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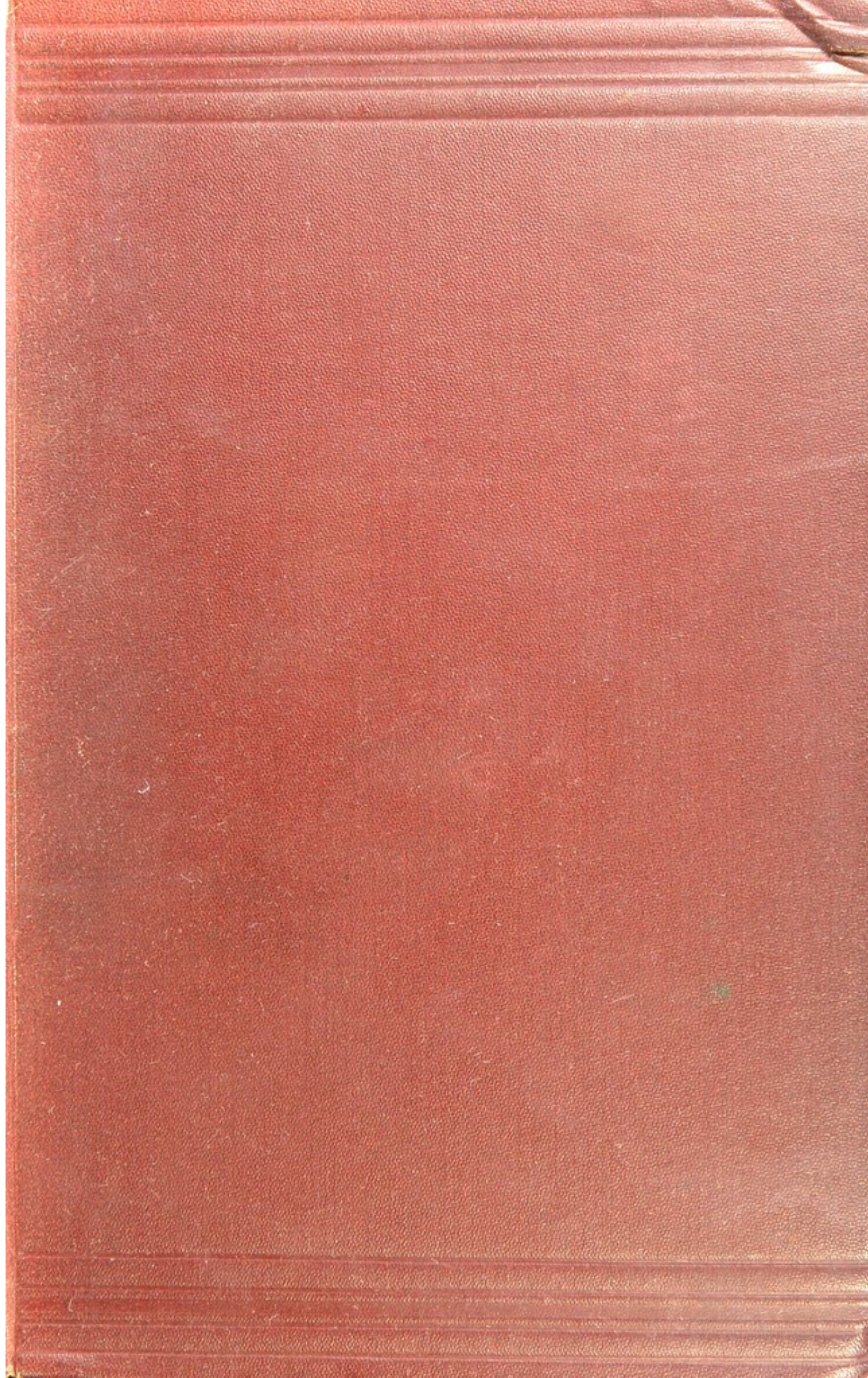
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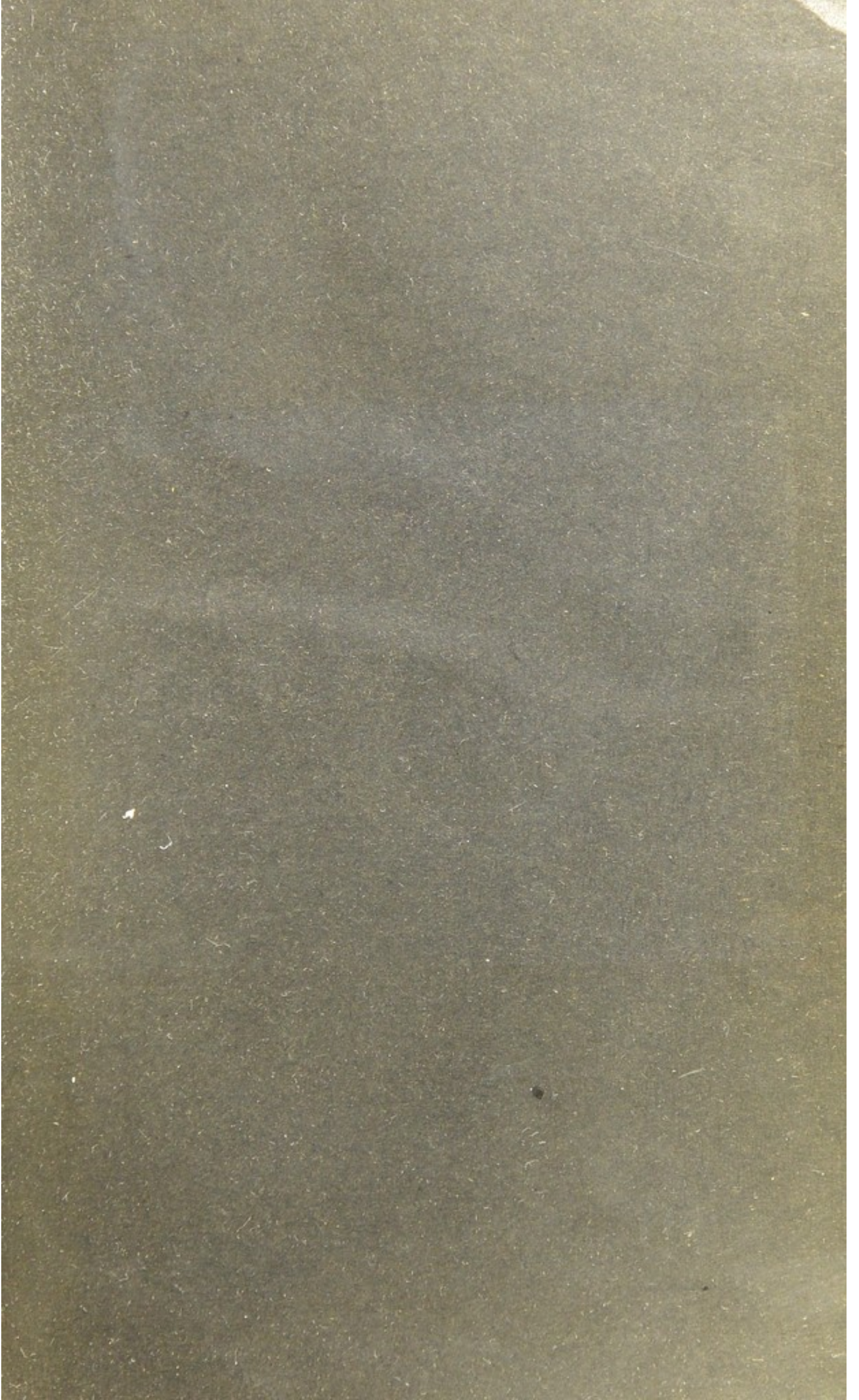


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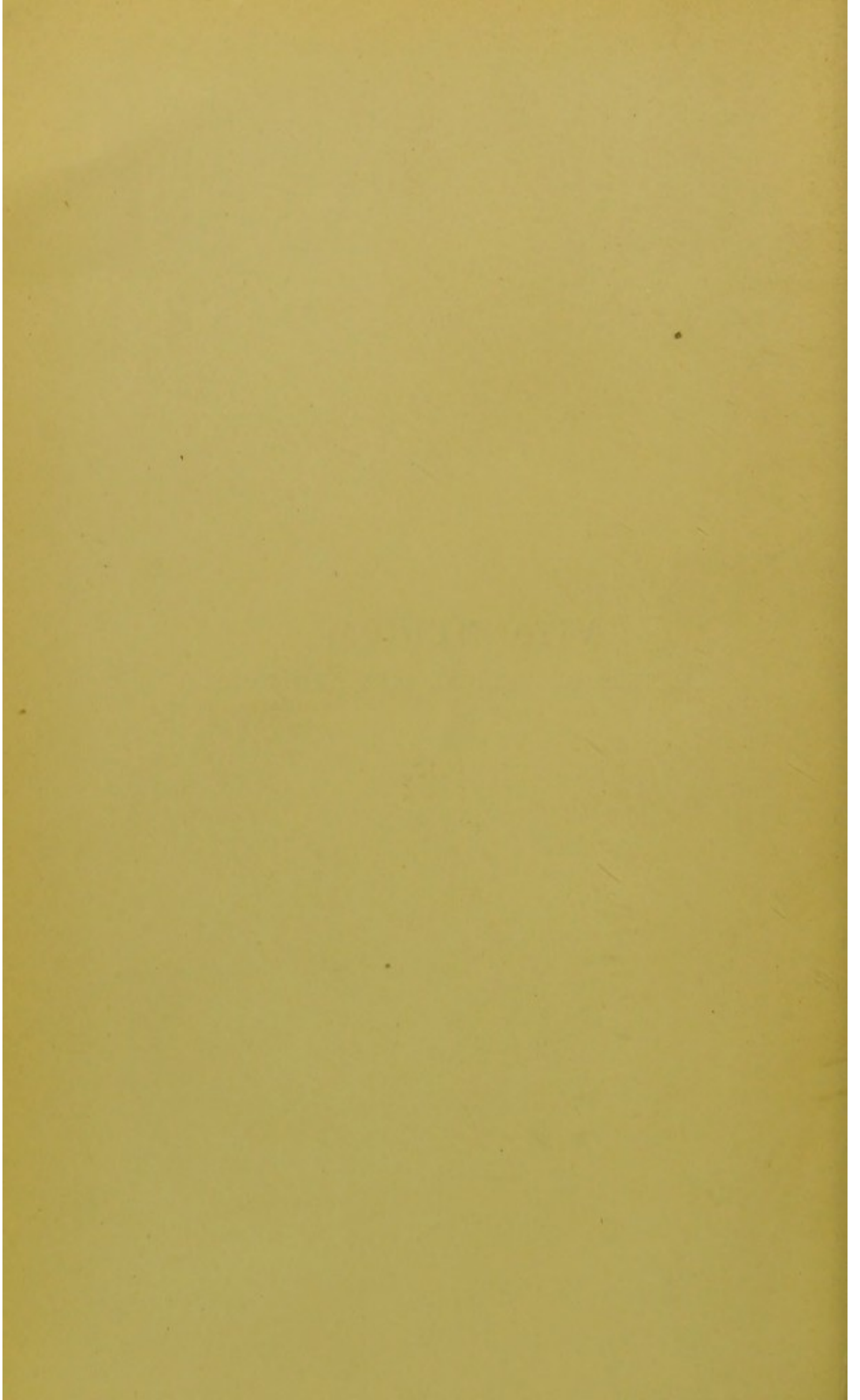
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VITA MEDICA:

CHAPTERS OF MEDICAL LIFE AND WORK.



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VITA MEDICA:

CHAPTERS OF MEDICAL LIFE AND WORK.

BY

SIR BENJAMIN WARD RICHARDSON,

M.D., LL.D., F.R.S.

"CORPUS QUASI VAS EST AUT ALIQUOD ANIMI RECEPTACULUM."—*Cicero*.

LONGMANS, GREEN, AND CO.,

39 PATERNOSTER ROW, LONDON,

NEW YORK AND BOMBAY.

1897.



TO
THE STUDENT OF THE FUTURE
WHO MAY WISH TO TAKE A GLANCE AT THE VICTORIAN ERA
THIS BOOK,
WRITTEN BY A STUDENT OF THAT ERA
WHO HAS SO FAR LIVED THROUGH IT,
IS RESPECTFULLY AND AFFECTIONATELY
INSCRIBED
BY THE AUTHOR.



PREFACE.

IN this book I venture to deal with some of the subjects to which my life has been devoted. I learned from the first moment in which I could read that there is a natural body and that there is a spiritual body; that the natural body is first, and afterward that which is spiritual. To me it became, I may say, inevitable that the natural body should be most immediately studied, the spiritual being too far off to be seen and understood, but existent and open to revelation, even to man. I trust that the work on the natural body may take precedence of any personal details with which it is incidentally interwoven. Some studies, akin to it, are still in hand; but meantime I have thought it best to issue what I have dared to imprint on these pages.

It has been a pleasure to me to collect details of the lives of many medical and scientific predecessors.

I have undertaken the task nearly fifty times, and have never felt so happy as when I chanced to gather the shortest sentence from their own pen or from their spoken word to some one who could record what was said. I have, therefore, ventured to put down direct things that I have heard as well as seen, hoping they may be of interest to some coming scholar.

In delivering the annual oration as President of the St. Andrews Graduates' Association in 1867 I thus presumed to express to many colleagues who surrounded me what seemed to be our duties for the future :—

“The glories of that happier time, for which all creation yearns, what are they but the glories of life relieved from pain, from want, from care? Are not these reliefs our duties? Is it not our office to be the first of men to pluck the curse of pain from the whole earth? Is it not our office to economise the gifts of nature, and lend her wealth to health? Is it not our office to soothe the troubled mind and bring the disturbed brain to equilibrium of power? If these be not our offices, who are the blessed that claim them? If they be—then the sweetest singer of Israel, telling of the

times when 'There shall be no more thence an infant of days, nor an old man that hath not filled his days;' and the Roman poet singing the

'Ultima Cumæi venit jam carminis ætas
Magnus ab integro sæclorum nascitur ordo;'

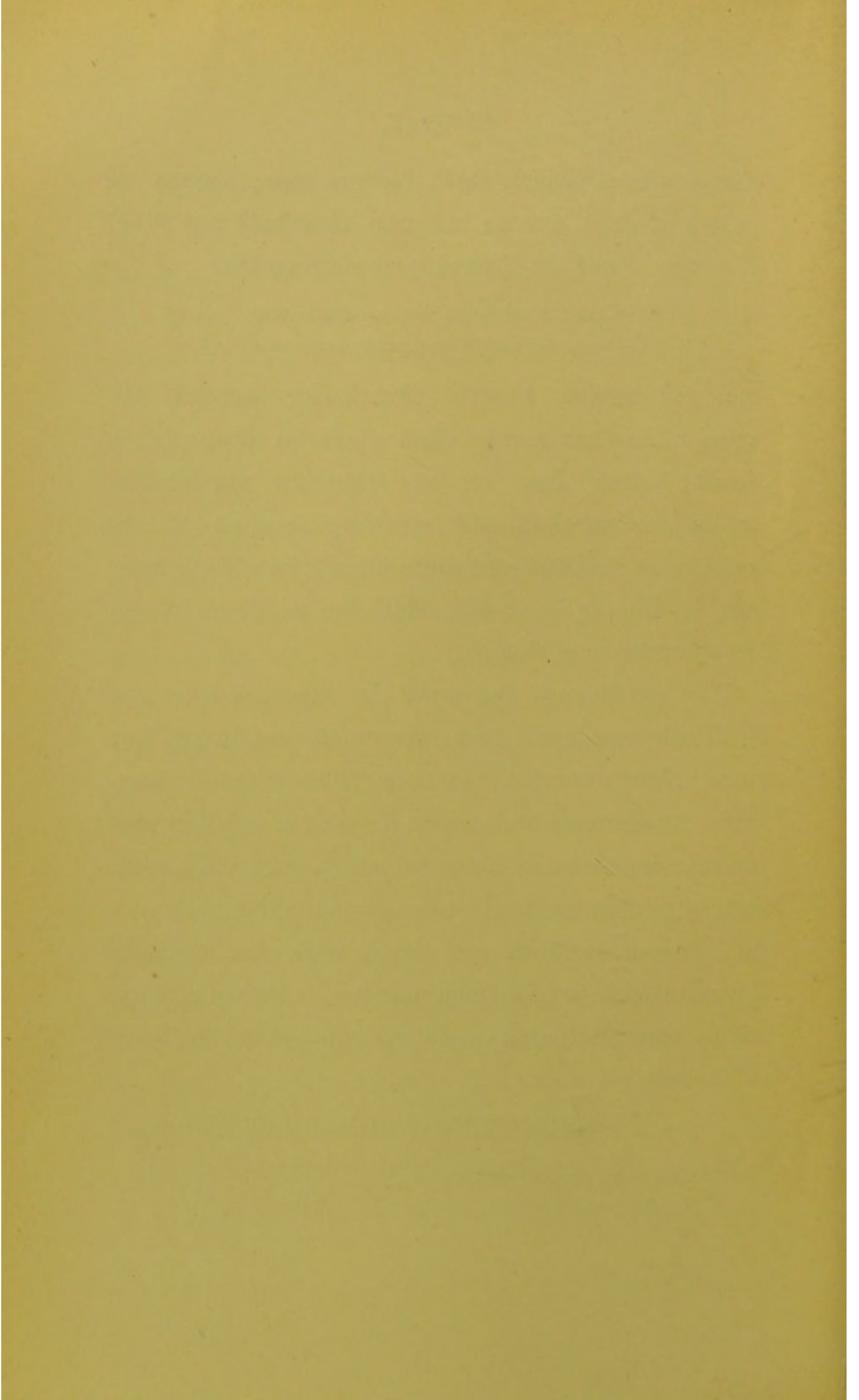
and the mighty apostle, thundering through the ages, 'The last enemy that shall be destroyed is death;' then these are our prophets proclaiming to us our mission, and assuring us that, if the mission be faithful and their prophetic visions true, we, in life or in death, shall be as kings in the kingdom of our Father."

The sentiments conveyed in this passage and faithfully rendered have never left my mind, but have always carried the wish that I could have done much more and much better for my day and generation, so as to have helped to turn this earth into a garden, with all races of one colour; all men and women brothers and sisters, with the beautiful lower animals as their companions; with their high-roads through the skies and their paths on the floors of the sea.

BENJAMIN WARD RICHARDSON.

25, MANCHESTER SQUARE, LONDON, W.

October 31st, 1896.



NOTE.

THESE chapters of "Vita Medica" were finished by my father on Wednesday, November 18th, 1896, just before eight o'clock in the evening. At ten he was seized with the illness which ended fatally on Saturday morning, November 21st.

The last proofs were not revised by my father, and, but for the few corrections that could be made without him, the book is published as it left his hands.

BERTRAM RICHARDSON.

January 1897.

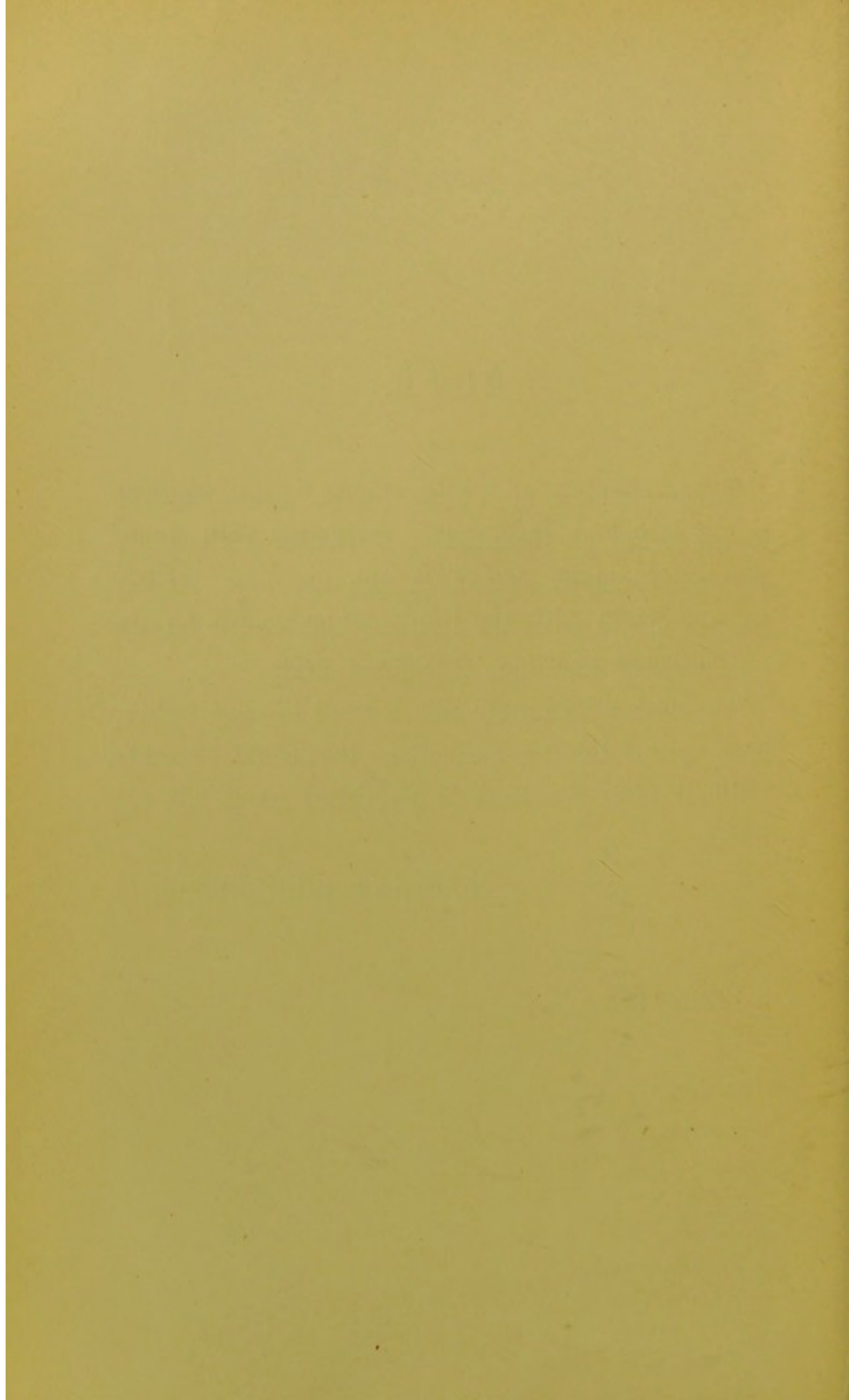


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CHAPTERS OF LIFE.

CHAPTER I.

A FIRST WORD.

IN my wanderings, not simply on this earth—the whirligig which turns several thousand miles a day on its axis—but in the journey through the mighty space that seems to me one of the mightiest of human considerations, I must have travelled round the red-hot globe we call the sun sixty-eight times at least, and some way into sixty-nine. Of this journeying I am giving infinitesimal outlines as memory and ideal may inspire me.

Let it be understood that I have no intention of composing what men are pleased to call an autobiography. I shall write largely from memory what I have seen, and some events I have taken part in during the long journeys made; and, as my memory has always been good—indeed the best gift in my possession—this will not be a complicated task. To the memories, such as they are,

I have also to add researches and ideals that stand apart from the memories.

In my young medical days I met a man with whom I often consorted, with whom I was on good terms always, and whose departure into some other world, state, or condition I sincerely and long lamented. His name was Dr. James Bird, a Scotchman, who had, I believe, been a surgeon-soldier, and in India had held a kind of medical command. He was a hard-featured man, though he sometimes beamed, and when he spoke he almost always asked for data. He assumed to be ever a man of facts, and was very severe on all men who differed from him. "Facts, sir, are what I want, not fancies!" This was his ordinary expression. At the same time he was not himself altogether destitute of fancies, and he held an idea which he much revered and often repeated, that the "isothermal lines" were the lines that should be known by all physicians and surgeons who wanted to get at origins and to know the hidden causes of phenomena. He spoke in the broadest Scotch and in the most obscure manner, as if in eternal parenthesis, exploding rather than explaining, so that we who listened were inclined to smile, to which he paid no heed, but perhaps rather pitied us as stupid beyond hope. His oddities were many, and none greater than his extreme liking for me, who was, in many respects, his opposite.

One evening a few of us who constituted a society bent on scientific work met together to discuss a

great question—no less a question than the values of human lives in a civilised community like our own in this modern England. When it came to my turn to express myself I was very definite in stating that we might, by good management, pull down our current death-rate to fifteen in the thousand, perhaps to twelve, and even to ten. Bird lifted up both his hands, and lowered rather than beamed. He followed me in discussion, and as far as he could bring eloquence to bear on my industry, he derided, or thought he derided, my conclusions. To him they were based on nothing; words to be forgotten. They were, he said, words that were purely idealistic. He begged his audience to accept them as from one who “was given to ideals,” who let ideals “take the place of data,” and whose dreams must not be always accepted when data were called for.

As in this instance I had taken the greatest pains in my argument, as the late Dr. William Farr had given me access to his data since the year 1838, and as I had done no more than exclude from those data diseases that were preventable, I was rather astounded at Bird’s criticism. Next day, with the kind assistance of an arithmetical friend, Mr. Adolph Leipner, I went over all the calculations again with the same results, results, the truth of which had been sustained by what had transpired. But all this did not signify one iota to Bird. He had treated me as one who had ideals, and in that

character I have stood until the present moment. I have advanced many things and views that have turned out right, but they have been called idealistic, whether they were so or not, and I have become at last so accustomed to the statement that it seems part of my existence, as if it were true and even natural.

On the whole, ideals have their advantages, and I sometimes thought that James Bird himself, though he did not know it, indulged in them. His isothermal lines meant really points where diseases crossed each other and ceased to develop. Typhus fever marching towards the equator stopped at one of these lines, and yellow fever marching towards the North Pole stopped at the same place. This was a big vision or ideal, if nothing more, and I might have returned his compliment if I had liked. Instead of so doing I kept my ideals by me for occasional use, and always found them serviceable. They lifted me largely from the world, and gave me glimpses into vast fields which were pleasant to look upon; they have often filled time and swept away loads of details from my mind, and I never knew them do injury; I rather have liked than banished them, as if, in fact, they were a kind of feast, or rarity of life.

This is the reason why I now sometimes attach ideals to memories and researches, though they are distinct, and I might leave to the reader without another word the task of separation.


However, to prevent any task of the kind I will divide the matter to follow into three parts or sections; in which memories, researches, and ideals will be distinct.

To avoid the purely autobiographical, I shall not follow up any of these subjects in direct sequence, as though they formed definite parts of one career, according to the age or life of the individual. It will be best to take up each subject in a separate chapter, as it occurs to me, whatever may be the period of life in which it happened.

Recurring for a moment to the subject of memories, I do not pretend that in this volume I shall touch on all memories that occur to me. Most of those will be recorded that have made or found a resting-place in my mind. But I shall omit narratives and events almost altogether that have reference to living men, or to those who have been living up to a late date. By this plan I shall be able to write with a free mind, and speak of the past as if it were a portion of the present. In no case shall I go back to history except as it appears to me from my own standpoint and as I saw it, with the impressions it made upon me as it passed, probably, after all, the best history I could leave for the after-scholar.

CHAPTER II.

A MATERNAL LESSON AND FAREWELL.

 MEMORY connected with the day following Coronation Day, 1838, is painfully personal. I remembered when I woke that I had a mother, who was ill, lying in front of her bedroom window, looking out in the direction of the distant Whatborough Hills which she loved to visit, climb, and there tell me legends of fairies and giants, dales and woods. I was soon by her side, and in my child's language told of all I had witnessed the day before, not omitting an account of a little girl Queen who was carried round a field, nor that of a showman who displayed Versailles and the river of London, the streets of which city, I veritably believed, were paved with gold. Feeble though she was, she listened to all my prattle with a loving smile and caress. Then when I had finished she took occasion to reveal truths I had not before dreamed of. She reminded me that I had not seen her eat her meals as the others of us did. She had once met with an accident in swallowing a toy, which would have proved fatal but for the skill of a surgeon named Whitchurch, and she was now, since

the occurrence of a quinsy, reduced to her last term of life, though she looked young by comparison with others of middle age. She said she would not much longer be my companion, but I must remember her and must try to be a good boy; must follow lessons carefully, and above all things must learn to be a good doctor, the profession of medicine being in her opinion the noblest in the world. I was born to it and must do my very best. She would arrange with the Reverend W. Y. Nutt, who kept Burrow Hill School, that I should be educated there with the view to my medical future. I should find near the Rectory the house in which William Cheselden, a once great London surgeon who gave sight to the blind, as she had been told, was born, and who was the owner of an oil painting which hung in our little dining-room, up to which she had often lifted me to look at the man with the long spear on one of the tombs, her father having bought the picture at a sale of Colonel Cheselden's, the nephew of William Cheselden—a picture I must never part with, and which I never have. In a few words she told me also that my father would carry out her wishes in the way she intended, and would suffer nothing to be omitted, a promise he most faithfully kept. Then, seeing me wonderfully astounded and grieved by her communication, she became impressive in her consolation. Her sister Susan, who was married to Mr. Price, a surgeon practising at Barrowden in Rutland, it was

quite true, would be a mother to me, and I should be sure to get on very well. The learning of my profession and my work would fill my mind; she would never be entirely forgotten, but would practically fade, and there were endless means by which I might not only make sick people well, but might keep the people who were well from becoming ill, so that, like those of the Golden City, none would say, "I am sick." In the end, referring to my accounts of the preceding Coronation Day, she wished that the dear young Queen Victoria's life might ever be loved and honoured by the world; that it might be as prosperous as prolonged; that she might never have a sorrow or a care. She hoped also that I might live to make the Victorian reign useful. For her own part she was but a few weeks away from her heavenly crown, which would be a solace for me to know. She had fought the good fight, she had kept the faith, and henceforth there was laid up for her a crown of glory that would never fade away.

I am bound to say that the lessons my mother thus instilled into me have never been out of my heart and mind. They have been corrected by other lessons and impressions, but they still remain. She spoke as a godly woman, and to my recollection she never referred again to this subject. She died in the following month but one, August 6th, 1838. I, like millions more, was thus left to fight my way without a mother's counsel or consolation. But I

think it well to narrate the memory as explanatory of many things that will have to be recorded in the course of this work, and to add that my good father, who, as I have said, faithfully responded to her desires, survived her thirty-eight years, reaching the extreme age of eighty-seven.

CHAPTER III.

SCHOOL-DAYS.

MORE depends on the manner in which a boy or a girl spends school-days than on almost anything else in life. The mind is formed during this time, and the environments are of the utmost importance.

I am one of the believers in heredity, and, in watching the course of disease, I have rarely, if ever, been deceived in respect to the action of hereditary transmission on the value of life; but I am sure that the surroundings and influence of school-life are amongst the most precious concerns that give life its quality, failure, or success. The natures of both men and women are modified by school-days, which especially they love or hate. It is the most wonderful fact to find indifference in this matter. There are those who at all times remember their school with actual devotion, and there are some who recall the same period with an aversion which can never be too fully expressed, although on other subjects they may be moderate in tone and example. Likes and dislikes are thus

expressed even to the dying day, and the course of disease is tinctured by the remembrance.

For my own part I was fortunately well-favoured in regard to school-days. The practice of teaching boys to sew, not uncommon sixty years ago, and a part of my dame's plan of education, was a good practice, and to me proved uncommonly useful, rendering me, in the profession of a doctor, more than usually quick, not merely in stitching up wounds, but in connecting bandages and making them fit with neatness of adaptation. We learned of her sums and tables, as well as geography and maps, with elementary drawing. Once, and once only, I played truant, and to this day excuse myself. The lessons I had been set to learn were unusually long; one, relating to this England of ours, being specially stiff, showing that, girt by the sea, and cut off from the rest of the world, we English became mariners by necessity, and that what at first was a serious inconvenience became, at last, so great a boon that we were admitted by all nations to be the indisputable Lords of the Ocean. I liked the idea and the history, but had not the time to get it all up, and in despair at my incompetency took refuge in absolute silence; that is to say, I did not venture to school. I found a tree, crept under its branches, cried for a while, learned my task completely, and at eleven o'clock was not sorry at being found out and taken back to school a truant

culprit. I said my lesson, and just as the other children were going away—it was Saturday afternoon—was doomed to stand for an hour at a little window which looked into the street, wearing on my head a paper cap as long as my own body, across which the word “Dunce” was written in large letters, for the sightseers to see and laugh at. I neither laughed nor cried, nor, indeed, cared I a rush, for I knew I was not really a dunce, and so did the dame, who let me off within the hour; and, actually sorry to have set me up as an example, took me into her pantry, kissed me kindly, and gave me a splendid slice of a savoury pie, which I much enjoyed, as a sort of luncheon that should prepare me to spend the rest of the day with my other companions.

Quite lately, a gentleman who had been to the village—Somerby—told me he had met an old villager there, nearly ninety years of age, who carried the occurrence in his mind, taking him to look at the window where, sixty years before, he had seen me perched with the awful denunciation on my head, and my two little fists dug deeply into my pockets, as though I were saying, “It is a libel.”

Miss Lane’s was my elementary school, and here I remained until I went to a mixed school, in which I got on fairly as far as arithmetic was concerned, and in which I learned, as did the other boys, to measure land—a duty which never led to anything

practical, but which was of service to me in unexpected ways in after scientific calculations.

I did not like this school, owing to the fault of the whipping system carried out by the master of it. Whipping was cruelly severe, a cruelty then felt to be necessary. I never was a martyr to this process myself, but I looked on and writhed as much as if I had been. I did not remain here long, and when I left it was not without feelings of relief.

