

1254. Thus it is after coming in from the cold and sitting down by the fire that the great suffering from chilblains ensues; in other words, by the aggravation of a cause which induces *an increased rush of the blood's current.* Hence also it is that heat in all shapes gives rise to the production of itching, or increases the itching when already in existence.

1255. *Why will rubbing a chilblain with snow relieve it?*

Because by rubbing the chilblain with snow, *it produces a combination of friction and heat* a degree above that of the benumbed part; and by the continuation of the friction, the temperature of the fluids used in the process may be increased, until circulation is *gradually* restored to its proper degree.

1256. *Why are bandages efficacious when applied to inflammation in the lower limbs.*

Because they give support to the vessels, and aid in the movement of the blood towards the heart.

* Erasmus Wilson, *On the Skin.* Churchill.

"Though gold bides still,
That others touch, yet often touching will
Wear gold."—COMEDY OF ERRORS.

1257. *What are warts?*

Warts are formed by a collection of layers of skin; excited to artificial growth by an exuberant vitality of the system, or undue local irritation.

1258. *Why do corns form on the feet?*

Because the pressure from which corns commonly arise confines certain nutritious humours destined for more enlarged uses of the skin to one particular spot; and from this *excess of nutrition*, the skin so fed grows to unnatural proportions.

1259. *Why do corns situated between the toes remain soft?*

Because, owing to that part of the feet being unexposed, there is always *a moisture existing* there, which the corns constantly absorb and retain.

1260. *Why should a corn be cut in the centre, and the surrounding parts left unpared?*

Because by this means the most prominent and sensitive part of the corn is removed from the pressure of the leather, and the edges that remain *act as a bolster*, to protect the central portion known as "the root."

1261. *Why do scalds and burns occasion blisters?*

Because the secretory arteries of the skin are excited to such an unusual degree of action, by the stimulus of the heated body, that they *pour out an aqueous fluid* in such quantity as to *lift the skin* and form bladders full of fluid.

1262. *Why, in cases of severe scalds and burns, do the lungs become affected?*

Because they exhale the same aqueous fluid as the skin; and, in proportion as the perspiration is diminished, *the pulmonary transpiration is increased;* but when a large extent of the skin is destroyed, the lungs are inadequate to the extra task imposed on them, not being able to perform their own work and that of the skin also, and consequently they become oppressed.

"Indued with intellectual sense and souls
Of more preeminence than fish and fowls."—COMEDY OF ERRORS.

1263. *Why should persons, when they catch fire, immediately roll themselves upon the floor?*

Because the upright posture is obviously not only favourable to the spreading of the flames, but to their *reaching the more important parts of the body*, the neck and the head. Running about is also extremely dangerous, as the motion of the body gives great advantage to the flames, by bringing fresh currents of air into contact with the burning materials.

1264. *Why is the shock arising from a severe scald more painful than that arising from a corresponding burn?*

Because, in cases of severe burning, the textures of the body are at once destroyed and *cease to have sensation*, whereas scalds, except from heated metals, pitch, oil, &c., seldom destroy the textures.

1265. In cases of burns or scalds, the affected parts should be immersed in cold water, ice-cold if it can be obtained. Should the position of the parts not admit of their immersion in water, cloths, which have been dipped in water, should be applied to them, and kept constantly wet. Some persons recommend, instead of these cooling applications, stimulants; such as brandy, spirits of wine, oil of turpentine, or vinegar, to be kept on the affected parts by means of old linen, or lint soaked in the fluid. The use of these applications, whether the cool or the stimulating, should be persisted in until the pain ceases; the parts should then be dressed, as some recommend, with the yellow basilicon ointment, softened with the oil of turpentine; or, as others prefer, with emollient poultices, often renewed. It is singular that, common as this piece of surgery is, practitioners are not agreed which of these two plans, the cooling or the stimulating, is the most efficient; and comparative trials have not yet been made on a scale of sufficient extent to determine the question. It is probable that the one may be more advantageous than the other under different circumstances, which the unprofessional person cannot be expected to discriminate. After all, perhaps, the only thing that should determine the choice between either the cooling or the stimulating articles is *the facility with which they can be got*.

It is probable that the chief effect of all these applications is *to prevent the air from coming in contact with the true skin*. Accordingly some of the most distinguished surgeons state that they have produced the very best effects by merely covering the affected parts with old linen saturated with oil, by which the air is effectually excluded. On this ground, it is probable that a remedy, occasionally recommended, will prove in practice as useful as any, namely, *enveloping the part in cotton;* which would be a more acceptable remedy than any, both on account of its lightness, and from the ease with which every mistress of a family can always have an abundance of it at hand.*

* *Penny Cyclopædia*. C. Knight and Co.

"The air
Meekly and sweetly recommends itself,
Unto our gentle senses."—MACBETH.

1266. *What is the nature of "flesh worms" so called?*

They originate in the obstruction of the small hair-like pipes which carry off the fluids from the skin, the moisture in which not getting a free passage, becomes thick, and closes altogether the mouth of the pipe, where the greasy moisture, thickened by stagnation, catches and combines with the dust, and other impurities floating in the air, and soon assumes that black appearance which spots and disfigures the surface of the skin. If, at this stage of the formation of the pimple, it is squeezed on both sides between the nails, the thickened matter contained in the little pipe will escape *in the form of a small white worm, with a black head.* But the common opinion that such pimples are caused by worms or grubs is quite erroneous.

1267. The tendency of the skin to form these black-headed pimples, depends on bilious disorders, indigestion, acidity, or some derangement of the stomach. So that the most effective mode of removing these disfigurements is by correcting the complaint which occasions them.

1268. *What is the cause of whitlows?*

Whitlows generally have their origin in causes of a local nature, among which may be enumerated the following:—*a contusion; suddenly warming the finger when it is exceedingly cold; pricking with a needle or other sharp instrument; the insinuation of irritating matter into the scratches on the finger; and the lodgement of splinters or thorns.*

1269. *Why are boils not healthy?*

Because their very existence proves a disordered system, and the only way in which they can be said to be healthy is, that the humours which they contain are more easily disposed of *when presenting themselves externally,* than they would have been had they remained within.

1270. *Why do some parts of the body "chap?"*

Because where the scarf-skin is shrivelled, and consequently raised from the true skin, *either by heat or cold,* it cannot be brought to unite again, and leaves the true skin, which is

"I pr'ythee go and get me some repast;
I care not what, so it be wholesome food."—TAMING OF THE SHREW.

acutely sensible, quite bare, raw, and sore; and this soreness soon causes irritation and inflammation.

1271. *Why do "styes" form on the eyelids?*

They arise generally from a *disordered state of the blood;* and may be specially induced by acrid irritating food, or the immoderate use of ardent spirits.

1272. *Why do our eyes become inflamed with weeping?*

Because, under the excitement of the brain, the eyes become hot and dry; this induces an increased flow of blood to them, and *tears,* formed from the watery parts of the blood, overflow the glands, and lubricate the heated surface of the eyes. This tear-water, being suddenly abstracted from the blood, retains a portion of salt; the *saltness* of tears is known to every one. But the natural fluid of the eye—that which is secreted *expressly to moisten its surface,* is, like the saliva of the mouth, free from salt, an ingredient that would render it very unfit to moisten and cool the delicate surfaces of the eyes.

Our eyes, therefore, become red, not only from the increased flow of blood, and the excitement of the brain, but from the *salt* which escapes with the tears from the blood.

1273. *Why has the free use of cold water so salutary an effect on the skin?*

Because, in consequence of the loss of heat, there is an accelerated change of matter in the *cooled parts,* and the action of oxygen being directed to the skin, *the activity of the pores of the skin is augmented,* and the waste materials more quickly and entirely thrown out of the system.

1274. *Why is flannel better than linen, cotton, or silk, for wearing next the skin?*

Because woollen clothes have a greater attraction for moisture. The perspiration of the human body being absorbed by a covering of flannel, *the pores of the skin are disencumbered, and kept continually well drained.* This property is not to be confounded with another advantage possessed by wool, that of being a bad conductor of heat, and consequently also a good protection both against heat and cold.

1275. *Why are our feet not so easily kept dry as our bodies?*

Because the *vapour of the skin,* even after passing through worsted stockings, must in some measure be obstructed by the leather of the boots or shoes.*

1276. *Why is the wearing of comforters and wrappers round the throat and mouth injurious?*

Because the impure air which is exhaled from the lungs is impeded in its passage, and is in part re-inhaled. The breath, also, *being retained between the skin and the wrapper,* becomes cold, and produces a sensation of chilliness and damp.

1277. *Why does a respirator relieve diseased lungs?*

Because the silver wire gauze through which the air passes, before it enters the mouth, communicates the heat which it receives from the *expired air* to the *inspired air,* by which process the temperature of the cold air is *regulated,* and rendered more consonant to the atmosphere of the lungs.

1278. *Why do persons "huddle themselves up" in the cold?*

Because there is always a stratum of warmer air immediately surrounding the body, than there is at a more remote distance; so that the body instinctively endeavours *not to disturb this partial warmth* and admit the cold lying beyond it.

1279. *Why does active exercise raise the temperature of the body?*

Partly because every muscular contraction is attended by the development of one or two degrees of heat in the acting muscle, the heat increasing according to the number and rapidity of these contractions. Partly, also, because some degree of heat is generated in the various movements of the

* Vaughan's *Essay on Clothing.* Gilman.

other tissues, as the arteries, whose elastic walls, alternately dilated and contracted, may give out some heat, just as caoutchouc, alternately stretching and recoiling, becomes hot.

1280. *Why is the sense of smell partially lost when persons have a cold?*

Because the matters of odour must in all cases be dissolved in the mucus of mucous membrane before they can be immediately applied to, or affect the olfactory nerves. When persons have a cold, therefore, the secretion of mucus within the nostrils is lessened, and the organ, having parted with its accustomed moisture, is *unable to absorb the odours* that are presented to it.

1281. *Why is exposure to cold during sleep especially dangerous?*

Because, during sleep, the body has its power diminished of producing heat, and consequently of maintaining the temperature to which it is accustomed.

1282. *Why is nailing list, &c., round doors injurious?*

Because, when the door is shut, the room becomes so hot, owing to the exclusion of a free current of air, that it has to be opened from time to time in order to ventilate the apartment; and this admission of cold air into the previously overheated room, occasions a *variation of temperature*, which is both unhealthy and inconvenient.

1283. *Why is the use of fans in crowded rooms objectionable?*

Because the tendency of air to mix is increased by agitation; and the breath being prevented from ascending by its own levity, and forced to mix with the surrounding fresh air, the *foul production of respiration is inhaled a second time.* Hence the air in crowded rooms, and especially in places where it is tainted by disease, should not be agitated, except when it is passed in large quantities for the sake of airing or purifying the place.