From the schools I have named I passed at last to that for which my mother destined me, and in which I spent several years. It was one of the principal schools of the county of Leicestershire, and was kept by a clergyman of the Church of England, the Reverend W. Young Nutt. It was a typical school of the period, and I was not in it long before the settled terms entered into between the principal and my mother were carried out. By religious persuasion a Calvinist, my mother had to attend her in her last illness a Calvinistic doctor, who, during a medical visit, made an observation far from agreeable to her. They had got over the professional part very well, for he was a clever man; but they had passed on to talk of religion—always a dangerous topic with sick people. She, on her part, praised the religious sect to which she belonged, and that was all right; but she went a step further, as women are specially inclined to do under such circumstances, stating

her belief that she herself was one of the elect, and predestined, even before the world began, to become one of the saved. Death, therefore, was to her no more than the word of release from a long train of disease and suffering. I do not know what led the doctor to dispute this hope, but dispute it he did. He raised a warning note, perhaps with the best intention. He said he had known many who had closed their eyes in sight, as they believed, of a glorious Heaven, and had opened them, to their amazement, as he believed, in a very different place. It was enough. He was admitted to be a clever doctor, but he must come no more, and he never did. The uncle of mine, by marriage with my aunt, came instead, from a greater distance, a retired doctor near also coming occasionally.

Meanwhile, on the religious side, a doubt remained, to settle which the Reverend Mr. Nutt, who was then the incumbent of the village church, was, by my mother's wish, sent for, and willingly came. He was not of an austere school: he soothed each doubt, and for a few weeks was her beloved pastor; he administered the last rites; he preached in eloquent words the usual funeral sermon, and directed that Pope's *Vital Spark* should be sung at the funeral service.

With many marks of attention he received me at his school, arranged for my education in accordance with my future prospects, and agreed with my

father, who was goodness itself for ever, in respect to my welfare. I was now under proper supervision. The profession I was to take up was fixed as that of medicine, of the preventive section of which I had an inkling or foretaste, for in the first vaccination of our village, in which I was one of the vaccinated, the operation was carried out in our garden. There had been also a public meeting of the villagers, at which they drew up a letter to the Lord Lieutenant, praying that a man who had been executed for a murder at Leicester might be removed from the gibbet on which he was suspended; first, because his suspension there did no good, and, secondly, because it led flies to carry from his remains products which were very mischievous to all the fruit near. To be brief, I never thought of anything else than physic; I commenced reading Latin from the Latin pharmacopœia, and eventually, not merely from Valpy's *Delectus*, but from Celsus and from Gregory's *Conspectus*.

The school in which I was now fixed was, as I have said, a good specimen of its kind in the first half of the present century. We began our work at nine in the morning by delivering from memory the lessons we had been set the night before. We went next to our Latin lessons, which lasted a good hour, and to the Latin some of us added Greek, so that I read through the *Diatesseron*. We then passed to arithmetic, the more advanced adding mathematics—the first four books of Euclid—to the task,

on which one hour more was fully expended. Then we stood up and read from one of the great books of antiquity, and listened to the exposition which the learned master chose to apply. We were also questioned on what we read and took our places accordingly, by which time the hour had arrived for the dinner we very much enjoyed. Afterwards, for between two and three hours, we had our play. We were well-practised in this exertion. Outside the school stood a little boot-house, in which we took off the thick slippers we were obliged to wear in school and put on strong boots, well-fitted for outdoor work, but not considered proper in the house. Our play was varied, controlled very much by the seasons. Hide-and-seek was a favourite game; fox-and-hounds was another; so were climbing trees and kite-flying. In the warm months cricket was our great game, and in that we excelled, for we had a good field near to us, and had considerable practice.

It was at this time that a grand revolution took place in cricket, which I myself never cordially liked. A change took place in the art of bowling. In the original game, as it had been practised for ages according to our ideas, and as the traditions of Burrow Hill seemed to testify, the bowling had always been what was called "underhand." The bowler would run up to the side of one of his adversaries' wickets and deliver his ball to the wicket at the other end of the pitch with his hand down by his side, with much precision whether swiftly or

slowly. Sometimes he was a fast bowler, and went straight, sending his ball towards the opposite wicket with all his might. The batsman had to look out and hit or parry the ball, otherwise the wicket fell, the bails at the top were scattered, and all for the time was over with the batsman. Or the bowler was slow and artful. He would let his ball trail queerly along under the bat of the batsman, to reach the wicket in that way; or he pitched his ball so that it would come just short of the bat, or go just over it, a very difficult ball to meet and very treacherous. These were feats of skill, and implied considerable tact for which bowlers were celebrated. Quite suddenly all this was changed and the system of "round-arm" bowling came into fashion, for which I think we are indebted to a Captain Barton, who was an impulsive and merry Leicestershire man, great in ballooning and in all sports of an active character. The round-arm bowling altered the entire aspect of the game. The bowler no longer kept down his arm to his side; he practically threw the ball. He was not allowed to throw it overhand, as if he were casting it for a catch; he was obliged to arrange that his fist should not rise above his elbow, but still he pitched, and so gave rise to what is called "round-arm bowling." The bowler did not now try to give artful casts, but endeavoured by sheer swift bowling, as a general rule, to go through his opponent's wicket. There is no doubt that he did bowl swiftly, as the padded legs of the batsman

plainly indicated, but he was apt also to bowl very much on one side or other of the wicket, and he stood anything but gracefully. He bent on one side, and his position was not at all elegant as he delivered the ball. On this there became more of side swing, of backing-up behind, of wicket-keeping, and of wider outposts, great batsmen, such as Pilcher, sometimes driving the ball to distances that had never before been seen or heard of. We school-boys were not slow in taking up the new method, but I much doubt whether we particularly relished it. It has held its own, and we scarcely ever see a match now under the old system. I have once or twice known it set aside, and a neat and skilled bowler take an immense number of wickets by the old system with astounding success; but round-arm and over-arm bowling hold the first place in the mind of the present-day cricketer.

Besides cricket, we had other pastimes which were pleasant. We often went in the spring-time to see the sheep washed and sheared, and were greatly delighted to chaff the washer as he stood in his tub in mid-stream. At other times we used the stream for our own bathing-place, and laved and bathed and learned to swim and dive, like true English boys.

We played a game called fox-and-hounds which leads me back to an incident calling into view one of the most remarkable statesmen of this country when he was comparatively a young man, and when he

little thought of the great future that lay before him. The game of fox-and-hounds most people understand, but they rarely connect it with an event such as befell us schoolboys. The custom is for one boy, either by the choice of his fellows or by a toss-up, to be elected fox for the game. He is then divested of all clothing that would be inconvenient, and round his neck is suspended a bag filled with short cuttings of paper. He is next allowed a ten-minutes' start, when he makes his way as he likes, and at the end of ten minutes indicates his path by throwing out his papers right and left. I once, selected by virtue of the toss-up, made for the station of a railway which had not been many years open and which I wanted much to see. I also wanted to catch sight of a gentleman there who was stationmaster. This gentleman had created a good deal of conversation about himself. It was gossiped that he had been editor of a paper called *The Satirist*; that in that capacity he had written some rhymes which were not well received in high quarters, but that, being a man of family, he had been permitted to escape the law and to conceal himself.

I started for Syston, a long run, and finding myself on the edge of a spinney, or small wood, stuck some papers on the fence, and crept through it into the wood. Some of the trees were high, and finding them close together, I climbed one, from the top of which I could see my companions making

straight towards me. Losing no time, I practised an art I had learned at Burrow of leaning over to the next near tree in turn and descending by the last in the wood. Then I crept along the spinney until I found an opening on the opposite side to that by which I had entered, escaped by it, and made my way onwards. My comrades naturally stayed at the little wood, and knowing my propensities for lingering in such spots, they completely searched it, climbed some of the very trees I had mounted, and not finding me, crossed, and in time discovered the bits of paper that denoted my course. By this thorough search of the wood they lost a great deal of time and gave me the opportunity of pushing on a good way. I made for a village called Queenborough; talked to the people there, to whom I told my destination; scattered a few papers; drank a glass of good gingerbeer, and not very long after reached the station named Syston, where the stationmaster was busy in his garden. I did not know him, but he soon began to talk to me; ascertained what I had been doing, and seeming to revive under some old and long-forgotten pleasure, asked me into his house and gave me a glass of milk. It occurred to me to be best to wait there until the rest came up, and all I did was to watch the stationmaster meet a train that was just coming in. Some passengers got out, and one of them spoke to me in a kind of informal manner, set up his little trunk on top of a seat, and then

began to walk with the stationmaster up and down the platform, whilst I ran about and got on the lines, from which I was summoned back to look out for my friends. The passenger, who meanwhile walked about, and had heard the history of the fox-and-hounds, a brisk, active, comparatively young man between thirty and forty years of age, was obviously pleased with the game, and quite alive to what it meant. He carried a short stick or cane, which he often brought sharply to his right leg, and he spoke with a rather slow and decisive voice, with frequent turnings towards his little trunk, as if to be sure it was quite safe. I knew who he was by this time, but did not dream of the important part he was to play. On his trunk, in white letters, was conspicuously painted his name. It was Benjamin Disraeli, Esq., the name of the son of the author of *Curiosities of Literature* and *The Calamities of Authors*, books I had often perused with boyish pleasure. The present Disraeli was, of course, new to my mind, but not all new in name. He was slender in build, and dark-looking, wearing a dress which alone would have told the race from which he sprang. He was well-dressed—that is to say, his clothes fitted his body as correctly as was possible. His shoes were very bright; his trousers tight; his waistcoat had a collar and upper part of sealskin. His shirt looked dingy, and round his neck was what was called a black stock just showing the collar. His overcoat was loose

and of a dark grey; his hat, tall, narrow, and curved a little, was worn on one side. As he tapped his right leg with the short stick, he had a sidelong, droll look, a look he never lost, and he spoke clearly, but with a kind of drawl, which sounded foreign. He made several inquiries about our school, and was intensely pleased with my account of Burrow Hill, the races there, and the particulars of a pony, "Dead-nap," that belonged to one of my schoolfellows, and always won any race in which he partook.

While we were walking and talking some of my schoolfellows arrived, and, after giving me a good blowing-up for having led them so far out, seized me as their prey and made a great prize of my paper-bag, as if it were the tail of the fox that had been caught. I dare say Mr. Disraeli would have questioned us more, but just at the moment a new train made its way in, the stationmaster was fetching the famous bag, and we all gathered to see the passenger off. He was handed into a comfortable carriage for London, and, putting his bag by his side, shook hands, to our surprise, with the stationmaster, whom he evidently knew, bade us all a cordial good-bye, and sped away to the Leicester station, the next on his way; the Syston stationmaster telling us that we had met Master Disraeli, whose father he had known, and predicting for him a future career we scarcely understood: "He is a wonderful young man, is that; writes stories, gets into and out of debt, and I shouldn't

wonder if some of you live to see him a Minister of the Crown."

I did not see Mr. Disraeli again for many years after this, and when I did he was in a very different position. Some twenty years after the Syston adventure I was one of the lecturers of "Lane's School," adjoining St. George's Hospital, and was going from Manchester Square to that school to deliver the morning discourse. Mr. Disraeli was taking his early walk, and in South Audley Street I met him. He was very much changed; older, dressed differently, and extremely grave and thoughtful. As we met he recognised me at once, and came forward in a friendly manner.

"We have met before," he said, "but I do not know when."

I reminded him and he immediately remembered.

"Yes!" he said, "I well recall that interview at Syston station; but what are you doing at this time?"

I told him I had gone through my medical examinations, was duly qualified, and delivering lectures on Medical Jurisprudence at a medical school close to St. George's Hospital. He turned round, indicating that he was, for the moment, at leisure, and accompanied me on my way towards Hyde Park. We talked all the while. He remembered the game of fox-and-hounds, spoke about the changes years had made, asked the subject of my lecture that morning, and was much interested

to hear it was "Spontaneous Combustion." At the new grounds, which have now been turned into a garden and which I have scores of times crossed since, we parted. I met him again several times. When the Shaftesbury Estate was opened we spent most of the afternoon together in agreeable converse, and on one occasion he sent me, through Sir William Stirling Maxwell, a kind and useful message from the House of Commons. But, curiously, he remained always to my mind the travelling stranger at the station, where, by accident, we first came together—he a brilliant young man, I a playing schoolboy.*

I never recall those school-days at Burrow without satisfaction; every incident connected with them

* The school in which Mr. Disraeli learned his own early lessons still exists. It is situated at Higham Hill, near Walthamstow, and as it stood in his time must have been a handsome place. The house—Essex Hall—is now occupied by the widow and daughters of the late Sidney Cooper, Esq. The house is large and commodious, and on the right side of it are the schoolhouse and playgrounds just as they were in the olden time, for the owner has not liked to disturb them. When Mr. Disraeli—that is to say, Lord Beaconsfield—lived in the house, there were as many as sixty boys all undergoing their education, and the school was kept by a Unitarian minister—the Reverend Dr. Cogden—a remarkable teacher and scholar. The school-room is divided into two parts, which is exactly as it was originally; the desks continue in the same position as they were then placed; the fireplace where the boys warmed themselves is the same, and all over the boarded walls and desks the names of scholars are cut, but the Earl's name is not to be found. The late Recorder of London, Samuel Gurney, was also educated here, and an old schoolboy, still living, points out the beam running across one of the rooms on which the boys would all climb on occasions. In one of the divisions of the room the scholars partook of their dinner, which the servants had to bring up from the house, and the bell that summoned to work, eat, or

comes back with pleasure, as if nothing were too small to be recalled. I remember well an old gentleman by the name of Dr. Wing who used to ride a fine cob, followed on all occasions by two greyhounds. He was a retired practitioner from the Vale of Belvoir, and I heard that for a long time he went regularly each week to Grantham, where he carried on a kind of consultative practice which paid him very well. I recall him as a private gentleman, although he would now and then see a patient and write out a prescription in a large hand on a large sheet of writing-paper, charging five shillings for the effort. I know not why, but he took a great fancy to me, and often asked me to see him. His housekeeper was a sister of a nurse who once saved me from drowning. Dr. Wing was very fond of his profession, and would tell me a great deal about it as he pictured it fifty or sixty years before. He always told me to work away hard, predicting that if I did I should one day be, as he called it, "a star of the medical firmament." He would also, with great care, describe the house near to his own, though not in the same parish, in which

play is still suspended conspicuously on the outer wall of the mansion. At this moment the divided school is used by the Misses Cooper as a Sunday School.

Apropos of meeting Mr. Disraeli at Syston station, as recorded above, I have no doubt that it was owing to the circumstance that he had been on a tour or visit to Charnwood Forest, to which he was partial. He evidently knew the forest very well, for in his story of *Coningsby* he refers to many facts connected with it, and even to persons who resided in it.

Cheselden, the great surgeon in the reign of Queen Anne, was born. He had known an old man who had seen Cheselden, and he knew the nephew, Colonel Cheselden, at whose sale my grandfather, Richard Ward, bought the Panini picture that once belonged to the great surgeon himself.

Old Dr. Wing lived on all through my time at Burrow, and when I was established afterwards in London he sent for me to see him in his dying days. I am happy to say I went, and with his regular attendant, Mr. Henry Hudson, of whom I shall have to speak again, did my best to ease his pain and prolong his life. He died very soon afterwards of old age.

Our work at school was always full of interest, which carried us along blithely. We had, among other friends, if I may still call him so, a sad specimen of the parish clerk of those days, and of many long years previous. This clerk had always a kind word for us, but sometimes we got entangled in a quarrel with him. He was a droll reader, and he not only had to read his parts of the service, but had to select and give out the first lines of the hymns sung by the choir. The leader, who was a good musician for his time, and a violoncellist, did not hesitate to take his seat on the altar-table, and lead with his voice while following with his instrument. Our clerk, Johnnie as he was commonly called, would never heed how he read, but we knew his tricks. He would say, "Fill the hungry with

good things, feed 'em, and send 'em empty away," the impossibilities of which he did not seem to comprehend. But the drollest thing he ever did, was, I fear, due in some measure to our mischief. We boys at vacation were invariably allowed to ring a peal on the parish bells. We had four bells; merry ones they were. I myself used to ring the tenor, and never was more delighted than when the rope of it was in my hands. One Christmas-time, we could not discover why, Johnnie took it into his head that we should not ring. He cleaned up the church, set out the green stuff on pulpit and pew, and locked the door. It was fortunate and unfortunate that one of us boys knew how to get into the church by a secret way, which we promptly fathomed and entered in by. We, closing the church door and securing the latch firmly, as well as our own mode of entrance, made our way to the belfry without disturbing a single leaf. Once there, certain of us stripped off our coats, and, running up our bells, commenced our usual peal, only to bring Master Johnnie back in a furious passion. I answer for no bell but the tenor, and I know that not one pealed more joyously, indeed it never seemed to ring so cheerily. The door and all entrances being securely closed, poor Johnnie spent his rage in vain. Meanwhile some of our fellows mounted to the roof of the church and to the battlements, while we in the belfry waited a short time, and snow being abundant, those outside made

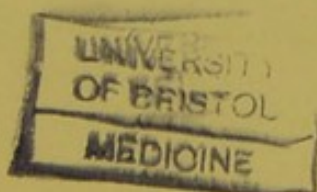
heaps of snowballs, and calling aloud, brought Johnnie, who was under close cover, into view. Then the snowballs flew fast and furious; we at the bells joined the outside ranks, and very soon the invader, who for a time stood as still as Lot's wife, had to retire, for Jack Lambert, the lion of the school, who afterwards lost his life while taking soundings in the river Hooghly near Calcutta, threw a ball so skilfully that it knocked off Johnnie's hat, with telling consequences. We were molested no more, and quietly ceasing our sport marched to the rectory for tea; corded our boxes; told some good tales; dwelt on our last adventure, which we did not try to conceal, and left in numbers the same night.

It was quite curious to all who had to stay a few hours longer to observe how civil our good friend Johnnie was to everyone. He said he had only been played a boys' trick, and on our passing his house he and his good lady together at the parlour window kissed us with their hands a merry good-bye, and seemed to proffer all their good wishes for the new year: in our wish, father to the thought, we hoped so.

Our Christmas vacation passed away as all such times do. We had a few lessons to learn, but my time was mostly filled with merry parties and games that were in progress, and with the reading of Cook's and Anson's Voyages, Southey's Life of Lord Nelson, which was then very popular, with some of Charles Dickens' early works, which were

just catching the public mind, and with tales about Jack Sheppard, who, though long dead and gone, was becoming the hero of the hour. In those days, too, we learned to shoot with the old flint gun, which had not yet been replaced altogether by the cap, and our sport was chiefly with fieldfare, birds shy and timid when the cold was not intense, but by no means bad game.

We came back to school at the end of January, the usual time, found some new friends, and got on very well. One day we started rather early to Buttermilk, where the hounds met, and after they had "found" we made our way back through the village. There we were met by our friend Johnnie, who, forgetting, or seeming to forget, old scores, asked us all about our holidays and invited every old boy into his house, but would ask none of the new boys. His wife, as cordial as her husband, laid out new presents, such as mince-pies, inviting us with grace and enticement to partake as we would have done if we had been at home, and inquiring religiously about every father, mother, sister, and baby, if there were any. The mince-pies were splendid, only too small in size, and how every one devoured them, and how many, it is unnecessary to tell. We went "galumphing back" to our school, but oh! the horrors I cannot repeat. They were awful, and if some doctor had declared, as a bait to his practice and skill, that Asiatic cholera—which had not long left the locality—



had returned with all its virulence, he need not have been doubted. As to ourselves, we knew better what was up, and when we got over the attack we thought most deeply of our revenge ; but we did not for the moment see our way to it, so we waited many weeks. Revenge came at last, and that is the pith of the story. In Burrow Church there was a funeral, and when it was over, two of the naughty boys who had been sufficiently punished got a quill and a gum-bottle, and by the private way entered the church after Johnnie had left. They found, as expected, that he had got everything in order. He had put in the proper marks at the lessons, the psalms, the gospel, the epistle, and the collect, for the next Sunday. He had seen the choirmaster with the big fiddle, and had duly set out the hymns. Finally, he had prepared his own reading-book, which we sought. The psalm for the day in which he had to read was the CXXXVIth, which tells the children of Israel how they had been saved in their great trouble, and how grateful they ought to be to the God they worshipped for saving them. The psalm begins with the solemn invocation to the Lord, to give thanks unto Him because He is good "and His mercy endureth for ever : " the clerk follows the priest with a recital in the same strain, and so they proceed verse by verse until the thirteenth and fourteenth are reached. At that precise point poor Johnnie suffered. The parson tells in verse thirteen how the Lord divided the Red Sea into parts, and

the clerk reads, "And made Israel to go through the midst of it"—by an interpolation always expected, "dryshod"—"for His mercy," etc. But here the clerk stopped. The two bad boys had done no great wrong, but sufficient to be mischievous, which was enough. Dropping the feathered end of the quill pen into the gum, they had stuck down the margin of the leaves in such a manner that the page ended with "for His mercy," while the next leaf commenced "Thou knowest my down-sitting and mine up-rising" instead of "endureth for ever." What was to be done? Johnnie turned back the leaf, but it had no effect, so he read on, "And made Israel to go through the midst of it dryshod, for His mercy thou knowest—— No! he did not know," and in awful confusion he once more turned back the page, exclaiming "for His mercy endureth—— No! damn it! I'm wrong!"

The exclamation was loud enough for all the church to hear, but the consternation it produced is better imagined than described.

"Sit down!" cried the parson, and then turning to the boy by his side, whose duty it was to read the lessons, he bade him go on with the service. I am ashamed to say the boy laughed so that the clergyman, turning to the principal gentleman of the parish who sat near, asked him to do what the boy was unable to, and he, with much grace, complying with the request, the service went on to its close.

I have only one other word to say about Johnnie, so famous a specimen of the ancient parish clerk popular in my boyhood. He would always say "to the cheruphim and serabim continual I do cry." His learned master corrected him on this point more than once, but it did little good. The first words he would correct, but "continual I do cry" he considered was more respectful than "continually," and he stood to his text to the end.

This clerk was a wonder of our school, but we had more wonders of a living kind than he. We had dwelling not far from us a live marquis who did the oddest of things, what he would call practical jokes—sometimes practical, sometimes serious, and I should say usually costly. He once painted Melton Mowbray from end to end "brick-red," and over the squire's house bestowed so much labour that he stood on a staunch comrade's back, and admonishing another friend to "give us another brush, Jack; it's best to do it well while we're about it," he laid it on rather too thick and was arrested. Visiting some friends in a parish a few miles off, he rose in the night; made his way quietly to the churchyard; pulled the ropes of the bells out of the belfry window; tied them together with one cord; tied the end of that to a halter fixed on a jackass, and then sped home to bed. When the animal came to the end of his tether he naturally pulled, and, making the bells ring, in his fright pulled harder. The row was

terrific. All the village arose armed, but no one dared to proceed to the churchyard, except the marquis's man. This man ventured, and loosing the cord solemnly declared he could see nothing, and it was not until some days after the master and his man had left the district to hunt in another county that the true perpetrators of the hoax were found out.

We were constantly hearing rumours about this noble lord, at some of which we laughed, while in regard to others we were not so elate. We once heard of a good-natured clergyman who preached for him and his friends a charity sermon. The clergyman rode over to the church, at which he was to preach, on a slow but favourite old pony, and put the animal up in the stable allotted to him. Whilst he was conducting the service the legs of the pony were dressed with deer fat, or something of the kind, which dogs would follow. Then, when the service was concluded and the clergyman was returning to his college, the dogs were let out, and, running after the scent, followed the poor old gentleman at full cry into the midst of a weir in a village he rode through, from which he was extricated with the utmost difficulty. We were filled with anecdotes of this sort which came to us from all sides, until at last we wearied of them, many of which I could repeat if repetition were necessary: at last we heard that the half-mad originator of them, venturing, at length, into some foreign city,

received a crack on the head from a night-watchman, which caused his death either at the time or soon afterwards.

Amongst other things in our village we had, almost as a matter of course, a great "black-jack" centre, and it is worthy of note that the maker of the article, one Nanny Brown, was the finest manufacturer ever known. I am afraid we played her many sad tricks. Her cottage was easily scaled at the back by its roof, and one day when she was engaged making the sweet in large quantities two of us boys ascended, while the rest remained below. Those at the top could look down the chimney, and could see the iron pot on the fire boiling or simmering, with the sweetstuff in it. Calculating the right time, they let down a long string and hook, and, catching the pot, drew it up with its load. On returning to the fire Nanny missed the precious mixture, and rushed into the next house to call assistance. Meantime the sweetstuff was poured out on to a newspaper, pennies were poured in to take its place, and the pot was let down again. The neighbour coming in discovered the pot in its right position, and proceeded to turn out the money on to the floor; but when the two women came to pick up the pennies they were burnt by them, and exclaiming loudly "Oh! I'll have none of the devil's money!" pious Nanny pitched the whole into the sink without compunction. Very soon after, all of us boys rushed in for our usual

share, and found none to be sold, to the apparent great surprise of some of us. A few, however, were too inquisitive, some too communicative, and some sniggered so that they let the cat out of the bag, and a sound scolding and refusal to let us sit on the corner copper and tell tales brought the whole of the joke to a close. Many years after Nanny and I renewed our laughter at this adventure, when she gave me a receipt for her famous mixture, and I returned the gift—through the doctor who was with me—in the way of attendance and prescription. Later on I heard in London of her death, and often amused my own children by relating the incident above described, as did other of the boys of the same age who took part in it.

As boys at Burrow School we all kept on good terms with each other, although now and then we had a free fight. One boy, who had heart disease, from which in a few years he died, was a splendid boxer. He could thrash any other boy in the school, and, as boxing was not forbidden, it is a fact that he often did, especially when he was nicknamed “body-snatcher,” a name he cordially resented, or when any reference was made to the occupation of persons of that class. For my part I took no share in any of these violent disputes, and never exchanged a blow. I was a student among students, and while I was obliged to take part in the lessons that were set, I was not expected to fight or quarrel. Often, indeed, I did not go out to

the games in the yard except to build rabbit-houses, or to play at "fives," which was always a fine game. I was great at kites, constructing one in cloth that was six feet high, and which, when it was well up, would lift my own weight easily, carrying me over low fences in the direction of the wind. The kite seemed to me to be a most applicable instrument for flight, and I wonder still why it has not been vigorously turned to account.

Several healthy years passed at this delightful school, and, on the whole, we could not have been better occupied. We all worked in anticipation of what we were going to be. I got thoroughly versed in the English pronunciation of the Latin language, and, notwithstanding much after-labour later in life, found it difficult to get it supplanted by the purer and more ancient school. I read through and through the first four books of Aurelius Celsus and the whole of Gregory's *Conspectus*—the two primary Latin books for the medical profession—but I also read and construed the Latin *Delectus*, the *Selectæ Profanæ*, Cæsar's *Commentaries*—the first books of Virgil, and other classics. I learned the Greek *Grammar*, the Greek *Delectus*, and a portion of the *Diatesseron*.

I followed Euclid through the first four books, and of course, was taught reading, writing, and arithmetic, geography, manners make the man, natural philosophy, and all the common school-works of

the day, entering into a general education for a pupil about to join a profession.

Our schoolroom was a capital library, and Mr. Nutt took care to have its shelves well-stocked with useful books, to all of which we had free access in our leisure hours. To me, indeed, the library was a treasure, and it was well-used on wet and gloomy days. Sir Walter Scott's novels were there, together with the works of other famous authors.

One or two special matters are fixed in my memory in regard to the school. We had two excellent globes, a celestial and terrestrial, from which we took regular lessons, until at last some of us were as conversant with them as we were with our ordinary maps, and extremely useful they became. But what was most beneficial to us was our tutor's love for the telescope and his mode of teaching us its meaning. He had himself a good instrument, which stood on its own framework and enabled us to see from over a low wall in the yard the full outline of Charnwood Forest; it showed us when the mill at a place called Markfield, in, or adjoining, the forest, was in full swing; on fine days allowed us to see the miller trimming the sails; and at night another glass resolved the satellites that surround Jupiter, and the rings, or supposed rings, which encircle Saturn. My own eyes were so good that I could see Jupiter's satellites without the aid of the glass whenever they were dominant on one side of their planet, but the telescope greatly assisted us and became a good

guide to our vision. The gazing on the stars necessarily led us into the study of astronomy, so that we knew something about the early, as well as the late, history of the science.

Astronomy at the time I name was, in brief, a favourite study, and we once, for some time, saw the tail of a comet, which led us on to the theory of comets, the nature of the Milky Way, the mighty realms of the universal space, and that which filled it. It staggered us to hear all about these wonders, and we often recalled the words of Young, whose *Night Thoughts* were duly before us:—

“What am I, and from whence? I nothing know
But that I am, and since I am conclude
Something eternal. Had there e’er been naught
Naught still had been. Eternal there must be,
But what eternal?”

Herschel was now a great authority. He, Sir William, had, we were told, resolved the Milky Way into stars, and his son, Sir John, was close upon him in discovery. Sir John I much longed to see and hear, advantages which fell to my lot in the future, and did not disappoint me.

It has been already told that the school, some incidents connected with which are given, was to me like a home for many years, and I left it with actual profundity of regret. On leaving, if the matter may be put in this way, my literary life commenced, for I ventured a parting poem which was forwarded by Mr. Nutt to one of the local

papers, and was published in its columns. It is curious to see one's name for the first time in print, and although it was transitory it was a strange sensation to me, while Mr. Nutt, very much pleased with the effort, pinned it in his diary, and so long as he lived deigned it his perusal and commendation. In this poem was sketched a history of the school-life: the entrance of my schoolfellows and myself into learning; the method in which we were treated by our master; the nature of our studies; our games and other recreations; our afternoon's work, and the close of our day, the final dissolution of the whole being portrayed with acute sorrow.

I have seen many vicissitudes since those boyish rhymes were constructed, and I dare say I should now retract some views that were written, but they were faithful at the time, were in full accord with my youthful aspirations, were reflexes of what I had learned and done, and I refer to them with all candour in the pages of "school-days."

I might leave the history of school-days at this point, but there is one other observation I should not like to omit. It has been told that the library of our schoolroom was well-charged with useful books, and that good books of fiction formed an essential part. It should be added that the library was also thoroughly supplied with books of adventure, and particularly with books of a biographical character. There was scarcely a man of eminence up to that time whose name was not enshrined in

the works located on the shelves before us, and we took full advantage of this department. As far as I could myself obtain the advantage I utilised it, and spent every moment of the time I could spare in reading and learning the history of the lives of the great men who have preceded us. On wet days all the playtime was spent in this effort, and no section of school-work was in after-life more profitable, for from it I imbibed a strong literary taste, and in writing found it at all times useful to be able to refer to the past through the deeds of the men who had lived in the past. This was specially the case when I was dealing, as I often did, with the lives of members of my own profession and with the history of my own profession. As early as 1853, when Dr., afterwards Sir, John Rose Cormack was editor of the *Association Medical Journal*, I contributed to it for him, with little difficulty, a series of articles on "Medical History," discussing it as a neglected branch of medical education, and urging its practical applications in the study of diseases and their treatments. Later on, in the pages of the old *Medical Times and Gazette*, I wrote another series of articles on "Our Heroes of the Past," giving an account of their lives and works, not supplying a tithe of what I wished to supply, but filling a considerable number of pages, and creating a great deal of interest in the minds of medical, as well as general, readers. Still later, indeed within the two last decades of my life,

I have pursued the same subject, and in my own medical work called *The Asclepiad* have written over forty Lives, with epitomes of the works of physicians, surgeons, and philosophers who have assisted in the progress of medical science and art, or have added to our poetry. The labour thus exacted has ever been of the most delightful kind, and I can faithfully say that, whether good or bad, it was derived from the early studies of a biographical nature that were instilled into my mind.

From the experience thus obtained, from the happiness that has arisen from it, and from the use I know it has been to many others, I would urge every student, whether medical or general, to start life with a good biographical training. Sometimes it seems to me as if the whole field of knowledge were open to a man if he first become conversant with the lives, characters, and works of his predecessors who have cultivated the world and its literature. The world is man, and in so far as he possibly can, man governs everything that is upon it: builds architectural structures, carves roads, pierces mountains, spans valleys, constructs languages, discovers sciences, frames laws, and becomes, in short, the living lord of all. If, therefore, we know man as he has been, and is, we know the history of the world as it appears before us in what man has left behind him, the world of all time and of all character.

CHAPTER IV.

ENTRANCE INTO PHYSIC.

ENOUGH has been told to convey the fact that, practically, I had no alternative except to take up physic as my profession, but I may candidly say that I was not personally in any way prejudiced in the matter of choice. It was my mother's wish and pride for me to follow medicine, and her feeling was diffused throughout her circle. My good aunt was of the same opinion, and her husband, a medical man, would, I am sure, have marvelled greatly if anything had distracted my course.

The gentleman under whom I had been a scholar had educated me for a fixed destiny, and my schoolfellows, among whom I had no rival in physic, greeted me as an embryo doctor. If with it all I had an enthusiasm, it was for the sea; for, like many boys, I had read Southey's *Life of Nelson* and was greatly impressed by it, as well as by Sir John Richardson's work about his travels towards the North Pole. Another schoolfellow, "the Lion," as we called him, Jack Lambert, sympathised strongly

with me, and we two, on one occasion, actually ran away, intending to make for Portsmouth or Plymouth, and to seek our fortune upon the ocean. Fortunately, as we trudged along and discussed the subject more fully, we determined, towards evening, to return to our school and to say nothing about the matter further. This resolution was lucky, at all events for me, but poor Jack stuck to his determination, spoke of it to his friends, obtained their aid, went out as a middy to Calcutta, and was accidentally drowned while taking soundings in the river Hooghly.

One of my other schoolfellows went also aboard ship, and though he lived to return and take up his residence in England, his experiences were not happy. The two facts put together influenced me finally to remain at home and make my way as best I could on solid land.

The Church had a few temptations; the Bar many; but, on the whole, Physic came first.

In the early part of this century it was the custom for all youths destined to follow the practice of physic as a profession to be bound for a certain number of years to a man who was himself in practice. It was an old rule, and, at one time, was considered all-sufficient by the community at large.

Certain men of good position, and well off, "walked the hospitals," or made the grand tour of Europe, going to Leyden, Paris, Göttingen, Montpellier, Padua, Rome, or some other foreign

centre. These, returning home, retired to Oxford or Cambridge, graduated as M.D., and becoming connected with the Royal College of Physicians in London, the only truly organised English corporation in Medicine, entered into practice either as a Licentiate or Fellow of their College. These were exceptional men, doctors *par excellence*. The majority were bound or apprenticed to gentlemen in general practice, established in cities or in country places as practitioners. I have often said, and again say it, that this method of introduction to our profession, now practically abandoned, was the best that could be, and ought to have remained untouched. It was a fruitful source of income to every respectable practitioner; it kept such practitioners well up to the mark; it made good openings for introductions and practice; it was warmly appreciated by the public at large; it cultivated well a common field, and effected a sound and general good. The chief benefit was to the student himself, for he learned early in life all the practical branches he afterwards most needed; he soon acquired as "the young doctor" the style and manners of the medical man; he learned the mode of entering the sick-room, and of conversing with the sick; he practised naturally the true etiquette of physic; he became a good rider on horseback, and a good driver of a gig or phaeton; he was familiarised with the night-bell; he gained ripe experience as a dispenser of drugs, and knew by sight, touch, and

odour every drug he was called upon to dispense. There were also many branches of learning open to him. There was botany; a wide field of anatomy; a school of chemistry; and the whole course of dietetics. Beyond all, there was the practical teaching of the details of the art under the guidance of one man. There was really not one detail of a minor kind omitted. The pulse could be felt, counted, and particularised; the expression could be noted with facility, and all kinds of motion of the limbs observed; the temperature of the body in different conditions could be tested; dyspeptic symptoms could be chronicled and corrected by diet and exercise; the effects of age could be faithfully recorded; if a patient should unhappily die, a post-mortem examination of the body could often be procured and carried out, to which the pupil was admitted, and from which information wanted at all stages of after-life was obtained; accidents were constantly occurring at which immediate aid from master as well as from pupil was demanded, and hosts of little operations were going on, such as tooth-drawing, venesection, the application of bandages, frictions, and other acts. These acts, though at the moment they might appear to be trifling, were in reality not so, for they gradually transformed the youth into the doctor, and most successfully preceded, if they did not supersede, a hospital career.

On leaving school I was fortunate in being the

pupil of a competent master, the late Mr. Henry Hudson of Somerby, who was not only a good doctor, but was also a general scholar, in many ways advanced, and by natural gifts a skilled mechanic. He had his faults—who has not?—but he knew how to teach. He was the medical man of our neighbourhood, and I met him fortunately. A man, for some misdemeanour, had been placed in the stocks, and sat there very like a beer—or spirit-steeped idiot. Two wooden pillars, erected under a tree at the foot of a churchyard wall, had sliding in them two perforated cross-bars, the upper one of which lifted up; the person punished was made to sit on a wooden seat before the stocks; the upper cross-bar was lifted; the legs of the culprit were laid in the perforations of the lower bar, and the upper bar was brought down, enclosing the shins immovably, and was then locked at one side. The man in the stocks was now secure enough, and a crowd soon gathered in which the person insulted or injured was present. The man locked up was not allowed to be ill-treated by having stones or other hard substances cast at him, but it was permissible for any person at his pleasure to cast a flour-bag or a rotten egg, so that, as the culprit sat there for two hours or more with numbers of people round him who were not always polite in their language, he had enough to bear.

Henry Hudson was utterly opposed to this punishment, and, in fact, in the end had the audacity one night to dig up a pair of stocks and cast them into

a fishpond. Upon the occasion I have named, he stood near the imprisoned victim looking on, probably taking care that the unhappy man was not too severely tried. He held by the hand his young and only daughter, a child, and she, with anxious and wondering face, held and gently embraced a dove she was very fond of. A shower of eggs descending on the poor prisoner before her gave her a start, and caused her to let loose the dove, which flew to the top of a neighbouring pine-tree. I was brisk at climbing trees, and, therefore, quickly clambered up the tree to the dove, laid my hand gently upon it, put it in my breast, descended, and, to her great delight, took it to the little girl, placing it once more in her arms. She was immensely grateful, and her father, at that time a stranger to me, was equally pleased, asked me my name, and invited me in to tea.

It was natural that I should not only take tea with Mr. Hudson and his wife and child, but that I should be deeply interested in his occupations and conversation. He was equally interested in me, and to his life's end was a faithful and admiring friend, often calling on me for advice. He showed me his surgery, his workshops, his good little library, and all that he possessed; he also strongly persuaded me to keep to the idea of following up medicine. He had himself no blind faith, and no infatuation, for, having read, and having been much impressed with, the Book of Ecclesiastes, he believed there was nothing new under the sun, and was inclined to ask,

“What knowest thou of the spirit of man that goeth upward, and of the beast that goeth downward?” He had been a pupil of the famous Joshua Brookes, F.R.S., who once taught anatomy at the Anatomical School at Blenheim Steps, and who was a wonder of the day in a wide circle. He told me a great deal concerning Brookes—how in Brookes’ theatre and rooms he dissected and listened, and how with this master he had not infrequently breakfasted after removing some part of a skeleton in order to find a chair on which to sit. Of course, all this was new to me, as well as were some fine anatomical sections which he had made in the Blenheim Street School.

We passed, altogether, a most pleasant evening, not a little varied by a careful perusal of some of the chapters of Rollin’s *Ancient History*, a book I had not read, but which I found afterwards very fine and useful. He told stories, too, that were short and happy. He described to me what the Egyptians did in their method of embalming the dead, detailing every step of the old process, and explaining that however much they admired the method, and however much they followed it, they did their best to inflict some injury on the man who, with his flint or stone knife, made the first incision in the body, and who was obliged to “cut and run” in order to save his own skin, from whence, he said, the words had their origin. We became mutually attracted to each other on that first night, an attachment

never broken, and I have no doubt it was my fate to be his articled pupil as a first step of entrance into physic. Soon after the thing was done. I became his pupil, and was taught to beat opium and soap together in order to make opium-and-soap pill ; I wrote fresh labels for all the bottles ; I learned not only the names, but the nature and quality of the medicines, and was soon a scholar in the mystery as well as in the art. It was not long before I saw patients on my own account, and once, on Mr. Hudson going away, I was entrusted with the care of the outside sick people who would have me, and being called to a man with acute peritonitis, was obliged to summon the kind assistance of old Dr. Wing, who most graciously informed me for the best. I also read, with the utmost desire to do what was most useful, the famous work on *The Practice of Medicine* by Dr. Mason Good, a splendid authority in physic, and the learned translator of *Lucretius*, as I afterwards discovered.

My pupilage under Mr. Hudson continued many months, and had its value in other directions than the healing of the sick. He was of mechanical tastes, and taught me good lessons in wood-carving, in which I have ever felt a deep interest. But he pleased me most with his electrical efforts. He was considered locally a magic electrician, and spread out his electrical apparatus with more care and pride than he did his books or bottles. In accordance with his day, he was more of a static than a dynamic

electrician, and was only secondarily acquainted with the Galvanic, the Aldinic, or the Voltaic systems.

"I am," he used to observe playfully, "a continuous or primary battery man, and you must take me as I am."

He was thoroughly well-read in the works of Franklin, Cavallo, Priestley, Fowler, Adams, and all the older school, and was richly furnished with the instruments they had depicted. He had his big revolving glass globes, his amalgams, his conductors, his collectors, his Leyden jars, his chains, and his "toys." He could set off a peal of bells, make water stream rapidly from a little pail with a pin-hole in it; cause the hair of a doll to stand upright, and do endless tricks to the delight of an audience. He could repeat the experiment of Franklin of causing a number of standing persons to bow down lowly and to rise again without knowing they had ever moved; he could also make a straight rod luminiferous in the dark. We often discussed together what this widespread universal power known as electricity could be; why it existed at all, and whence it could be derived; what its uses would be, and what it would do in the future. I am sure my own study of it dates from these early considerations and observations.

Besides being a practising doctor, a wood-carver, and an electrician, my master was an antiquarian scholar, and was anxious to infuse a liking for a most graceful and useful pursuit. We had near to

us that old military encampment Burrow Hill, the ancient Vernometum, which the learned Stukeley has depicted, and in this spot we spent many an hour measuring out the seats of the various camps, the position of the Forum, the site of the ancient Governor's House, the form of the raised walls, and the four open gateways. From an excavation there the skeleton of a man was taken, supposed to have been that of a Roman soldier, which interested us, as it did many at the time. From different parts on the raised walls we could command magnificent views of the surrounding country, and could admire the skill with which the forefathers of our race made their surveys. We did not give to those fathers the Roman nature, for we believed that the place was pre-Roman, and that the Roman soldiery had simply occupied it because they found it suited their purposes, but we admired it none the less as an outlook and fortification.

We saw cricket-matches and races within the encampment, and once we did our best to save, and succeeded in saving, the life of a poor woman who had been ridden down among the horses.

What made us wonder most was the adventure of a schoolmaster whom we both knew, and who was an odd character. He was a small but clever man, with an obliquity in his vision which led him to look askance. He was a good fellow and a capital schoolmaster, always popular with his young flock, and anything but cruel. The only fault I ever

heard of him was that he was very fond of pork-pie, and too often ate so freely of it that it gave him nettle-rash of a severe kind, for which we had to treat him. He had his accomplishments, one of which was that of playing upon the violin. He played so often and so readily that, like Paganini, he could perform on one string, and got to be quite careless whether he had one or four strings upon his instrument, which rarely left his side. He would go into the village church aisle, place himself at the bottom of the choir before the pulpit, and lead the children through the most difficult parts of the Ripon Collection of Songs and Hymns, using only the single string, and at last finishing in such a sharp tone that the top note seemed to ascend above the head of the tall vicar in his high pulpit, touch the ceiling, and, reflected back, strike him at the back of his head, making him bow forward down the church, and causing all the congregation to turn their eyes round on the player, as if he had done some dark deed.

One day the droll medical master of mine was persuaded by me to turn out for a long stroll. He had been from home; the practice had been left in my sole charge, and I had been over to a village known as Ashby Folville to see patients there. To one of these I had sent out of the common drawer "*pil pro tusse*" a little box of pills which had worked so miraculously that the

sufferer declared—not in joke, though it was one of the best jokes I had ever heard—he would “never again touch a pill for his cough unless it came from the young doctor.” We saw him and others, and were satisfied. We left, and proceeded in the dark on our way towards home. It was a bitterly cold day; snow was beginning to fall; and passing a little country inn we, attracted by the bright fire, went in to refresh ourselves. The landlady, a good, loquacious woman, told us she had had a patient of the doctor there only a few minutes before, naming the schoolmaster, and adding that, fearing the night, he had just started across Burrow Hill (*Vernometum*), the same road as that we had to follow. We quickly started off, hoping we should catch him up and be company for him. At the foot of a rising ground we both thought we saw him at the top, and did our best to catch him, but to no avail. We reached the hill, and walked along its walls slowly and with difficulty, until we came to a place where it looked as if somebody had fallen. We stopped and shouted without getting a reply, and I tried to follow what was possibly a sheep-track, but, owing to the abrupt descent, was obliged to return. We strolled on to a cottage we knew, and found the cottager—a man great at arithmetic—who affirmed that he could see figures before him and reckon them up in the dark. He had heard footsteps a little before proceeding from the hill, and, so assured, we made

our way, and got home all right, sending to inquire if the schoolmaster were also safe. He had not reached his house, but was shortly expected. Next morning (Sunday) we were apprised that the missing man had not been home, and we not only gave all the information we possessed, but joined in every endeavour to find him. There was no trace of him all that day and night. The snow, as fast as possible, was turned aside. On Monday his fiddle was found on the hillside, which made us certain he was not far off. The search was renewed by many toilers, and on Tuesday he was discovered lying enrolled in the snow at the foot of a fence at the bottom of one side of the hill, far away from the place we thought we had seen him in, and far away from the spot where the fiddle was found. He was alive, but drowsy ; and, being carried to a cottage, quickly came to himself, and recovered so completely that he could teach as usual the next day. He had no knowledge of his fall, but had felt, on the top of the hill, as if he must lie down overcome with sleep, went to sleep, and forgot all else until he was brought to—a good illustration of the facts that snow is one of the best non-conductors, that cold is a fine anæsthetic and preserver, and that a living body, under the conditions described, may lie an immense number of hours without injury.

It would be possible to recount a great many more circumstances connected with this early entrance into medical life, but it is not convenient to find

room for them. I saw here the first case of small-pox I ever witnessed, and remember how the doctor dreaded taking me to it, while feeling it was necessary for me to learn to face the worst evils. I remember performing the task of extracting a tooth for the first time, from a village shoemaker, and that, steel forceps not then being popular as they are now, the old-fashioned instrument called the "claw" was successfully used. I recall also seeing sick people leeches, cupped, and bled, and subjected to other professional operations.

We had our amusements and lectures in the schoolroom, and mesmerism played its part. A man named Norman was mesmerised, and Hall the lecturer, about to give his lecture, was recommended by a lady to stand on a round table and be turned steadily round, so that all the audience might see and hear him.

These remembrances, however, must pass, for time went inexorably onwards, and it became necessary that I should leave for a wider sphere in which to pursue my medical course. The sphere was Glasgow. My cousin, the late Henry Swann, had followed his medical studies in Anderson's College, or, under the title it then had, Anderson's University, in the city of Glasgow. He knew all the professors there, as well as the physicians and surgeons of the Royal Infirmary, and, being a great admirer of them, recommended that I should follow in his footsteps, a recommendation backed up by

a letter of introduction which I bore to the late Professor Easton—the original prescriber of the famous Easton Syrup—who received and treated me as if I had been a member of his own family, and whose kindness I can never forget.

No name I have ever heard in my time has been more familiarised to all classes than that of Professor Easton. As a scientific doctor and as a professor of *materia medica* he was particularly interested on the subject of the action of medicines, and was fond of giving a specific value to every remedy. He did not like to mix up several remedies together, and told a good story about a practitioner in the Salt Market, who was accustomed to give to any one patient a separate drug for every pain, so that the patient would get a large number of remedies blended in a single dose. “I only test one drug, or at most three, at one time on one patient,” Easton would say; and this predilection led him to prescribe the famous syrup of iron, quinine, and strychnine, which bears his imprimatur. He was a good lecturer, though rather pompous in style, and an able physician.

CHAPTER V.

MEDICAL STUDENT LIFE.

MY studies as a student of medicine commenced in the year 1845 in the College, called at that time Anderson's University. It had been founded about the beginning of the century by Dr. Anderson, one of the most esteemed Glasgow citizens, as a kind of school not in opposition to the College or University that had long existed and which gave the instruction of a curriculum together with degrees in the arts and sciences—including the degree of Doctor of Medicine—but rather as an aid to the College as a technical institution. Dr. Sexton, the present Professor of Mineralogy at the Andersonian, has just published a valuable book reporting the origin of Anderson's and its course through the century, with the portraits of those who have been teachers since Anderson's time, a work well worthy of perusal. For some years the school seems to have been technical, but it gradually lapsed into a medical school, and as such became strictly organised. Dr. John Burns, whose book on Midwifery was for years the great text-book,

was elected Professor of Anatomy and Surgery, and other professors were soon appointed as his colleagues.

When I joined the school it was carried on, as it had long been, in George Street, and it was well filled with students who came to it from Scotland, Ireland, and, to some extent, from England, although those from the latter were comparatively few in number. The famous David Livingstone, the traveller, had been a student there, and his name was well-known. There were other students, John Reid of Newbiggin amongst the rest, a man I knew personally, who became one of the most famous lifeboat captains Scotland ever had, and with whose adventures I could fill a volume.

It was held up to us—such was the proof of his industry—that Livingstone every day walked from the factory at Blantyre, where he worked, a distance of eight miles, to the Andersonian classes, and back again in the evening, sixteen miles in all. It was a tough journey to keep up all the winter months, but, as I found by taking it, a pleasant one, and had a great deal in it to commend it. After a time he went to Africa as a missionary, and so commenced that career on earth that ended in the quiet of a grave in Westminster Abbey, an end which those who saw the beginning could never have contemplated. It has been many times reported that I was Livingstone's fellow-student, though really he was before me. At lecture I occupied a seat close to his,

and I suppose we must have met each other on one of his returns to Glasgow, for some twenty years later, when we chanced to meet at the city of Bath, he recognised me; came up to greet me in a student-like way; accosted me by my Christian name; referred with zealous warmth to Anderson's College; asked me whether Dr. Moses Buchanan, the anatomist, and other teachers we both remembered, were still alive, and attached himself to me as one of his old fellow-students.

There were others than Livingstone at the Anderson College and in the old College, who have been retrospected, but we must certainly give to David Livingstone the pæan of praise amongst them. He was not a man of whom the greatest things were expected. He was not brilliant; he was not—ordinarily speaking—enthusiastic; he was not, in appearance, winning; but he was earnest, courageous, and, as it was said of him always, a plodding man. It was as a plodding man who loves those who help him, and believes that there is good in every living thing, that he connected—what he had never dreamed of—the glory of history with his own name.

Amongst others who should be mentioned was the anatomist Dr. Moses Buchanan; Professor Hannay, one to whom Dr. Hope dedicated the first work in our national language on *Diseases of the Heart*; Professor James Lawrie, as fine a surgeon as ever lived, and Professor J. A. Easton,

to whom I have already referred in the preceding chapter. For a time the Chair of Chemistry was filled by Dr. Thomas Graham, a chemist of whom the world has never seen a superior, who discovered the law of diffusion of gases; the law that one gas diffused into the other, as if gases were vacua to each other; who divided the organic world into two classes, the colloid or jelly-like, and the saline, changing the words "endosmosis" and "exosmosis" into the one word "osmosis." Graham was most illustrious as an experimentalist and observer, but it must be confessed that he was a bad lecturer. I knew him in Gordon Street, London, when he was Master of the Mint. He raised the name of Anderson's to a high pitch, and was greatly honoured. He was succeeded in Glasgow by Professor Penny, a lecturer as brilliant in speech as Graham had been faltering. Penny was likewise an admirable teacher in the laboratory, and a fine experimentalist. There were Andersonian professors besides these, and one of the same name as the founder of the University, indeed a relative of his, Dr. Andrew Anderson, renowned amongst the students, much beloved by them, at first teacher of Physiology, afterwards of the Practice of Medicine, and it is hard to say in which department he most excelled. He was, in the strictest sense, a philosopher, and cared only to teach those who were willing to be led. He would quote from Oliver Cromwell with sincere feeling: "Do I tell

you that I come to tie you to this war? No! But this I do tell you, that if with me you come to prosecute this war, prosecute it vigorously, or do it not at all. I think it my duty to deal plainly, and therefore I say, prosecute it vigorously." He, Anderson, was made President of the Faculty of Physicians and Surgeons of Glasgow, and met with every one's good word. A thin, thoughtful, energetic man, always doing his best, and in naming whom, not long since, I saw the eyes of a widow lady, whose husband he had attended, fill with tears. Alas! he died too early, and to him the words of Cicero—which he remembered well by heart—applied wonderfully, "Oh præclarum diem quum ad illud divinum animorum concilium cœtumque profisiscar quumque ex hac turbâ et colluvione discedam!"

In the old College there were in my day several who attach themselves to the memory. There was Dr. John Burns, the Professor of Surgery, who was doubly sealed to us because originally he was Professor in the Andersonian School to which we belonged; and there was the well-known chemist of the world, Dr. Thomas Thomson, whose book on *Heat, Light, and Electricity* led the thoughts of men. In my house there is a picture of a group of scientists, Fellows of the Royal Society of the year 1800, and Thomson by the side of Sir Humphry Davy is there, a conspicuous figure, the only one of that immortal set I have

ever met. Thomson was a man of deep insight, but rather rough in his exterior, and anecdotes which I recall in reference to him were exceedingly popular.

During these student days I experienced the sensation of taking a first fee in physic. A gentleman by the name of Henderson left a sum of money—I do not know how much—in order to establish a Chair of Phrenology in the Andersonian Institution. The trustees elected to the Chair a well-known physician in Glasgow, Dr. William Weir, or, as he was called by the student fraternity, “Woolly Weir.” He was not a professor, but a teacher in the Royal Infirmary, as one of the physicians there. His practice was good, and he was generally popular as an expounder at the bedside, but as a phrenologist his appointment caused considerable surprise, and, in the opinion of the students at large, did not add to his fame. I remember him well, and recall making him a visit in his old age, trying to persuade him to come for a short turn to London to see the great city. He was an earnest man, but not such an one as was likely to take the lead in a branch of education which, inaugurated by Dr. Gall many years before, had created a considerable fluster in the scientific world, and had then died away as so many things do. To give *éclat*, therefore, to the new, or rather revised, undertaking, he or the trustees invited the famous Mr. George Combe, the author of the book on *The Constitution of Man*, to deliver

the introductory address. Combe was an ardent phrenologist; he had been a pupil of Gall, and was a great follower and admirer of a friend of Gall named Spurzheim, who, accepting Gall as a master, was himself a master on the philosophical side of the question, and in that way was so great that the term "the system of Gall and Spurzheim" became the usual phrase. Combe accepted the term and admired the pupil as much as he did the master, and no man could have been found who was more likely than he to draw together a class of a minor kind. He, Combe, was ambitious himself to lead, and came to Glasgow with a considerable power of attraction. He had many texts for his doctrine. The cast of the head of the then so-called infant Sappho, a child who sang with extraordinary success, was in his possession, and he owned many more casts, some of which he had taken himself from men and women remarkable for some peculiar faculty, or for the performance of some deed, good or bad, that had caused surprise. I recollect George Combe exceedingly well, and had copies of his portrait, one taken in the Daguerrotype style which was the wonder of the day, and the other on the later photographic method. He was in person a lithe man, of rather quick movement of the limbs; of most expressive features, but of slow utterance, speaking as though he measured every word, and ever doing his best to make his address so clear by argument that every pupil could follow and understand. To me and other students

he was something less than his eminent brother, Dr. Andrew Combe, a physiologist of fame, author of a book on physiology, and who, having lost the use of one lung, was practically an invalid confined to his house, though by his writings he affected every reader.

Mr. George Combe gave a fine opening lecture on phrenology at the Andersonian. He was not a medical man and did not personally like medical or anatomical duties, but was strong on the anatomy and physiology of the human brain from a phrenological point of view. Like Gall, he hated to see the brain cut up for teaching "as if it were a Dutch cheese." He liked to trace it out by its fibres and show the character of its parts. Its central masses, according to him, were ganglia; its commissures were bridges; its nerves were highways. He wished to make of the brain a new and beautiful demonstration, and wanted a youth who would, according to his method, dissect it for the evening lecture. Dr. Weir, fortunately for me, selected me from the Infirmary class to perform the duty demanded, and it was for that service I obtained my first fee. I received also Mr. Combe's thanks, and got far more than a mere money fee, for I learned all that was modern at that time about the nerves and brain. After this the physiologists—nay! many of my fellow-students—looked upon me, not unnaturally, as a phrenologist myself, bitten, as they said, by the art, and in that sense a pupil

of Combe. This view, however, had no truth in it, and although I once delivered a series of lectures on Gall in St. George's Hall, I was never a professed representative of the school. Gall was to my mind a most illustrious man, and Combe did not say a word too much in his favour. He, Gall, was a figure of history, and, respecting the brain and its functions, both clear and original. His book of plates and descriptions is a splendid addition to a library, and my own was never better lined than when I was fortunate enough to be able to put the book on its shelves. It appeared to me that Combe's earnestness and minuteness gave his opinions force, but that he had become, in plain terms, too mechanical, and had omitted one great essential that lay before him. We had all learned since the days of the great Bichat that, in addition to the cerebro-spinal system of nerves, we have in our bodies another system, which ministers throughout to the viscera of the organism with which it lies in contact; which has its own ganglia and filaments, and which is as much a part of man as anything else. A seat of the passions; a seat of growth and development—this system rules impulses, desires, and acts. When Combe became excited, as he sometimes did, exhibiting what is described as impulse, the part of his nervous organisation—the part that moved and acted, or made action—was in play, and not the brain which he was descanting on. He was dealing with the head, its size, its contour;

he was dealing with the brain that is within the head, its shape, size, construction; but he did not laugh by that part, did not feel by it, did not weep by it, was not moved by it into work. It was his sympathetic half, his organic half, that was expressing itself, and that grand centre was altogether out of his sight or mention; he never named it. Characteristic skulls were only secondarily and indirectly concerned. They typified what was formed and permanently instituted—nothing more. What, therefore, I wanted, and still want, to see, is the size and quality of those hidden, those secret, centres of our living action. I felt them, I feel them; they are in the body, they are not in the head; they are mind as well as matter, matter as well as mind, and if they do not retain the facts and observations registered in the brain, they, at all events, receive them, and their nature must be known as intimately as the brain itself, or there is no such thing as phrenology, even should the outward readings of the skull be in every particular demonstrable.

The introduction of phrenological studies was not alone a novel part of our discussions on the nervous system. There existed in those days of student-life a man who, as an anatomist, was widely known, especially in Scotland, and who imbued us with new learning on the subject of the brain and nerves. This man was none other than the genius John Knox, about as famous a teacher of anatomy as his great predecessor had been of religion. Knox the

Second, our man, had not led a peaceful life with the world. He had been stamped by one of his rivals as of "one-eyed obliquity," and he knew and felt what was meant, morally at the least, and some said physically also, although we could never detect more harm, from a physical point of view, than "a cast of the eye." It is true that a mere cast may mean a great deal; it has given rise to what has often passed in the world as "the evil eye;" has led even wise and good men astray more than once, and has inflicted much suffering upon innocent persons who have by some hereditary mishap been the possessors of a vital flaw. Knox was an enthusiast in anatomy, an ingenious reasoner, and, as I have said above, a genius, particularly in the art of teaching. He seemed as if he had naturally imbibed the old saying of Pope—

"Men should be taught as though you taught them not,
And things unknown be told as things forgot,"

for he certainly made all matters in which the student was interested exceedingly clear, and that in such a way that his hearers, in listening to him, were reminded of something they had formerly acquired. He was also an eloquent man, was never at a loss for a word, and never spoke a word too much. One of my colleagues said that as a lecturer Knox was "warm and comfortable," and there could not be a better description.

It has been said that Knox had not led a

thoroughly pleasant life with the world: he was not shoulder to shoulder with it, and was one of those men who are liked, but are not spoken of cordially. If he were walking in a public place one of the crowd would be likely to touch a friend and ask curiously,—

“Did you ever see that man before? Have you any idea who he is?”

And if the friend did not know, the questioner's reply would be,—

“Why! it's Knox, the anatomist!”

And then both would stare with all their eyes, and probably would turn away trying to conceal themselves quietly, as if they had seen the devil.

Unfortunately, it was not the mere look of the man that stood in his way, for a cat may look at a king, and the ugliest man I ever threw a glance upon was one of the most popular speakers; there was a patch in the clothes of Knox's history that branded him. He was the Edinburgh teacher most notorious in connection with the persons named Burke and Hare, one of whom, Burke, was executed and from whom the word “burking” took its origin.

Warburton, statesman and public benefactor, was not in harness, and there was no Anatomy Act. Anatomy, however, was felt to be absolutely necessary, and at all costs subjects must be obtained for dissection. Body-snatchers became the vultures of dissecting-rooms, and we students had stories upon stories, which I could narrate here if it were

the proper place. Knox, before Warburton's Act, was a teacher in the "modern Athens;" he was a well-known authority, and had a class, as well as a dissecting-room. Connected with the dissecting-rooms were men commonly known as "janitors" or "porters," men who kept the rooms clean and possibly helped to arrange the museums. They were handy men; they knew the work of the body-snatchers, like all persons of their class; they got hardened in what they had to do and avaricious in what they had to get. At last it was suspected that they did not hesitate to kill the living for the sake of science if the opportunity occurred, and two men were seized by the authorities, and brought up before the law as murderers of a new kind who "burked" people by putting a plaster over the mouths of their victims, killed them by suffocation, and sold the bodies to the anatomists. The trial was an awful one. Burke was executed as stated, while Hare, who saved his life by confession, lived to become, for some years, a street-sweeper in London, watched over by one whom he had known in better days and trustful of her tender care.

As a matter of course the anatomists did not altogether escape suspicion, and the genius Knox especially came under it. This was the blot on the man, and sorely it haunted him. Still, stirred by enthusiasm—or by want, as a few held—he continued to teach, and came to Glasgow to try his fortune there.

There was a medical school in Glasgow known as the "Portland Street School." It was a small place, but had attached to it the necessary conveniences for conducting little classes, and was recognised as affording the signatures demanded by the examining boards. It had a lecture-room, a dissecting-room, and a good laboratory presided over by a downright good chemist, Dr. McGregor. To the Portland Street School, Knox became attached, and issued a circular to the effect that he was about to give a course of demonstrations and lectures on "The Brain and Nervous System." He did not go the most dignified way to work—perhaps he could not help himself—for he had his circulars distributed by a porter at the gate of the Royal Infirmary, by which means they reached the hands, or I had nearly said the pockets, of the students. A few of us—not more than half a dozen—determined to attend. Some of us were students of the old College, and others of the Andersonian, for at neither school was it felt that the brain had its full description, and we who joined the new class were most attentive listeners and learners. We were well paid by a most brilliant course of lectures on the obscurest of subjects. The dissections we saw were admirable, and we were so limited in numbers we were able to dissect, under supervision from our master, for ourselves. We were instructed in lessons quite as original as those which Combe taught, and, for examination purposes, by

methods far more practical and freer from dogma or speculation.

I was personally very sorry when the course was over, as there could not have been a more perfect teacher, nor a more accomplished man, than Knox. He aired none of his own sorrows, resented none of the attacks made upon him, whispered not a word about his own poverty, but did what he was paid to do and did it well. I found that Knox's lectures were appreciated far beyond the circle to which they were delivered, for many a student who did not attend them was glad to copy from the notes of those who did and to exchange conversation upon them. On my part I gathered no information that extended beyond the lectures. I entered into none of the heated current debates respecting the conduct of Knox, and during the course I never spoke to him on any subject except that one on which he was engaged as a teacher. Many years afterwards he came to London, and as I was then pretty widely known he called occasionally upon me. His visits were peculiar. He invariably made them in the evening, when the "gloamin'," as the Scotch say, was on. He had a favourite pupil whom he spoke of as William, whom I knew. He always called his pupils by their Christian names, and William evidently was to his mind a cherished one. He would sit with me a long time, and then would leave "to have a chat with William;" but he spoke on no other subject than science, and never, under any pressure, how-

ever courteously invited, would taste a particle of refreshment. There would sometimes be a stranger or strangers in the drawing-room, but he never would be introduced into it. He would listen to Lady Richardson, who is a good musician, playing over in the distance some piece of music on the pianoforte which she had been set to learn by her favourite and admired master, the late Sir Sterndale Bennett, or would hear her playing some of the works of Mendelssohn, whom she personally knew. In fact, Knox showed that he had musical tastes, but would never leave the library to go into the drawing-room. I told him I had written words to Handel's "Harmonious Blacksmith," and that I would sing them as my wife played. He replied that he would sooner continue to converse about skulls, so the subject dropped, and in his usual way he retired at last to see his old friend William, at whose house he went through precisely the same details. Where Knox lived while he was in London I did not know, nor when he entered the metropolis. I was pleased to see him, although I did not at any time, nor in any way, invite him, and when one night I said good-bye I had no idea it was for the last time. I simply read in the newspapers that he was dead and buried. His book on the *Races of Men*, which he gave me a copy of and begged me to peruse, is still in my library. It has been well-thumbed, and has given me many hours of gratification, but not such instruction as did his lectures on the anatomy of

the brain and nerves ; lectures which afforded early enlightenment on life and existence in regard to structural organic manifestations. I am told that in Scotland the name of this famous anatomical master has nearly died out, not only among the public, but even in scientific coteries. He was an authority of the first rank there, but he allowed his enthusiasm to overcome his judgment, allowed common sentiment to take its own course, and committed—without meaning to do so—a moral suicide.

Vis medicatrix naturæ was one of the subjects which we students at term-time were fond of discussing. We were led into it very naturally. One of our teachers at the Royal Infirmary was a supporter of the theory, and he had his adherents. He was a professor in the old College, but that made no difference, for the College Medical School and the Andersonian Medical School were quite distinct from the Infirmary, where practice only was taught, and he was, as one of the physicians to the Infirmary, an instructor of students of all schools, respected by them and listened to with equal pleasure. His name was Dr. William Thomson. He was a middle-aged man; a grave and painstaking physician; in figure tall and thin, and in voice and gesture commanding, so that some of the audacious ones compared him with the ghost in *Hamlet*. One of Dr. Thomson's views was that the *vis medicatrix naturæ* did all the work of cure—that is to say, the remedial force of nature—and he enforced his argument so ably that he

made an army of converts. Ambrose Paré, had he been a listener, would certainly have belonged to the convert class, and would have said more boldly than ever, "I treat; God cures." At last, one day in the class, while lecturing on the case of a man who had died from rheumatic disease of the heart complicating rheumatic fever, the fervent teacher showed from the specimen before him, which he removed from a jar, what Nature had been attempting to do. She had thrown out an effusion on the pericardial surface, and that effusion having adhered to both surfaces, the heart had ceased to beat owing to mechanical clutch, and death—not cure—had resulted. The most willing amongst us was not convinced, and I, and many more, felt that on the whole we would rather not be tampered with by the *vis medicatrix naturæ*, however skilful Nature might be. It was the right lesson; it has never been forgotten, and there is not a thoughtful physician living who does not daily learn it. He does not question that Nature ought to be the senior partner in his concern, and he does not doubt that it is the tendency in all disease for Nature to laugh at the too officious doctor, and to cure the patient without his interference. Yet he must see and know that Nature has no fixed design of cure out of beneficence towards the afflicted. He knows, and we all know, that Nature has no bowels of compassion; that she takes her own course, and goes her own way without caring a bit what may happen to man individually, to masses of men, or, for the

matter of that, to the universe altogether. She would, therefore, glue down a man's heart as readily as she would loosen it, and she cannot always be trusted as a power of cure—a point Dr. Thomson himself conceded, for, with all his argument, he was a splendid common-sense practitioner and master.

During the period of this student career there came to Glasgow a new physical apparatus which interested us very greatly. A German named Dr. Faber had invented an instrument which, under the action of bellows and keys, could speak. We had been listening to our professor on the subject of voice. We had seen the voice-box, the larynx of the human body, dissected; had learned the muscles that are to be found there; had inspected the vocal cords, and had been told the manner in which they are relaxed or made tense.