1284. *Why in rooms does the hot vitiated air find an exit at the highest point?*

Because the vitiated air as it leaves the chest, has nearly the

"Rich honesty dwells like a miser in a poorhouse, as your pearl in your foul oyster."—AS YOU LIKE IT.

temperature of the blood, viz. 98°, and thus being specifically lighter than the surrounding air, *it ascends, and must escape to a higher level.**

1285. *If hot vitiated air generally ascends and is removed out of our way, how is it possible for us to breathe a vitiated air?*

We must never overlook that the breath is, when first exhaled, *lighter*, but when cold, *heavier* than pure air; for it contains the whole of its original ingredients, with the addition of a portion of carbon, which adds only to its weight, and not at all to its bulk. On the whole, then, the vitiated air would sink to the ground were it not for its warmth, to which alone it owes that occasional force which removes it out of the way of a second respiration. As soon as it has cooled down to the temperature of the surrounding air, this relation is reversed; and, the impure air being now heavier than the pure, it *descends, to be breathed over again,* and in this condition it acts as a poison. Consequently, in our rooms an exit should be provided for the vitiated air, which, while still hot, would escape if allowed.

1286. *What is the explanation of the choking sensation caused by food "going the wrong way?"*

These cases arise from either solids or fluids having been *accidentally drawn into the wind-pipe* in the act of inspiration, and it can therefore be readily understood how that speaking while we are eating renders us liable to this accident.†

1287. It may be doubted whether the common practice of taking a little drink really does any good on these occasions, but as it is unattended by any evil, it may be resorted to. When we reflect that the offending matter is in the windpipe, and that the drink goes down the gullet, it is perfectly clear that it *cannot be washed down*, as is commonly believed; still, however, it is possible, that the act of swallowing the drink, may, by suspending for a time the action of breathing, allow the muscles of respiration to recover more readily from the state of spasm into which they have

* Tomlinson's *Encyclopædia*.

† Skrimshire's *Village Pastor's Surgical and Medical Guide*. Churchill.

been thrown by the irritation of the offending matter. With this view, therefore, the drink should be swallowed as slowly as possible; and with the same view a *voluntary suspension of breathing*, as long as can be made under these circumstances, tends to lessen and shorten the state of distress. After all, however, nature generally removes the intruder by the efforts of the cough which is invariably occasioned.

1288. *Why is it sometimes difficult to swallow a pill?*

Because, owing to the nausea occasioned, there is a *want of consent between the muscles of deglutition and those of the mouth and palate*, which, like all sensations of taste, are more or less governed by the will.

1289. *Why do we experience a sensation of chilliness at the extremities after eating a hearty meal?*

Because the stomach while secreting the bile necessary for the digestion of the food which has been introduced into it, attracts by its action an *increased flow of blood* and nervous energy towards it, which are thus drawn away from other organs.*

1290. *Why does a sameness in food tend to diminish the zest for it?*

Because frequent and continued repetition of the same taste renders the perception of it less and less distinct, and the same food, in proportion to its frequency, fails to *awaken the natural desire* and appetite for it.

1291. It is well known that a loathing for particular kinds of food may be permanently engendered, owing to the frequency with which that food has been administered in youth. If, for instance, the scholars of any public establishment have been in the habit when boys, of having boiled mutton for dinner twice a week, in the majority of instances, their repugnance to that dish will remain during the whole course of their lives.

1292. *Why does the pulse beat more rapidly at night than in the morning?*

Because the voluntary motions of the muscles, and actions of the external and internal senses, propel the venous blood into the heart, which being thereby *oftener stimulated*, makes more frequent contractions.*

* Chambers's *Information for the People.*

† Wesley's *Natural Philosophy.* Tegg and Son.

"Boundless intemperance
In nature is a tyranny; it hath been
The untimely emptying of the happy throne."—MACBETH.

1293. The pulse of a healthy person rising in the morning beats at the rate of 65 in a minute; but after the fatigue of the day, it will in the evening beat 80 in that time; and again by the night's rest, it will become less frequent, until in the morning it will be found to return to 65.

1294. *Why is an excess of sleep injurious?*

Because the brain is brought into a condition unfavourable to its healthy functions, and favourable to apoplexy, determination of blood to the head, and other diseases of the brain.

1295. Dr. Thomson says, "It is extremely difficult to estimate the quantity of sleep best adapted to preserve health; much depends on the constitution of the individual, and as much more on the nature of sleep enjoyed. From six to eight hours may be regarded as the best proportion for a healthy adult; but I once personally knew an old man who lived to the age of one hundred and eight, and who informed me that he had rarely exceeded four hours sleep in a night at any period of his life."

The late Duke of Wellington's motto was a very good one—"Let your first turn in bed in the morning be a *turn-out.*"

1296. *Why is nightmare and disturbed rest frequently occasioned by lying on the back?*

Because in that position the heart pressing, while pulsating, on the lungs, gives rise to a sense of intolerable oppression on the chest, which *seems to bear down on the whole body,* so that, in this painful state, not a muscle will obey the impulse of the will, and every effort to move appears to be altogether unavailing.

1297. *Why do persons faint?*

Because external causes, violent emotion, fright, &c., act immediately upon the heart and paralyze its powers in propelling the blood to the brain. The brain, being thus suddenly deprived of its customary support, temporarily *suspends its functions,* and in consequence produces insensibility.

1298. *Why do sick persons who have been delirious generally become conscious immediately before death?*

Because, owing to the general failure of strength, the influence of the excessive action of the heart upon the brain is mitigated; and the brain being thus *freed from oppression,* returns to a state of calmness.

"Is the house trimmed, rushes strewed, cobwebs swept, the carpets laid, and everything in order?"—TAMING OF THE SHREW.

1299. *Why, in cases of drowning, should the body not be hung up by the heels, or shaken?*

Because the water which the body contains is not the cause of suspended animation, and is of only secondary consideration; the real cause of insensibility is suffocation, or *exclusion of air from the lungs,* and it is to remedy this defect that every effort should be directed.

1300. *Why do epidemics frequently prevail after long-continued calm weather?*

Because, during the stagnation of the air, *fresh and purer particles of the atmospheric principles do not descend* from the higher regions to replace the heated and contaminated air near the surface of the earth.

1301. *Why, in headaches generally, is there a sense of depression in the region of the eye-ball?*

There are four muscles, which serve to move the eye and to retain it firmly in its cavity or orbit, like the cup in a ball and socket-joint. The pressure which these muscles occasion is *not perceptible in a state of health,* but in that state of nervous susceptibility which so frequently accompanies headache it makes itself acutely manifest.

1302. In the general treatment of headaches there are three special points to which attention should be directed—diet, exercise, and medicine. Diet is of the utmost importance in the simple nervous headache; exercise in hysterical cases; and medicine in the headaches directly dependant on extreme exhaustion. Persons suffering from headaches often fail to obtain relief on account of their not giving a fair and steady trial to any one plan of treatment. Years have been producing a condition of the system which a few weeks' medicine is vainly expected to relieve, unaided by medicine's best help—the careful obedience of the patient to the rules laid down and the regimen prescribed. If due attention be paid to these, it is almost certain that relief will be ultimately afforded.

1303. *Why is excess of reading injurious?*

Because, while in the act of reading, respiration is not carried on so freely as in other occupations; that is to say, in reading we are accustomed to *hold our breath* at long and irregular intervals, and therefore we do not inhale the due amount of oxygen necessary for the nourishment of the blood.

1304. *Why do laughter and cheerfulness during meals tend to promote digestion?*

Because the mechanical act of laughter *demands a large amount of energetic respiration,* and increases the nervous stimulus, from both of which causes the motions of the stomach are aided, and a more richly constituted blood imparted to it.

1305. Dr. Combe observes, "that the necessary churning or agitation of the food is, from the peculiar situation of the stomach, greatly assisted by the play of the diaphragm and abdominal muscles during inspiration and expiration; and the diminution of the vivacity and extent of the respiratory movement, which always attends despondency and grief, is one source of the enfeebled digestion which accompanies depression of mind."

1306. *Why are the bones of the body of different shapes and sizes?*

Because in the animal economy each bone has a *separate and distinct mechanical office* assigned to it, conformably with its structure. The long bones are adapted for motion, the flat for protection, and the square for strength and motion combined.

1307. The admirable construction of the human frame is shown by the disposition of its bones. The *long bones* are moulded into lengthened cylinders, and form so many levers, constituting organs of locomotion. In the employment of the *flat bones* for the covering of some of the more tender and delicate of the organs, as the brain and spinal cord, the form of these bones is such as to add to their strength, as is manifest in the *vaulted roof of the skull;* while in the construction of the vertebral column, composed of the *short square bones,* which are so adjusted as to afford a limited range of motion with a great degree of strength, so many and such opposite purposes are effected as tend to produce a combined but not inharmonious result.

1308. *Why are undersized persons generally unhealthy and short-lived?*

Because in these cases some member of the body (frequently the head) is *in disproportion to the members generally;* and this destroys that equality of action in different parts of the body which is essential to continued health and long duration of life.

1309. *Why do persons blush?*

Because the phenomena of the colour of the skin are refer-

"In the affliction of these terrible dreams
That shake us nightly."—MACBETH.

rable to the *quantity, velocity, or composition of the blood flowing through its vessels.* When mental emotions cause a sudden disturbance of these vessels, the natural red hue of the skin is heightened, and the state is termed blushing,

1310. *Why does near-sightedness come on most frequently at an early age; and why is it more common in the higher than in the lower ranks of life?*

Because it is at this age and in these ranks that the habit of looking at *near* objects is most common. Children born with eyes which are capable of adjusting themselves to the most distant objects gradually lose that power soon after they begin to read and write; *those who are most addicted to study become near-sighted more rapidly;* and, if no means are used to counteract the habit, their eyes at length lose irrevocably the faculty of being brought to the adjustment for parallel or distant rays.

1311. *What are the proper means of counteracting the habit of near-sightedness?*

To persuade children to read and write with the book or paper always as far from their eyes as they can see; to intermit study occasionally and take to field sports, or any employment which would *oblige them to look much at distant objects;* and to avoid the early use of concave glasses, as likely to injure the sight or bring myopy at an earlier period of life.

1312. *Why does the continuance of any monotonous sound induce sleep?*

Because a succession and variety of external influences are necessary to the waking state, and when these are withheld, the senses being engrossed by one object, gradually *lose their recognition* of any other objects, and are deprived of their vital energy.

1313. At public meetings, and in churches, we frequently see persons fall asleep some little time after the speaker or clergyman has gone on with his discourse. We also see that *when the voice becomes still, the sleeper suddenly awakes,* proving that the cause of insensibility ceasing to exist, permits the faculties to return once more to a state of conciousness or wakefulness.

"Suppose
Devouring pestilence hangs in our air
And thou art flying to a fairer clime."—RICHARD II.

1314. *Why does the voice of aged persons become shrill and tremulous?*

The shrillness is owing to the *ossification of the larynx* and the altered condition of the vocal cord, and the tremulousness arises from the *loss of nervous power* and command over the muscles.*

1315. *Why is the speech of some persons more pleasing to the ear than that of others?*

Because everything that is spoken is conveyed through *the medium of perfect notes*, some persons using eighths, some fifths, and some thirds. The most pleasing effect in speaking, therefore, depends upon the concord of the notes used.