Some of us had gone a little further than above stated. We had obtained the larynges of the carcasses of inferior animals, had inflated them with small bellows, and had produced by this process certain of the familiar sounds which we hear in the herd. So that when we were told that a machine had been made by Dr. Faber that would utter, however badly, some vocal sounds, we were glad to accept the invitation he sent us to pay him a visit, and we had the marked advantage of Dr. Moses Buchanan, our anatomist, being with us.

The machine consisted of a half-human figure fixed on what resembled a small pianoforte. There was nothing in its appearance that betokened mystery, but when, with his foot on a pair of bellows, the inventor blew air through the windpipe of the machine, a noisy gust was heard from the nose and mouth, and when he put his fingers on the keys this noise was slowly translated into vocal sounds like words. It had not many sentences, but they were understandable. It said "Good-day !" and it said very distinctly, "Excuse my slow pronunciation, because I am a foreigner." The professor who accompanied us was shown the mechanism in the artificial larynx, and found it to consist of elastic cords which gave forth a sound as the air was driven over them, and which, by the action of the keys, would change in tension, so that the sounds could be modified into words to a slight extent. It was an ingenious mechanism, and I have often wondered why it has never been more completely elaborated. Whether there is anything like it at this time I cannot say, but to us it seemed a little wonder, and, as it happened, it afforded some amusement. We had been taught that anatomy lessons would be much simplified if we accepted that all anatomical structures were divisible into threes. The celiac axis, an abdominal artery, divides into the hepatic, the gastric, and the splenic, and all other parts could, it was urged, be apportioned in like manner; muscles, arteries, and nerves were mapped out for

us on this simple plan. It is true the text-books did not say so much, but our teacher said so, working out what he called "a ternary classification," and maintaining that if we kept this in mind we should acquire a knowledge that was sound by a process which was ready and rapid. When Faber's speaking euphonia was before us, the theory occurred to us, and one more wicked than the rest ventured a poem on the topic :—

"When I first came to study, full soon did I find,
Let me work as I would, curse, pray, read, or grind,
The muscles ! the muscles ! I never could mind
Their origin, course, and relation.
Repulsed at each point, I grew almost forlorn,
When aid came like lightning. How ? In the form
Of the ternary classification.

"Go, Wilson, and Knox, and Cloquet, and Quain !
Stick the pen in its stand, take the scalpel again,
And try like kind souls if you can't make it plain
For the good of this new generation,
That muscle so strong, and artery and nerve
Can be grouped without making from Nature a swerve,
In the form which it's said they rightly deserve,
The ternary classification.

"Could the speaking euphonia own but a brain,
I think I could hear it slyly exclaim,
Yet mixed with some slight admiration,
'Oh ! Faber, what labour untold, but now done,
In the placing of muscles to make me thus groan,
Might all have been saved thee hadst thou but known
The ternary classification !'"

We had frequent meetings among ourselves. We had our histories, one of which I cannot stay to tell,

but which formed a pathetic narrative. It is well now that I should deal with a major matter which marked our period, and to this, owing to its enormous importance, I must refer at some length, for it deals with the latter-day, our day, discovery of the abolition of pain.

Hitherto all engaged in medicine, practitioner or student, had been acquainted with the phenomenon of pain as it was indicated whenever an operation had to be performed; but now all was suddenly changed: news came from America by the ship *Arcadia* that the abolition of pain had been made manifest in the operating theatre at Boston, U.S.A. In London, Liston, following up the plan of Wells, Morton, and Jackson, had removed a limb painlessly by letting the patient previously breathe the vapour of ether, and we were soon to see the advantages of this immortal advance in the profession of medicine, the most striking advance, probably, that the world has ever witnessed.

It had been our fate to learn surgical art in the midst of suffering, and I remember, still even with sorrow, what operating day meant as each week came round. I had become, by habit, accustomed to the scene, and custom does, without doubt, bring the mind and heart to bear many severe necessities. When I asked my first practical teacher how he thought I should get through the ordeal of seeing and taking part in an operation, he replied that, as

in learning to smoke, time brought tolerance, but that a man must keep his hand in if he meant to retain his firmness and presence of mind. I recall that when I had to witness the first capital operation I sought the companionship of a student much older than myself, but it turned out that he was more nervous than I, and prudently left the operating theatre as the patient entered it. I made up my mind to face the ordeal bravely, and for a time was quite taken out of myself by seeing the consummate calmness and dexterity with which the operator—the late Professor Lawrie—proceeded in his painful task. “The quicker the surgeon, the greater the surgeon,” was the order of the day, and such was the rapidity in this case the operation was actually over, in so far as the major part of it was concerned, before the patient uttered a single cry. If all had stopped there, all had been well; but just at that moment, as if giving vent to a long-suppressed agony, the patient uttered a scream, and, in spite of the tenderness and firmness with which the nurses assured him it was all over, continued to scream and struggle, so that he had to be securely held whilst the final steps of the operation were performed. Some of my comrades, neophytes like myself, became faint, and some left the theatre. I kept my legs, saw in a kind of haze the man being carried away, but soon came back to thorough consciousness. Several weeks went over my head before composure of mind accompanied such scenes as these. I think we all got hardened

at last, but it was not permanent hardening. If we were away a few times from the scene, we had a return of the terror, in a minor degree, so soon as we resumed work; and the eminent surgeon I have named told me that he never woke on operating day without feeling a load of care and anxiety that would not wear off until the labours of his day were ended.

It requires one who has witnessed the before and after of the abolition of pain to understand, in all its fulness, the change that followed the triumph of science in this one particular art. I feel oppressed still as I recall the time when the unhappy victims were brought, one after another, into conflict with the agony. They differed greatly in the way they took the conflict; but it occurs to me that, all in all, the women faced the ordeals as well if not better than the men. Some of both sexes were astoundingly brave, going through every stage of the process without expressing a word of complaint or of suffering. Now and then we saw, unexpectedly, a kind of trance state which favoured the labour of the operator. This was most common in the feeblest subjects, and was brought about possibly by what would in the present day be called spontaneous hypnotism. In these instances the patient kept up a steady gaze on some particular object, and appeared as if all the mind were intently fixed on one point at some distance off. We often endeavoured to divert the attention of sufferers towards another

subject, as a mother is seen to divert the attention of a child, in pain or in fear, towards some glittering thing or something entirely new, and here we experienced what the mother experiences—that is to say, we either made matters better or worse. Two facts I remember amongst the best of any: namely, that I rarely knew any person, who had positively made up his or her mind to undergo the operation, shrink from it at the last moment through fear of the pain, and that I rarely, if ever, saw one shed tears during the infliction of the pain. Regarding the first of these experiences, there was a remarkable psychological exhibition. A patient during first conversations on the subject of the ordeal and the suggestion of it would absolutely refuse to think of submitting to it; but this was followed by reflection, reflection by resignation, resignation by submission to the inevitable, and submission by a kind of holy courage, which lasted completely until the suffering began, upon which there was an almost certain change of view, and insistence, of the strongest kind at first, that the operation should be stopped at all risks; a resistance which had to be gently but resolutely overcome, followed, when resistance was useless, by as energetic a request for the proceedings to finish as rapidly as possible: “Make haste! make haste!” These different pleadings, frequently repeated, became stereotyped on the mind of the observers so distinctly, that the actual stage of an operation might be calculated from them by those

who were accustomed to the proceedings. After all was over, there was, under the most favourable circumstances, great nervous shock—a shock which not infrequently was full of danger, and which left deep depression for long periods of time. I heard many express that if they had known beforehand what the suffering was, and the effects subsequently endured, they would rather have faced death than such a fearful struggle for continued existence. I have no doubt that this depression interfered seriously with the healing of the wounds which the surgeon was forced to inflict; and I know that the fear of the depression hindered some of the boldest surgeons from attempting many operations for saving the lives of feeble and excitable people, operations which are now carried out with perfect success.

I have described that it was rare to see any sufferer weep during an operation. It was so. Sufferers would scream, protest, pray, and sometimes give out freely what was not prayer; but shed floods of tears, not at all. There was another strange thing. From an unusually painful operation the sufferers, however feeble, rarely if ever fainted, except from loss of blood. I asked a man once after an amputation if he felt faint during the operation. His reply was very curious and characteristic. “Did I feel faint? What a question to ask! Did I feel faint? Why, of course I didn’t. Neither would you if you had had the same reason to keep you from fainting. It was a good deal too bad for that.”

As these memories of the days when the abolition of pain was practically unknown are read, the reader will not wonder at the statement that the most treasured day in my life is that day when I witnessed for the first time the physical miracle of the abolition of pain during a surgical operation, the grand transformation of the phenomenon of agony into the phenomenon of sleep. The news of Morton's trial of anæsthesia by the inhalation of ether was brought as soon as possible to Glasgow, and was conveyed at once to the different learned professors of medicine in that city. According to custom, the large class was seated in that lecture theatre in which Livingstone once sat, waiting for the midday lecture. The professor we were under, Dr. Moses Buchanan, was one of the most punctual men in the world in respect to lecture time, and after we students had sat for five minutes at least, with no professor in view, we began to get a little bit restless and noisy, wondering what had happened. At last the janitor, John MacDougal, opened the door at the back of the lecture table, and the missing professor appeared. To our astonishment, he told us there would be no lecture that day; and then, not without emotion of pleasure, for he was as good a surgeon as he was an anatomist, he informed us that he had to communicate a piece of news which marked a new era in surgical science, nothing less than the discovery of a method by which the most important operations could be performed while the patient undergoing

the operation was asleep. "I am," he added, "on my way to the Royal Infirmary to take part in the first trial of the new system there, and by-and-by we shall all meet to learn if the news that has reached us, and that seems to be satisfactory, is really true. If it be, this day is a red-letter day in all our lives."

As a matter of course, this news created the utmost excitement. We trooped off to the Royal Infirmary as fast as our legs would carry us, and in due time were crowding into the operating theatre. The operating theatre was then under the fine dome which still crowns the Royal Infirmary. The room formed a chapel on a Sunday, and in the rush for seats the best places were speedily secured. I and one or two other students got into the pulpit, which formed an excellent place for observation; others seized the precentor's pew—I think it was so called—both forbidden places except on such a memorable day. The late Professors Lawrie, Andrew Buchanan, Moses Buchanan, Dr. Fleming, Mr. Anderson, with the other house-surgeons, and the dressers in their blue striped gowns, were in the arena and on the tiptoe of expectation. The task of operating belonged to Professor Andrew Buchanan, who, before the arrival of the patient, stepped forward and, in a gentle and nervous manner natural to him, described the news that had come from the Massachusetts Hospital, explaining that the process consisted in laying the patient in deep sleep by the inhalation of the vapour of ether; that

it had been carried out in America and in London ; that it was called anæsthesia—a word derived from the Greek, signifying “ not to feel ” ; and that he and his colleagues, after due consultation, had determined to put the new method to the test with as much care and precision as they could command in a first attempt. The patient was then sent for, and came in with quite a smiling face, delighted with the idea of being cut without pain, and rather proud, I fancy, at being the first man in Scotland selected to enjoy the honour as well as the pleasure. At all events, he agreed with the utmost readiness to the proposal of the professor that he should be put to sleep, and Dr. Fleming, with the house-surgeon of the day for Buchanan’s ward, commenced to administer the ether vapour from a sponge surrounded by a towel. In a short time the patient—whose name, I think, was Macleod—began to talk and sing in a loud voice in the style not uncommon to the second stage—as we afterwards designated it—of the ether narcotism, giving us a line or two at least from “ Bobby ”—the poet Burns—and communicating one or two secrets which he might just as well have kept to himself. He then lapsed into perfect quietude, and soon afterwards was allowed to wake up with the operation completed, without knowing that he had passed through anything more than a curious dream, feeling, as he affirmed with a broad grin, just “ a wee bit fou,” and in no degree ashamed of his acquaintanceship with that condition.

The day we witnessed this event, with some others like unto it, was indeed a red-letter day with us, for in it we had seen the last of the surgical science of agony and the opening scene of the abolition of pain. We were entranced. We made experiments on each other. I remember my much-esteemed fellow-student George Buchanan of Glasgow, still living, son of the distinguished Moses Buchanan to whom reference has already been made, offering himself, like a valiant young martyr, for experiment, and allowing his enthusiastic *confrères* to put him into the deepest ethereal sleep for the sake of practice; and I remember that when he came to himself again he looked about him, as if he expected that, for the sake of practice, some one might have lightened him of a limb or two while he sat an unconscious and helpless victim. I recall to mind also that at a meeting of the "Faculty" at the Faculty Hall, where the new subject was being discussed by the sages of the profession, student John Chalmers, a sturdy and frolicsome youth, having been put partially to sleep for experimental service, for which he had volunteered, rose in his doubtful state, and, stalking up to the presidential chair, did there and then roundly box the ears of the official occupant of that distinguished seat, and was with some difficulty prevented from carrying out further acts of violence, greatly to the amusement of all, except the President and himself when, afterwards, he "came to."

The excitement of the first demonstrations of the

discovery quickly quieted down, and the practice of anæsthesia became an accepted part of medical life. Paris took up the wondrous tale and confirmed it; the success in London re-assured America; and before long the abolition of pain was an accomplished art common to all the civilised world.

It was the frequent practice in the art of medicine to confound or mix together two or more diseases. Previous to the days of Sydenham, two diseases, measles and scarlet fever, were confounded together. A physician named Morton discovered that they were distinct maladies, and separated them, showing that they had different symptoms, different periods of attack, and a different duration.

In our day the more common Fevers were isolated. Cullen, a tremendous organiser and divider of diseases into classes, considered that there were three several kinds of fevers, "*continued*," "*remittent*," and "*typhus*." We followed that division, and sometimes used the word "*typhoid*," not as signalling a particular malady, but rather as indicating the lapse into a dangerous sinking state. We expressed "The patient is becoming typhoid," by which we meant that the powers of life were waning. At last the idea arose that two diseases, or fevers, were confounded. There was an acute and violently progressive disease, called *typhus*, which had been formerly known as Plague or Black Death, and was the cause, at times, of a fearful epidemic affection. There was another

disease, also epidemic and often very fatal, which was developed in the alimentary canal, was marked by disturbance there, and killed a great many victims, but was not contagious by mere exposure of the unhealthy body to the healthy. It was truly contagious, but only through the absorption of the fluid discharges, chiefly from the bowels of the afflicted. The disease had also different symptoms and ran a different course.

The late esteemed Dr. Perry of Glasgow was the first man there to note the distinction of these diseases and to act upon the knowledge. The cases affecting the bowels he denominated, after Bretonneau, "*dothin-enterite*," and he showed that patients suffering from it might be safely treated in the general wards amongst patients suffering from all kinds of diseases, that it was the true typhus patient that required to be separated, and, as far as possible, isolated. Perry had the courage to divide the different fever cases in the manner suggested, and to retain fever wards for the reception of typhus only. He met with opposition, as a matter of course, but he was right, and in the end the victory lay on his side. By some strange circumstance, nevertheless, his "*dothin-enterites*" were called typhoids, an accidental mistake that has remained in force up to the present hour, with the result of the absurdest confusion, particularly by the ordinary people. The term that ought to have been given to the disease admissible into the general ward was

“*Enteric fever.*” Unfortunately it is widespread, and is so often connected with bad drains that the late Sir Edwin Chadwick called it—not inappropriately—“drain fever.”

Dr. Perry was most successful in what he undertook. He was a much-esteemed man, and was honoured, though not adequately, by his compeers. He had one pupil who gave him more than honour, for he followed and apostleised. This was the late Dr. Alexander Stewart, afterwards Physician to the Middlesex Hospital and long a resident in Grosvenor Street. I knew Stewart intimately; was his friend for many years, and often joined him in travel and social communion. He had one fault, that of being always late and behind in his work; but he was fond of work, and when he left Glasgow to come to London he disseminated far and near his knowledge of the difference between typhus and enteric fever. We knew the difference as did he, since we learned it from the same source, and it is full time that the public generally should know the origin.

Dr. Perry was not the originator of the new theory about the division of fevers, but he was the first real developer of it, and was not only a great, but a very kind man. He was particularly anxious about his students, as I have occasion to remember. I was passing one day the post-mortem room towards the fever wards when Perry asked me, “Where are you going?” I replied, “To see the fever patients.”

"Yes," he responded, "you must do it, of course, but they are all contagious there, for the '*dothin-enterites*' are sent into the general wards, and you are young and susceptible, but keep by my side and I will lead you through in the safest possible manner." He led me like a boy, explaining all he could as we went along, and finally bade me good-day, begging me not to be afraid.

A man entered the Royal Infirmary to have replaced an anchylosed and dislocated shoulder. It was in vain; but I formed an idea that if a curved plate of wood were fitted on the chest, and a long arm on a swivel joint were attached to the plate, a pulley at the end could be made to give an extension from the wrist that would be safer, stronger, and more precise than anything that had been attempted. I was taken by a friend at my lodgings to a carpenter who worked in the very shop in which the famous surgeon John Hunter had commenced to carry out his first mechanical efforts. There the carpenter and I made a model of the contrivance that had settled on my mind, and when it was completed I took it to Professor Lawrie, who was good enough to speak very warmly of the apparatus, pointing out at the same time where it was defective, telling me that in the case I had seen even search after success might be attended by fracture, with consequences which I did not fully anticipate, but advising me to keep on in

original lines of research, akin to what I had shown him, and that in the end I must succeed.

The professor's recommendation stirred me to further action, and the great subject of the production of anæsthesia, every detail of which was a study to me, led me to invent the double-valved closely fitting mouthpiece, and the method of drawing over the vapour of ether through a long tube fixed in a Wolff bottle. I also perceived that the inhaling tube commonly used was too small, that it ought not to be narrower than the windpipe. The double-valved mouthpiece I constructed, and which, though broken, I still possess, has for many years been one of the displays at *soirées* and exhibitions. It was afterwards improved upon by the late Dr. Francis Sibson, who used thin soft lead as its material; was adopted by the late Dr. Snow as an addition to his apparatus, and was turned into a separate inhaler by the late Professor Murphy.

About the time when we were first interested in anæsthesia and witnessed one of the most marvellous advances ever made in medicine, we were engaged in meeting the ravages of that awful pest which went by the name of the "Irish Fever," and which was really due to famine. By bad government we had allowed Ireland to fall into the worst of conditions. The people lived and languished, became irritable to the degree of savagery, and uncontrollable beyond

the line of sanity. If we could have fully pictured in our minds the national calamity, the cause of it would have been clear and natural. If any of us should have to keep marching along, marching, marching, marching, without rest or food, we know what we should come to: we should lead a wretched, hopeless existence, and at last, seeing there was no chance of change, we should cease to care for others and do what, in our forced madness, we thought best for ourselves. We should, in our starved condition, become victims of fever, and as a necessary result should be the dread and terrible menaces of all who thoughtlessly oppressed us. Our mode of government starved the Irish people into two states—rebellion and disease. It was often said that what we saw was due to the peculiar Irish character, but this was mere selfish deception. It was really due to the manner in which the character was, by force, educated and trained, with the result that will always follow under the same circumstances, a widespread fever as the outward and visible sign of the inward distress. No physiological experiment intentionally worked out ever showed more misery than Ireland did under the English physiological process, and the miserable victims fled as if they were being driven, as in truth they were, to the larger island at all points where there was a way. Among other places they fled to Glasgow. Tenements had sometimes to be roughly erected for their reception, and they were literally carted from

the shore of the Clyde, known as the Broomielaw, into the city, to the fever-houses, or fever-dens, where they died by hundreds, communicating their disease right and left to the evil and to the good, irrespective of nation or person. I have never been able to forget that sad scene, nor the friends and companions who were swept away. We simply saw bodies that were trying to live without necessary constituents of food; we inhaled from them an air polluted by their disease, and we suffered proportionately. The doctors naturally suffered most. I was not much more than a mere boy, but had entered as a student an institution, in the then St. Andrew's Square, known as the St. Andrew's Lying-In Hospital. Dr. Wilson was the leading physician there, and a bold, kind, and able physician he was. Mrs. Ferguson was the matron, and there were several female aids who were educating themselves for the service of the Highland homes and who were called "houdies." Mrs. Finlayson was one of these, and she first taught me the mystery of the obstetric art, so that under her supervision I saw how babes were born into the world, and noticed the perils and pangs of pitiable womanhood. I did not at first reside in the hospital; I used to have my own lodgings in College Street, and was learning very well from my daily and nightly lessons, when one day Dr. Wilson called upon me and said, "You must go to live at the hospital; these are stirring times, and you must buckle to." I pleaded my

youth and inexperience, but it was of no avail. The last house-surgeon was dead of fever; two of his predecessors had shared the same fate, and I must accept the risk. It was a hard destiny, even for one who had been imbued with Calvinistic ideas, and I had no alternative but to do as I was bidden. I went; found a kind of father in Dr. Wilson, a mother in Mrs. Ferguson, a sister in Mrs. Finlayson, a very comfortable home in the walls of the institution, and respect and attachment on all sides, especially from another student, who had come in, called Dick, a youth who was of the strongest, and, some would declare, of the wildest, nature, but who had one of the tenderest hearts I have ever known. Things went on quite smoothly for a short time; I was looked on as getting quite clever, a kind of prodigy, and was proud of walking at any hour through the long and dirty old and new "Wynds," where you could shake hands across from the windows. I was known to all the inhabitants of the packed rooms as a kind of travelling light, that must not even be breathed or blown upon lest it should go out. At last I was one morning summoned to attend a poor Irishwoman in a crowded court. She was in the middle of fever, although near her confinement. She was lying on a bed of straw, so it was reported to me, and her wretched husband was with her lying on another bed of straw, dark over all his body with the fever and now and then raving. As I heard this report

I confess that for the first time in my life a kind of solemn awe crept over me. I felt inclined to resign my appointment, to swallow my ill-gotten pride, and to return to my own country. But the thought was at once checked by an old memory which I had gathered from the great William, who I fancy could never have anticipated my application of it:—

“Cowards die many times before their deaths;
The valiant never taste of death but once;”

and bidding good-bye to all fears I went with the guide and did my duty.

It was a sad duty, but imperative. The room in which we were immured was no better than a London coal-cellar; it was like a room in “darkness visible.” Fortunately it was not overcrowded: there was the patient herself on a kind of straw couch in the centre; there was her husband on a straw crib in one corner; there was an old haggish-looking woman acting as a kind of nurse, probably the mother; and there was myself with Mrs. Finlayson now and then looking in. The air was terribly close, and by my occupation I was held there for at least two hours. That I was breathing fever I was as sure as I could possibly be of anything. The fever was of the character of typhus, and it was usually denominated typhus, although it was to our medical minds of a remittent type, marked not only by a dry and baked tongue, but by

a yellowness of the skin and often by a bloodshot eye. The puerperal woman did not seem to me to be conscious of her condition, and the child was born dead. The old woman as she took it from me leered horribly, as if she thought it was a happy release. She crossed herself vigorously and expressed that she would see the "praste" and tell him, but why I understood not. Altogether it was not so bad a case, barring the fever, as might have been expected, but I knew or rather felt fully assured that I was in for fever. On my return Dick cheered me and laughed at my fears, his manner being rather agreeable than controversial, but it did not remove the anxiety. I went on with my work as usual, feeling nothing acutely. At last, a few days afterwards, being rather low and inclined to nausea, Dick proposed to row up the river Clyde towards Rutherglen, and I went with him. He was a good pair-oarsman, and carried me smoothly along, allowing me to steer, but letting me do nothing else, and often, in fun, upbraiding me for the way I did that. Returning along the river, we arrived just in time for the theatre, and we saw on the bills that Mr. Charles Matthews and Madame Vestris were to appear at the Theatre Royal in Dunlop Street, so we went there. One of our fellow-students, Alexander, was the son of the proprietor, an actor of celebrity commonly called "old Alec," with whom not infrequently "the gods" had a combat. At the door of the house we met our colleague, who,

until a fearful accident occurred causing the death of a little multitude, was a fine, healthy fellow, and he, finding me unwell, gave us two seats that splendidly commanded the whole stage. I never had a better place or view, and was deeply interested in the scene before me, although the players were, I thought, too frolicsome and too gaudy. Gradually they seemed to recede, and their voices to become faint and low. At last Madame Vestris, on tiptoe, stepped forward holding out in her hand a small timepiece, and as she danced sang a little strain I have never forgotten, and have often recalled unintentionally, though I have no knowledge of the play—

“Tick-a-tick-a-tick, just like a watch,
Tick-a-tick-a-tick”—

and as she sang the whole scene seemed to widen out and go round like a wheel, and then to vanish away.

That day one of our fellow-students had died in the hospital whither he had been carried, and I, dwelling on his fate, had called on my old landlady, Miss Cumming, of College Street; had told her of my own apprehensions, and had prayed her, if affected, to let me come to a large room in her own flat; to attend to me herself; to send for Dr. Andrew Anderson, of Woodside Crescent, our Professor of the Practice of Medicine, in whom I had supreme confidence, and to ask him to look after

me. She promised to fulfil all these requests, and so faithfully did she fulfil them that but for her I doubt if I should ever have written this memory. The next day I returned to her guided by friend Dick, went to bed without knowing it, was attended by Dr. Anderson, and lay, I understand, in the fever and the recovery from it for the long space of fourteen weeks. I must have tasted the delirium of the fever deeply, for I know from attendants I did the most chaotic things: thought that I had been sent for to attend Her Majesty; took umbrage at a pair of scissors which a barber had brought to cut my hair, and to his infinite horror chased him round the room with them until he fled, and sang wildly a song I had read from a story called *The Prime Minister*. Ultimately the fever went; my mind returned to its natural bent; my recovery was completed by repose, first at Rothesay, and afterwards in the town of Dunoon—now a brilliant watering-place, then a little village of cottages.

The suffering from Irish fever put a stop to all my physiological pursuits for the moment, and led Dr. Anderson to think it necessary that I should return to my native country for a session at least. I therefore made my way to Barrowden in Rutland, where my Aunt Susan was married to Mr. Price, who had practised there many years as a surgeon, and who had in partnership with him his stepson, Mr. Henry Swann, who had been looked on as a distinguished Glasgow student. At Barrowden I

rested with my relatives and helped them as much as I was able, but the scope of their business not permitting me to stay I responded to an advertisement in the *Lancet* from a surgeon named Mr. Thomas Browne, of Saffron Walden in Essex, closed with him, and became his visiting assistant.

CHAPTER VI.

A STEPPING-STONE.

IT was my fate to live in Saffron Walden for a considerable time, and I have many singular remembrances in connection with it, but shall chiefly relate how the residence affected me in practical and scientific research.

There was an institution devoted to natural specimens. Who started it I cannot say, but the late Dr. Forbes Winslow and the late Dr. Edwin Lankester, who had been assistants in the town before me, had assisted in sustaining it, and their efforts stimulated me to do the same. The determination did me a great deal of good and made me curious. Mr. Spurgeon, in practice in Saffron Walden as a surgeon, was indefatigable with the museum, setting up specimens and arranging lectures and demonstrations. At the village of Duddenhoe End, near by, a boy by the name of Wombwell was born, and became devoted to natural pursuits. He collected animals of all kinds, showed them about, and in the end became well-known as the owner of the finest travelling menagerie in the kingdom. We were very grateful to Wombwell, as

I have often told his mother, who was a patient of mine, for in order to serve us he sent many animals, after they were dead, to the museum. He sent lions, leopards, tigers, bears, and many sorts of birds, some of which were dissected, their skeletons being set up and their skins stuffed and preserved. I had the opportunity of learning a vast deal from this museum; the leading points of difference between the herbivora and the carnivora, including observations that have lasted me as subjects of study up to this hour, and have always been useful at my lectures in numbers of institutions. Dr. Carpenter, C.B., F.R.S., came down to us and treated us to a splendid lesson on "Instinct" as an animal property, a topic which, curiously enough, formed a matter of discussion between us very shortly before his own sad and accidental death. There were other influences which led me in the pursuit of physiological knowledge. There were some who were able to lead, there were many who were anxious to follow, and there were a few who were desirous to help. In this last class I recall one gentleman, who, although he would not have applied that title to himself, for in truth he was only a mechanic, really deserved it. He was pleased to work for me in making models of any kind in metal. He saw me dissect the eye-balls of dead animals, and learned from me the function of every part as far as we knew it, while it was his delight to mould for me models of the eye in tin, to construct a transparent

lens, and to adapt the whole to the illustrations of a lecture. With his aid, and with my own attempts to make diagrams and tables, it became a most instructive and pleasant task to construct lectures and teachings on natural designs. I gave my first lecture on this line, taking the subject of vision as the starting-point, and creating a general interest in the endeavour. The ordinary topic of vision as a mechanical adaptation was, in time, familiar to us, but we were led by it into other paths. We learned, for instance, much about light, and that what is duly recognised as the colour of things is not in the things themselves but in the light which falls on them and which they reflect.

From the eye we were led to the aids that have been invented, including telescopes and microscopes, with the objects which they reveal. On my part, in preparing to teach I read through what Bernardin de St. Pierre, the author of *Paul and Virginia*, has to say about the insect world, and not only grasped a very beautiful lesson myself, but held others spell-bound by it, to our mutual advantage.

A nobleman near by, the late Lord Braybrooke, had at Audley End, where he lived, beautiful gardens and a fine aviary. He was a liberal-minded man, a scholar, and editor of the well-known *Pepys' Diary*. He liked the people who surrounded him to visit his grounds. We recognised, as stated, that the colours we saw, in flowers or animals, were not a part of them but a part of the wider nature

by which we are enveloped. We traced also, by our museum specimens, how different animals were constituted for different regions, and how we ourselves were modified according to our different climates. It was altogether a fine study, and at that period was not commonplace.

At the time of which I write, fifty years ago, Saffron Walden was celebrated as a wonderfully musical town. At the beautiful church of which Mr. Ralph Clutton was rector, the late Mr. John Fry presided at the organ, and did so, I believe, for sixty years. He was a magnificent musician, of whom the eminent Sir Sterndale Bennett was a good admirer, and he served to diffuse the musical spirit everywhere where he had influence. There was a good violinist by the name of Spicer, and several amateurs who were all fine musicians. There were other allurements: a bowling-green, an active cricket club, and billiard-tables. Times, however, were not satisfactory. Bright and Cobden were making themselves heard; the old Corn Laws were trembling; rick fires were breaking out here and there, and the poor, I fear, were much neglected, while the face of society was undergoing change. Still, the days were comparatively happy, and I have often wondered why, to an inhabitant met by outsiders, it was so often said, "God help you, Saffron Walden!" as if he bore an aspect of hopeless sorrow, when, in fact, he bore nothing of the kind. The Quakers were dominant people, but they

interfered with nobody and were generous on all sides. Mr. George Gibson, who more than once acted as mayor, made donations of books; encouraged a corn exchange, of which I saw him lay the first stone; collected Saxon skeletons; revealed the relics of dead ages, and was never happier than when he was doing some curious and useful thing. A Mr. Joshua Clarke, who embellished his home with artistic treasures, was proud of having what he called "little bits of marble"—sculptures—and possessed the most splendid collection of stuffed humming-birds known, besides copies of Gould's works and of other books that were instructive. He was mayor fourteen or fifteen times, and when he was presented once to the King of the Belgians was recognised by His Majesty as "the permanent Mayor of Saffron Walden." There was also in the town an old gentleman, a "news monger general" oddity, who took notes of all events that were of local interest that did occur, and some, I fear, that did not. His notes were full of a number of droll incidents and practical jokes that ought to be recorded.

After all, there was nothing that filled me with so much gratification of learning as the museum of natural history with its able curator, Mr. F. Clarke. It was a school, and I left it with the utmost sorrow in order to proceed in the world. I have never lost sight of it; have returned to it more than once to give a lecture; have distributed prizes to boys of its King Edward's Free School; have a

specimen of a fine Saxon skull once belonging to Mr. Gibson, and have admired a new library he left to the inhabitants. When Mr. Browne, the gentleman I assisted, was in the last extremities of life, I went, at his request, from London to attend him medically, in conjunction with the late Sir George Paget, F.R.S., of Cambridge, for whom I had the warmest regard and respect, and who more than once expressed what I most earnestly repeat, his wish that every similar town in the country would set—as it easily could—the same example for the advantages of the rising generations as the little town of Saffron Walden.

In the district of Saffron Walden we had great racing, hunting, and shooting; and we were all fond of doing our best whenever we were on horseback. I remember a black mare bolted with me into an inn-yard at Wendon, under clothes-lines that spread across it, throwing me over her haunches with such violence that the sturdy assistance of the late Mr. Rule, who caught me in his arms, was a true piece of good luck.

In addition to the pursuits mentioned, I entered largely into practice in this district, became so installed, and had such hosts of friends that my own inclination would have been to remain there all through life, to qualify and become one of the practitioners of the place, with most of whom I held a brotherly attachment that years did not break. I called the place “the first stepping-stone,” but it was necessary to leave it and find another.

CHAPTER VII.

A TURNING-POINT IN LIFE.

EVERY man and woman has a turning-point in life, and mine I have always felt came in the change which was now effected. I made my way from Saffron Walden once more into the midlands ; visited my old master to whom I had been articled, Mr. Henry Hudson, when we recast some of the medical experiences we had had together. I had learned to lecture, and in the schoolroom of the village of Somerby, with the Reverend W. Y. Nutt, who had taught me for so many years, in the chair, ventured to give a demonstration and lecture, which was largely attended and awakened a great deal of interest.

But the most useful thing to me was the fact that I obtained from Mr. Hudson a letter of introduction to an elder brother of his, Mr. Edward Dudley Hudson, a surgeon who lived and practised at Littlebury, Narborough, near to Leicester, in the midst of the "stocking" district.

The bearing of this note from Mr. Hudson to his brother has always seemed to me to be the true

turning-point in my life ; it was attended by a shower of rain as a kind of natural accompaniment. I had two special pastimes which I sometimes took together—long walking and long reading, with a book in my hand, which I carefully perused. I have walked as far as sixty miles in one day, and, after rest, felt none the worse. In one of these humours of walking and reading I took a book in my pocket and set forth for a very long spin to a place called Sapcote, the road to which led through Narborough. A beautiful church in Leicester, St. George's, had, a year or two before, been struck and partly demolished by a flash of lightning, and I made my way to see the manner in which the building had been reconstructed. I started with the sunrise, under the impression that to make the sun a fellow-workman was one of the best feats of the pedestrian, and, having visited the church, made my way on towards my intended destination.

It was a bright April day, but uncertain in regard to the weather, and as I was going through Narborough there came on one of the keenest of winds, accompanied with the most violent downpour of rain one could ever have to encounter in this climate. For protection I took refuge in a small shop, of the owner of which I inquired whether Mr. Hudson lived near. I was told I had only to turn up a road to my left, and there I should find his house in the hamlet called Littlebury, and, in all probability, himself in it, for he rarely issued forth,

unless he were specially summoned, until after his dinner, for which reason he was characterised as "The Evening Mail," in contradistinction to his partner, who was known as "The Morning Post." When the rain abated, therefore, I turned into Littlebury, soon reached a rather large house on my left, and was informed that Mr. Hudson lived there. The house had its stables and stable-yard on its left, a long high wall, evidently enclosing a garden, on its right, and a central entrance door between. I knocked at the door, which was opened by a tall, fine-looking, active, middle-aged woman, who afterwards I found out was "Susan," while at the same time out of the stable-gates came a short, active man, "Stephen," quite a factotum in his way. Inquiring if Mr. Hudson were at home, I learned that for a wonder he was not; that he had been called out urgently, very early for him, and was not expected back until three o'clock, but Mrs. Hudson was at home and would see me. I explained that I merely brought a note of introduction to Mr. Hudson, and it would suffice to leave it, but Susan, taking it from me, begged me to wait a minute. She ran off, but soon came back asking me to walk in, and led me into the dining-room, where sat Mrs. Hudson all alone working busily at crochet. She dropped her work willingly to cross the room and welcome me, asking any number of questions about her brother-in-law, and about a brother of her own, a Mr. Garrett, who lived near

to him. She told me she expected her husband back to dinner, and hoped that I would stay and dine with them. There was something so hearty about the invitation I could not say no, although I had my fears about the great man, of whose learning, whimsicality, and judgment I had heard many stories, and I accepted the invitation. There was every inducement for me to stay, and I had a curious idea in my mind that I had reached a turning-point in life, although I did not dream to what it would lead. Everything I saw was quite new—a world, in fact, that I practically did not know of in its details. The room itself was a wonder. It was surrounded with bookshelves filled with books of science and medicine, the volumes being old and new, all well-bound and neatly arranged, with dictionaries and encyclopædias. In one corner near the window stood a very pretty table or cabinet, on the top of which rested the most splendid microscope I had at any time seen. This instrument, I was told by my hostess, had cost what appeared to me to be an incredible sum, and would enable one to look at the minutest objects. It had been manufactured and sent by the famous Smith & Beck of London, and Mrs. Hudson said her husband would be sure to explain it to me and give me a demonstration with it when he had had his dinner. “Nothing would gratify him so much, for no child was ever more pleased with a doll.” She knew it had cost a great deal of money, but everybody had their

hobby, and if he had not that he would probably have some other which might be more expensive, more dangerous, and not so interesting or useful.

While we were thus talking a monkey I had seen sitting on the garden wall came pounding down the long broad gravel walk of the lovely garden that stretched out before us.

"Oh! here is Jacko," said Mrs. Hudson; "he has come to see whether he likes you."

"Is he gentle?" I asked.

"Well! that depends upon his first impressions. He likes some people, hates others and makes them quite frightened. He hates a postman, and he took such an aversion to a lady who was staying as a guest here last week that he positively terrified her. He is not particularly fond of me, but he is very fond both of Susan and Stephen. He fears his master, whom he worships, and takes to everything and to everyone his master likes. He sits on his master's shoulders and appears to talk to him; lets him play any joke, and always gets on the wall to see him go out and come in. One day he actually followed him into a wood through which there is a bridle road, and got lost somewhere there: it was three days before we found him, and although he has not done that again, for his master gave him the cane for it, he does a number of mischievous tricks: steals the eggs from the fowls; pulls the young nuts from the trees; takes the golden pippins, when he can get at them; covers his paws

with jam, if by accident he creeps into the jam cupboard, and has a trick of climbing up to any window of the house and looking in at it, which is not at all pleasant to those who don't know his habits."

At this moment the clock struck three with a loud sound, and Susan began to lay the cloth for dinner. She opened the garden door without ceremony, and seizing the piece of an old pulley that was hung round his neck, she brought in Jacko. He passed his mistress with a sort of reserve or dislike, and made one spring at me which caused me hastily to draw back.

"Oh! don't be alarmed, sir," said Susan; "he has evidently a liking for you, and you will get on well together. Where's your paw, Jacko?"

The monkey thereupon held out to me his right forefoot, skipping along the table, and bestowing upon me the most friendly look, very much intensified as I offered him a nut that had been laid out with others on the sideboard. He cracked the nut with ability, extracted the kernel from the shell and munched it with gusto, while a large parrot I had not made the acquaintance of bawled out as plainly as any human being could, "Capital, capital, capital! Go to bed, Tom! Go to bed, Tom!"

Mrs. Hudson and Susan both laughed at my surprise, and Stephen, who had just come in with some of the dinner, joined in the fun.

“Jacko seems to get on well with this gentleman,” said he, “and if he does so the master is sure to fall in. Oh! he’s a knowing one, he is. Come, Jacko!” And Jacko thereupon leaped upon Stephen’s back, and, snatching up another nut on his own account, was marched out, while the parrot gave a shriek which made her cage rattle and almost broke the window.

Dinner was soon laid, and a chair at one end was placed for me, my hostess taking the other end, observing that we would not wait, for the doctor—meaning her husband—was such an uncertain man it was of no use doing so. At the same time I noticed that covered dishes were brought in hot, and very nice pieces of food carefully put aside in them—slices of beef, vegetables, pudding, and fruit, which were evidently selected according to some one’s particular taste. Also a little decanter of what seemed to be sherry was placed before an empty plate.

We had got through quite a fourth of our meal when the near sound of horses’ feet told us of an arrival, and the new arrangements that were at once set in progress suggested to me that the master of the house had arrived. The hot plates were brought in; an empty chair was placed ready; a clean serviette was laid down near the plate, and the knives and forks and spoons were set in due order. In two or three minutes Mr. Hudson entered. He was a rather short, thick-

set man, apparently about fifty years old. He wore a well-fitting greyish overcoat; "antigrophiles"—a kind of leather overboot with straight iron spring and long sides, extremely comfortable, and then fashionable; a knitted muffler round his neck, and a rather low hat. I rose, but at once was requested by the lady hostess to resume my seat, and addressing the master with the casual remark that he was rather earlier than expected, she suggested that he should take off his things, a suggestion he immediately followed, sitting a moment by the fire; throwing off the "antigrophiles;" removing his overcoat, scarf, and hat; putting his gloves into his overcoat pocket, and handing the whole to Susan to take into the hall, together with a riding-whip which he regularly carried. Then he rose and walked to his place at the table, lifted the chair before his plate and bumped it down again as if it were not an altogether safe chair, gave a short grunt, helped himself to a glass out of the decanter, sat down, and began to eat heartily. Meantime Mrs. Hudson told him who I was, and passed him the note I had brought from his brother Henry, which, however, he did not read, but laid by his plate, still eating. He did not himself utter a word, and I began to feel uncomfortable, as if I were an intruder.

"I have been showing this young gentleman," Mrs. Hudson explained, "some of your curiosities. Jacko has been introduced, and has taken quite a fancy to him; the parrot has called him Tom and

bade him go to bed; we have had down two of the books, and he has set his eyes on the new microscope, as if he wanted to eat it, but of course I dared not meddle with that."

The listener, still eating, now gave a second grunt with a smile, and for the first time spoke.

"Have you shown him the ichneumon?"

"No!" replied his wife, "I forgot that, for I haven't got used to him yet;" and rising she went to the couch, and stooping down to a mat in a warm corner, she lifted up what looked like a cat and brought it for me to look at, saying, "They say it sucks the eggs of the rhinoceros or some such creature."

"Rot!" struck in the host as he brought his knife-handle smartly down on the table. "The rhinoceros has no eggs to be sucked; it's the crocodile," and he grunted once more.

"Ah yes! the crocodile! So it is. I always forget and make some mistake. It sucks the crocodile's eggs."

"Yes," I said, "and a very useful animal it must be. I've heard of it, though I never saw one before; but I believe it does eat the eggs you speak of."

"Rot!" replied the master, "an ancient lie altogether. Here! kneel down in that corner, and on the shelf there you'll find an encyclopædia that will tell us all about him, and we'll read it up."

It was a most singular mode of introduction, but

I guessed it was all right, and so at once obliged him and brought up a beautiful book coated with dust, for it lodged near the carpet, and Mrs. Hudson had to send for a duster, to give it a good rub; taking it also to the fire, flapping it vigorously, and then turning up the name of the animal, she found the place, and laid it open before me so that I could read the account.

The master seemed gratified by my reading; filled the wineglass before him from the decanter; held it out at arm's length and peered through it in the most inquisitive way, and then drank the wine off, while Polly, to Mrs. Hudson's obvious delight, crowned the whole by screaming "That's good!" emphasising the statement by a term common among sailors, but not quite the thing in a dining-room or in ears religiously polite.

"Shut up!" cried the master hastily to the bird, and then turning more slowly to me held out his hand with, "Very glad to see you, sir, and how did you leave old Harry?"

I knew he meant his brother, who was as eccentric as himself.

"He was out shooting yesterday with a gun shaped like a walking-stick."

"He'll shoot himself next."

"Well! he is certainly very odd. I was articked to him and soon found him out."

"Oh! I know all about you. He was very much taken with you, and when he comes here you are

always at the tip of his tongue. You carve wood, make kites and all that sort of thing."

"And read books."

"Yes, I know! Rollin's *Ancient History* has been one of the subjects."

"Yes, and Sir Walter's *Waverley*, and Miss Porter's *Thaddeus of Warsaw*."

"Rot! I told Harry so. Rollin's *Ancient History* I could swallow, but t'other books are a packet of lies. I could tell 'em better myself if I tried; so could Mother Popples, if she didn't eat the candles."

I didn't see the bearing, but it was explained to me by my gentle hostess that Mother Popples was an old neighbour near, who was by repute very rich and an awful miser, who once, gloating over her money, like Daniel Dancer, lived a week in a cellar on the rushlight she had carried in a lantern, trying to eat the horn of the lantern too as a sort of dessert after dinner.

The subject dropped, and we began to enter on others. Beginning with the new microscope, it was taken to pieces and put together again so as to show its powers, which went up to an eighth, a marvel as it was considered at that time, in which I was deeply interested. Then we stepped into a little laboratory in an adjoining room where my manipulative craft was tested for making up a chemical preparation, until we were apprised of a call by Professor Thomas Taylor, to whom we repaired. Taylor had agreed to stay to tea. To me he was

a stranger, but I soon found he was a teacher of chemistry in the Middlesex Hospital, London, and one of the wisest men the most ambitious student in physic could desire to know. He told us all about the new advances that were being carried out in physic, and of the new drugs that were being prepared, but the point I remember best was the statement of the proper mode of trying to save the rich steeples of churches, or rather, the effect of trying to mend them in an improper manner. It seemed that the steeple of one of the City churches—I fancy Bow Church—was losing its grip; so to meet the difficulty long iron rods were fixed in the stone at a time when the temperature happened to be low. The job was finished and the steeple left as secure. The weather became hot, and under the heat the rods expanded; grew longer than they ought to have been; by the expansion loosened the stones and caused the steeple to come down as if it had been stricken by lightning.

I recall that afternoon as if it were but yesterday, and the statements the guest made about the London men, their habits, researches, and modes of thought, as if they were but now made. He had soon, however, with real regret, to leave us; but I had accepted the Hudsons' kind invitation to stay all night, and we found plenty of things to discuss and do. We went out to a churchyard near, where we met the sexton, who had a treasure for us. In digging a grave he had found at the bottom, amongst

some remains, nearly half an ounce of fluid mercury which he had collected, and which appeared, in a dry bottle he had obtained, as bright and good as if it had been just bought at the chemist's. Whence came it? Had it exuded from the bones which had once been made to receive it as a cure for a specific disease? We turned up the pages of Astruc in order to discover if such a mode of treatment was at any time fashionable, and we came, finally, to the conclusion that the metal had had another mode of application. Some unhappy specimen of humankind had, more probably, in a day long past, suffered from obstruction of the bowels, and the mercury had been administered in order that it might, by its weight, find its way through the alimentary intestinal canal. The suggestion was entirely new to me, but my monitor, although he had not used it on his own account for the purpose assigned, had known in his young days an old doctor who had tried the experiment.

A little later on there came round to the door a chariot called the "Pillbox," for the purpose of making the usual daily, or rather nightly, visits. It was the queerest affair that can be described, but for a time it found favour. It was a covered-in carriage, capable, on an emergency, of holding four people, and standing on two wheels. You got in from behind, and the reins came through a slot under the middle window in front, while a side window opened, out of which the arm could be put for the use of the whip

when necessary. It was awkward driving, but we were kept warm and dry, and we progressed at the rate of some six miles an hour. It is probable that we stopped at some five-and-twenty houses on the round we made, and it appeared that there was universal welcome. It was not necessary often for me to alight, and so I sat in the vehicle holding the reins, usually conversing, while we waited, with one of the family who had found his way out and discovered the occupant. But I was occasionally asked to get out and see some patient who was suffering from severe disease out of the usual course. Good cheer, both in words and in what were thought to be necessities, was general, and I do not believe there was one house of any importance in which a special table was not laid out for refreshment; biscuits, sandwiches, port, and sherry were at our command, with an occasional request that we would try a glass of the October brew. We could, in fact, have lived altogether on the good things we met with in the course of the round, and many of the kind people who provided them were apparently oppressed by the very bounties, shares of which were offered to us. With the exception of the liquid refreshments, with which my companion was evidently most conversant, we were deaf to all invitations, and made our way without impediment. At what hour the sick got their medicines I was most puzzled to make out, but it must have been on the following morning, for the place that supplied it was far away, and when

we arrived home a long list had to be sent off by a waiting messenger, who looked tired, but was accustomed and resigned to his fate.

I never remember a happier day than that which has been described; I went to bed in one of the loveliest rooms to dream it all over again, and when, next morning, I was awakened by Susan's loud rapping at the door, I experienced with sorrow what it meant—the turning over for ever of a leaf in the book of my life. I am proud enough to think that I made as good an impression as I had felt, for at breakfast the course of coming events was talked over as if I were expected to take part in them, and before the sun set I made an arrangement which led to my participating in the work for many months, in and during which I had a persistent delight. But my satisfaction is most complete in the retention of the memory of the strange and brilliant man I had been destined to meet. He is before me as I write, and I formed such a friendship for him that I saw his virtues even through his faults. I have made a man sing of many qualities that he sighed for, with one above all most coveted:—

“What is my heart's desire
Above all these?
A friend who will not tire
Of friendship's subtleties,
Though all my faults he sees;”

and I became that friend.

I was attracted neither by the manner nor person

of Mr. Dudley Hudson. He was a rather stern-looking man of middle age. One might say he was gnarled; his face rather long, and ruddy-dark; his eyes small, hazel, and piercing; his manner sometimes impetuous; his shoulders square; his dress countrymanlike, but neat; his limbs clumsy-looking, but his hands so educated he could thread a fine needle as readily as he could drive through a gate, and he could draw a small tooth as delicately as he could cut off a limb, which latter task no one could do better when duty imperatively demanded. His voice was rather coarse, and his delivery abrupt and jerky. He told jokes, but rarely laughed; he hated as hard as he loved, and sometimes his kindly spirit was the dupe of his heart, as Rochefoucauld expresses it. Once, for this reason, he, Mr. Hudson, became the subject of a joke which he never ceased to be reminded of. As he was riding through a village, he was called in to see a girl who was very poor and who presented to him all the symptoms of death. He was much touched, used all the means at his command to restore her, and galloped to the surgery to prescribe the best remedies for her case. He found that the dispensers were well-acquainted with the character of the case, and were, as he thought, slow in their work, one of them saying it was only that "Hysterical Harriet" who would cure herself with a peppermint drop. He got angry; affirmed that this time hysteria had nothing to do with the illness; that the girl was dying, and

would probably be dead before the medicines arrived. The dispensers were aroused rapidly; made up the medicine, sent it off by special messenger, and were inclined to shake in their shoes.

The doctor himself, so beneficent, went home to pass a restless night, and in the morning positively rose so early as to ride off to see his patient before he had taken his breakfast, to find—when he reached her home—that she was as well as could be, and singing away at a wash-tub. Nor had she touched his physic. How we all laughed at this incident I need not tell, but it afforded a splendid illustration of what a distinguished brother has called “the mimicry of disease.” Of course the good doctor himself merely smiled at the mistake he had made whenever it was referred to, and he not infrequently told the story in detail for our diversion. But there was another story, quite correct, about which he never spoke, but at which he felt natural pride and satisfaction. There lived near to him a strange man whom he knew—a nervous man, a lonely man, a man essentially of a generous and feeling heart, but of a sad nature. One unfortunate day this man committed suicide, and some of the neighbours were horrified. The minister, or clergyman of the church, who was thought to be a hard, resolute, and extremely orthodox rector, granted—to everybody’s surprise—burial in the churchyard, and there the suicide was laid. The grave was a conspicuous object, an object of much comment, people fancying

that the parson contemplated the same deed. A month afterwards it got about that the doctor was going to erect a stone at the head of the suicide's grave, that the rector had given his assent, and that nothing stayed the proceeding except the want of an appropriate epitaph, which the doctor had much trouble in searching out and selecting. At last the thing was reported as having been accomplished, and one morning early the stone-cutter brought the stone on a truck and set it upright in its permanent place. The stricter persons were astounded, as were the unconcerned in heart, who are usually led by fashion or opinion rather than by intellect. There was, therefore, quite a flocking to the stone to read the epitaph, by which they were all thunderstruck and brought to a stand. There, five feet above the earth, stood out a rather wide gravestone, with no flowers or other artistic designs upon it. There were not many lines of letters, but what were there were cut deeply, and pointed cleanly so that it was impossible to have doubt about them. First came the full name of the deceased, where he lived in the parish, and when and where he died. Then just below it, as in admonition to the living reader and as a criticism to all sticklers, were two, and two only, very pronounced words, "*Judge not!*" It is worth while noticing that nothing more was said in later times; even the sticklers were dumb.

For some few months after the time when I first visited Mr. Hudson, I remained, as the reader will

not be surprised to hear, as an aid in the practice which belonged to him.

A great many practical experiences occurred to me while I was living at Narborough, where I rode, read, and learned night and day. It was an extensive, poor neighbourhood, composed largely of persons engaged in the weaving of stockings, so that the rattle of the stocking-frames in the villages seemed heard from every door. The men were sickly, full of political troubles, and the women and children, markedly anæmic, appeared to live on very little food, the women taking far more tea and bread-and-butter than were good for them. There were agriculturists in the district who broke the monotony of disease, but they were relatively few. The practice was extensive and very hard, and, including two dispensers, there were five of us regularly engaged. We had thirteen horses also in our service.

Such a busy practice yields endless details I must pass over, excepting one which, from the moment of it, has been on my mind and has led me to many researches and beliefs that in its absence might never have been thought of.

About twelve o'clock one night I was hastily summoned to see a man four or five miles distant who had met with a misfortune which caused his death. I galloped to the spot, to learn a curious story. In those days India, America, Australia, and Africa were indeed foreign parts, and persons

who went to them were thought to be separated from their friends, almost as if they were dead and buried. In the place whither I went there lived a small innkeeper who some years before had lost sight of his son. The lad had left home, had migrated to Australia, had occasionally, but rarely, written, and was practically considered to be lost for ever.

One day—the day before that I am writing about—this lost youth suddenly appeared in his own flesh and form at the house of his birth. His father, mother, and sister were astounded and filled with joy. They were literally maddened with excitement. A flag was put out of the window, a band poured forth its strains, the skittle-alley gave out its sounds, the belfry bells rang their peals, and, to use the words of one of the inhabitants, “It was just as though there had been an unexpected club feast.” The news travelled into the neighbouring hamlets and villages, and it caused no surprise that all the people about were invited in the evening to partake of a grand supper in the club room of the public-house, to smoke a pipe, and to lay in any amount of the October brew. The invitation was, of course, widely accepted; the tables were speedily crowded, and before the supper was ready quoits, marbles, and penny toss-ups were indulged in in the paddock, while a solo singer, with some talent for extempore versification and songification, attracted and pleased his audiences, who cheered and chimed in in the

choruses, especially when the grand guest of the evening happened to saunter near and recognise one or more of those who were congregated.

Everything went on as well as the most sanguine could expect or desire, and the supper was an immense success. The health of the unexpected traveller was proposed by his jocund father, was seconded by his godfather, and was cheered to the echo by the company. The healths of the father and mother were treated in a similar manner amid congratulation and delight, and triumph reigned boisterously.

At last it was seen that two men were leaving the feast, and that one of them looked more than usually pale. Soon one of these returned, hastily calling for aid, saying that his companion, the pale-looking man, had fallen to the ground in an adjoining paddock and was groaning as if in danger. There was a rush of friends; the sick man was lifted off the ground, was carried into a stable, and was laid down in one of the stalls, while a doctor was sent for on the swiftest horse that could be found.

I was the doctor called, was on the spot as quickly as possible, and found an unusual commotion. The facts presented to me were that the unfortunate patient was a young man of about thirty-five years of age; he was a carpenter by trade, and known to be a man of voracious appetite, swallowing his food as fast as he could get it, "regularly gobbling it," as his aunt described, so

that she was always frightened lest he should choke himself. He was one of the first to come to the supper, one of the best to "lay to," and how many plates of animal food he devoured the man who carved was unable to remember. He "tackled" everything—corned beef, ham, sausages, and whatever else he could get; he drank only a mug or two of beer, but he never let his plate be empty, and so he went on until he had to leave the table from satiety. This created little wonder, for it was known he was accustomed to over-eat. He had been knocked over at the Coronation banquet, at pretty nearly every club feast, and when Miss Osborne, a lady of the village, was married and her friends gave a public supper, he had had to be carried home, but had always got well in a day or two, and suffered from nothing worse than chaff and the reputation that no man of any neighbouring place could eat so much. This time the celebrated gobbler had gone too far and had fallen with a vengeance. He was lying with all about him intensely cold, for a hoar frost was on the ground, and there was practically nothing between him and the stable-floor. He looked "stone dead," was indifferently clothed, and an object of universal sympathy.

In accordance with the feeling of the day, I supposed that the patient was lying in the most unfavourable circumstances for recovery. The "calor vitalis" was the one thing demanded, the one thing absent. It was a cold air, cold enough

to kill anything, and no wonder he looked dead. It was long afterwards that I learned the error of this idea, and that, in fact, he was not really cold enough. I did what appeared to me best. There were no baths there, and we could not make a fire in the stable, where there was no fireplace. I therefore turned up my coat-sleeves and commenced vigorously to set up artificial respiration, getting a man to help me who took my place, and who, being strong, was an efficient aid. We kept this up for half an hour, and some thinking that the man's feet were getting warmer and that his bloated face was more natural, we kept steadily vigorous. At last it seemed as if he choked, and it was found that it was not so easy to squeeze out the air from his chest as it should be, as if there were something in the way that stopped the breathing; so, with my penknife, I freely opened the trachea, or windpipe; with a quill that was at hand cleared the windpipe, pushing up an obstruction into the space above, and removing what could be removed by his mouth. To my wonder, the artificial respiration began to take effect; the feet became warmer, and at last the man swung round his head, breathed of his own accord, and looked as if he were struggling into life. He moved his hands, and letting him alone for a few minutes he astonished every one by the signs of life he manifested. Soon, however, he became choked up again from the stomach; all our efforts failed to restore the breathing, and, in the

end, I had to ride home leaving a veritable lifeless body, but duly accredited for many a long day afterwards with having "raised a dead man."

At the inquest that followed, the jury, after hearing all the details, brought in a verdict of "Accidental death," and I was complimented by the coroner for the part I had played.

A curious circumstance also occurred at the inquest which added to my credit. It was put as a question, "What hour in the night did the man fall?" when one witness swore one time and another quite a different time. In the dilemma the coroner asked me when I had arrived on the scene. I named the hour by my watch, and then went out of the room to see how it tallied with the clock in the bar. To my surprise, the two appeared entirely different.

"That's the hour," said the landlady, looking up straight before her; but I knew my time was right, and discovered that, standing at the bar door and looking over the landlady's head, I was not looking at the house clock at all, but at a reflection of it. The clock was attached to the wall opposite the bar, while on the wall facing it, over the bar, there hung one of those old-fashioned, round, gold-framed mirrors which at one time were extremely popular and are now coming into use again. Into this the face of the house clock shone, and the mirror reflected a time which, in a hasty look by the witness, passed for the true time, yet in fact was, as I was able to explain, entirely false.

The history of the case just before noticed does not appear on these pages in any way as a digression. The fact that a man could lie seemingly dead for nearly two hours in a very cold atmosphere, and could then, under artificial respiration, show distinct signs of recovery, was an eventful fact, new, and, may I say, to me momentous? It gave me food for reflection for years, and could not be forgotten in subsequent researches.

To return to matters more immediately personal, I may state that I had now gone through the greater portion of my curriculum, and it was suggested to me to complete it, qualify, and hold my office permanently. A solicitor was consulted, the plan drawn up but not executed, and I was preparing for the final effort of qualification, when one morning, while riding on horseback to Littlebury, Professor Taylor, whom I had met, and with whom I was so much impressed, hailed me. He came to my side, putting his hand on the horse's mane, and told me that he wanted me to settle near to town. He had a friend at Barnes, Dr. Robert Willis, whose sister had been married to Mr. Syme, the illustrious surgeon, and he, Willis, wanted an "old young man" to join him in what had been one of the best practices in the United Kingdom, and in the very cream of British society. I at once explained my position, to find that he, Taylor, had anticipated me. He had talked everything over with our mutual friend Mr. Dudley Hudson, who would give me his own ideas on the

matter. In a few minutes we met him, when he told me that nothing could have been more congenial to him than the completion of our proposed contract, but that he could not stand in my way; that on his own part he never regretted anything more than that when he was in London, a pupil of the famous anatomist Joshua Brookes, he had not remained there to fight and win his way to both fame and fortune; that a country life for a doctor was both hard and obscure, and that the offer now made to me was one of the best he had ever heard of—was, in fact, a kind of providence, which, apart from all sentiment, I must accept.

It was quite impossible to avoid sorrow on leaving Mr. Dudley Hudson, for I shall never, to the end of life, forget the good fortune and kindness that had befallen me while with him, or the knowledge I had been permitted to acquire. But I accepted the offer Professor Taylor made, and went with him to London, where I saw Dr. Willis, of whom I shall have more to say.

To a youth and a stranger there is nothing more bewitching than London. The theatres had to be visited. At the Haymarket Lady Boothby was playing in *The Taming of the Shrew*; Macready was beginning to create his last wonderful revivals; Charles Kean was coming to the front; Phelps was already established, and for a few nights there was a veritable dream of variety. I had the felicity of finding a home with Mr. Taylor in Vere Street,

presided over by his aunt and two sisters, with one or two of his brothers as companions. I visited the Middlesex Hospital wards and the school, gaining the friendly acquaintance of Mr. Alexander Shaw, who had living in his house Lady Bell, the widow of the famous Sir Charles Bell. I heard Faraday lecture; was introduced to Drs. Bright, Brande, Hodgkin, and Addison, and paid the expected visit to Dr. Willis at Barnes. Very soon I came to terms with Dr. Willis, settling that I was to live at Mortlake, and from a centre there conduct the practice with him.

CHAPTER VIII.

A NEW SPHERE OF WORK—MORTLAKE.

AFTER leaving Narborough I went once more to Anderson's University in Glasgow, completed my studies there, passed the Faculty of Physicians and Surgeons, and entered Mortlake with the full expectation of settling for life in practice with Dr. Willis. There was an absence of all flash appearance about the practice, and of all promise of wealth; but no young man could, I think, find himself more fortunate from a medical and scientific point of view. I had as much to do in seeing the sick as I could reasonably expect, never neglecting any who might be under my care, and letting practice take the first place, a plan I have ever conscientiously followed.

I met with many who were far more than mere patients. Mr. E. Cooke, R.A., the famous artist, told me all he knew about the stones of Venice and Ruskin's views in relation to them, as I sat watching his skilful hand traversing the canvas. Mr. Dawson Turner would fill me with antiquarian details. Bob Coombes' pupils on the Thames, which flowed at the foot of my little garden, would imbue me with

the mysteries of boating, and Mr. Coombes himself would give me instruction. The Vice-Chancellor of England, Sir Lionel Shadwell, who lived at Barn-Elms, would come to me, much more enthralled with the Apocalypse than with the law, unfolding his views about Apocalyptic wonders. Sir James Knight Bruce, afterwards one of the Lord Justices of Appeal, who lived at the Priory, Roehampton, mightily taken with some of my researches, would bring me from Spain glass flasks which were so thin and strong they would stand the fire. He gave me permission to take possession of any live stock on his lands that might afford me useful specimens for investigation, and once sent me a note from the bench respecting a paper of mine he had perused and on which he wished to be more enlightened.

I also began to know some of the Esculapian lights. Dr. Bright, then at the acme of his fame, came regularly to one of our patients, and never returned to London without bearing from us a pretty bunch of flowers cut in Dr. Willis's beautiful garden. Dr., afterwards Sir, Thomas Watson, came in the same way, and in London I became acquainted with the eminent Sir Benjamin Collins Brodie, and Mr., afterwards Sir, William Fergusson. Professor Owen was a neighbour, but the man to whom of all others I was most attracted was Dr. Willis himself.

Willis was a Scotchman with a marked accent; of good appearance, except that he was obliged to wear spectacles and read with the paper held close up to

his eyes. He was now about fifty years of age, and knew everything. He was great at budding roses, loved music, was strong in political debates, and particularly admired the late Bernal Osborne's witty speeches. In his early days he had traversed the Continent of Europe, and had travelled as a fellow-student with George Combe, on whose *Constitution of Man* he was rather severe. He had settled in London; was an Abernethian Scholar; Librarian of the Royal College of Surgeons, and a lecturer on "The Practice of Physic" in Aldersgate Street School of Medicine. He was content to settle down as a general practitioner in a pretty house with a fine garden close to the church at Barnes in Surrey. He had translated and published many books—Wagner's *Physiology* from the German, the works of William Harvey from the Latin, and *Rayer on Skin Diseases* from the French. He was an original thinker, holding excellent views on the "Portal System" and on the "Functions of the Skin." Just before I knew him he had brought out, in conjunction with Professor Marks of Göttingen, a little book on "*The Decrease of Disease by Civilization*," a work of which he was not a little proud. As a practitioner of medicine Willis was not a man of push or energy. He despised all cant or cunning; had not the strongest faith in physic, and held by Ambrose Paré's motto, "I treat; God cures," with a tenacity which knew no limit. He told capital stories, and once dropped on an unqualified London

specialist who had carried his trade to Barnes itself, and who, when suddenly found out, was glad to fly.

The choicest things to Willis in all physic were that he had a thoroughly good memory and a capital little library, and as he entered heart and soul into my work he helped me both with memory and books. After I parted from him for London life he took to more remote studies. He wrote for Mr. Scott of Ramsgate, and also for Mr. Nicholas Trübner, presenting the life and works of Michael Servetus, whom he literally worshipped; he annotated the works of Spinoza, and composed a catechism of an advanced kind according to theological representations. He died, full of years, in 1878, his memory still unfailing, planning with me a fortnight before his death to go to Hempstead Church in Essex to see a leaden chest in which reclined all that was left of William Harvey. It is a matter of wonder to me that so illustrious a man should have been left to fade away so quietly by a world that has allowed so many of its worthless to live. He was one of the lights of this little earth, and it might have been from the knowledge of some man like him that Gray framed one of the most famous verses of his *Elegy*. Willis was not a rich man, and notwithstanding all his learning held to a theory which always shook and offended the pedantic scholars. He held that learning by grammar was not half so good as learning by words or sounds, and that it was easier to learn by speech than by written

rules. What has the word "*Va*" to do with the word "*Aller*"? It might have suited the old monks to employ their time in tracing out or inventing formulas, and a man like Milton himself might, by trained imitation, have taught on their system. But what did it lead to further than that a few industrious students mastered, at great labour, a few classical books, and were esteemed scholars? They were not fluent readers at the best. They were poor composers, and limited in their vocabularies, whereas if they had been taught the words of other languages as they were taught their own, all had been under their command, and they were not men of one mind if all readings came before them.

Willis chose the Hamiltonian system as his basis, a system now so steadily gaining ground that I was surprised recently to hear a well-known academical professor talking of it as the method which was cultivated in his classes with extraordinary success, as if it were a new device.

It will be seen from what I have written that the life in Mortlake was happy, and, indeed, I began here the greater part of what I might consider my true work in this world. I have said that I began to pick up literary tastes, and many others followed that will appear in detail as my record proceeds.

I recall that what gave me the most steady pleasure was the fitting up of a small laboratory in my house, with a bedroom adjoining. The church

clock acted as my timepiece; shelves all around afforded me room for specimens and chemicals; a pneumatic trough occupied a convenient place; and an old Franklin battery with all its apparatus—an instrument which had been used at an institution for lecture purposes in the south of London by Benjamin Franklin himself, since lent by me to the South Kensington Museum—filled up one end.

I could not have had a pleasanter room for research, and Willis used to call it the “life shop,” in which he was anxious, though no experimentalist, to watch the goings on and to contribute any assistance in his power. Dr. John Rose Cormack too, who had taken the famous Fairfax House at Putney, and his assistant at that time, the well-known Dr. Alexander Henry, were my constant companions; while Drs. Snow and Edwards Crisp, after a time, came to join me when they could give the leisure.