1316. *Why is there a difference in the sound of the male and female voice?*

The different *pitch* of the male and female voice depends on the *different length of the vocal cord* in the two sexes, their relative length in men and women being as three to two. The difference of the two voices in *tone* is owing to the different nature and form of the resounding walls, which, in the male larynx, are much more extensive, and form a more acute angle anteriorly.

1317. *Why, when children are taken out for exercise, should their bodies be kept warm?*

Because they are then able to part with the superfluous heat gradually, until exercise shall promote that general glow which seldom fails to accompany it; whereas, if a child is taken out cold, the chilly and moist air *abstracts such a proportion of heat* from the body as to induce an unnatural and painful state.

1318. *Why is the sleep of children necessary for their growth?*

Because the digestive and assimilating processes go on more perfectly *if the energy of the brain be accumulated upon the stomach*, than if it be expended on a variety of other objects, and also because the sensorial energy being recruited by repose,

* Kirke's *Handbook of Physiology.* Walton and Maberly.

is thus rendered adequate to the purpose of maintaining the vigour of the organic functions.

1319. *Why should children's nurseries be carpeted?*

Because the material of which the carpet is made being elastic, operates materially, should children fall, in *breaking the force of the blow* upon their heads and limbs.

CHAPTER XLIII.

1320. *Why are the feathers of birds shed and reproduced?*

Because, in process of time, their continued exposure to atmospheric action *dries them, and renders them unfit for the functions that are required of them.* They are also apt to be broken or torn in the flights, the wars, or the labours of their owners.

1321. *Why, when migrating, do birds adopt a triangular form of flight?*

Because this form is the most favourable for *cutting the air*, and also because the birds are thus constantly supplied with *a fresh leader;* for as the bird at the point becomes fatigued, his place is taken by one of the hinder birds, who gives way in his turn to another, and so on through the whole band.

1322. *Why do woodpeckers tap at trees?*

In order to terrify the insects which are concealed under the bark, or to catch them if the wood be soft enough to admit of the penetration of their bill.

1323. *Why should a regular portion of food be allotted to cage-birds every day?*

Because, if too large a supply be given them at once, they will pick out the best at first, and leave the rest for another day. An *unequal amount of nourishment* is thus distributed, and the vocal powers proportionately impaired.

"Your message done, hie home unto my chamber,
Where you shall find me sad and solitary."—TWO GENTLEMEN OF VERONA.

1324. *Why should young canaries have for their companions only such birds as have a good song?*

Because the canary is remarkable for its capability of reproducing all notes it has heard when young, and consequently much of the sweetness of its after song depends upon what it hears and remembers at an earlier period.

1325. The following is a recipe for the making of German paste, a food universally known as better adapted for birds than any other :—Bruise in a large mortar or on an even table, with a rolling-pin, a pint or quart, as may be required, of rape-seed, in such a manner that you may blow the chaff away ; to this add a good-sized piece of bread, reducing the whole to powder, and well mixing together ; put this in a box of oak, which should be kept from the sun. A tea-spoonful of this powder, with the addition of a little hard yoke of egg, and a few drops of water, will make an excellent food for young birds ; to the old ones it may be given dry. The powder must not be kept longer than twenty days, as the rapeseed is apt to turn sour, so that when the water is put to it, it smells like mustard. It is best to make a small quantity of this paste every day ; under such treatment the birds grow more rapidly. Stale sponge-cake, rubbed to powder, with the addition of hard white of egg, is the best food for young birds during the first three or four days after they are taken from the care of their parents.

1326. *Why do ducks and geese only make a hissing or cackling sound?*

Because the construction of the larynx in these birds is so simple, as to preclude the possibility of their producing any varied or compound notes.

1327. *Why is it necessary to pay the greatest attention to the feet of cage-birds?*

Because most of the diseases incident to them arise from that member, and a cage-bird of any age is rarely seen with its *full complement* of claws.

1328. *Why are birds enabled to sleep perched on one foot?*

Because there are a set of muscles proceeding from the thighs to the toes, and passing over the knee and heel, so that *the weight alone of the bird closes the claws,* and preserves their equilibrium.

"Now get you to my lady's chamber, and tell her, let her paint an inch thick, to this favour she must come."—HAMLET.

1329. *Why do the various movements of birds indicate reliable prognostics of the weather?*

Because their rapid passage through the different regions of the air, and the lively and continued action of this element upon them, enable them to *anticipate the variations of the atmosphere* with the minutest delicacy.

1330. *Why are the feathers of birds imbricated, or placed one over the other, like slates on a roof?*

Because, by means of this arrangement, all the parts of the bird are equally feathered, and so *rendered equally proof* to the action of the atmosphere.

1331. The feathers of birds are formed, chemically speaking, from coagulated albumen, or nearly the same substance as white of egg when consolidated by heat, in which state it *better resists the action of water*, than almost any other flexible substance; this substance is also combined with oils and metallic particles, and thus the covering of the bird is rendered durable and waterproof.

1332. *Why do not female birds sing as well as males?*

Because the capacity and size of the larynx are much less fully developed in the female than the male bird.*

1333. *Why do fowls swallow small stones, gravel, &c.?*

Because, when the swallowed stones are put in motion by the muscles, they assist in grinding down the grain which is in the stomach, and, by separating its parts, allow the digestive fluid to come more readily in contact with it.†

1334. *Why does the laying of hens cease when the process of moulting commences?*

Because all superabundant nutriment is required for the production of the new feathers, so that one process is retarded to favour the other.

1335. *Why do hens hatch best on the ground?*

Because the rising damp materially assists in incubation; whereas, when the fowls sit upon floors, or in boxes, the eggs

* Beckstein's *Cage and Chamber Birds*. Bohn.
† Dickson's *Management of Poultry*. Bohn.

> "To bed, to bed, sleep kill those pretty eyes,
> And give as soft attachment to thy senses
> As infants empty of all thought."—TROILUS AND CRESSIDA.

become so *dry and parched*, as to prevent the young from disencumbering themselves of the shell.

1336. *How are bees propagated?*

The queen-bee deposits her eggs in separate cells of the comb. This egg is glued by its smaller end to the bottom of the cell, which it touches only on a single point. A day or two after the egg has been thus deposited, the *worm is excluded from the shell*, presenting the appearance of a maggot rolled up in a ring. In less than ten days' time it acquires its full growth. The older bees then close the mouth of the cell with a waxen lid, and the worm is thus left to itself. It is no sooner shut up, however, than it throws off its inactivity, and commences to labour, and in about *one-and-twenty days* it passes into the aurelia state, and becomes a perfect bee.

1337. *By what process is the honey gathered and conveyed to the hive?*

The bee is provided with a trunk, or tongue, which it is capable of doubling up or elongating at pleasure. From this tongue the sweet juice gathered from the flower is removed to the mouth; it then passes through the gullet into the first stomach, or honey-bag. When this bag is sufficiently filled, the bee returns to the hive, and disgorges its load into one of the cells.

1338. *Why should the mouths of beehives not be exposed to the east during winter?*

Because the morning sun, which by this means shines in upon the bees, *tempts them to venture out*, so that many are probably destroyed on their return home, by the cold which sets in during the afternoon.

1339. *How is it ascertained that the absence of the queen-bee from the hive is the cause of general agitation amongst the whole swarm?*

Because, a short space after the queen-bee has been abstracted, the bees forsake their young, and begin to traverse the hive in a furious manner. In their progress, wherever they meet a companion, they mutually cross their antennæ (feelers), and the one which seems to have discovered the national loss *communicates the sad news to his neighbour* by giving it a gentle tap with these organs. This one in turn becomes agitated, runs over the cell crossing and striking others. Thus, in a short time, *the whole hive is thrown into confusion*, everything is neglected, and the humming may be heard at a distance.*

1340. *Why is there a difference in the quality and flavour of honey?*

Because the taste of bees is not refined, and *instead of selecting particular flowers* from which to extract their food, they gather honey from *every flower* they may chance to meet with indiscriminately.

1341. *How is the wax of bees formed?*

The wax-workers, having gorged themselves with the nectar of flowers, hang motionless in festoons in the hive; and in the course of twenty-four hours scales of a white matter like talc are formed under the rings of the abdomen.

1342. The following interesting description, in connection with this subject, is given by Huber, who devoted much time and attention to the habit and customs of the bee tribe. Having provided a hive with honey and water, it was resorted to in crowds by bees, which, having satisfied their appetite, returned to the hive. An adequate supply of wax for the construction of a comb having been elaborated, one of the bees disengaged itself from the centre of the group, and clearing a space about an inch in diameter, at the top of the hive, applied the pincers of one of its legs to its side, detached a scale of wax, and immediately began to mince it with the tongue. During the operation, this organ was made to assume every variety of shape; sometimes it appeared like a trowel, then flattened like a spatula, and, at other times, like a pencil ending in a point. The scale, moistened with a frothy liquid, became glutinous, and was drawn out like a ribbon. This bee, which Huber immortalized by the name of the "founder," then attached all the wax it could concoct to the vault of the hive, and went its way; a second bee now succeeded, and did the like; a third followed, but, owing to some blunder, did not put the wax in the same line with that of its predecessor; upon which another bee, apparently sensible of the defect, removed the misplaced wax, and, carrying it to the former heap, deposited it there, exactly in the order and direction pointed out.

* *Natural History of Insects.* Murray.

"Like the lily,
That once was mistress of the field, and flourished,
I'll hang my head, and perish."—HENRY VIII.

The result of this series of operations was a little block of wax, fixed to the vault of the hive, running in a straight line, rugged in surface, but circular in its edges, half an inch long, one-sixth of an inch high, and about the twenty-fourth part of an inch thick. The wax-workers, or common labourers, having deposited the requisite stock of materials, an architect, or muse-bee, quitted the cluster, inspected both sides of the block, felt here and there with its antennæ, and then, like a skilful mason, began to excavate in the centre as much of the block as equalled the diameter of a common cell; and after kneading the material which it had removed, the insect placed it carefully at the sides of the excavation. Having performed its task, it was succeeded by a second bee; and in this manner upwards of twenty workers succeeded each other, until the cell was completed.

1343. *In what manner does a spider weave his web?*

It first glues one end of the thread to the wall, or piece of furniture selected for the purpose, and the other end of the thread is fastened to the spider's feet. When the insect has reached the opposite side, to which it purposes to continue the web, it there *fastens the first thread by means of glue.* Close by this thread another is fixed, which the insect carries forward by running along the first, like a tumbler on his rope. The second thread is glued on one side of the point, where the work was begun. The two first threads are *used like a scaffold* to assist in building all the rest. All the threads are stretched and fastened, one after another, with equal art and industry, and the whole is executed with wonderful expedition.

1344. *How is the thread of the spider's web formed?*

All spiders are furnished, at the extremity of their belly, with four or six teat-like protuberances, or spinners. Each of these protuberances is *furnished with a multitude of tubes,* and from each spinner proceeds a compound thread. These threads again unite, and form the one we see used by the spider in weaving his web.

1345. *How are mites generated?*

Mites are supposed to be generated in the woods; their body is smooth, and their shape resembles a little oval sac or cap, a reservoir for the vital fluid. The *trunk or pump is furnished on each side* with a set of teeth like those of a saw, and it is by reason of these that they are enabled to fix themselves in the flesh so firmly.

1346. *How are earwigs generated?*

They are hatched from eggs, upon which the *mother sits brooding*, much in the same manner as a hen does over her chickens. Their colour is at first white, and they change their skins more than once before they are perfected.

1347. The idea of the earwig introducing itself into the human ear, and causing madness or death, may be ranked among vulgar errors. If it infested human ears, it is more than probable that it would often be found in the ears of other animals, and yet such is not the fact. The cerumen, or wax secretion of the ear, is itself a *sufficient guard against the entrance of an insect*, whose natural food is decayed fruit and vegetables. Some years ago, several regiments were encamped in the neighbourhood of Winchester, in fields swarming with these insects: nevertheless, during the whole season only *one single instance* occurred of the earwig getting into the human ear. The insect fell into the ear of a soldier when asleep, and was speedily killed and extracted without pain or inconvenience.

1348. *How are gnats generated?*

Gnats originate from larva which inhabit stagnant waters; the larva are produced from eggs, laid in the water by the parent fly, and attached to plants. The last metamorphosis from an aquatic insect into a winged fly is attended with curious circumstances. When Nature has prepared the insect to change its element, it splits the covering by which it is confined, elevates its head above the water, and supports itself perpendicularly by the inequalities of its skin; it then draws out its two fore-legs, and, bending towards the water, places them on its surface, the wings then dry and expand, and the insect, quitting its natal element, mounts into the air.

1349. *Why do moths, &c., fly against the candle-flame?*

Moths are night-flying insects, whose eyes are *exceedingly sensitive to light*, so that they can see by the slight traces of light in what we call darkness. When they come under the influence of the candle-light, their eyes are *overpowered* and their senses bewildered. It is not unlikely that the excess of light is so great that it completely blinds them, and that they are then attracted to the flame, not by the *light*, but the *warmth*.

The propensity of moths to fly around candles has been wrongly ascribed, by some authors, to their *fondness for light*. This, however, cannot be the case, as they seldom appear by day; and, moreover, house-flies, which are fond of light, and accustomed to it, *do not fly against the flame*, although they frequent tables where lights are burning.

1350. *Why are slugs not killed by frost when it sets in gradually?*

Because they creep beneath the surface of the earth, and are *kept warm by its internal temperature*. But when a frost sets in rapidly, they are then killed in large numbers by the cold, before they can reach the depth in the earth requisite for their preservation. They are also killed by dust, in times of drought, the heat and dust depriving them of their natural moisture.

1351. *Why should the beds in a garden always be dug or forked over before they are re-planted?*

Because, when the soil remains unstirred for any length of time, it becomes hard, and its particles adhere so firmly together as not to be separated without manual force. In this state *the soil is unfit for the reception of seeds*: as the tender roots of the young plants will not be able to penetrate it through without great difficulty. Besides, when the surface of the ground is hard, the rain, instead of soaking gradually into it, *runs off or evaporates*, without being of any service to the roots; and the air cannot reach them in sufficient quantity to make them thrive.*

1352. *Why, in the germination of a seed, do two shoots issue from the vital knot?*

Because one must *descend to become the root*, and give the

* Mrs. Loudon's *Instructions in Gardening for Ladies*. Murray, 1840.

> "We see the way the stream of time doth run,
> And are enforc'd from the most quiet sphere
> By the rough torrent of occasion."—KING HENRY IV.

plant a firm hold of the ground, while the other *ascends to form the leaves*, stem, flowers, and fruit.

1353. *Why does the root divide into numerous fibres or fibrils?*

Because the root has two principal uses: first, to form a *base to support the plant* and keep it upright; and second, to *supply it with food*. For the first purpose, the root either spreads so widely through the surface soil as to find a support proportionate to the height of the plant, or it descends a proportionate depth into the earth to steady the part above ground. For the second purpose, the numerous fibrils are each furnished with spongy organs, which afford the only means the plant possesses of absorbing the moisture necessary for its support.

1354. *Why should the ground in which the seed is to be sown be cleared of stones and pulverized?*

Because the young roots will not be obliged to waste their strength in *overcoming unnecessary obstacles*, such as twining themselves round a stone, or trying to force their way through a hard interior of earth; and because pulverization admits the rain, without suffering the surplus water to remain so as to be in danger of rotting the main roots.

1355. *Why do plants become blighted?*

When a plant first produces its young branches and leaves, all the new-born parts are tender and succulent, and part with their fluid matter with rapidity, until the solidification of the recently created vegetation takes place. To perform these functions effectively it is necessary that the air should be in a *certain state of humidity*, or the perspiring parts will lose their watery particles too fast; and it is also necessary that the temperature should not be low enough *to destroy the tissue by rupturing its sides*, or by any other cause. But if the air is rendered extremely dry by the prevalence of easterly winds, the young parts perspire with such rapidity, that *the loss thus occasioned cannot be made good by the roots*, and the consequence

" 'Tis better to be lowly born,
Than to be perk'd up in a glistering grief,
And wear a golden sorrow."—HENRY VIII.

is, that the tissue becomes dried up and scorched, or brought into a more or less diseased condition.

1356. *Why do leaves of plants, and other fragile structures, bear the atmospheric pressure?*

Because the pressure acts equally in all directions. A leaf of two square inches on its upper surface would bear upon that surface a pressure of thirty lbs., but this would be exactly balanced by the pressure on its under surface; and the air, thus *surrounding the leaf, and pressing equally on all sides,* instead of imparting a dead weight, forms an elastic cushion on which the leaf reposes.

1357. *Why are the choicest plants found in the greatest perfection in places where the sunlight is strongest?*

Because the more plants are exposed to the light, the deeper is their green, the more robust their appearance, and the greater the abundance of their odours, or resins; all of these appearances arising from the active influence of carbon.

1358. *Why do forests lower the temperature in their locality?*

Because they detain and condense the clouds as they pass, and *pour into the atmosphere volumes of water dissolved in vapour.* Winds do not penetrate into their recesses, the sun never warms the earth they shade, and the soil being porous, through being formed in part of the decayed leaves, branches, and stems of trees, is constantly in a state of moisture.*

1359. *Why have trees planted in cities and crowded towns a sanitary effect on the people?*

Because they imbibe a variety of gases *noxious to animal life,* and in return emit from their leaves, under the influence of the sun's rays, streams of pure air, or oxygen.

1360. *Why do we sometimes see trees that are cut, with living twigs growing on them?*

Because that part of plants, &c., which contains most carbon

* Gower's *Scientific Phenomena of Domestic Life.* Longman.

dies the latest, and as there is *much carbon in the bark of trees*, that portion endures long after the rest has perished.

1361. *Why do nettles sting?*

Because they are furnished with a tube which is seated upon a gland formed of the same tissue in which a poisonous fluid is secreted. When any pressure is made upon this gland *the fluid passes into the tube*, just in the same manner as the venom passes up the fang of a serpent's tooth.

1362. *Why have plants a thick outer skin?*

Because they are by this means enabled to protect the tender tissues beneath from external violence, and also because it *contains air-cells which prevent the too rapid escape of internal heat*, and guard the inner tissues against the too powerful action of the sun.

1363. *Why are forced cucumbers under shade superior to those that grow naturally in the open ground?*

Because, under bright light, evaporation goes on with great force from the surface of the cucumber plant, the quickness of growth is thus diminished, and *the fruit is formed in a more solid manner than it otherwise would be*, and thus its delicacy is impaired. And also because the effect of direct light is to produce whatever secretions may be natural to a plant; the natural secretions of the cucumber are bitter; hence the less cucumbers are exposed to light while growing, the less bitter and the more delicate they will be.

1364. *Why should turnips and other vegetables which have been injured by the frost have their roots placed in cold water when thaw appears?**

Because if left in the air its action would agitate the nitrous substances they had contracted into a thaw with such violence

* See the *Gardeners' and Farmers' Reason Why*. Houlston and Wright.

"For there was never yet philosopher
That could endure the toothache patiently."
MUCH ADO ABOUT NOTHING.

as to *lacerate the substance of the root*, and, reduce it to a soft pulp or liquid.

1365. Vegetables of the tenderest nature may be preserved by placing them in a brine, made from spring-water and salt, of such a strength that it *will float an egg*. The vegetables must be laid carefully in an earthern vessel, of a tall shape, and with as small an opening as is convenient for the hand. This vessel must then be carefully stopped up, and set in a cool dry place; but the vegetables when wanted for use, must be steeped in warm water, where they are to lie for about six hours, after which they may be boiled, and will be found to be of an agreeable taste, and to have preserved a good colour.

1366. *Why should melons be cut before they are matured, and placed in a cool place to ripen?*

Because owing to the unequal distribution of the sun's rays over melons *the whole of the fruit does not ripen simultaneously*, the upper part becoming fit for eating, whilst that next to the foot-stalk remains intolerably bitter, so that by placing them in a situation where the temperature is equable, they ripen gradually and uniformly.

1367. *Why should straw be placed about strawberry-plants, when the fruit begins to mature?*

Because the straw shades the roots from the sun, and also *preserves moisture*, and prevents evaporation.

1368. It is supposed that this custom, which was formerly adopted universally in the culture of the strawberry, is the origin of the name of the fruit.

1369. *Why are fruits gathered in the afternoon less acid than when gathered in the morning?*

Because fruits are ripened by the conversion of the acid which they contain into sugar, and as this requires *the aid of light and heat*, the intervening hours between morning and afternoon produces the difference in their ripeness.

1370. *Why are wet surfaces quickly dried on a windy day?*

Because with wind there is no moisture, and the air then possesses the property of promoting evaporation.

"To swim, to dive into the fire, to ride
On the curl'd clouds, to thy strong bidding."—TEMPEST.

1371. *Why, when we walk across ploughed fields or muddy soils is it difficult to raise our feet?*

Because the moisture of the soil and the pressure of the foot upon it partially exclude the air, consequently the soil becomes attached to our shoes by *atmospheric pressure.*

1372. *Why is it difficult to raise stones from the ground when the earth is wet?*

Because the water *excludes the air*, and the stones are therefore bound to the earth by atmospheric pressure, in addition to their own weight.

1373. *Why are there white and black peppers?*

For precisely the same reason that there are white and brown *flours.* Black pepper is pepper which contains the external coating of the seed; white pepper is that from which the external coat has been sifted. As the essential property of pepper lies chiefly in the black coating of the seed, black pepper is to be preferred for all processes which extract this property, such as stewing, boiling, &c.

CHAPTER XLIV.