It would have been difficult to find a happier union of necessities for research, and when I added a good microscope and a balance to my establishment, I thought myself one of the most fortunate of men.

A historical event that took place at the date to which I have now come falls on my mind, and as it influenced medical practice, at all events practice near London, I am bound to refer to it. The great Exhibition was opened in Hyde Park and was the wonder of the world, the wonder through all time as far as we now know. The constant supervision

of the Prince Consort no doubt caused the first success of the project, but everybody who could joined in it, not least the great gardener Sir Joseph Paxton, who devised this brilliant Palace of Glass which Chaucer foreshadowed. Say what men may, there has been nothing anywhere since the Palace of 1851 equal in brilliancy and splendour of original conception, or usefulness of intention. It illuminated the world with a new light and set an example. It was not merely an exhibition, it was the Mother of exhibitions, and we who remember it forget our years instead of envying our younger brethren who have since been born. I used to go regularly to see it constructed, and after its removal it was once my delight, in company with one of its founders, the late Sir Henry Cole, to measure out the points where it first stood, and to mark out where the outlines of it might still be found. In its existence, and in its original grandeur, it was a marvel, a marvel of beauty as well as of industry. To Dr. Willis and myself it put forward a temptation that was simply irresistible, but, worse than that, it put temptations before other people upon whom we depended for our bread and cheese. Ours was an old practice, and had been one of the most remunerative of any in this kingdom or any other. The late Dr. John Scott, of Chandos Street, who for many years held the practice, told me that he and his partners had realised as much as five thousand pounds a year out of it as a business, and I have no doubt of the

correctness of his statement. The practice, as I knew it, was still of a good class, though not so profitable. But the Exhibition had its effect. The older patients, women especially, had often kept the house for years, and looked upon the visit of the doctor as the event of the day; his visits were a kind of expected right. Scott told me that for years he had attended a lady who invariably turned night into day, and, whatever might happen, had to call on her at her breakfast hour, nine o'clock at night. The Exhibition broke up all such arrangements, and patients who went to it being greatly taken by it, and in better health than supposed, would not keep to the house as they had done before. They met their doctors there as they met other people, and they kept their pockets at Christmas much closer than they had been wont to do.

Here, in the Citadel of Fascination, I saw my old friend Mr. Dudley Hudson and wandered through the various scenes with him. He was unchanged in his habits and modes of expression, but I thought he looked careworn and smaller in size.

In the Exhibition we met with a very clever old man called Josh, who had never been in London before, and who was the leech-man of the practice at Narborough. He was a splendid layer-on of leeches, and would get them to bite when everybody else failed. We were much amused at seeing him look with all his might at an equatorial telescope which stood in the building, and after a few friendly

observations we were interested in getting a question from him in reference to the instrument.

“Wouldn’t it fetch ’em down?” he said at last, and we, thinking that he mistook it for a cannon, asked in reply, “What would it fetch down, Josh, do you think?” when he took us both aback by saying, “The stars, in my opinion.”

Mr. Hudson stayed at Professor Taylor’s, and one night I dined with him there, promising to meet him again. We returned to our respective duties, however, without meeting. He went his way, I mine, and, alas! a little later I was informed that he fell suddenly near to his own home at Littlebury, and, despite all the measures to save him, died.

To have a work-room of the kind I have named like that at Mortlake, and to have a library, formed a taste which has never left me, and I have passed through life with it. I have improved on both from time to time as I have been able, and have been secluded in them very closely. It has fallen to my lot to have at times an active outdoor life, but that has been extraneous, and, I had almost said, forced, from which fact the notion that I am of ascetic nature has had its origin, a notion absolutely untrue.

The two rooms, or centres of action, are, nevertheless, the choicest resorts of mine. In the library you become friendly with all the great men of the past. They are always delighted to meet you; they have no worldly desires or ambitions, no jealousies,

no quarrels, no hates. They tell what they were, why they were, and in linking them with the world they link themselves with you, yet allow you to leave them so soon as you are tired. You are in the book-world of man.

The work-room is, in one way, the same, but in other ways it is different. In it you are in companionship with Nature, whom you ever see in form, or in act. All she does, like an invisible spirit, is for your observation and learning ; she never deceives you, never conceals anything from you, never puts on a voice or face of compassion, but seems to be all mind and no heart ; invariable, like the ancient Roman soldier, performing her tasks in the same methodical fashion. In her presence you are in sweet, yet awful, company, and even if nothing seem to be before you she is there as busy as ever. Men and women meet, contest, conceal, ramble, and often babble. They become afraid of each other or of what others will say of them, but the mistress of your laboratory shows no contention.

I have dealt at some length on the room set up at Mortlake, because it became so useful to me and such a good model. A few weeks ago I revisited it after a lapse of between forty and fifty years, and by the kindness of Dr. McIntosh, at present living in the house, took a good look at it.

The laboratory is a drawing-room now, and seemed much smaller than I remembered it, but in the bedroom attached, looking on to the river, I could

discover no change. I saw the place where everything was set up in my time, going through a kind of dream of past researches, and recalled that as Robinson Crusoe had his bower away from his castle, so I had had mine away from the world.

I recalled also many other events of that young time : my first dinner-party, the dining-room library in which I lived, the books I used, the walk to Kew Gardens, and the Gardens themselves. I heard, in fancy, the knock at the door of Henry Hirschfeldt, who used to teach me French and German, and who, long years afterwards, died in the Uxbridge Road, leaving me his quaint library. I remembered some lectures prepared for the schoolroom, together with an accident from flaming phosphorus ; the old lady whom I helped over the puddles, and who was of opinion that "politeness had returned to Mortlake." I reflected on the composing of the Fothergillian prize essay on "Diseases of the Fœtus in Utero," epitomised in this work under the title of "The Birth of Disease and Death." I met in imagination Drs. Henry, Rose Cormack, Grant, Alfred Carpenter, and a number more of us who united to found our "East Surrey Cholera Society," in order that we might have a common bond of observation in regard to a fearful outbreak of the disease then stalking amongst us. I remembered the old straggling village itself—the spot where Dr. Dee would wait for Queen Elizabeth to exhibit his marvellous crystal by which he shadowed forth events, and

cast a glance at the corner in the churchyard where he lies buried. I peered into an alley where the people once wrought tapestry, and where I witnessed a fire and carried an old damsel from the flames. I refreshed my mind with the memory of the now widely known Lethal Chamber, which I invented there, under the ideal of making death painless. I recalled the time of falling in love with Mary J. Smith, the lady who is now my wife, and who was then head and ears in music—an ardent student of Dr., afterwards Sir, Sterndale Bennett, and from whose metronome I conjured up an electric measurer.

I summoned all these memories and many more, with the final recollection of the preparation for taking, by examination, my degree in Scotland, and of hearing the Principal of the ancient University of St. Andrews, while laying on my head the cap cut out of John Knox's breeches, pronounce the words "Te doctorem medicinæ creo."

CHAPTER IX.

THE BIRTH OF DISEASE AND DEATH.

TIME, that nothing-everything, in the absence of which we *were* not, in the presence of which we *are*, did not creep at Mortlake—it flew, so fast as almost to engender fear. Occupations of varied kinds were ever present, but at the moment, my mind was most absorbed in the lesson of poor humanity holding and grasping death.

There was a wide expanse near Mortlake called Barnes Common. It was covered with grass and furze gently spreading out of the ground, and I was first led to it by professional duty. A number of tents of canvas and straw were dotted over it here and there, in which people called “gypsies” lived and breathed. One day a youth at the back of one of the tents attempted to harness a donkey to a little cart. By mere accident the donkey, meaning no ill, made a start before its time, ran the shaft of the cart into the back of the boy, and broke his spine. I reached the tent a little time afterwards, and there on the straw lay the half-dead lad, his legs insensible to pain. He knew everybody, could swallow everything administered to him, tasted everything,

spoke about everything he knew, told the story of the accident, and, to my great delight, prayed that the poor donkey, who had done no intentional wrong, might not be punished. This vagrant child knew, in fact, that mercy is twice blessed—a saying I had heard pronounced many times, but had never before seen put into practice. From that moment I loved the poor boy, attended to his injury, put him in the right position, made up his rough bed, and saw him take his food. The lower half of his body was as dead as it could be, and the active young lion, pierced through the back by an arrow from the hand of a Pharaoh, was not stretched out more helplessly.

Walking home I saw in a butcher's shambles the carcase of a sheep hanging with its back cleft in two from top to bottom, and I could see in the protruding spinal marrow the precise spot where, under a slight division or bruise, it might in life have ceased to act. The lesson was not lost upon me, and never has been. I never see a sheep hanging in the shambles but it comes back to me; I never see a picture of Pharaoh and the lion but it comes back to me; and I never see a patient suffering from hemiplegia but it comes back to me in all its details as vividly as ever.

One thing in nature leads to another, and it was so now. The poor woman who, some years before, had given birth into this world to that beautiful injured boy while her husband lustily swore, was now about to bring forth another child, and was not,

as she said, "the woman she used to be." She asked me if I would attend her if her husband should one day come for me, and I promised to fulfil her request.

The father of many children since the firstborn had meantime become marvellously changed. He had not ceased to swear, but he had by this time raised himself to the dignity of a sot, and he carried about with him a tambourine which he had stolen of somebody, and which, by virtue of a natural gift, he had learned to play in a jingling style. One day he came to me, and instead of ringing the bell played the tambourine before my door until I was called. Learning his errand, I went with him to his tent, and stayed there until the unhappy wife gave birth into this little sphere to another victim on the straw bed while the clattering tambourine was within earshot.

These sad events are not without their meaning, and this one had, to me, its definite meaning. Through the tents it was soon known that near by was a young doctor who did not disdain to come to poor mothers, reclining even on straw, and more than one husband, directed by the sot with the noisy tambourine, sought my services, and I became a noted accoucheur in their large and humble community. The Arab children of this community were not all of the most perfect health, and some, from their first moments, were branded with disease. There was one touched with rheumatic fever, and

more than one gave evidences of the fact that earliest life is sometimes a mere struggle with early death. I noted these truths, and was aided by them to improve in knowledge in the direction of research that lay, with other evidences, before me.

The study I was engaged upon was not an inappropriate one for a man who was destined to enter into conflict with the powers which tend to lay the highest in the dust. I began to see disease, not only from looking at it in the face day by day in the young and old, but as it was manifested even in those who had not yet come into the world. I saw it as it entered the world, and learned how man was born to die as the sparks fly upward. It is astonishing to discover what one can learn even in a short time when the opportunity presents itself, and when the will leads to the opportunity. Friends, books, experiments, all coalesced in my case, and it was curious that the Medical Society of London just then offered its Fothergillian Gold Medal for the best essay on the subject of "Diseases of the Fœtus in Utero"—"Diseases of the Child before Birth." I took up the subject and concentrated my energies on a synopsis of it that might be useful, the first synopsis of the subject that had been drawn up. It was a good beginning for a young man on the threshold of a practice to study patiently and practically the diseases of the unborn. It was not the usual beginning, but it was sound, and very soon became of the greatest interest, brimful of new facts,

and suggesting new ideas. The subject was one in which the world at large had made little or no progress whatever, that I could find, and Dr. Willis, with all his widespread and mature learning, declared himself unable to point to a treatise of medicine that would much enlighten me, and the notes which I made out from natural observations were as new to him as they were to me. The views of the medical profession generally were limited; it was the outline of discovery only that had been reached, and that narrowly, by Harvey, Fallopius, and the Hunters, who were long dead. We had, however, arrived at the conclusion that in the uterine life were two stages—the stage of the embryo, and that of the foetus. In other words, there was a first stage, when living matter was apparently chaotic, when in all creation there was a soft mass of structure not discernible as differing between one animal and another; and a second stage, when the soft mass began to resolve itself into intelligible form, marking out what the animal was to be, and founded on the characters of the animal from which it sprang.

My teachers, reflecting the most common opinion, had taught me that the foetus must be looked upon as if it were a section of the body of the mother and must derive its qualities from her. But as Nature unveiled herself the idea did not bear this interpretation. The foetus, by receipt of nourishment from the blood of the mother, was a complete

body of itself. It had its own circulation, its own build, its own nervous system, its own movements, its own organs, and it might have its own sex independently of either of its parents. At the same time, by some absolutely inscrutable condition, it might have a tendency to its male parent's diseases as well as to his form and general nature. The proposers of the Fothergillian prize did not enter into this abstruse difficulty. Accepting the natural fact of heredity, for there was no disputing it, they wished only to know what the diseases were, without reference to cause, and that inquiry, extending through a wide circle, was my business. I readily found that both disease and death were coupled with the dependent yet independent existence before birth. I found and classified diseases arising from perversion of the nutritive process, including increase, decrease, complete arrest or decomposition, local or general. I found inflammations and their consequences—in-duration or hardening, *ramollissement* or softening, suppuration; the mucous membranes, the serous membranes, the skin, and the structures of organs being involved. I found exudations; I traced out communicable diseases like smallpox, chickenpox, scarlet fever, gonorrhœa, and syphilis; I detected transformations, malignant tumours, softening of bones, and fatty degeneration. I saw parasitic developments of the nature of hydatids and entozoa. I discovered inorganic products in cavities and

ducts, gall-stones, calculi, salivary concretions, scaly layers, false membranes, and various diseases of the skin. I noted mechanical alterations and injuries, with aneurism in the vascular system. In the bony system I found fractures, luxations of joints, and ankylosis; in the muscular system, derangements of functions, convulsions, rigidity, paralysis, and epilepsy.

In these findings lay the truth that the pathological or diseased condition found after birth might precede it, and what is more, that death even might precede birth.

It would be incorrect for me to say that I gathered all the data from what I learned in the midst of the stray gypsy population met with on Barnes Common. I learned many details there, and treasured them up while they were fresh in my memory. I was appointed, in earlier life, a student surgeon in a lying-in hospital in a great city. I was now acting as surgeon to a lying-in charity, and was in what may be considered a large mixed midwifery practice. I had numbers of medical friends around me who were pleased to render me all the assistance and information in their power, and had at command some of the best museums in the world, as well as recourse to the best libraries. All avenues were, therefore, open to me, and nothing was wanted but application and industry, which being also mine, the research I was upon progressed steadily towards completion and to what turned out

to be success in a competitive sense. If it had not succeeded from that point of view, the research would still have had its advantages as a field of instruction for a young man.

The grand lesson was that disease and death afflicting the human family, not to say all other families on the earth, were a part of the birth, but commencing in different shades of degree according to the surroundings or environments. It is certain that I never once saw birth without some remote indications of death through some particular signal of disease, but it also sometimes happened that disease, and even death, appeared with the birth, owing to the surrounding conditions, both, by proper antecedent provisions, avoidable. The chief cause of disease and death was enfeebled or perverted nutrition. It was not necessary to look upon offspring as actual parts of the mother, or to consider the direct failure as a complete failure on her part; yet the failure she must suffer had its bearings: the infant she carried might have been quite independent, but it must have had its source of supply, and indirectly, through the placenta, from the blood of the mother, while all the changes of circulation, of construction, and health in the placenta, however brought about, must have been reflected in the being, or beings, that were supplied from it. In knowledge of this most important point I soon became so familiar that at last I could, from the placenta or secundines, read the state of the body, or

bodies, supported; and the changes of nutrition which were indicated in the foetus were, I believe, invariably dependent on the modifications in the structure which acted as the food-market of the child. Amongst the poor of all classes defective nutrition lay at the root of the parent evil. The poor little object born, even if it were alive, was made up of the most forlorn material, and could no more be expected to work well than an engine could that had been constructed out of the poorest metal, instead of out of the best steel. The feeling crept over me that it was no penalty to these unfortunates that they should prematurely die; they had, at the best, hardships to go through, of which better born children knew nothing, and they were the worst prepared to go through any difficulty.

In addition to the failure of nutrition it became manifest that the birth of disease and death in the unborn was connected with the many other calamities that lead to them in the full-born. There was at work a powerful, mysterious, and unseen influence that comes from parental origin—comes from the father, and perhaps really descended to him through his mother; there were influences direct from the mother, influences of fear, joy, expectation, thought in every phase.

In one of our museums was a set of skins with stripes of the quagga marked upon them. Upon one, all the stripes were more or less distinct; upon another, a smaller number and so on, but never a

skin free of stripe. Why was this? The mother was a mare, and no stripe proceeded from her; the father of the first thoroughly striped animal was a quagga, and the occurrence of the stripes, therefore, on its offspring might be called natural. But in all the others the father was a horse, and was not responsible for any stripe at all, and yet the stripes were there. A white woman was married to a black man, and a child born of her was a mulatto; it was not a wonderful thing according to the common idea. The black man died; she then married a white man, and by him had other children. They were not actually black, but they were all tinted by the dark stain, the degree varying with the date of the birth of each child, and in the earliest of the last group some other of the negro characteristics were seen, such as the thick lips. They had characteristics of a black father from the white source on both sides.

We do not know why these events should ever occur; they are inexplicable, and certain other events in the features of disease developed at birth are equally undefined. They come from the placenta as from a common centre, but how they come remains in obscurity. Atrophy is not invariably the fact; hypertrophy may come also. Sometimes a largely developed child sprang from the worst developed parents. Occasionally other affections were shown which were more traceable, but even then there was some obscurity. There were signs of impregnated disease presented in the fœtus,

but whether derived from the mother or the father remains still the problem. Hardenings of the skin, scales, and ulcers might show themselves, and appear to have their origin on the male side, but might be present with proof of the same either from father or mother. This, moreover, was the case even with hard deposits, as in gall-stones and stone in the bladder. Inflammations and their results had representations as if of independent nature. Infectious diseases of a well-known type, such as fever, rheumatic fever, and scarlet fever, seemed to be transmissible direct from the placental blood, the mother being at the time affected with the like complaint. On the other hand, doubtless, the foetus alone might suffer from one of the same maladies and actually die from it, as if the poison of the disease could pass through the blood of the parent so as to infect the intermediate organ lying between mother and child, and yet not be communicable to any part of the mother herself. It was also striking that disease, like cancer, ultimately fatal to the mother did not always affect the child, while the selfsame disease, as I twice saw, and others have seen, might destroy the child and not communicate itself—at all events not at the time—to the mother.

When the essay on “Diseases of the Foetus” was finished it was duly sent in, with a motto, to the Medical Society of London, accompanied by tables of weights and measures, and other necessary statements of phenomena. After it won the prize, and

the ancient Gold Medal was in my possession, I carried the work—swelled with pride, I have no doubt, at my success—to the late Mr. John Churchill, the then well-known medical publisher, feeling sure he would be glad to publish it. Churchill was a man of fine commercial instincts who had made his own way in the world and stood, very properly, among the heads of his profession. He always calculated before he undertook, and although he laid no claim to a medical scholarship, he had a shrewd knowledge of what every work contained and of its value and “go,” even among medical men. He told me he did not know a word about the subject, was surprised at seeing the award of the prize announced, and would be glad if I would tell him what the words “Diseases of the Fœtus in Utero” meant. I explained to him, and heard him express his wonder that the Society had not used plain English. “Diseases before Birth,” he said, would have been a much better title, but even that might not be sufficiently explicit.

“How is it likely,” he said, “that my numerous readers—all of whom are engaged day and night in treating the diseases after birth, the diseases of their living patients—will care a rap about the diseases which took place before birth? Their time is already sufficiently occupied, if they are worth anything, with what is; and how can they occupy themselves with what may have been, but is not? No, no! It won’t do! It is a ponderous work; I

am sure it has cost you enormous labour, and I know it will call for a very large sum in printing, to say nothing about the corrections; and, to your annoyance as well as to my own, it will fall stillborn from the press."

It was so true what he said, and I was so astounded, that I could not reply a word, but, folding the book up in its paper coverings, left quicker than I had entered, a very much wiser man.


Churchill used to write with his pen straight down on the paper as if it were a short stick, and he made figures as though he were still drawing lines and hooks. But he had a sweet laugh and bright twinkle in his eyes, and as he laid down his pen to shake hands with me, the old proverb, "Let him that thinketh he standeth take heed lest he fall," seemed to be whispered to me by some invisible being, and it impressed me for good.

As I was leaving Mr. Churchill's house I met the well-known Dr. Stevenson Bushnan, whom I knew. Churchill had bought up the *Medical Gazette*, a paper which Sir Benjamin Brodie had founded, and which Drs. Malcolm, Willis, and Alfred Taylor had in turn edited. It was considered a paper of the first class, and when the eminent publisher I have named bought it, it was combined with his paper *The Medical Times*, went under the title of *The Medical Times and Gazette*, and was edited by Dr. Bushnan. Bushnan was a man of extraordinary capacity, a fine scholar, and one whom it after-

wards delighted me to know, and, according to my powers, to aid. He saw the Fothergillian product and was much pleased with it, disagreeing altogether with the commercial view, and stammering out—for he was a tremendous stammerer—very strong epithets in regard to publishers. From that day I was one of the staff of the journal he conducted, for many years contributing some hundreds of columns to its pages. For my part, I had no money to spend on publishing “*The Fœtus in Utero*,” and it seemed to me that the commercial estimate of Mr. Churchill was sound. The work has always continued as a book in name only, but I have never regretted the labour I bestowed upon it. The labour was worth all it got from me, since it gave me an insight into particulars I could not otherwise have obtained. It enabled me to write with authority “*On the care that ought to be taken of the expectant mother*,” a paper which, if it was nothing else, was of value, not to the medical world alone, but to every mother influenced by its perusal. It was a practical protest against the birth of disease and death, still so decidedly wanted by the world everywhere.

CHAPTER X.

EXPERIMENTS, ANTISEPTIC AND LETHAL.

LTHOUGH it took me many months to write the essay on diseases of the child before birth, I did not let that altogether engage my time. It was a kind of experimental inquiry truly, but other inquiries lay before me from which I could not keep away, and in the experiment room there lay at hand an immense number of important questions to be asked directly of nature herself.

One of the first of these had relation to the antiseptic qualities of gases, and I, very early in life, sent a paper on this subject to be read to the Medical Society of London, and was fortunate enough to be very favourably noticed in the columns of the *Lancet*. In this research, through the pneumatic method, I made gases of various kinds and sealed up in them portions of dead animal structure, ascertaining by comparison with other specimens in the air what effect the gases would have in resisting putrefaction or other change.

The gases made for the purposes of this inquiry

were hydrogen, arseniuretted hydrogen, sulphuretted hydrogen, phosphoretted hydrogen, chlorine, chloroform vapour, nitrogen, nitrogen impregnated with iodine vapour, nitrous acid gas, ammonia vapour, cyanogen, coal gas, carbonic oxide, carbonic acid, and all the hydro-carbons that I could work with in the gaseous form.

The inquiry was a very laborious one. I sometimes had as many as twenty specimens on my shelves, and the late Dr. Snow repeatedly came to make his observations upon them. In conclusion I arrived at the opinion that arseniuretted hydrogen was, on the whole, one of the best preservers, but I was very much struck with the effects of cyanogen, and was only prevented from extensively using it by the dangers of working with it. The preparations shown at the Medical Society of London that attracted most attention were those in which the specimens were immersed in arseniuretted hydrogen, and a specimen of a heart so immersed retained its perfect appearance for no less than two years. At the same time I observed several other facts which were of great interest, some of them very practical; for example, seeing that ammonia vapour preserved so well, I proposed it as a means of keeping preparations which had been removed at post-mortem examinations, suggesting that the operator should carry with him a carefully made jar through which ammonia vapour was diffused, and that the specimen to be preserved should be kept in the jar. I also brought

forward a box nicely fitted and divided into compartments, through which ammonia vapour could be diffused and in which specimens could be separately placed. This suggested practice was rather largely seized, and at this day it is not uncommon for practitioners to use ammonia as an antiseptic in the manner described. In the teaching of anatomy the anatomist might employ the vapour with considerable advantage, since a careful dissection might be made and retained for demonstration throughout the whole of a course. These observations led me later on to communicate another paper to the Society, which was published in their *Transactions*.

In other instances I also found new facts. I discovered that when nitrogen was obtained in the pure form it acted as a negative substance, and as such preserved, but that it was most difficult to separate it altogether from oxygen, in the presence of which a peculiar decomposition was produced. I also found that ammonia itself, though it for a time preserved, had a tendency to lead to a fatty degeneration of tissues, and that from the tissues a kind of adipocere could be formed. The action of chlorine vapour on fresh muscle was particularly marked, the muscle being changed in colour to a yellowish tint and giving off a vapour having the odour of hydrocyanic acid. Carbonic acid sustained preservation, but caused a bluish tint of structure, while carbonic oxide gave a brilliant red tint, so that a natural appearance was observable until the specimen was

exposed to the air, when the red colour rather rapidly vanished and the substance decomposed.

I tried to make phosphorus play the part of absorbing oxygen from a limited portion of air, and immersed specimens of flesh in the air so deoxidised, but I did not succeed as I could have wished, a peculiar process of oxidation seeming to go on in spite of the presence of the absorbing body.

Another very interesting research consisted in tracing out the effects of the smoke of the common puff-ball, the "Devil's Snuff-box" according to the vulgar, or *Lycoperdon giganteum*. This is a fungus eaten in the fresh state by the Italians as a food, *bovista*, and in the dry state is used in surgeries generally for stopping hæmorrhage. My first master, Mr. Henry Hudson, had told me that puff-ball smoke was largely used in the midland counties for putting bees in their hives into so deep a sleep that the hives could be robbed of honey and wax without the knowledge of the bees, and this, he believed, in his district had been going on for centuries. I witnessed the proceeding, wondered whether in large animals sleep could be induced by the same kind of inhalation, and tested this matter at the time in every variety of administration, to find that the smoke of the puff-ball did produce sleep and insensibility in every class of animal. I performed a large number of painless operations on lower animals under the smoke, such as castration, removal of tumours, closing

openings or wounds. The animals were placed in a small glass chamber and subjected to the fumes of the vapour burning in two joined funnels which were fastened together mouth to mouth, and which carried air, by bellows, through the burning fungus into the chamber. It was not pleasant air to breathe because it contained particles of smoke-dust, and I, therefore, made a plan for passing the smoke through alkaline water, when it entered the chamber free and transparent, and answered well. Further, I burned the fungus in oxygen itself, and still found that the narcotic property of the vapour was preserved. These observations gave rise to a paper on the fumes of the *Lycoperdon giganteum*, read before the Medical Society of London, accompanied by experimental demonstrations, a paper which became widely known and led to analyses of the vapour in order to see what was the narcotic that caused the effect. The late Dr. Snow, and the late Mr. Thornton Herapath of Bristol, took up the inquiry as well as myself, and they came to the united opinion that the narcotising agent was carbonic oxide, in which opinion I joined, for the evidence was incontrovertible.

A further subject connected with this work at Mortlake which I best remember has reference to what is now of world-wide interest—the means of putting domestic animals painlessly to death and the invention of the Lethal Chamber. It occurred

to me one day that no method of destruction could be more humane than anæsthetic narcotism, and I made a chamber for this mode of death which answered perfectly. One day the brother of the lady to whom I was engaged and whom I subsequently married, came to me, bringing a beautiful retriever of his which had been bitten by a rabid animal, and asking me if I would give it a dose of poison. I begged him to bring the kennel and put the dog into it, which he did. I closed all the openings of the kennel with soft clay, covered it with an oil-cloth, and then rapidly diffused through it some purified puff-ball smoke that had passed through chloroform. The animal, by inhaling these vapours, quickly fell asleep and was allowed painlessly to die.

The proceeding was so satisfactory I was led to transform the kennel so as to make it more convenient. It was set up in my garden, and from that time, about the middle of 1853, my neighbours were accustomed to bring to me all their pets for whom they wished to secure a rapid and painless death. I designated it the "Lethal Chamber," and some years later I set up the same kind of thing on a much larger scale at the Dogs' Home, Battersea, where it has been in constant use ever since, and where each year many thousands of dogs have slept their last sleep.

The more my mind reverts to life in Mortlake the more crowded memory seems to become, for work

was ever in progress. I was never wanting for a friend like Dr. Willis to propel me on, and I had an excellent ally in Mr. Adolph Leipner, a tutor by profession, who had exceedingly fine manipulative skill, a good artistic taste, and excellent calculating powers. Mr. Ives, a national schoolmaster, who afterwards graduated as M.A. and became a clergyman of the Church of England, acted as secretary, and copied for me the Fothergillian essay. Dr. Alexander Henry, whose literary and microscopical abilities were ever at my disposal, with many other friends, was by my side.

I was deeply interested in the subject of the formation of "Fibrinous Clots in the Heart," and carried on a brisk controversy on them with the late Mr. Henry Smith, who had the kindness, in the end, to endorse my views on the matter. I received a specimen from Italy of Pagliari's Hæmostatic, a description of which I gave, after a due trial of it, to the Medical Society of London, and from which I was led to take up the question of arresting hæmorrhage. I introduced the method of treating cholera by the plan of introducing water into the bodies of the sick by injection of it into the peritoneum, or subcutaneously, making artificial ascites or anasarca.

Not infrequently in the evenings I used to meet some of the rowing men who were on the river. The training master, who won the belt many times

and was a most intelligent man, took a pleasure in the tasks he had to perform. He it was who told me how bad the effects of glasses of wine on rowing men were, and I learned from him, as a patient, more, I fear, than he ever learned from me as a doctor.

In the competitors who were in training I saw for the first time a truth, for the announcement of which I have been severely criticised, and that not always fairly—namely, that athleticism, good as it may be, has its disadvantages. These had not to be looked for specially; they stood out plainly. It was certain that the rowing man suffered, and required to be taught that competition had its dangers. It seemed to me that the breathing powers of the rower were often oppressed, that he could make himself breathless, that his circulation through the lungs suffered, and that winning money and fame were not the certain means of winning health and life.

The observations thus made led to the publication of the papers on “Diseases of Overworked Men,” and to the heated controversy respecting the fate of the oarsmen engaged in the Oxford and Cambridge annual race. Successful men in these trials were often thought to be superior to winners at the Universities of mathematical or classical honours, and my contention simply was that, whatever might be the opinions of lookers-on at the time, the athletic rowers did not become of necessity the

strongest, healthiest, and longest-lived of all the rest.

A case that occurred in Mortlake, and an account of which I have published under the title of "Pulsatile Pulmonic Crepitation," showed, almost for the first time, that a piece of the left lung may become adherent to the chest wall over the heart, and that the pulsation of the heart may, by the pressure that follows, produce in the lung a crepitation very much like that which occurs in pneumonia.

I reported and published that scarlet fever may be followed by rheumatism and may give rise to what I call rheumatic scarlet fever. Investigating a widespread epidemic of scarlet fever, in the course of which I myself became a victim, I wrote for the Epidemiological Society a compendious paper entitled "Facts Relating to Scarlet Fever," in which it was shown that this disease has its own special months of mortality; that Withering was right in asserting that babes and very young children were exempt from its ravages; that it sometimes took the idiopathic type and was not then contagious, and that the best treatment for it in those afflicted by it was the free use of ammonia.

A number of us at this time banded ourselves together to consider medical meteorology and public health, and the late eminent Dr. Moffat of

Hawarden joined with me in constructing a paper for the Epidemiological Society, on "Meteorological Changes in Relation to Disease," a paper accompanied by a large number of charts and maps, in which it was indicated that there is a close connection between the direction of winds and the development of human maladies, and that, according to Moffat's ever-prevailing view, the phenomenon called "phosphorescence" plays a most important part in regard to health and life.

All these topics, engrossing at the period of their representation, would of themselves make a modest volume, but I must not be tempted to enter into them here at greater length, or into the kindred subjects which sprang out of them.

There is, however, one special subject that cannot be omitted. I refer to a series of inquiries in regard to oxygen, which deserves attention in the special chapter that immediately follows.

CHAPTER XI.

RESEARCHES ON OXYGEN.

THE subject of oxygen was with me for a long time a literary study, and connected itself with the lives and works of men of the past who had become well-known to fame. It came to me originally, perhaps, under the title of Phlogiston, and, practically, it was always before me in the common term antiphlogistic. In this study one name grew specially familiar, that of Dr. Joseph Priestley, whose experiments on dephlogisticated air were so on my mind that at length they became a veritable piece of my own life. I saw him, in fancy, in his secluded den, as it might be called, working with the new gas which he had liberated; saw the almost extinguished taper relight and burn brightly in it; saw the animal, on which Mrs. Barbauld wrote her pitiful poem, breathing the gas; saw the grand discovery that plants possess the power of taking up the gas in combination with carbon—carbonic acid—and, feeding upon the carbon for their own structure, give back the oxygen to the air for the use of animals. I saw the existence of the gas both in the water of the sea and river, in the clouds,

in the air. My mind crossed over to revolutionary France and to the unhappy Farmer-General Lavoisier. I summoned up the picture of a gathering in his room, including Priestley, Lord Shelburne, and that Madame Lavoisier who at one moment was Priestess of the Madeleine, and later on the ill-starred wife of Benjamin Thompson, Count Rumford. I saw her standing at Priestley's back, and taking down his words for the use of Lavoisier, who, after making the new gas, found that it combined with other elements, fancied that it had the property of producing acids, and named it oxygen.

The incidents laid bare in this discovery of oxygen remained veritable wonders of history, and to Willis, as well as to me, were an endless delight. He read up all that chapter of history in which the discovery came forth, and there was not a man political or scientific whom he did not recognise. But his wide knowledge did not lead me away from the one wonderful fact, the discovery of oxygen and the first early speculations about its qualities as the balance of the universe, making both animals and plants one, the unity of a vast engineering design.

The study captivated me beyond mere student methods obtained from text-books and original treatises ; it led me to read from the thing itself. I made oxygen after Priestley's plan and other methods since known, and began to estimate its character as a gas and its influence on life, from which inquiries came that I am now about to relate.

Rarefied Oxygen.

It had been discovered that in the air oxygen exists in combination with another gas known as azote or nitrogen. Oxygen is combined with nitrogen in air in the proportion of twenty-one parts to seventy-nine of nitrogen; it is diluted to that extent, not by any chemical combination but by mere mechanical admixture, so that an animal may make use of it direct without any demand of a chemical kind for its separation. In the case of fish it was soon detected that the oxygen of the water in which they lived was loose and directly absorbable. Oxygen of water is in chemical combination with hydrogen, but that knot has not to be untied, for there is plenty of free oxygen derived from the air in common water. What the proportion of the loose oxygen must be for animals that breathe in air is indicated by nature, showing that the figures of twenty-one and seventy-nine are requisite for all practical purposes in various climates. However, it was as well to test the fact.

I made pure specimens of oxygen and of nitrogen and kept them separately. Then I arranged series of glass vessels in which those gases could be commingled in definite measured proportions, so as to make an artificial atmosphere, and I tried with small animals, animals of warm blood and animals of cold blood, to see how they would exist in such atmospheres; how their temperatures would vary,

and how their products of respiration would be modified.

The results were most conclusive. It came out that, when the oxygen was in excessive measure and duly warmed, the respiration was quickened and life generally intensified; but when the oxygen went below the standard, then respiration was reduced and languid life passed slowly into death, so that the measure given to us by nature for the support of life, without exaggeration or reduction, was the exact atmosphere that we require. No feat of engineering, in point of fact, could be more perfect.

We know that the dilution of oxygen in nitrogen must be of a certain character, so that we should receive at least a fifth of oxygen, but oxygen, as a gas, admits of being rarefied so as to represent one fifth, and the point was whether thus rarefied it would of itself support life. The question was asked of nature, with the reply that rarefied oxygen is capable of performing the function demanded of it, but to carry this out would call for processes of an extremely complicated kind, and would deprive the air of what is probably one of its most important elements, the nitrogen which forms so large a part of it, and which, probably, may be itself performing duties that, passive as they may seem to be, may be essential to a continued existence. It therefore stands out as a truth that the process of diluting oxygen in another gas, if that gas be practically

negative, is the best design that can be successfully accomplished.

A question that had to be settled was whether any other gas than nitrogen could be as truly effective as nitrogen. There was at hand the gas hydrogen, which admitted of being diluted with oxygen mechanically to any extent that might be desired. I made, therefore, an artificial atmosphere in which oxygen and hydrogen were combined in exactly the same proportion as oxygen and nitrogen are in the air. I formed, that is to say, an oxy-hydrogen atmosphere and afterwards tested its capacity. A burning taper dipped into such an atmosphere exploded, so that in the presence of burning bodies such an atmosphere would not have succeeded safely, because a whole atmospheric sea of it surrounding the earth might as well explode as the small quantity of it in a bell-jar. What was more, the combination was not effective even in regard to the life of animals; it formed a narcotic atmosphere; caused modification of every function, and led to death.

Another line of experiment was pursued. There are certain gases besides oxygen which support some kinds of combustion; thus, if turpentine carried on a feather be dipped into chlorine, combustion takes place, and it was a point whether animal combustion could be sustained in a similar but modified manner.

I took great pains, therefore, in diffusing chlorine in various proportions through nitrogen; collected the atmospheres produced, and tested their effects. It turned out that unless the chlorine were extremely diluted it prevented respiration by its own activity, so that when I tried to inhale it myself I could not, without danger, continue. The larynx was irritated; spasmodic contraction followed, and breathing became a dangerous process. On the other hand, when the chlorine was so diluted that it could be inspired, it did not lead to the usual vital maintenance. The chemical changes that followed were perverted; there was no true combination with carbon resembling in any way the carbonic acid that is formed from oxygen, and life was evidently rendered insupportable.

Effects of Re-breathing Oxygen.

Entirely satisfied by experiment that in the study of respiration no other element need be considered except oxygen, it seemed to me most desirable that oxygen in itself should be the basis of further experiment, and thereupon I proceeded. I fitted up two immense reservoirs for the gas, filled them with it, and arranged that it might pass in continuous current from one to the other, and showing its loss according to its effects on the living things it came into contact with. Then it was that I made the unexpected discovery that warm-blooded animals

living in chambers fed by pure oxygen in current, continued to live, showing no indications, except of a ravenous desire for food and drink, a certain feverish condition, and a glow in their transparent parts; but that so soon as they began to breathe oxygen over and over again, however thoroughly it might be purified, they went to sleep, and died asleep, unless they were supplied, through the gas, with electrical vibrations, when they continued to live. These phenomena were not observed in cold-blooded animals such as frogs, and they led me to the conclusion, which has over and over again been discussed with various expressions of opinion, that there is in oxygen something more than the mere substantial gas which helps to support life, or which—*de facto*—is life.

Oxygen as an Anæsthetic.

It was in the course of these experiments on oxygen gas that I came upon the equally remarkable observation that if subjected to extreme cold oxygen becomes an anæsthetic. I made it by this means quite as anæsthetic as air impregnated with chloroform, and learned the difference in the actions of different anæsthetics under the influence of temperatures of various degrees; that heat quickens action, and that when young animals, like kittens, are to be destroyed, it is always the safest mode of taking life to raise the temperature of the water to

that of the body that is immersed in it. I noticed that what is known as rigor mortis, or the muscular rigidity of death, is suspended under cold and quickened by heat, and that consequently fresh blood can be kept liquid in cups of ice, and that fresh muscles can be kept free of rigor for long periods in very cold air, a fact entirely subversive of that which had been previously taught.

Ozone, or Electrical Oxygen.

Oxygen can be charged with electrical force and can take the form of what Schönbein called ozone. To manufacture ozone was not by any means a difficult process. I knew how to keep, for a certain time, a store of it ready for use, and I reported and illustrated its worth and character as a purifier, a decomposer, and a supporter or destroyer of vital action. I specially showed the influence of temperature in causing modifications of ozone in its general and vital power, and learned that in excess it led, when it was inhaled, to congestion of the lungs and rapid death from that cause. Diluted largely with air, I utilised it as a method of ventilation, and in a large assembly caused it to be felt by all present.

Summary.

As a summary of these inquiries on oxygen I was led to a conclusion I have still continued to hold, that oxygen must not be looked upon, as it usually is, in the mere light of a gas which combines and

forms part of a body. I have not the slightest doubt that this ought to be more widely recognised, and that the poet in speaking of the chameleon was quite close to the mark when he sang

“Stretched at its ease the beast I viewed,
And saw it eat the air for food,”

for oxygen enters largely into the composition of the body, forming, perhaps, a third of the body; gives weight and substance, combining, in fact, with other material in the body as it does combine with iron out of the body, in the form of adherent rust.

But far beyond the part which oxygen may play in ultimate construction it has always looked to me as if, in entering the body in the form of a gas, it carries also vital force—energy—which, in the course of distribution is liberated, giving the activity we define as motion; in plain words, animating every structure.

CHAPTER XII.

A LONDON CAREER IN MID-CENTURY.

RESIDENCE in London in the middle of this century was a very different thing from what it is now. I entered the place in 1853-4, and although the changes that have occurred seem too gradual to be startling, they are, when duly compared in respect to details, remarkable.

I commenced residence in the house numbered 12 in Hinde Street, Manchester Square, which house I held up to the year 1880. It turned out to be the house in which, probably with its neighbour No. 13, the Honourable Henry Cavendish, who discovered the component gases of water, used once to reside. In the Regency the house belonged to a Captain Fowler, who, by turning all the ceilings into arches built with inverted earthenware tubes, believed he had made a fire-proof dwelling. Two cracks in the roof of the back room on the ground floor, which extended from corner to corner, crossing each other in the centre, indicated, as I was informed, that a huge fire had been made beneath as a test of the fire-proof qualities of the ceiling, and that while it burned the Prince Regent took his luncheon comfortably

in the room immediately above. Captain Fowler had also made over this and the next house arched roofs, and had covered them with a kind of asphalte called Val de Travers, a substance introduced into England about the year 1828. Beautiful roofs they were, for we could walk on them and utilise them in many ways. They formed the driest roofs imaginable, although they caught a great deal of snow in winter. On the asphalte roof of No. 12 I planted a telescope, through which Hampstead and the northern heights were commanded, and here I was told the first news of the great impending American War against slavery, in the literature on which I was led to take an active part, my sympathies being against slavery. The article entitled *The New South Sea Bubble* was written by me when we in England were about to lend a large sum to the Southerners, as most people believed, on the security of cotton. I also entered keenly into the question of the feeding of our people, in order to see what the expenses would be under the withdrawal of the importation of food stuffs.

In the house No. 12, Hinde Street, I at once set up a laboratory, or workroom, like the one I had left at Mortlake. At first it was not so good, for I was obliged to transform it out of one of the cellars in the area, which, in the life of my predecessor, Mrs. Woodgate—one of the sisters of the Commander-in-Chief, Lord Hardinge—had been a kind of lumber-room; but I soon built a new room in the back-yard, with light streaming in from above, and—for the

term of twenty-six years—it became a physical workshop, in which I carried out my experimental researches.

For a few years I took another house in St. John's Wood; there built another laboratory for investigating the question of preserving dead animal substances from putrefaction in air. I retained nevertheless the old house and laboratory in Hinde Street for general and medical study, making it the centre in which researches were carried on that illustrated the lectures of a post-graduate course which lasted for several sessions, and is remembered by medical men who attended it, many of whom still live. When I finally left Hinde Street in 1880 and moved into the house in which this is written, namely, 25, Manchester Square, I had to find another similar workshop, which I easily did, and which I still retain.

Residence in Hinde Street at first was not lonely, for I had with me as companions two friends who became rather widely known. The first was a gentleman named Barton. He was advanced in life, but of very active habits, and belonged to the young sect called Positivists founded by Auguste Comte in Paris, and established in this city by the Reverend Mr. Congreve, who, for the sake of consistency, studied physic, and passed the Royal College of Physicians. Barton translated Comte's Catechism, and was a sincere and practical teacher until his death, which did not occur until about his

ninetieth year, long after he left me. The second, a learned medical scholar—Dr. Henry—was of affectionate disposition and of secluded and peculiar habits. He undertook the re-editing and republication of Maynes' famous Medical Dictionary, and himself wrote a little glossary of medical terms; he was very fond of revising my early proofs, the matter of which interested him exceedingly. He was by my side, under the same roof, until 1857, the year in which I married, and then made for himself a new home, in which he carried out the pursuit of literature in preference to that of practice.

The first appointment I obtained after settling in London was that of physician to the Blenheim Street Dispensary, a large dispensary in the street running from Blenheim Steps. This institution was of great interest, inasmuch as it was the old anatomical school of the distinguished anatomist Joshua Brookes, a man to whom I have previously referred. In Brookes's day there were few, if any, medical schools attached directly to hospitals. Medical education was free, and was undertaken by any man who had the ability to teach. This was as it should be, and Brookes took full advantage of the position. He was a first-class anatomist, and his demonstrations as well as his lectures were appreciated by everybody who visited him. In order to make everything effective he bought or rented the large building which became our dispensary, and, in another form,

still stands. By the side of the large central door of the building in its front were two full-sized statues of Sydenham and Harvey, and inside there were the best arrangements for teaching. A large room in the centre formed a museum, and on each side were smaller rooms, in one of which Brookes dissected, while in one or two others his students worked in a similar manner. Below there was a large lecture-room lighted from above by a central dome, and there was a yard in which it was rumoured that eagles were kept. It seems to have been a fashion in Brookes's time to decorate in a kind of Syro-Egyptian style, or in an Indian style. John and Mrs. Hunter carried out the decoration very fully in their own house at Earls court, as I have myself many times seen. A gentleman, whose name is unknown to me, opened a cave or grotto at Margate which was inlaid or ornamented on a somewhat similar design, and there have been many houses in this country in which the same fashion was adopted. Brookes was an evident admirer of this idea, for his school was a model of it. Columns ran up in the museum engraved all over with Eastern symbols; the lotus flower was everywhere, and birds and beasts were depicted upon the pillars, doors, and walls, wherever there was a vacant spot. The effect was lasting; remained during the dispensary period, and was tempting in its appearance. Had I been wealthy enough I certainly should have bought the whole place for a medical school; as it was I could only

act as a dispensary physician. The place passed gradually away into other hands. The lecture-room became a tinman's and brazier's workshop; the museum became a waiting-room for the dispensary patients during the week and a Methodist chapel on Sundays; the dissecting-rooms changed into private rooms for the physicians and surgeons. Finally, I believe, the whole building was transmuted into a huge dyers' establishment, and as a medical school was entirely forgotten, the images outside altogether disappearing. We had a large practice at this dispensary and a complete staff, the members of which, all on excellent terms, met at each other's houses once a month for a gossip, supper, and cards.

Another institution with which I was connected professionally was the Royal Infirmary for Asthma, in the City Road, now called the Royal Hospital for Diseases of the Chest. Her Majesty's father, the Duke of Kent, was said to have been the founder of the Royal Infirmary for Asthma, asthma being the term once applied to almost all affections of the lungs. The leading physician for a long time in this institution was one Dr. Ramage, who was elected in his early life a Fellow of the Royal College of Physicians. He was living in my time, and I knew a patient who consulted him, but I never saw him. From what I gathered he was a man of ability, although from his professional brethren he did not gain approbation, for it was

believed that he pushed his own private practices too far, inventing a "chest-whistle," made in large numbers, and recommending it right and left without hesitation. He had other curious practices, on which I will not dwell, and had given up the infirmary for some years when I joined it.

The infirmary itself was a very good school of its kind, and in it I obtained the observations which led me to write the paper originally on alcoholic phthisis, in which it was indicated that the disease—pulmonary consumption—may become the consumption of drunkards, and that all the signs of it, even to the spitting of blood, may develop in persons past middle life, alcohol being the prompting cause. I remained fourteen years at this infirmary, and was the senior officer at the time of retirement.

Adjoining the St. George's Hospital there was for many years a Medical School called the St. George's School of Medicine. Tattersall's yard, where horses were tested, bought, and sold, was at that time in existence to the right of the hospital as you passed out of it, and the school named stood in the yard. It had been founded many years before by the late Mr. Samuel Lane, a Professor of Anatomy of great ability who died about ten years ago at an advanced age. The school was distinguished by many men besides Lane; Marshall Hall taught there, and several others of celebrity. In the latter part of the forties, however, a new project was started to found

the St. Mary's Hospital at Paddington, and in time that valuable institution was erected, and a school connected with it. Mr. Samuel Lane, who had lost election as surgeon to St. George's, the late Mr. Tatum being the successful candidate, put in a natural claim to be made one of the surgeons of the new St. Mary's. He was this time successful, and became head of the new school, a fact which left the old one without its leader, but with a rival called the Kinnerton Street School, conducted by the St. George's Hospital staff, in dangerous proximity. Lane let his old school to the late Dr. Edwin Lankester, who had been for some time Professor of Botany, and he undertook to re-organise it. He obtained several *confrères*, Sir Spencer Wells and Mr. Adams as Professors of Surgery, and Dr. Amadée Deville, a refugee from Paris, as Professor of Anatomy. In this primary selection Deville—whose father was said to have been leader of the Mountain during the First Republic of France, and to have been transported to Cayenne when Napoleon III. was master—was a host in himself. He taught anatomy and operative surgery superbly, and, although as time went on his mind tottered so that he ultimately died in an asylum in Paris, he was for the time a power. I could tell many astounding anecdotes of Deville, but will simply state that I was one of his colleagues on Lankester's invitation, taking first the chair of Forensic Medicine, the details of which were as full of narrative as of science. No chair

could have suited me better, and I had the good fortune to be the first lecturer of public hygiene, which I concurrently added to the course. I was obliged in the end to give both up for Physiology, a subject that remained under my care for several years. At last I became Dean of the School in place of Dr. Lankester, and remained at that post until the school itself was dissolved, and the very building, with the other buildings in Tattersall's Yard, was demolished.

While public teaching in a private school was forming in the way described, a part of my life, a great attempt was made to establish a new institution. The dentists of England having then no qualifications determined to take the game in their own hands, and to found a College of Dentists which should be an educational body, and, at the same time, an examination one. The Council of the intended Society took a part of the Royal Polytechnic Institution, and fitted up a lecture-room, in which I, who had previously delivered a course of lectures to dentists on "The Medical History of Diseases of the Teeth," afterwards published by Baillière, was asked to take up Anatomy and Physiology as one of the lecturers. Mr. Hulme, a distinguished dentist, joined me as lecturer on Surgery; Professor Bernays of St. Thomas's, as lecturer on Chemistry; Drs. Spencer Cobbold and Francis Webb, F.S.A., as lecturers on Natural History, and Mr. Perkins—a practical

dentist in Baker Street—as teacher of Mechanical Dentistry. We worked together as a school for a long time, but there was opposition; the Odontological Society was formed; the Royal College of Surgeons took their side, and finally took possession of the power to give a licence, to be called the Licentiatehip of Dental Surgery, a power they ultimately obtained for their College, and which still remains. The original plan, therefore, broke up, and dentistry unfortunately became a subordinate part of surgery.

My hands were necessarily very full of work in connection with the duties above referred to. I not infrequently lectured twice in the day; had large practical duties and a good spread of social life, to say nothing of the investigations that were continuously going on in the library and experimental room. With it all, however, I prepared for the College of Physicians, and in 1856 took the membership by examination, having Professor Rolleston of Oxford as one of my fellow-competitors, with whom I formed an acquaintance which lasted to the end of his life, and with whom I also became a Fellow of the College as soon as the time was ripe for the enjoyment of that distinction.

From the date of my entrance upon London life, as above given, and onwards until now, professional and scientific life can only be reckoned as one long

endeavour, and as such I shall treat it, dividing the narratives according to the nature of them, but not specifying the particular periods that were devoted to particular objects. The latter task would, indeed, be superfluous, for the simple reason that I have regularly published and made known all the work I have been enabled to accomplish, with dates attached. The titles, therefore, will be sufficient references.

CHAPTER XIII.

STUDIES ON THE BLOOD.

I HAD at home, as previously mentioned, my own laboratory, and worked there steadily; but in order to carry out researches on blood more perfectly, I sought and found, in Bulstrode Mews near by, a series of slaughterhouses in which cattle were killed and dressed, and in which blood could be obtained quite fresh. I took one of these; had a space fitted up with the necessary apparatus, and while the workmen were engaged in their task followed up my inquiries. It is impossible to say that the work I here undertook was of a pleasant nature, but it was of an important character and taught me some very necessary scientific and social facts. It showed me the nature of the slaughterer's life and habits; it disclosed the character of the bodies of the animals on which we depend for food; it showed me the Jewish modes of inspection of food; it led me to consider the qualities of the different methods of taking animal life, and it made me acquainted practically with a large number of useful truths.

It was my custom to go to the slaughterhouse early

in the morning, returning for breakfast. One morning there had been driven into the lair a sturdy, savage bullock, that would not settle down with the other animals in captivity. The lair in which he was confined consisted of a compartment railed off in the slaughterhouse, with bars of quartering extending across from the floor to the ceiling, and to these rails my bench was attached, before which I worked. I had been engaged in seeing how cold prevented the coagulation of freshly drawn blood, and cups, surrounded by frozen material, were the principal implements before me, with a small timepiece marking periods. The lair was empty of all animals except the savage bullock, and, in fetching him out, he made his escape into the more open place, leaving the two men in the lair. The first movement of the animal was at me, who was looking between the bars at the moment of his escape, when one of the men we called "Jemmy" shouted out, "Climb up the bars, sir, quick! or he'll gore you to death." I fortunately did so in good time, for he immediately struck the bars beneath my feet with his stiff, short horns so powerfully that he made the whole railing vibrate as if it were coming down, as it well might have done, for it was not very strong. He then poked his horns under the lower rail as a lever and began to heave. The moment was critical, so, taking the poleaxe from the hand of Jemmy in the lair, I seized the handle of it in my right hand, and, letting myself down carefully rail by rail, took

advantage of the head of the furious animal beneath and dealt it such an accurate and heavy blow, just in the right spot, that the poor creature fell as it would have done if it had been properly led forth. Jemmy in an instant ran out, pithed the spinal column, and all was safely over.

By good luck my life was saved, but in another respect I was not so fortunate. I had had made a long brass tube, shaped like the letter U; the two side stalks were a foot long and half an inch in diameter. I had filled it with oil, and by means of a conducting string drew under the oil a portion of a vein with the blood tied in it, taken from the bullock just dead. Fixing the vein firmly, I then displaced the oil with a quantity of mercury that had cost me no trifle, and left the vein under the mercurial pressure in order to see whether the pressure would or would not, like cold, keep the enclosed blood in the fluid state. The experiment was made successfully, when, unhappily, Jemmy, in the flurry of clearing away, and not understanding what he was removing, had the misfortune to capsize my U-tube with all its mercury in it into the gutter, so that I lost every drop. However, on repeating the experiment, I succeeded many times.

From the researches on coagulation I won the Astley Cooper prize of £300, and had the felicity of receiving it from the hands of Dr. Addison, who was then one of the physicians to Guy's Hospital, and the discoverer of "Addison's Disease," the

terrible malady to which human beings are sometimes subjected.

After the award my Astley Cooper Prize Essay was published in full, and became well-known in the medical world. It is, therefore, unnecessary to refer to it, except in a few sentences stating the pith.

It was in my mind that the solidification we see taking place in blood freshly drawn, forming a plug or clot, and which we call coagulation, is of itself a distinct process of which we have many examples, as in the coagulation of an egg, the setting of some iron solutions, and the solidification of muscle. I knew that coagulation could take place by the addition of fluids of a chemical substance like nitric acid, and that it could be suspended by the addition of other substances such as common salt; but it did not appear to me that this circumstance implied the necessity for a chemical substance in order to produce the spontaneous coagulation of blood naturally observable.

I soon found that the process of solidification by coagulation was absolutely different to the solidification that takes place when fluids are exposed to cold. In other words, coagulation is an entirely different process to congelation; indeed, the processes are so different that they should be accepted as precisely opposed to one another. Thus, blood frozen in a solid form like an icicle could be held in that state for any length of time; could be snapped

across; be ground into a fine powder like glass powder, and yet not coagulate. When, in this frozen state, it was subjected to heat, it, for the moment, became quite fluid, and then on being subjected to greater heat it became solid again—that is to say, it coagulated, and in the state of coagulation remained solid until it decomposed. Cold and heat in this manner exchanged powers and places, just as if the naturally fluid blood held something it derived from the body which would condense or freeze under cold, or would dissipate under the influence of heat, causing the fluid to become solid by adhesion of its own particles, coagulation.

I found that chemical substances, that for the moment were greedy for water, maintained the fluidity of the blood in the same manner as cold did. Thus, common salt added to blood kept up fluidity for long periods, as Gulliver had already shown, but when water was added in large quantity so as to take up the salt freely, there would be adhesion of the blood particles and coagulation.

I found that by adding various chemical bodies to blood it was possible to obtain differences of result. The mineral acids excited coagulation; the vegetable acids suspended it. Alkalies suspended it, and most salts, especially if they were soluble, did the same. This fact led me to the conception that if an alkali, or any other substance that was soluble, were volatile as well as soluble, it would, dissipating by heat and condensing by cold, possess the precise

characteristics both for congelation and coagulation, according as heat or cold were brought into action.

Many experiments were made with heat and cold, and the differences were noted. I learned the art of making cups of ice, and of surrounding glass cups with ice. Blood placed in these cups was kept fluid, while other blood from the same source, and simultaneously subjected to warmth, coagulated. The rule was absolute: cold had the effect of suspending coagulation, heat the effect of quickening it.

I passed from cold and its effects to those of pressure on the one hand and the vacuum on the other, and the results were as might have been anticipated. Pressure suspended coagulation; the vacuum quickened it.

In the end I came to the inevitable conclusion that fresh blood, at all times alkaline in its reaction, was held fluid by the volatile alkali known as ammonia, which solvent condensed or diffused according to temperature. The view offered seemed to strike large numbers of people as the only true one, and so the ammonia theory produced a marked and favourable impression. The theory was sustained by the circumstance that in experiment I could hold blood fluid by the volatile alkali, and let it undergo coagulation by withdrawing that added substance, either by warmth, by the vacuum, or by the addition of bodies that caused its evolution. In further proof of the theory I was able to catch ammonia naturally escaping or dissipating from natural blood that was

undergoing the process of coagulation, and could fix the ammonia as it escaped.

The theory broached in my essay on the coagulation of the blood meeting first with favour, was afterwards subjected to severe, and I do not think, from every point of view, just criticism. It is most unfortunate in science that we still exist in a time when some men let the passions rule. We have our likes and dislikes, even as regards the interpretation of nature. I have myself never belonged to this impetuous school. It has at no time mattered to me how, or by whom, an interpretation has come, so long as it has come at all, and is, without hesitation, on the whole, deemed correct. I could never see a reason for disputing an obvious principle on the ground of an error in some technical detail, inasmuch as all men are liable to err. It gave me no surprise to see my views criticised, and after a full review of them and of the counter-arguments, I did, in a certain sense, voluntarily withdraw a part of what I had stated, for which act one of my critics extended to me unbounded praise. My act was merely the admission of a possible error, and had the critical objection been strictly accurate it would have been sufficient to satisfy one for a lifetime; it was a good, generous expression, which I am sure its author, although now long dead, really meant, but it was not strictly accurate, and therefore not reliable.

What happened was that in repeating my experiments I found out in them some technical errors.

One probable error was that in the places where I worked while testing for ammonia it was possible that the ammonia found and fixed might have had its origin in the surrounding air. There was no place absolutely free from decomposition; there was no animal decomposition there that was free of ammonia as a product. I might, therefore, have been mistaken; that is to say, the ammonia might possibly have been formed outside, and not inside, the animal body. I saw no method of settling the difficulty so as to convince the thinking world, and came to the conclusion, as a consequence, that an observation or deduction not resting on absolute proof should be, at least temporarily, withdrawn.

But the principle involved in the theory and derived from demonstration has never been withdrawn. I am as sure as ever I was that the principle is perfectly sound; that it is above all quibble, and that in the future—for I can scarcely myself expect to see it—some student of science will prove what is now written.

I am satisfied that there exists in the living blood a volatile spirit, which, on the one side, is as easily condensable by cold as the blood is itself, and, so condensed, is congealed or congelated with the blood, holding its own place and helping to make the solidification, or solidified mass; on the other side the spirit is evaporisable from the blood, leaving the blood particles to attract each other, squeezing out

the water in which they previously floated, and causing, in fact, coagulation.

The effect of extreme cold proves to me the truth of the plan stated. Cold condenses the whole—the volatile spirit, the particles of the blood, the water, and other structures. But if the frozen parts be suddenly influenced by heat, the separations are not equal; the most volatile portion goes first, leaving behind it the particles that attract each other, and they, being no longer congelated, are coagulated, and, as a result, dead.

The effects of heat and cold are thus equally decisive. A fluid like the blood, or a soft structure like muscle, holding the solid particles in water in combination with a volatile spirit, is solidified the moment the volatile spirit is driven off from it; the solid particles unite, and the mass becomes coagulated.

In the above I have dealt with the more potent influences of cold and heat, but the whole truth does not seem to me to rest there. The volatile spirit may also be absorbable by structures with which it is in contact, and, being absorbed, may be withdrawn from the universal sphere of its action, so that some parts may become hard or practically coagulable. There may thus be origins of local disease, like cancer or induration of tissues, such as sometimes occur in nerve or brain.

Again, the volatile spirit of the blood or body may be a compound, and may be lost in part by the

process of its decomposition. There may be local degeneration from its disintegration, or there may be death from its general disintegration. I have seen, I believe, in disease, in anæsthetic conditions, in death, the various states of the body due to disturbances of the volatile spirit of the blood, and am sure every other medical man, if he looks fairly at the matter, has seen the same over and over again. In the collapse of death, in death itself, the escape or the absorption of volatile spirit is one of the most striking and visible of phenomena. In the sudden expansions which occur and which so frequently cut life short in the supposed healthy, in the phenomena of agitation or fear, the signs are often manifest.

In so far as name is concerned—I mean the name of the ordinary common volatile alkali we know of, ammonia—I withdrew the theory, but not more. I am as convinced as ever of the principle, but the solvent at work I do not define verbally. This solvent is probably alkaline, and is certainly soluble; it is volatile at a comparatively low temperature, that probably of the heat of the body; it diffuses through the particles of the blood, making the blood a fluid; it condenses under cold; it possibly decomposes with readiness when the conditions for decomposition are at hand, and in many respects it represents ammonia more nearly than it does anything else. An engineer requiring a fluid having the qualities of blood would find it absolutely

necessary to employ an agent of this nature, and I found in treating fresh blood with common ammonia that the conditions required were very fairly supplied. I kept blood fluid by the addition of ammonia. I kept some in the fluid state for several years without decay or any trace of decomposition, and I could cause the ammonia to escape by warmth; by the vacuum; by agitation, and by gradual evolution under the action of lime. I could also condense the ammoniated fluid by cold, and after thawing the congealed mass could produce the final solidification by the processes that lead to coagulation.

There are some forms of combination of carbon, nitrogen, and oxygen, other than exist in common ammonia, which, acting in the same manner, may constitute the spirit of the blood, and may play the part that is required as between the constituents of blood and the necessary solvent; may condense by cold, and may diffuse by a slight warmth; may continue, under pressure, maintaining fluidity; may pass off into a vacuum and lead to coagulation. I have not found such a combination, but it lies open for some more fortunate successor to discover it, or to see some better reading than I have seen. At the same time, I have found certain facts in trying to translate fairly the theory submitted, which are of practical value and repay all trouble. In the work done an observation was made and reported in full to the Medical Society respecting the power of

ammonia in preserving blood and other animal substances. By bringing animal tissues merely into contact with the vapour of ammonia they were preserved, as has been shown, for long periods with the utmost ease. On the sad day on which the nation lost Prince Albert I had to make a post-mortem of a child that had died of scarlet fever, and having enclosed specimens of various sections of the intestinal canal of the deceased in jars containing the vapour of ammonia, I was able to keep them intact for many years, there being no sign of putrefaction.

I also found that blood held fluid by ammonia could be injected into the veins of animals, and I employed it, therefore, for purposes of transfusion, as described in a special chapter in the essay on coagulation.

A most important and useful service, rendered to me by the research on the ammonia theory on coagulation, has consisted in the application of ammonia to the treatment of disease. The older practitioners seem to have been fully aware of the value of hartshorn, by which term they described ammonia, as a medicinal solvent for external injuries, hardnesses, and swellings. They rubbed hartshorn and oil into injured parts; spoke as if they had discerned a specific in the practice, and certain it is that since their time ammonia has been the basis of all the legitimate external remedies and of the pre-

tended secrets of all the quack embrocations. However good it may be in this method of using it, and it is undeniably of some good, it is poor in this use as compared with what it can do when it is administered internally in the right cases. It was my business when I observed its direct effects on blood, not only in holding blood fluid, but in the action of it on the corpuscles, to try what it would do in the solvent direction on separated fibrine divided into parts more or less large. I dissolved portions of fibrine in it so as to make them at first into a kind of jam, or rather, into a sort of thick albuminoid solution. Then I began to try as a medicine the doses in which ammonia could be taken, and the action of it on the body after repeated administrations. Using the ordinary aqueous solution of pharmacopœial strength, I commenced by taking it myself in measured doses, and found that in water, ice-water, or milk, it could be safely swallowed in five-minim doses every two hours. Repeated many times in the dose named, it affected the blood, causing solution of the corpuscles, and acting after the manner of a solvent, without seeming to injure the digestive organs.

The mode of administering the solvent as a medicine varied in some details, but, on the whole, was the same in effect. To some it was administered in combination with small doses of glycerine, with which it blended readily in water; to others it was given with ice-cold water. It admitted of being mixed with what is known as "*mindererus*," the

solution of acetate of ammonia, a very good mixture when the tongue and skin are dry and when a high temperature prevails; but the most common practice was to mix it with the milk that was supplied as food, occasionally adding an agreeable quantity of sugar and cream to let medicine and food go together, a plan against which nothing reasonable can be urged, and which has many advantages for the doctor and nurse as well as for the patient.

Quite apart from the theory of coagulation, the ammoniacal treatment of fibrinous deposit has got installed into practice beyond any other, and I am bound to say that in my hands it has exceeded expectation in many instances in which it has been adopted. I safely recall at least nine patients in whom life has been retained by it, and for whom I knew of no remedy until this line of treatment was carried into operation. I was summoned once by Mr. Bramley of Halifax to visit with him a lady who had just been confined, and in whom the distinct symptom of fibrinous deposit on the right side of the heart had appeared. There could be no mistake in the diagnosis he had been obliged to make. The physical signs indicated the presence of the obstruction, and of the condition of the sinking body that suffered from it; the act of bleeding to death could not have been more apparent. No time could be lost; the lady was laid in the horizontal position, and was not permitted to be raised or moved. Then the

ammoniated food was commenced and continued zealously. A milk solution of ammonia was made in which five minims of the strong solution of the alkali were blended with four ounces of milk containing a teaspoonful of cream, and this was taken every hour. The body was brought under the thorough influence of ammonia—to use a common phrase, was saturated with the remedy. The odour of it was detectable by the emanations from the breath, body, and excretions generally. When a point of blood was drawn and microscopically examined the effects of the remedy in the solution of the blood corpuscles were sufficiently manifested. The physical quality of the body was changed, and the mental tone was distinctly changed, though not so much as to create alarm. It was observed that the senses were not so acute as usual, and there was no decided manifestation of the will. It was also noticeable that there was no over-action of muscle, nor any marked excess of excretion like to the salivation that can be produced by mercury or the flux that can be made to follow a purgative. All in fact was quite passive, but with the solution going on the symptoms that were most alarming became favourable. The disturbance that had been heard in the heart was reduced; the breathing was easy; and the extremities, which had been cold, were warmer, rising from 98° Fahrenheit to 99°. Sleep also was improved. After two days the dose of ammonia was reduced a third, and next day half,

and the worst symptoms of obstruction were so decidedly relieved that ammonia was, on the fourth day, brought down to the proportion of five minims in four hours, with return of the ordinary symptoms of life. I presumed that the obstructing clot on the right side of the heart had undergone solution and that immediate danger was over. The idea was a little hasty, for as the blood made its freer course over the pulmonic circuit there was a febrile attack as if an abscess had been discharged, and a distinct pneumonia which lasted for several hours and caused some anxiety. With the rise of temperature that ensued, a rise that brought the thermometer up to 101° , the ammonia was again given more freely, five minims every three hours, with benefit, and the temperature fell. In the end this patient slowly recovered, and when I last saw her she had made a complete recovery, the blood corpuscles having assumed their natural shape and form, so that one could not have known from them that they had ever undergone so marked a solution and separation as we, during her illness, had witnessed under the extreme action of the blood solvent.