1374. *What is the chemical process of malting?*

Malting is the conversion of the starch of the *barley into saccharine matter*, and this is effected by the abstraction of carbon, which takes place on the malt-floor.*

1375. *Why does hot water cause malt to set?*

Because water, at or near boiling point, readily converts any farinaceous substance into a stiff gluey paste; and this mass is

* Accum's *Treatise on the Art of Brewing.*

impervious, or nearly so, to liquids in general; but as it is the object of mashing to give the water an opportunity of dissolving the saccharine matter of the malt, the effect must necessarily be in a great measure prevented, if the surface of each particle of the malt, by being *converted into a paste,* prevents the water from penetrating into the body of it; the term therefore is expressive which says, that the too great heat of the water shuts or closes the pores of the malt, and causes it to *set.*

1376. *Why are three separate portions of water used in mashing, and not the whole quantity in one?*

Because, if all the water were applied at once, a great portion of the richer wort would be retained by the *grains,* which, by the other method, is more completely *washed out* by the repeated application of fresh water; partly, also, because the water itself, in divided quantities, extracts more abundantly the soluble parts of the malt, than the same quantity of water used at once would be able to do.

1377. *Why has the highest coloured malt the least tendency to set?*

Because high-coloured malt contains a less portion of *undecomposed starch* than malt of a paler colour.

1378. *Why are hops used in the brewing of beer?*

Because the bitterness which they contain not only imparts an aromatic flavour, but also retards the *acetous fermentation.* Malt liquors will keep longer in proportion to the quantity of hops added; the bitterness decreases as the liquor becomes ripe, and wholly disappears as it verges to acidity.

1379. *Why does beer become transparent?*

Because, as the fermentation advances, a quantity of spirit is produced proportionate to the quantity of saccharine matter originally contained in the wort; this spirit being *specifically lighter* than the wort, the opaque particles which were easily suspended by the wort before fermentation, now readily *subside* in it, and the beer consequently becomes transparent.

1380. *Why does isinglass fine beer?*

Because it has the power of attracting all feculent matter towards it floating in the beer, and, forming a network on the top of the fluid, it gradually *sinks to the bottom*, and carries all the impurities along with it.

1381. *Why should beer be perfectly transparent before it is bottled?*

Because the smallest quantity of yeast or lees renders the liquor liable to *ferment*, and endangers the bursting of the bottles.

1382. *Why is removal injurious to beer?*

Because a quantity of yeast is gradually deposited from the beer in the form of barm, which, having a tendency to *insensible fermentation*, any motion will stir up, and thus render the whole contents of the cask turbid.

1383. *Why may spirits, wines, &c., be most perfectly preserved by the bottles in which they are being secured with a covering of bladder?*

Because the animal substance of which bladder is composed possesses the property of *retaining alcohol*, and consequently prevents the liquor from being vitiated.

1384. *Why are home-made wines, which are derived from various fruits, neither so wholesome nor palatable as wine made from the grape?*

Because the acid produced by grape is *tartaric*, and that produced by other fruits *malic;* and this latter, requiring an inordinate quantity of sugar to correct its acerbity, the natural juices of the wine become vapid, and the whole compound has a sickly taste.

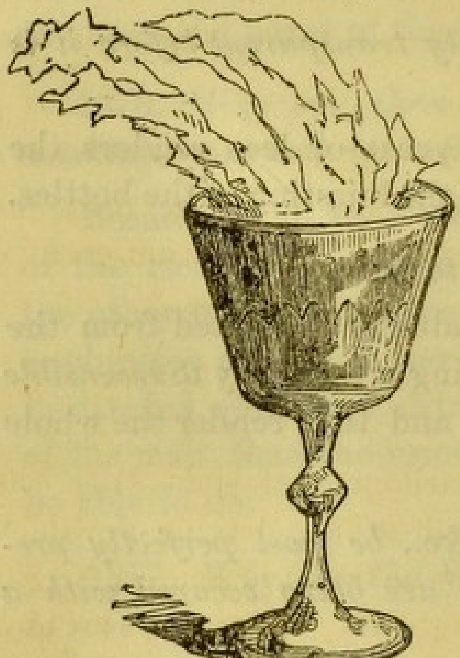
1385. *Why is champagne brisk and effervescing?*

Because it is bottled before the fermentation is completed;

in consequence of this, carbonic acid is imprisoned within it in a *state of compression*, which renders it liquid; but as the form of gas is the natural state of this element, directly the cork is withdrawn it expands into the gaseous form, causing effervesence.

1386. *How may the spirituous strength of wine be ascertained?*

By taking a wine-glassful of any wine, and adding, in small quantities at a time, *pure* sub-carbonate of potash (which should



previously have been dried by the application of heat), until the glass is quite full, and nothing appears over the powder but a colourless fluid. The sub-carbonate of potash absorbs the water, but repels the alcohol, consequently the spirit rises to the surface, and the application of a lighted taper will inflame it. The length of time which this flame will burn will afford some indication of the strength of the wine.

1387. If the experiment be made in a glass tube from one-half inch to two inches in diameter, and graduated into 100 equal parts, the *per centage* of spirit in a given quantity of wine may be read off by mere inspection. In this manner the strength of any wine may be examined.*

1388. *Why are gooseberries the best fruit for the manufacture of English champagne?*

Because the juice of the gooseberry contains some portion of *tartaric acid*, which is the essential acid of the grape, not found in other fruits employed in the making of home-made wines.

1389. *Why ought not bacon, cheese, onions, potatoes, or cider to be stored in wine-cellars where there is a store of wine?*

Because the wine is very liable to be impregnated with the

* Accum on *Adulteration of Food*. Longman and Co.

"Sleep, that knits up the ravell'd sleave of care,
The death of each day's life."—MACBETH.

peculiar odours that escape from such substances. In this way large quantities of good wine have been destroyed, without the cause being understood.

1390. *Why, in the making of cider, does so much depend on an equable fermentation?*

Because *slight* fermentation will leave it thick and unpalatable; *rapid fermentation* will impair both its strength and durability; and *excessive* fermentation will make it sour, harsh, and thin.

1391. *Why is German yeast effective as a substitute for barm?*

Because it contains the germs of *fungi*, upon the presence and reproduction of which the progress of fermentation greatly depends.

1392. *Why do baking-powders serve as a substitute for yeast?*

Because, by the action of the carbonate of soda upon the *tartaric acid* (the second component of the baking-powder), *carbonic acid gas* is evolved, and thus the bread is rendered light by the diffusion of this gas through its substance, without destroying any part of the nutritiveness of the dough. Such bread is therefore economical and healthy.

1393. Bicarbonate of soda and tartaric acid are to be thoroughly mixed and to be kept dry. When used, *one tea-spoonful* of the powder is sufficient for *each pound* of flour. In preparing dough with this mixture, it should be *thoroughly* incorporated with the dry flour by agitation and sifting. When this is complete the usual quantity of water should be added, and it should be placed in the oven as soon as the loaf is formed. In making this kind of dough a wooden spatula should be employed instead of the hands.*

1394. *Why does boiling strengthen a syrup of sugar and water, but weaken fermented liquors?*

Because the spirituous part is transformed into *steam* at a lower temperature than water is; and therefore flies off first

* Muspratt's *Chemistry of Arts and Manufactures.* Mackenzie, Glasgow.

leaving the water behind; whereas, with the syrup, the water is converted into steam, leaving the sugar behind.

1395. *Why is alcohol employed in preserving vegetable and animal substances?*

Because it has a great *attraction for moisture,* and combines with water in all proportions, thus counteracting the process of putrefaction.

1396. *Why, when the crust of a loaf forms in baking, does it conduce to the lightness of the bread?*

Because the crust acts as a barrier to the *escape of the air;* the water is dissipated, and between every particle of bread there is generated a particle of gas.

1397. *Why, when wine is to be cooled, should the whole bottle be placed in the ice and not the bottom only?*

Because the coldest part of the liquid *being heavier,* and already at the bottom, *cannot ascend,* nor can the upper part which is warmest, change places to be cooled, consequently the application will be imperfect.

1398. *Why, before wine is iced, should it be decanted into a fresh bottle?*

Because the action of the ice *agitates* the wine in the same way as though it were *shaken,* and thus impels any sediment that may be deposited in an upward direction.

1399. *Why may eggs be kept fresh a longer time with the small end downwards than in any other position?*

Because in this position *the yolk is suspended in the albumen,* and enveloped by it; if otherwise placed for a length of time, the yolk comes in contact with the shell, and so causes injury and decomposition.

1400. *Why, upon breaking the shell of a stale egg, do we observe a shrunken appearance of the interior?*

Because all eggs, after being laid, lose daily a portion of their matter, by the *transpiration* going on through the *pores of the shell*, and as this transpiration progresses, a vacancy is occasioned in the egg, in a degree proportionate to the loss which it sustains.

1401. Eggs not only spoil by the transpiration of their moisture, and the putrid fermentation of their contents, in consequence of air penetrating through the pores of the shell; but also by being moved about and jostled when carried to a distance by sea or land. Any sort of rough motion *ruptures the membranes which keep the white and yolk in their appropriate places*, and upon these becoming mixed, putrefaction follows.

1402. *Why do eggs crack when put into boiling water?*

Because every egg contains a quantity of *air*, which becomes *expanded by heat*, and bursts the shell.

1403. *Why do eggs that are a few days old crack in hot water more readily than those that are newly laid?*

Because, as eggs become old, *gases are generated within them*, and they also *absorb gaseous matters* from the air. Hence there is *more expansible matter* in an old egg than in a new one.

1404. *Why may water be boiled in an egg-shell without injury to the shell?*

Because the heat is *borne away* by the water and steam as fast as it is transmitted from the fire to the shell. This proves that heat may *pass through bodies* without injuring them, when there is a sufficient *conduction* to bear away its excess; but when that conduction ceases, the heat accumulates, and often destroys the body that was previously unaffected.

Hence saucepans become *red hot* as soon as the water has boiled away, and the egg-shell is destroyed.

1405. *How is the wisdom and goodness of Providence shown in the causing the white of the egg to be of a different substance to the yolk?*

The white of the egg is found to be a very *feeble conductor of heat*, retarding its escape, and preventing its entrance to the yolk, which not only *prevents fermentation and corruption*, but also averts the fatal chills which might occur in hatching, when

" If your business
Seek me out, and that way I am wife in,
Out with it boldly; truth loves open dealing."—HENRY VIII.

the mother-hen leaves her eggs from time to time in search of food.

1406. *Why will the white of eggs assist an emetic in dislodging unhealthy substances from the stomach?*

Because the egg *coagulates in the stomach*, and retains the substances embedded within it, until such time as the emetic has power to operate.

1407. *Why will cooked meat keep longer than raw?*

Because the heat to which the meat has been exposed in cooking has *expelled the air from the interior, and coagulated the albumen*, in which putrefaction first commences, and as coagulated albumen is somewhat slow in decomposing, the meat in these conditions will keep longer.

1408. *Why is sugar sometimes white and opaque, and at other times brittle and transparent?*

The difference of appearance arises from the altered condition of the atoms composing the sugar; and the atomic condition depends upon the different modes in which the sugar is prepared. *Barley-sugar* is transparent because it is in a perfect state of crystallization; *lump-sugar* is opaque because its atoms are in the granular form, in which they are imperfectly crystallized.

This may assist us to understand why carbon assumes the different and dissimilar states of the *diamond*, *charcoal*, and *lampblack*, &c., being three different conditions of the same element, *carbon*.

1409. *What is yellow hard soap?*

It is formed of *soda and tallow*, and contains also resin, and sometimes palm oil.

1410. *What is mottled soap?*

Mottled soap contains *potash* in lieu of soda, and is mixed with whale or other fish oil.

1411. *Why is sea-water in its natural state unfit for washing linen?*

Because the salt which the water contains *decomposes the* *soap* and prevents its action; soda, however, will remedy this, by which means the water will become turbid and a precipitation of earths takes place.

Sea-water contains a certain proportion of *hydrochloride of calcium and hydrochloride of magnesium*, as well as hydrochloride of sodium. As hydrochloric acid has a stronger affinity for soda than for lime or magnesia, it will unite with the soda which has been added and *leave the earths*, which therefore fall down or are *precipitated*. The water is now salter than before, but more soda must be added than is sufficient to form sodium, or saturate the hydrochloric acid; then the latter is rendered ineffective, being unable to decompose soap. Sea-water, therefore, with this excess of soda, acts nearly as fresh water.

1412. *Why is soap an effective agent in removing dirt?*

Because soap consists of *alkali mixed with oil*, the latter component being employed in correcting the corrosive power of the alkali, and preventing the destruction of the texture of the fabric.

1413. *What are potash and pearlash?*

Potash and pearlash are the *ashes of burnt vegetables* resolved into fixed alkali.

1414. *What is soda?*

Soda, the base of which is called sodium, is one of the *components of common salt*, plants which grow by the sea-shore, or in any situation favourable to the deposit of salt, yield soda by incineration.

1415. *How is carbonate of soda obtained?*

By decomposing common sea salt, which consists of *chlorine and sodium*; by the application of sulphuric acid, the sodium is changed into soda, quits the chlorine to incorporate with the sulphuric acid, and thus sulphate of soda is obtained.

1416. *What is starch?*

Starch is made from two vegetables, *wheat and potatoes*, from both of which certain juices are extracted, and resolved into a solid consistence.

"And oftentimes, to win us to our harm,
The instruments of darkness tell us truths."—MACBETH.

1417. *Why should soap be used sparingly in scrubbing floors?*

Because the alkalies, which soap contains, *act on the woody fibres,* and cause the boards to turn black.

1418. *Spots of grease* may be removed from floors by the following method:—Mix a quarter of a pound of fuller's earth and a quarter of a pound of pearlash into a paste, stirred well in a quart of boiling water. Lay a thick coat of this over the stain, and let it remain for ten or twelve hours, then wash off with clean water, adding sand if necessary. Another method is to well rub and soak the spots with turpentine, and afterwards wash them with soap or pearlash. *Ink spots* may be removed by salts of lemon, or diluted spirit of salt, or strong vinegar. *Wine stains* may be taken out by water in which soda has been dissolved; or, if this do not succeed, chloride of lime may be used.

1419. *Why does the addition of a portion of blue to water in washing or bleaching improve the whiteness of clothes?*

Because the *violet blue* forms, with the *brown yellow* of the material, a mixture tending to white, or less coloured than the yellow of the material and the blue together.

1420. *Why should soiled linen not remain long unwashed?*

Because with time the dirt and impurities are more firmly *absorbed by the fibres* of the materials, and are consequently more difficult to render clean and pure.

1421. *Why ought oil-cloths not to be wetted?*

Because moisture *destroys the colours, rots the canvas,* and leaves in it a dampness, which, being afterwards imparted to the feet, is frequently productive of serious consequences.

1422. Oil-cloths should be cleaned by merely rubbing with a flannel, and polishing with a brush of moderate hardness, exactly such as is used for a mahogany table.*

1423. *Why does rennet curdle milk?*

Because it contains an acid, either artificial or natural, which possesses the properties of coagulation. In Holland, *muriatic acid* is used to produce rennet. But the natural curdler of milk is the *gastric juice of a sucking calf's stomach,* in which milk is as rapidly coagulated as it is sucked.

* *Practical Economy, or the Application of Modern Discoveries.* Colburn.

"So may a thousand actions, once afoot,
End in one purpose and be all well borne
Without defeat."—HENRY V.

1424. *Why have cheese, when ripening, round eyes formed in their substances?*

Because, during the process of ripening, a quantity of *elastic fluid, containing a clear salt,* is disengaged, which bursts through these eyes, and are called "tears."

1425. When a cheese, which has been much salted and kept very dry, is washed several times in soft water, and then laid in a cloth moistened with wine or vinegar, it gradually loses its saltness, and, from being hard and dry, becomes soft and mellow, provided it be a rich cheese. A dry Stilton cheese may be thus much improved.

1426. *Why should milk-sheds be situated as near as possible to the dairy?*

Because the milk suffers more or less from being *agitated or too much cooled* before it is set for the cream to rise; and, consequently it should be brought immediately from the cows, without being exposed to the outer air.

1427. The dairy-house should consist of three distinct departments below, with lofts and cheese-chambers above. The principal place is the dairy properly so called, sunk two or three feet below the level of the ground, with a stone or brick bench or table round three sides of it to hold the milk-pans. This table should be a little below the level of the outer soil. *Air-holes, covered with wire,* should be made in the walls a little above and on opposite sides of the dairy; and they should have sliding shutters, to open or close over them according to the weather. The *floor should be of stone* or paving-tiles, sloping gently towards a drain, to carry off the water. Great care should be taken that *no water stagnates* in this drain, which must be kept as clean as the floor of the dairy, and not communicate with any sink, but run out into the open air; a declivity from the dairy is essential for this purpose. *The windows of the dairy should be latticed.* Glazed windows may be added for the winter, but they should always be open, except in very hot or very cold weather. If the windows are made like Venetian blinds, the light will be excluded without excluding the air. The utmost purity must be maintained in the air of the dairy; nothing should enter it that can produce the slightest smell. No cheese or rennet should be kept in it; and particularly no meat, dressed or undressed. Even the dairymaid should avoid remaining longer in it than necessary, and should at all times be extremely clean in her person.

1428. *Why are ice-houses generally built in the shape of an inverted cone?*

Because that form tends to keep the ice more compact, and also because, in case of any thaw taking place, the remaining ice will naturally slip down, so as to keep the mass solid.

"An unlesson'd girl, unschool'd, unpractis'd,
Happy in this, she is not yet so old,
But she may learn."—MERCHANT OF VENICE.

1429. *Why do porous earthenware vessels keep liquids cool?*

Because, when soaked in, and saturated with water, they, by *copious and gradual evaporation*, generate cold.

1430. *Why should water, intended to be preserved, be kept closed?*

Because, by the admission of air, the *lime of the water* will be precipitated by abstracting carbonic acid from the atmosphere.

1431. *Why is wine or water cooled by wrapping a wet towel round the vessel containing it, and exposing it to a draught of air?*

Because the evaporation arising from the draught of air on the wet towel *absorbs heat* from the vessel and its contents. This being an application of the known principle that when a liquid or moistness dries up, that is, passes into the state of vapour, there is a great absorption of heat; this must be supplied by the nearest body at hand, which consequently becomes cool by such deprivation.

1432. *What is a smoke-jack?*

A smoke-jack consists of a horizontal wheel filled with spokes or radii of metal, placed obliquely in the same manner as the sails of a windmill, or the little circular ventilators sometimes seen in windows, and turned like them by the *current of air* striking upon them. This wheel is fixed in the inside of the flue, and the *motion of its axis* is easily communicated to another wheel, to which is attached a chain that goes over another fastened to the spit.

1433. *What is blacklead?*

Blacklead is a mineral substance dug out of the earth in masses, and reduced to powder for domestic use; it contains *carbon with a little iron*, and its superior quality may be tested by observing the brightness of the polish it will give with the least trouble.

"Her voice was ever soft,
Gentle and low: an excellent thing in woman."—KING LEAR.

1434. *Why does a lucifer match, when lighted, produce such a suffocating smell?*

Because, when the heat is applied to the sulphur, it inflames and *combines with the oxygen of the atmosphere,* forming sulphuric acid gas, from which arises the fume that has such a disagreeble and suffocating effect.

1435. *Why should rabbit-hutches be kept dry and well ventilated?*

Because rabbits are subject to a disease called the rot, which is a species of liver complaint, chiefly induced by impure air.

CHAPTER XLV.

1436. *What is the cause of mouldiness?*

Mouldiness arises from *minute fungi* which appear in masses upon organic bodies. It is caused by a *damp atmosphere and a diminution of light,* both which conditions are favourable to the development of those bodies whose reproductive particles are floating everywhere in the atmosphere, ready to spring rapidly into growth whenever they chance to fall upon suitable situations.

1437. *Why does Russia-leather binding preserve books from mould and decay?*

Because it is dressed with an *empyreumatic oil* of birch, which is a powerful agent in resisting the process of putrefaction.

1438. *Why is a water-bed warm, and not cold, as might be imagined?*

Because the mass of water prevents the approach of cold air from beneath, and also by its *non-conducting properties* does not allow of the dispersion of heat downwards.

"From lowest place when virtuous things proceed
The place is dignified by the doer's deed."
ALL'S WELL THAT ENDS WELL.

1439. *Why are window panes brittle in winter?*

Because the outside of the window being exposed to the cold frosty air, while the inside is warmed by the heated air of the room, the two sides are *expanded in different ratios,* and a slight blow is sufficient to break the pane.

1440. It is commonly supposed that the bones of the human body are more brittle in winter than in summer; such, however, is not the case, for the *animal heat does not differ* in cold weather, excepting on the surface of the body only. This popular notion doubtless arose from the fact, that owing to frost, more persons fall down in winter than in summer, and consequently there are more bones broken.

1441. *Why should water never be left in brittle vessels exposed to the action of the frost?*

Because, as the water continues to freeze, its *bulk expands,* until at length it becomes stronger than the earthenware or glass, and the latter is forced to give way.

1442. *How may glasses be rendered to withstand any change of temperature?*

Glasses, when first bought, should be *put into cold water,* placing a little hay on the top of the water, and then carefully raising it to boiling point.*

1443. *Why does the hair of the head which was of a light colour in infancy becomes darker in after years?*

Because light and flaxen hair contains *phosphate of magnesia,* which, as life advances, *separates* from the other chemical properties residing in the hair and disappears.†

1444. *Why does wood decay from a species of dry rot?*

Dry rot is caused by a peculiar kind of vegetation, a *fungus,* similar to that which prevails in fermentation. Wood is now prepared with a solution of *corrosive sublimate* (a form of mercury) which, as it forms an insoluble compound with albumen, destroys the fungi that thrive upon that element.

* Bernay's *Household Chemistry.* Sampson Low, Son and Co.
† Kittoe's *Ladies' Medical Friend.* Sherwood.

"This does make some obstruction in the blood; this cross-gartering."
TWELFTH NIGHT.

1445. *Why does arsenic destroy superfluous hairs?*

Because when it reaches the pores of the skin, its *solvent action* is so powerful, that it penetrates and destroys the bulbous roots of the hairs.

1446. *Why are pastiles inefficacious as disinfectants?*

Because they have only the power of *concealing and not destroying* offensive exhalations, which are temporarily overcome by a more powerful odour.

1447. *Why should ventilation and purity of lower apartments be particularly attended to?*

Because the air from the lower story ascends the staircases, and any *noxious effluvia disengaged below* will contaminate the air of the whole house.

1448. *Why do chloride of lime and chloride of soda purify the air?*

Because the *attraction of lime and of soda for carbonic acid* is stronger than for chlorine; upon chloride of lime being exposed to the atmosphere, it becomes decomposed by *the lime taking carbonic acid from it,* and consequently leaving the chlorine free to escape. The change is most rapid when the air is charged with putrid effluvia, because the carbonic acid then present hastens decomposition.

1449. *How may a room which has been occupied by many persons be speedily purified?*

By opening the window, and then rapidly opening and closing the door for a few minutes, it will act as a *pump,* and speedily remove the air contained in the room.

1450. *Why should pianofortes never be placed against "party walls?"*

Because the sounds are apt to pass through to the house of your neighbour, and by *dull and indistinct noises* cause them much annoyance.

"Thou, Nature, art my goddess, to thy law
My services are bound."—KING LEAR.

1451. *Why are the voices of singers sometimes flat and at other times sharp?*

The change in voice depends upon the change in tone of the system. After cold, exhaustion, and depression, the voice becomes flat; but when the system is well braced and in good tone, then the voice is sharp.

The organs of the voice are under the *control of muscles* and nerves, which partake of the general ability or debility of the system.

1452. *Why does singing or reading aloud increase the appetite for food?*

Because the increased respiration which these exercises demand, occasion a speedy *waste of the vital air,* which requires to be renewed by food.*

1453. *Why is playing upon wind instruments hurtful?*

Because air is inhaled in much larger quantities, and in quicker succession than it can be emitted, or *decomposed by the lungs,* therefore it interferes with the circulation of the blood which is sent towards the brain in an impure state.

1454. *Why is it injurious to drink wine after eating cream, or any preparation mixed with milk?*

Because the heat of the stomach causes the wine to *ferment, and coagulating the oily substances* previously taken, converts them into an indigestible mass.

1455. *Why are persons affected with momentary deafness when any loud explosion takes place?*

Because the vibration of the explosion destroys the *equilibrium of the air* within and without the tympanum of the ear, and so acts upon the organ of hearing. Hence, speaking trumpets and tubes are promoters of sound to affected ears, because they conduct into the diseased organ the necessary amount of atmospheric vibration.

* Sydney on *Food and Nutrition.*

"The nightingale, if she could sing by day,
When every goose is cackling, would be thought
No better a musician than the wren."—MERCHANT OF VENICE.

1456. *Why does exercising the memory strengthen it?*

Because the brain is strengthened by increasing the *circulation* through it, on the same principle that the use of the hammer strengthens the blacksmith's arm, and dancing strengthens the muscles of the leg.

1457. *Why is it said that "thirteen to dinner" is an unlucky number?*

Because the estimates of mortality show that the chances are even that *one person out of thirteen dies in a year.* This, however, applies only to very large numbers of persons, including all ages, and cannot be regarded as ominous respecting any thirteen that may dine together.

1458. *Why are the feelings more susceptible, and the fancy more vivid, in early life than in after years?*

Because the susceptibility of the nerves makes them capable of being stimulated more vehemently by *new than by accustomed impressions,* and in proportion the nerves become dulled by a too frequent repetition of the same incentives.*

1459. *Why do we sometimes imagine that we see spectres, faces of persons who are dead, or absent, and other images?*

Because the irritability of the brain is so vivid as to *act on the retina and optic nerves,* and by the co-operation of the brain so affected, with the organs of vision, these illusions are produced.

1460. *Why are imaginary spectres mostly seen in the dark?*

Because in darkness *the eye assumes a new condition.* The pupil expands nearly to the whole width of the iris, in order to collect the feeble light which prevails; and in this state the eye cannot accommodate itself to see near objects distinctly, so that the form of persons and things become shadowy and confused.

1461. *Why are ghosts and spectres generally seen as clothed in white?*

Because white is the only colour that can be seen in the

* Kidd's *Adaptation of External Nature.* H. G. Bohn.

"Come, take your flowers,
Methinks I play as I have seen them
In whitsun pastorals."—WINTER'S TALE.

surrounding darkness, and it is produced either out of inanimate objects which *reflect more light* than others around them, or of animals or human beings whose colour or change of place renders them more visible in the dark.

1462. *Why does iron rust so speedily?*

Because, when air and moisture come in contact with iron, it *absorbs oxygen* rapidly. Iron also becomes liable to rust and decay when it touches another metal, such as lead, which induces a *galvanic action* that facilitates the absorption of oxygen.

1463. *Why does brass become covered with a green coating?*

Because certain acids, or fat and oily matters, have the power of depositing on the surface of the metal *green carbonate of copper*. Copper being one of the component parts of brass.

1464. *Why do eggs stain silver spoons?*

Because the white of eggs contains a portion of *sulphuretted hydrogen gas*, which, by combining with the silver, forms sulphuret of silver, and produces a blackish purple hue.

1465. *Why have silver mustard-spoons gilt bowls?*

Because mustard contains in its oil a small amount of *sulphur*, which tarnishes silver.

1466. *Why do jewellers have their gas-lamps placed on the outside of their windows?*

Because some proportion of *sulphuretted hydrogen gas* comes from the pipes with the carburretted hydrogen, and the sulphuretted hydrogen has a powerful effect in tarnishing silver.

1467. *Why do silver and plated goods tarnish?*

Because sulphuretted hydrogen, from various causes, *mingles with the air*, and blackens the silver.

1468. *Why should copper vessels be kept scrupulously clean?*

Because moisture, and especially grease, corrodes the copper, and produces *verdigris*, which is a strong poison.

"Love like a shadow flies, when substance love pursues;
Pursuing that that flies, and flying what pursues."
MERRY WIVES OF WINDSOR.

1469. *Why do fruits stain the blades of knives?*

Because *gallic acid* exists in the rind of most fruits, and in some vegetables; when this substance comes in contact with iron it combines with it, and forms gallat of iron, which is a description of ink.

1470. *Why do kettles become furred?*

Because, in the process of boiling, water parts with *lime* and *other earthy substances* that it contained, which are attracted by the iron, and from repeated boiling form a crust.

1471. *Why is marking-ink indelible?*

Because the nitrate of silver, of which it is chiefly composed, has a strong *affinity for the fibre of linen and cotton,* and its indelibility and blackness is further enhanced by the action of the oxygen of the air.*

Marking-ink, although pronounced indelible in the every-day acceptation of the word, may yet have its stains or writing removed by cyanide of potassium.

1472. *Why does the ink of old writings become discoloured and faded?*

Because, in process of time, the *vegetable matter* which the ink contained decays, and leaves only rust, or peroxide of iron.

1473. *Why does the flame of a candle burn more brightly after it has been lighted a few minutes?*

Because, by that time, a cup or basin of melted tallow has formed, in which the wick has become more thoroughly *saturated,* and consequently furnished with greater powers of emitting light.

1474. *Why, when the wick of a candle is snuffed too short, does it emit a dull light?*

Because more fat is then raised to the flame than can be consumed; in other words, it is *drowned in the sustenance that it fed upon.*

* Brande's *Manual of Chemistry.* Parker.

"Foul words is but foul wind, and foul wind is but foul breath, and foul breath is noisome."—MUCH ADO ABOUT NOTHING.

1475. *Why do candles sometimes gutter?*

Because the tallow is not proportioned to *the size of the wick*, small candles having large wicks, and large candles small wicks. One flares away too fast, and the other gives too little light, and the outside of the candle is scarcely melted, from the heat being too feeble to extend so far.

1476. *Why, when a candle is going out in the socket of a candlestick, does its flame jump and flicker?*

Because the metal of the candlestick *takes away a great proportion of the heat* of the flame; the cold air playing around the heated candlestick makes its temperature *rise and fall*, and thus the amount of tallow converted into gas *constantly varies*, and causes the flame to diminish and then revive again.

1477. *Why does a candle, in the steam of a washing-tub, exhibit a luminous ring?*

Because the light of the candle is *refracted*, at a certain angle from the flame, by the watery vapour in the air, just as the rays of the moon are bent by the clouds, and what are called *haloes* produced.

1478. *Why is gas the most desirable and economical light to burn?*

Because it gives a steady and brilliant light at a much less cost than that given by any other medium yet discovered.

1479. If a certain quantity of light given by tallow candles costs 1*s*., an equal quantity of light from an Argand's lamp will be 6½*d*., and from coal gas, 2¼*d*.

A pipe an inch in diameter will supply gas enough to give a light equal to that of *one hundred ordinary mould candles*; and the rate of supply increases proportionably with the size of the pipe; thus the gas conveyed by a four-inch pipe will be equal in illuminating power to 2000 mould candles, estimating the consumption of each candle at 175 grains of tallow per minute.

1480. *Why should the openings in gas-burners not be too large?*

Because the gas then *rushes through* faster than it can be consumed, gives less light and much smoke, and impregnates the apartment with a disagreeable odour.

"For being not mad, but sensible of grief,
My reasonable part produces reason."—KING JOHN.

1481. Holes the size of a bristle are the most suitable and economic; one hole of this dimension gives a long, slender, cone-shaped flame. The bat's-wing is produced by a thin flat slit, and is one which allows of a free access of air on both sides of a thin substance of flame. The fish-tail is formed by two holes being bored so as to cross each other, and produce a triangle with the point downwards.

1482. *Why do candles improve by keeping?*

Because in newly-made candles there is always a proportion of air and water, which is expelled by the setting or *consolidation of the tallow*. Hence it is said that March candles are better than others, because, being made in the spring, they are not generally consumed until winter, when their tallow has become hard and dry.

1483. *Why is twilight called "blind man's holiday?"*

Because persons suffering with diseases of the eye, can generally see better at twilight than at any other time. The reason of this is, that in the softened light, called twilight, the *pupil of the eye expands*, and as the diseased lens which intercepts the light is chiefly opaque in the centre, it follows that the rays of light are in some degree admitted when the pupil is fully dilated.*

1484. *Why cannot we see a person standing immediately on the other side of the candle?*

Because we see an object by the *rays reflected from it*, even although direct light from a luminous body may be entering the eye at the same instant; and, in this case, the direct light interferes with the reflected light, and effaces the slighter impression of the latter.

1485. *Why, when looking with one eye at a particular object, are other objects close to it rendered invisible?*

Because the invisible objects fall on the *base of the optic nerve* or the place where this nerve enters the eye, and expands itself to form the retina. And upon this part of the eye light of ordinary intensity makes no impression. But when both

* Harrison's *Popular Medical Errors.* Longman.

"This is a strange repose, to be asleep
With eyes wide open; standing, speaking, moving,
And yet so fast asleep!"—TEMPEST.

eyes are open, the object whose image falls upon the insensible spot of the one eye is seen by the other.*

1486. If we place two coloured wafers upon a sheet of white paper, at the distance of three inches, and look at the left-hand wafer with the right eye, at the distance of about eleven or twelve inches, taking care to keep the eye straight above the wafer, and the line which joins the eyes parallel to the line which joins the wafer. When this is done, and the left eye closed, the right-hand wafer will no longer be visible. The same effect will be produced if we close the right eye and look with the left eye at the right-hand wafer.

Of the same character, but far more general in its effects, is another illusion of the eye, pretty generally known. When a person is engrossed with deep thoughts, "gazing on vacancy," as it is popularly termed, the eye suddenly becomes blind to objects seen directly before it; and when the thoughts have passed away, the objects which disappear will reappear, without any change of the position of the eye.

1487. *Why does the eye of a cat appear so luminous when seen in the dark?*

The illumination arises from the external light collected on the eye, and reflected from it. Although apparently dark, a room is penetrated by imperceptible rays of external light from lamps or other luminiferous bodies. When these rays reach the observer directly, he sees the lamps or luminiferous bodies themselves; but when he is out of their direct sight, the brightness of their illumination is rendered visible through *the rays being collected and reflected* by some appropriate substance.

1488. The cornea of the eye of the cat, and of many other animals, has a great power of concentrating the rays and reflecting them through the pupil.

Professor Bohn, at Leipsic, made experiments which proved that when the external light is wholly excluded, none can be seen in the cat's eye. For the same reason the animal, by change of posture, or other means intercepting the rays, immediately deprives the observer of all light otherwise existing or permeating the room. In this action, when the iris of the eye is completely open, the degree of brilliancy is the greatest; but, when the iris is partly contracted, which it always is when the external light, or the light in the room, is increased, then the illumination is more obscure. The internal emotions of the animal have also over this luminous appearance a great influence, by the contraction and relaxation of the iris dependent upon them. When the animal is alarmed, or first disturbed, it naturally dilates the pupil, and the eye glares; when it is appeased, or composed, the pupil contracts, and the light in the eye is no longer seen.†

* Sir David Brewster's *Letters on Natural Magic*. Murray.

† *Philosophical Transactions*, vol. lxxxix.

"There's not an orb that thou beholdest,
But in his motion like an angel sings."—MERCHANT OF VENICE.

1489. *Why do mahogany, walnut, and other fancy woods, exhibit their grain when polished, but not otherwise?*

Because, before the furniture polish is applied, the *porous surface* of the wood *absorbs the light;* but when these pores are closed, and the surface covered with a transparent medium, the rays of light are *reflected,* and transmit to the eye an impression of the graining of the wood as it exists underneath the glassy coating of varnish.

1490. *Why does blacking, when first rubbed upon shoes, look dull, but acquire a bright polish after being rubbed with the shining brush?*

Because, in the first state, the atoms of the blacking are in a *granular* condition, presenting a somewhat *porous surface,* by which *light is absorbed.* When, however, the shining brush is applied, the grains of lampblack and the particles of vinegar and treacle are rubbed into an *amorphous* mass, which, instead of *absorbing* the rays of light, *reflect* them. The process is similar to that of *burnishing,* in which atoms that absorb light, or reflect it irregularly, are made to reflect more perfectly by being rubbed into a state of greater compactness and uniformity.

Granular—consisting of grains. *Amorphous*—having no determinate form.

1491. The same explanation applies to *blacklead,* used for polishing grates.

1492. *Why should we be careful not to leave globes or bottles of water in the sunshine falling upon our windows?*

Because the globes or bottles, collecting the sun's rays into a *focus,* act as burning-glasses. In this manner they have been known to set fire to combustible substances upon which they directed the heat rays of the sun.

1493. *Why do tumblers sometimes crack when hot water is poured into them?*

Because the interior surface of the tumbler into which the hot water is poured, suddenly *expands with the heat*, while the exterior (glass being a slow conductor) remains at its original temperature. So that the contending forces are brought into contact, and the effort of the inner part to expand before the outer part has received the heat, causes the glass to crack.

1494. *Why are cut tumblers more liable to crack than plain ones?*

Because the inequalities of the thickness of the glass caused by the cutting, make it swell or shrink *irregularly and partially*, so that a crack easily ensues.

1495. *Why have coffee-pots, tea-pots, &c., wooden handles?*

Because wood is a *non-conductor of heat*, and prevents the metal, or other conducting substance, from communicating excess of heat to the hand.

Bone, ivory, wood, glass, wool, hemp, &c., are severally used as *non-conductors*. Tea-kettles, tea-pots, and tea-urns are furnished with glass or ivory handles, according to the fancy of the purchaser. But in each case the object of supplying handles of a different material from the vessel, is to *cut off the communication of heat*. The handles of metal water-jugs are frequently wrapped around with hempen cord, varnished. This shows how thin a layer of non-conducting material will prevent the conduction of heat. To touch the *metal handle* of a jug filled with boiling water would cause intense pain to the hand, but the intervention of a single thickness of twine stops the transmission of heat, and enables us to lift the jug with safety.

1496. For these reasons we use "*kettle-holders*," when the vessels we employ are not provided with permanent handles of *non-conducting material*.

1497. *Why will a bright metal tea-pot make better tea than a black or brown earthenware one?*

Because bright metal is a *bad radiator of heat;* while black earthenware *radiates heat freely*. The latter, therefore, parts

> "How many things by season, seasoned are
> To their right praise and true perfection."
>
> MERCHANT OF VENICE.

with heat, and reduces the temperature of the water, while the former preserves the heat for a longer time, and therefore *produces better tea.*

1498. *Why do we use bright tin for screens in front of kitchen fires?*

Because the *bright metal,* though it receives the heat of the fire, and so keeps the kitchen cool, by cutting off the direct rays of the fire, does not throw the heat into the room *by radiation* to the same extent that it would if its surface were dark and rough.

On the side *towards the fire,* the bright metal *reflects the heat* upon the joint on the spit; and thus it assists the operation of cooking, by *economising the heat.*

On the side *towards the room* the bright metal acts as a *non-radiator,* and therefore serves to keep down the temperature of the apartment.

1499. *Why should the lids and front surfaces of kettles be kept bright?*

Because bright surfaces are *bad radiators of heat.* If those surfaces were allowed to become black, they would throw off by radiation a great portion of the heat derived from the fire.

1500. *Why should the bottoms of saucepans be allowed to remain black?*

Because black surfaces are good *absorbers* of heat, and therefore they *take up the heat of the fire most readily.* Black and rough surfaces are at once the best *absorbers,* and the best *radiators.* When placed near a source of heat, they take up heat rapidly; but when removed from that source they *throw it off freely.*

1501. *Why should soot not be allowed to accumulate on the bottoms and sides of kettles, &c.?*

Because, although black and rough surfaces are *good absorbers* of heat, soot is a *bad conductor.* When, therefore, it accumulates in a mass it acts in the same manner as a kettle-holder does, *preventing the passage of heat.* Therefore it occasions a waste of fire and a loss of fuel.

"Against ill chances men are ever merry,
But heaviness foreruns the good event."—HENRY IV., Part II.

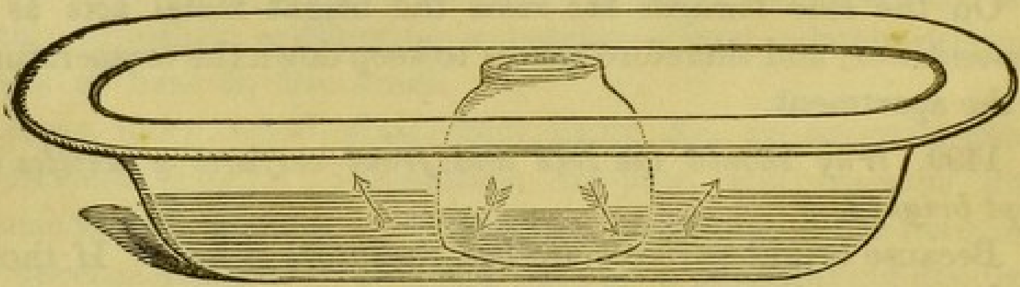
1502. *Why are crocks and saucepans with rounded sides better than those that are straight?*

Because flame, hot air, and heated water *ascend*. The rounded form brings the substances to be heated more perfectly *over the heat*, a part of which would escape and fly up the chimney if the sides of the saucepan were straight.

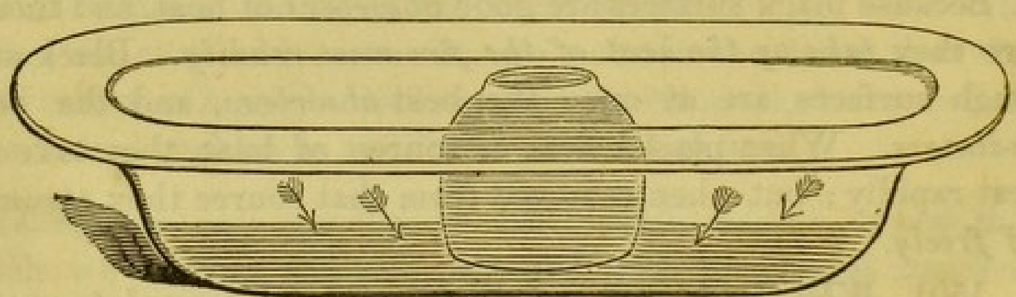
The publicans "warmer" is made upon this principle. The warming of glasses of ale requiring a speedy operation, the saucepan is made of *a wedge shape*, and thereby catches the full force of the ascending heat.

1503. *Why does a cup in a pie become filled with juice?*

Because the air within the cup is expanded by the heat of the oven, and a portion of it *driven out*.



When the fire is just placed in the oven, the cup contains air of the usual density and some portion of water, nearly equal to the level of the water in the dish. But when the heat of the oven takes effect upon the air within the cup, the air *is expanded and escapes* (in the direction of the arrows); the portion of water originally within the cup is forced out, nothing but highly rarefied air remains.*



When the pie is taken out of the oven, it cools rapidly. The rarefied air, becoming cold, occupies only a very small space, and the pressure of the external air upon the juice in the dish (in the direction of the arrows) *forces it into the cup*.

* See *The Reason Why*—General Science. Houlston and Wright.

Thomas Harrild, Printer, 11, Salisbury Square, Fleet Street, London.

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