In another case—that of a young girl living in Wigmore Street—symptoms of obstruction on the right side of the heart came on suddenly during what seemed to be an attack of pneumonia. Mr. Carr Beard summoned me, his diagnosis being that of deposit in the right heart. I was obliged, unhappily, to confirm his view, and was further obliged

to confirm his opinion that the obstruction was too serious for life to last. We proceeded, however, on the same plan of treatment as that adopted in the last-named case, and after many hours—sixteen—it looked as if it were about to have the same success, when quite suddenly fatal obstruction was pronounced and death took place. We were allowed a post-mortem examination, and then found what had happened. The fibrinous deposit was there on the right side of the heart, as we had predicted. It was soft, saturated with ammonia, and was partially dissolved, having a column of red blood going through it towards the lungs; unfortunately it had given way at its lower part where it had been adherent to the chords of the pulmonary valve, and, like a wedge, had been carried into the narrowing pulmonary artery, which it had effectually obstructed.

In a third patient, to whom I was called by Mr. Andrews of Haverstock Hill, the symptoms were identical with those of the lady at Halifax, and were treated in the same manner and with the same good result.

A further and remarkable instance came before me in the wife of a medical friend; there were not only the cardiac and pulmonic indications of obstruction, but, in addition, signs of obstruction in the right femoral vein were noticed, the vein itself being felt filled with fibrinous deposit, so that nothing could pass along it. The patient herself

looked upon the attack as, what we may consider, septic. In a bad state of health she had gone to see a sister who was lying dead, and while in the room was overcome by the inhalation of what she thought—probably correctly—was a gas of decomposition from something she was near. I need not relate the symptoms of obstruction, nor say more than that they were local as well as general, and that we knew we could easily have pushed the concretions in the femoral vein into the wider upper circulation, and so into the heart. We were scrupulous not to act in this dangerous way. We laid the body recumbent, and administered ammonia as freely as in the previous examples. The husband of the patient was as persistent as we were, only he preferred that the ammonia should be given in the form of ammoniacal spirit, *sal volatile*, which I did not object to, and which was diluted with milk as the food on which subsistence was maintained. The patient was rendered completely ammoniacal; the corpuscles of the blood, which were under constant watch, were dissolved as before, and in the end as good a recovery took place as could have been expected or wished. At the same time two or three new and corroborative points ought to be narrated.

The relief to the obstruction that first appeared was shown in the heart, but now also followed the lung mischief, as in the previous case. The solution of the fibrine and relief of the circulation caused a rise of temperature attended with pneumonic dis-

turbance, together with cough and expectoration of mucus. The symptoms passed away, and we were apprehensive that the liberating clots in the femoral vein would escape into the circulation. Fortunately they did not, but underwent fluidification, and so became diffused, with a rise of animal heat as each part was carried away. In the end this lady made a good recovery, and, I believe, still survives, although many years have gone by.

It was observable in this, as in the preceding example, that the patient bore the ammonia thoroughly well. It never disagreed with the digestion, although it occasionally "rose" and was tasted in the throat. It did not affect the mind, or produce any cerebral noise or delirium, and it was found by accurate measurement that no less than three pints of the solution were administered.

I briefly note these illustrations as typical. Many more could be added if they were called for, and I could relate a number of additional facts respecting the uses I have made of ammonia in cases of inflammation of the body in pneumonia, bronchitis, and their allies, in which the real cause of death is some kind of obstruction induced by the deposition of fibrine. It is unnecessary here to repeat the facts, because I have written at such length on the subject and been so many times over the same ground. I ought not, however, to leave the recollection and retrospection of studies on the

blood without reference to descriptions I have supplied by pencil, as well as by pen, of the varied forms of depositions of fibrine, and the symptoms or diagnoses defined.

Sometimes I fear I have wearied both seers and hearers by the persistency in which, at first especially, I have pressed these points, and have been many times struck by the way in which cotemporaries and compeers—by the use of such terms as “embolism” and “thrombosis,” terms I have never seen the necessity for, or used—have commented on fibrinous depositions. The student of the future will clearly understand it all, and will relegate the words that have been coined, simply as the jargon of the time, to nothingness, as we relegate such words as “vapours,” “peripneumonias,” “surfeits,” and their likes. The enduring lessons will be: (*a*) that there is present in the body a compound of the ammonia type, volatile, diffusible, absorbable by the blood, condensable by cold and pressure, decomposable and antiseptic; (*b*) that this compound governs animal combinations and disintegrations; (*c*) that the compound sometimes escapes from the blood, leaving it to its new fate of coagulation; (*d*) that it sometimes accumulates, causing too marked a fluidity, and disease from that change.

These are questions for the future; for the present I am content to leave the observation that ammonia dissolves fibrinous deposits in the blood when it

is freely administered as a medicine; that it may be carried to the extent of dissolving the red blood corpuscles, and that its use in proper cases marks a new era in positive therapeutics. It has, in fact, made so distinct an era that practitioners, who seem practically to discard the tenets of the old therapeutical schools, have accepted and adopted ammonia as a solvent remedy mixing well with fluid foods like milk, and making a compound thereby that feeds as well as cures.

CHAPTER XIV.

REANIMATION.

IN whatever way we look at an animal body, it stands forth as a mechanical device or design. Every part of it is mechanically displayed. The skeleton is a mechanism out and out. The muscles are mechanisms; the brain is a mechanism. The vibrating membranes and the condensing bodies like the lenses of the eye are mechanisms, and the nature of the force by which the parts are all made to act is of a mechanical character, vibratory. The evidence of all this is most striking and convincing when the body is looked at in its immediate living, and in its immediate dead, state. In either case it is a mechanical combination, and the only difference is that in one instance it moves and in the other it can only be moved. No one feels this so keenly as does the man who makes a post-mortem examination, while to the working physiologist it is at every instant present. A part of a machine, or a machine altogether, has ceased to work. It may be all right for work; nothing may be wanting; it might begin to indicate life just as determinately as the person who looks on it feels as if a mere turn of the

mechanism, almost a touch, would bring back into motion that which has ceased spontaneously to move.

Yet another thought occurs to me. In reanimation we may have gone astray in exciting secondary phenomena, the acts of respiration and beating of the heart. We may have to commence at the centre of organic life, setting into play the sympathetic nervous system, and waiting to see the phenomena that arise from central movement.

We shall, probably, some day not only restore life on this basis, but rectify disease, the secondary phenomena being absent, while the primary remain, unless the parts by which they are manifested sustain some special injury.

There is no animal that proves this statement better than a fish proves it. It is one moment a living animal on its own account; it floats in water from which it derives oxygen through exposed lungs; it holds in its body cavities from which it preserves and liberates oxidised material; it has an apparatus through which the prepared fluid can circulate towards the oxygen; it has vessels through which the oxidised fluid can circulate into all the tissues; it has interspaces in which the process of oxidation can take place; it has a nervous system and nervous centres from which the force liberated by the oxidation can diffuse; it has muscles in which the liberated energy can be utilised; and it has nervous surfaces through which the vibrations from the outer world can be

communicated to the susceptible muscular organs, giving to them the power that is demanded for motion, and giving them also, through the controlling centres, the direction that may be wanted.

The result is that the combination of these properties constitutes life.

I attempted to make a fish exhibit all these qualities according to my desires. Carp were allowed to exist in water of such a temperature that they could live and move. The water was left so that it could solidify or freeze, and the fish were allowed to freeze in the water by which they were surrounded. Thus in the bodies of the animals the substance in which the generated force was entombed was allowed to pass into the solid condition, not to escape from the bodies, but to be—so to say—buried in them. For twenty days the immersed animal organism was held firmly fixed. One animal was then removed, and could be snapped or broken across just like an icicle, feeling nothing, and differing little from the solid water. Then another in precisely the same state was removed uninjured, but, under the influence of gentle warmth, was caused by thawing to resume its pristine condition. Its tissues relaxed; the force it made refilled them; its life was rediffused, and by care that it should not contract and coagulate by adhesion of its particles, it moved again under external vibration and took on all its original characteristics. It was once more a living organisation.

I plunged an empty thin glass cup into ice and salt, and drew into it fresh blood from a living animal, exposing the blood with a slow and gentle motion to the action of cold. The blood did not coagulate; it froze in layers on the surface of the glass, and at last into a mass or lump. It was still alive, for it held in the condensed form that which it had become endowed with during its living state, and it was ready to move again when it was set at liberty. It was so hard it could have been ground into a powder like so much fine glass, but instead of that it was cautiously warmed so that it could liquefy without loss or escape of its solvent. It was thus brought into fluidity. The temperature was then raised, the fluid was exposed to a vacuum, or distributed with motion over a wide surface, when it went solid in consequence of what it had lost; it became solid by the adhesion of its own particles, and the adhesion squeezed out the water it contained. It had permanently coagulated.

In preparing my lectures on Life for the Medical Society of London in 1858-9 I made a more curious observation than that just recorded, and exhibited the same to the Society. A young dog was lethally, and was allowed to sleep as if it were dead; one of the limbs was then frozen and made entirely rigid by the cold, the arterial vessel feeding it being subjected to pressure so that no blood could flow into it. The rigid chilled limb was permitted slowly to thaw,

and the compression on the vessels was slowly taken off, by which a little blood was allowed to recirculate in and through the vessels at the normal temperature, pressure, and pulsation which attended the liberation. The effect was that the limb entirely recovered its functions; the muscles commenced first to quiver; at last moved definitely, and the surplus force generated being carried off by the uninjured nervous surface through the nervous cords, there was natural reaction. Ultimately there was the requisite co-ordination, not only to the animal, which awoke as it came out of its narcotism, but with restoration of the frozen dead limb, so that the fact of there ever having been a change was unobservable.

A leech was allowed to feed itself by drawing blood from my own arm. Then it was freely frozen, but not with such rapidity as was likely to kill by the expansion of its fluids. In this frozen condition it was practically dead, but was gradually thawed, upon which its blood once more assumed the fluid state; the circulation was restored, and, floating in the water into which it was immersed, it was impossible to tell that it had ever been touched, or, indeed, to distinguish it from another leech which had all the time been in the water. The reanimation was complete.

There are some substances which, entering into the body, are carried universally over it, and so

modify the blood that they maintain its fluid state and do no injury further than lowering the temperature. But in time the substances may undergo decomposition, change into a new form, and escape from the body, leaving it in its original and vital state. Amongst these singularly acting substances the most common, as it is the most striking, is the hydrate of chloral. This salt, mixed and dissolved in the living blood, divides into two parts, one of which acts like an alkali, and the other spreads out or diffuses, acting as an anæsthetic. In time the anæsthetic, which is an antiseptic, not only diffuses through the tissues of the body, but escapes from them, while the saline part of the chloral is removed by the action of the membranes, so that time only is required, with a sufficient influence of warmth, for the body to be left as it was before the chloral was administered—left entire and free of decomposition—whereupon it resumes its vital functions and lives again after the full appearance of its being dead. If heat sufficient to evaporate the chloroform be not supplied, the body remains in its apparently deathlike state, and is, in fact, dead. Or if the heat is applied so rapidly and intensely that the chloroform is too quickly driven off and the particles of the tissues are allowed to come together—that is to say, if coagulation is allowed to solidify them—then there is no recovery, but death by coagulation. But if the evaporation is just sufficient and no more, then the body is left in

its pristine condition, and the vital acts resuming their parts the body lives again, and, to the marvel of all beholders who do not understand the details, is raised to life and escapes without a trace of injury.

At the meeting of the British Association for the Advancement of Science, held at Exeter in the year 1869, the facts just described took place. Liebrich had, a little time before, studied and introduced chloral, and the late Mr. Daniel Hanbury, F.R.S., had brought over from Germany a specimen of the salt, for presentation to me. I was elected to inquire into its value, and in my experiments I narcotised with it, by needle injection of its solution, six pigeons. They all lapsed into sleep, and lay before me so like dead animals I could detect no sign of life in them, and after some hours I had them laid on one side as dead. It was to my intense surprise that next morning the porter told me he had seen one of the birds move one of its wings. He brought the animal to me, and I saw that it was living. I then had the pigeons produced: slightly increasing the warmth, they began to recover, and I was able to place them before the meeting at which my lecture was delivered, all living, and two of them so alive as to be in condition for active flight in the air. I have since repeated my observations so often as to bring the test recorded to a certainty, and I have three times witnessed the revival named in men themselves who have taken the chloral as a poison,

desiring to commit suicide. I once also witnessed the same reanimation in a horse that was apparently killed by a large dose of the salt.

There are other substances than chloral hydrate which have the power of suspending life so that the suspension resembles death even in a more extreme degree, and yet reanimation is possible. Nitrite of amyl is one of these substances when a cold-blooded animal is subjected to it. I once put a number of frogs under its influence for the study of severe paralysis induced by it. They lay as dead for several days, and were so far gone into death that the webs of their feet began actually to decompose. It was thought time to bury them lest they should become offensive, when it was observed, for the first time, that the muscles of one of them were plainly contracting, and they were all retained under observation with gentle warmth as the means of treatment. In a few hours the motion first noted was more evident, and in the end they all were reanimated and continued to live precisely as if they had not been subjected to any life-destroying or life-suspending agent.

I do not doubt that in the course of the disease called catalepsy, occurring in the human subject, a similar thing happens to that which has been induced in the lower animal. In the chemistry of the body, or rather in the chemical processes which have been going on in it, there has been formed an

organic substance which has the properties of such an organic body as the nitrite of amyl, under which the body collapses and is, to common observation, dead.

As the facts already named on the subject of reanimation have been gathered, I have held always in remembrance the case of the man I was called to near Narborough.* That case first excited my curiosity and made me anxious to know more. The man, I felt sure, was accepted as dead, and in the common course of natural events would have been considered so decidedly dead that he would, without hesitation, have been buried. He was laid in the cold as dead for the long period related, and yet, under artificial respiration, showed temporary signs of life—was, in fact, for the time reanimated, which was of itself a sufficient lesson by demonstration.

In the Croonian Lecture delivered to the Royal Society in the year 1873 on “Muscular Irritability after Systemic Death,” I related the curious history of a birth in which two children, united, were born at the same labour. In one of these children death took place, and all the indications of death for many hours were marked. Then, without any effort to bring the change about, the dead child again showed signs of life.

I also recorded that Mr. Warrington, while at the Apothecaries’ Company, had to destroy the life of a cat by administration of hydrocyanic acid. The

* See Pages 124-8.

animal seemed perfectly dead, and in the dead state remained for many hours, but, exposed to a water current, suddenly came again to life.

A complete series of examples of resuscitation after what appeared to be absolute death are well-marked in the attempts to restore the lives of human beings who have collapsed under cholera. I do not know who the doctor was who first thought of injecting with fluids the veins of choleraic sufferers, but it was a very great idea that has never been duly appreciated. In Edinburgh, during one of the choleraic epidemics, a saline fluid was discovered, which, introduced into the body by a vein, restored animation for a time so strikingly that it seemed as if the dead actually came to life, until, by the recurrence of the disease, they relapsed. An illustration of this nature came under my own observation in London. A lady in a square near to this place seemed to die from cholera, and when I was called in by two medical friends all attempts to assist her seemed in vain. However, the apparatus was ready for injection, the saline solution prepared, and we threw in three pints of it, at least. On this, reanimation was manifested in so perfect a manner that the lady was able to arrange the particulars of her will and even to sign the same. She ultimately died from the recurrence of the disease, but this merely showed us our ignorance of choleraic treatment and did not prove the less the possibility of reanimation.

In the experiments related above there was general reanimation of living bodies. I made many more in regard to local reanimation, which were not so remarkable, but may deserve mention, because they bear on the whole subject. From the limb of an animal just dead I cut out a straight long muscle, and plunging two fish-hooks in the tendons of it, one at each end, and surrounding it with thin guttapercha, placed it in ice and salt and kept it frozen in that condition for twenty days. At one of my lectures I removed this muscle, fixed one end of it by the hook to a firm standard, and the other end by a thread from its hook to the trigger of a rifle loaded with a blank cartridge and also firmly fixed. Then I gradually applied warmth to the muscle until it was thawed, when it suddenly made a sufficient contraction to fire the rifle, and afterwards passed into permanent rigidity or rigor.

A similar but more remarkable experiment was carried out in the following manner. A young dog that had slept to death in chloroform vapour had its body opened and had a tube firmly tied in its ascending aorta. It was then taken out into an atmosphere where the temperature was below freezing point, and was left there for ten hours, during which exposure it became universally rigid from the cold. Connection was now made with the tube tied in the aorta, so that through it the arterial system of the animal could be fully injected. The body was carried into a warm room and simple water

was injected to 125° Fahr. The results were most surprising. The muscles not only relaxed, but began vigorously to move, and continued to move until under the action of the heat they ceased owing to coagulation.

In another line of inquiry I approached the subject in a different direction. I made use of cold for suspending the life of the nervous centres, by which I prevented them from conveying the impressions that had been derived by their surfaces from the external vibrations. This caused sleep rather than death, and interfered locally rather than generally. Indeed, I showed that local action could be modified through the nervous centre acted upon by the cold. It was not lost labour, for it told me that between sleep and death there is no absolute difference, that sleep is a local, death a general, condition, and that a hibernating animal lying asleep for many weeks is, during that time, practically dead.

It must be fully understood that for securing reanimation there can be no break of substance—that is to say, there must be no such injury to the machine as shall interfere with its vital functions. I name this specially because some have been led to infer from my researches that reanimation has a much wider range than I would assign to it. It is true that a man once fell under the ice in the Welsh Harp water; was submerged for over ten minutes; was rescued; carried to an adjoining

house, and, after artificial respiration, set up by Dr. Belgrave of Hendon, recovered; lived for many hours, and died from an entirely different cause than the immersion. In a lecture on drowning and cold I published the details, in which it was shown that this man, whose fate caused much comment, was not physically injured nor distinct from other persons subjected to intense cold.

One day considerable excitement will be created because a number of persons supposed to be killed by sudden immersion in cold water or shrouded in the vapour of a mine, will have been under advancing knowledge, reanimated. The fact will, however, be no new discovery, for reanimation, as described above, must be accepted as a current fact requiring nothing more than correction in details to demonstrate its value and confirm its reality.

In conclusion, it will be seen that in these attempts at resuscitation I trusted largely to injection of the blood vessels, and in the paper on "The Restoration of Life after Certain Forms of Death," read before the Royal Society in 1865, I used the term "artificial circulation" as descriptive of this process, although I showed that there were other methods that could be adopted. In 1885 I reviewed the whole subject in the pages of *The Asclepiad*, pp. 171-187, arriving at the following summary:—

1. That resuscitation under the conditions of suspended life—now often practical death—in which

the body is not mechanically injured, nor structurally diseased, nor charged with a fixed poison, may, in course of patient investigation, become a demonstrable fact of modern science.

2. That the modes of death in which the restoration of life will be possible will include a large class, such as (*a*) various forms of sudden death from anæsthetics, from choke-damp in mines, from mechanical suffocation; (*b*) deaths from drowning, and especially deaths from drowning in very cold water, as in immersion under ice, in which the suspension of life is extremely prolonged; (*c*) sudden deaths from shock or stun; (*d*) deaths from sudden and profuse loss of blood.

3. That the mode of procedure will be by artificial respiration combined with artificial circulation, or by some modifying combination.

4. That the great obstacles to success which have to be met are obstruction to the circulation by coagulation of the blood, aggregation of the blood corpuscles in the minute vessels, contraction of the capillaries, the occurrence of rigor mortis, and the intervention of putrefactive changes commencing in the blood. These difficulties are probably surmountable by the use of one agent which suspends them all and holds them in abeyance—extreme cold.

CHAPTER XV.

EFFORTS TOWARDS THE EXTINCTION OF DISEASE.

SANITATION.

THE chapter I am about to write is as important to every intelligent reader as it ever can have been to me, because it concerns every living being. It concerns everyone in his or her own person, for it deals with the idea that in this world it is possible to extinguish every kind of disease. It does not assume that every person is born to live for ever; on the contrary, it supposes nothing more than a term of life, but it gives to that term a definite set of stages. The body grows, becomes developed, becomes fully developed, becomes matured, passes maturity, fades into a kind of second childhood, and then runs out, passing into the nothingness or obscurity that preceded its birth. The idea carries with it, therefore, this proviso, that in the space intervening between the first and the last stages of existence there is no occasion for those outbreaks and disturbances to which we attach the term disease. There are natural conditions, one of which—the subsidence into final sleep or death—might be called, and even

looked upon as, disease, about which there need be no question. But there is unnatural disease, known by the occurrence of certain signs denominated symptoms, which may appear at any period, and for which we appoint ministers who have to recognise, and, if possible, treat and remove. Theirs is a delicate business, depending on both the knowledge and wisdom of those who have to watch, as well as upon those who have to suffer; at its best theirs is a doubtful business, because two persons at least—the watcher and the watched—must be concerned in it, and because the lapse into disease itself is not always clear and not always accounted for. Disease is, in fact, a deceitful lapse to us, and, although repeated and repeated as if necessary to conditions not proclaimed to everyone, is really unnecessary.

The best idea, therefore, is that the disturbance or catastrophe called disease—excluding accidents—is not simply to be met by treatment, although that may be necessary and beneficial, but is to be prevented, and that with so much perfection that it shall altogether become extinct, or remain as a mere historical ghost.

The ideal is a grand one, but very few have as yet been attracted by it—few indeed have understood it at all, but it has had a kind of poetic basis and is not so extreme as to be destitute of all friends. In the early fifties it commenced to be practically acknowledged, and even to expand. There were men who declared that prevention was better than cure,

and a great change promised to mark out the middle of the nineteenth century. We had made advances in the proper directions. There had been appointed a public officer called the Registrar-General, and, although he was not originally intended to become an important officer of health, he was fated to be one of health's greatest pioneers, not for this country alone, but—by imitation—for the whole world. It was felt to be a part of his duty to collect facts respecting the births, marriages, and deaths of the people, and if a man of true sanitary instinct, he might also report on diseases when the people were afflicted. The suggestion—which sprang from the mind of the late Sir Edwin Chadwick—took root, and he was allowed to draw out the scheme. Fortunately the plan was submitted to the notice of the eminent Dr. William Farr for exposition, and he was appointed as superintendent, or chief officer, to act under the new Registrar-General; he organised the tables that were published weekly by that officer, and from the year 1838 became the official index of life and death in this country. Dr. Farr's labours were an inestimable boon, and have ever been so.

Again, it was felt that an awful evil was being carried out in the way in which the dead of the nation were disposed of, and on many sides the details of the manner, and of the danger, were rendered, with suggestions for improvement. Chadwick, always urgent and always important, allowed no one to stand before him in this matter, and he was vigorously

supported. A gentleman named George Alfred Walker was imbued with the subject. His eyes were everywhere; his pen knew no rest, and the late Mr. Thomas Wakley, founder and editor of the *Lancet*, was only too glad to give him scope and encouragement. It is impossible, even at the present moment, to read Walker's vigorous and awful disclosures without a shudder—how the dead in chapels and churches were buried up to the floors of the buildings. Churches and churchyards were, therefore, closed, and the cemetery took their place, to the temporary advantage of the whole community. Chadwick also, as a Poor Law Commissioner, swept through the land disclosing abuses innumerable, and trying to lay the foundations of a system which, had it been developed as he wished, would have turned the land into a very Paradise of Health. Other reforms made their way, and a great outbreak of Asiatic cholera opened the eyes of the multitude to an impression, never properly felt before, that epidemics themselves were due to influences begotten of human ignorance, and preventable by human intelligence.

One day, as I have often told, I was requested to support and render service to a Society which it was hoped would assist in explaining and quelling the diseases of an epidemic nature, and, under the impression of the value of the work, I became one of the Fellows of "The Epidemiological Society of London," which Mr. Tucker founded.

The tasks I was engaged in crippled me, but a number of incidents occurred which lent a hand to the labour of the new Society. It happened that Asiatic cholera broke out in Mortlake—where I then was—and the surrounding district, and called for full attention. The local vestry asked for help, and, appointing committees of inquiry, selected as one the late Vice-Admiral Lord William Fitzroy, the late Professor Sir Richard Owen, F.R.S., and myself. Lord William, who was rather nervous about the disease, had not much method, but was most attentive to his duties, and being—as he described it—a lazy man with time on his hands, was most solicitous not to interfere with the work of his colleagues. We met, as a consequence, without trouble and without interruption. In Professor Owen I found a man full of energy in sanitation. He was then at the zenith of his fame; was one of the leading men of science of the day, and had just been presented by the Queen with the sweet little lodge in Richmond Park in which he continued to live for a long series of years, and where, at an advanced age, he died. There was nothing connected with the cholera that we in our district did not, as a committee, investigate, if it were within reach. By our directions as to isolation and perfect cleanliness there can be no hesitation in saying that we cut short the epidemic. In order to be on a level with the rest of our medical brethren, I founded the West Surrey Cholera Society for investigation, and

brought together, ably assisted by the late Dr. Alfred Carpenter of Croydon, a considerable number of medical men. Of this Society Dr. Willis was elected President, and we held our meetings at the board-room of the Hospital for Children at the foot of Waterloo Bridge, on the Surrey side. I was invited to deliver an address there; it was published and widely circulated. The point of it was that, to the doctors, an epidemic outbreak of any disease was like the appearance of a comet to the astronomers, and ought to be viewed with particular care. It ought to be followed in its course, and all its history noted as it passed the observers.

In the Epidemiological Society the subject of cholera created the utmost attention, and men such as the late Dr. John Snow stood forward prominently. Snow was the first to surmise that cholera spread by the drinking of water impregnated with the cholera poison. He traced out the difference in respect to prevalence of the affection in districts supplied by different water, comparing Southwark and Vauxhall specially; he showed up the astounding fact about the epidemic caused by the water supplied by the Broad Street Pump, and created a tremendous sensation by his demonstrations and references. In the Epidemiological Society his conduct was as much beloved as his industry and originality were admired, and his sudden death at the early age of forty-eight years was a matter of universal regret amongst his brethren.

Pursuits connected with epidemiology became naturally incentives to the art of preventive medicine. It would be superfluous to say that preventive medicine assumed at once a first place over curative medicine, but assuredly it placed itself on a level with that method, and planted the idea that if it were possible to bring about the preventive part, the curative would be of minor worth. It also became obvious that, as the living world was wallowing in disease, the sooner its peoples ceased to wallow the sooner they would be happily freed from the terrible curse to which they were subjected. In the young mind the truth thus presented seems to glow, and what is more, the accomplishment of prevention seems to be so easy that nothing further is, as it appears, wanted save the spread of knowledge and of sanitary principles far and wide. We suffer from disease through ignorance; we escape through knowledge. I was very soon certain then that these views were sound, and in the heyday of youth and strength came to the resolution that I would do my best to make both the knowledge and the truth broadly known. I determined consequently to publish and circulate a journal devoted to Health, and to obtain all the assistance possible from friends who held similar views to my own. In 1855 I convened a meeting, therefore, at Dr. Benjamin Guy Babington's in Hanover Square, and proposed the plan of the *Journal of Public Health and Sanitary Review*, a title reversed a

few months later at the suggestion of the late Dr. John Chapman into the *Sanitary Review and Journal of Public Health*. I undertook to publish in it the Transactions of the Epidemiological Society, if each Fellow would in turn take a number of the new work. These terms were considered fair, and the periodical began to appear. The enthusiasm felt in it can only be appreciated by the perusal of the early numbers.

The new journal met with a favourable reception both from the profession and the public, but it was not attended by the signs of progress expected of it. The expectations I had for it are expressed in the first article, and it is after this long period a wonder to me that they were not more fully realised. Certain progresses have been developed, but not all. For instance, in the first volume I broached a plan for the registration of all diseases in the kingdom, so that we might be able to say how diseases originated, and why, in particular parts, they were most prevalent. To carry out this project, I wrote to medical men in different centres of the country and asked them to fill up for me a printed table for regular publication. The table gave the latitude and longitude of the centre; the dates of observation; the diseases of the human family that had appeared, ranged in regular order; the diseases of the lower animals, if they could be specified; the diseases of the vegetable world; the states of the weather, and points connected

with the conditions of the inhabitants of the district. The observers from the first were widespread, and as the design was popular they extended at last from the Scilly Isles to the Shetlands, Dr. Moyle of the Scilly Isles being at the southern end, and Dr. Spence of Lerwick at the northern. The care with which the observers followed up their task was beyond all praise, and, indeed, it was their energy and enthusiasm that at last actually caused me to give up my labours. The observers increased to sixty, and would have gone on increasing to as many hundreds, but the task of communicating with so many was more than I could undertake. The costs, moreover, grew beyond my means, and in extremity, I was obliged to give up the attempt. As a final effort, in 1857, I made application to Sir Benjamin Hall, then President of the Board of Public Health, a body that has practically ceased to exist under that name, but which has never actually been abolished. Sir Benjamin Hall, who ultimately became Lord Llanover, listened most patiently to my design, carefully examined all the reports laid before him; expressed his own warm admiration, and consulted some of his staff on the subject. At last, however, he was obliged to tell me that he could not entertain the project as a Government scheme; there were neither the funds for it nor the organisation, nor did he see that it would be possible for one like myself, however filled with energy and enthusiasm, and however usefully educated and actuated, to carry on such a national

undertaking. The country, not ripe for the design, would require to live another century before the development of sanitary registration, and it must be given up as a plan that would not grow if forced unduly.

I felt too keenly the truth of these statements to doubt their accuracy, and was compelled to close the record. Yet there are one or two words I must say for it. It showed conspicuously how ready men of physic were to write a history of their time that could only have one end, that of enfeebling their craft and of lessening its value as a commercial concern. It brought up earnest investigations of natural phenomena, and illustrations of them, in public literature, and it proved how usefully the public interests could be served. On the last-named point one truth stands prominently forth. Two of the observers and recorders at Canterbury, Dr. Reid and Dr. Haffenden, noted that in a village near them called Ash there broke out a fatal malady known as the "Ash Fever." The malady was most prevalent amongst children; the throat was affected malignantly, but the disease was not scarlet fever. It turned out to be an epidemic now recognised as diphtheria, so named in the South of France by Bretonneau, and it has, since its appearance at Ash, extended all over the kingdom, with the loss of thousands of lives that might have been saved could we have grappled with it at its onset.

An immense number of other questions were

brought up in the *Sanitary Review*. The water supply of London was discussed ; the organisation of the Medical Officers of Health was first described ; vital statistics were unfolded and examined ; the life of the English soldier, and all its dangers—irrespective of war—were exposed ; the homes of our population were described, and numerous improvements, in the home, in the hospital, in the workhouse, in all our public institutions, were suggested with no niggardly mind, and in a manner that has led to useful changes. The Crimean lessons were treasured up, and in the Transactions of the epidemiological department Mr. Keith Johnson enumerated and classified the diseases of the world in the then current stage of civilisation.

On the whole, I expect that in this first English journal devoted to Health, I erred in trying to do too much, but this was not the universal opinion. In calling upon me to say that two copies of the work had been taken for the Royal Library, the late Sir James Clark, Bart., warmly congratulated me and took me by surprise in saying that the late Prince Albert had read with delight the article on the “Health of the English Soldier”—which article had come from my own pen—and had expressed to him the fear that our only danger was that of going too far in our efforts to bring about sanitary reforms, an opinion in which he, Sir James, entirely coincided.

This communication of Sir James Clark was highly prized by me, but another matter was, as

showing a wider sentiment, even more grateful. The printer of the journal—Mr. T. Richards—had asked me, when the first number was in the press, to construct a motto that would suit the drawing of Hygeia on the cover. I did so by inventing the sentence “National Health is National Wealth,” a sentence which was seized almost universally and used as a proverb, attributed to numerous authors other than the real one, and which, I trust, has been of general service to Sanitation.

A good many years passed on, during which we made slow and varied progress, looked upon in turn with doubt and approval. Edwin Chadwick already mentioned—who caused a change in the Poor Laws, but who had not been properly understood, and, in fact, had seen some of his noblest ideas perverted—was not, as a sanitarian, invariably free of personal criticism. He was sometimes treated as though he were an extremist, and, resigning his position as a sanitary state officer, retired into private life, while many of his colleagues and rivals retired from life itself. He, however, still retained his interest in sanitary work, and never allowed an opportunity to escape. “Fair above, sire, and foul below,” he remarked to the late Emperor Napoleon III., when that monarch asked him what he thought of Paris.

Like him, we all laboured in our respective ways, hoping for the extinction of Disease, but influencing so few the thought dawned upon us that the world

cared less for our recommendations than we had anticipated. The world admitted the truths we proclaimed, but did not utilise them. A big Society was founded, called the Social Science Association; held its perennial meetings in large towns; secured the still powerful but faltering aid of Lord Brougham—who to us was always very kind—and gave to Health a helping hand. It aimed at cultivating Law and Education, but also commended Health as a study. In course of time it invited me to preside over its Health section, giving the leading presidency, including all the sections, to the late Lord Aberdare, who, as the Honourable H. A. Bruce, had for some time played a leading part.

The meeting of the Association was fixed for Brighton in the year 1875, and a good deal was expected from it. All the sections were powerfully represented, and we congregated as a goodly company. The question that I had to settle was the subject of the Presidential Discourse. It was a golden opportunity, if it could only be so used as to create effect. But there was the rub. There were two courses before me: either to go on in the old way dealing with data and keeping religiously in tune with the Association, or to plunge into imagination, for the pleasures of which, in private life, I was greatly indebted to Mark Akenside, but which I had never dared to air in public. In my anxiety I wrote two addresses, one on "The Statistics of Death Rates," the other on a model city or what a city ought to be if

Sanitary Science were ever to be advanced—a city to be called after the goddess of Health, Hygeia, or Hygieopolis. Both essays were in my pockets. I and my family took up our residence at Littlehampton, so as to be near Brighton, and I thought I would try both the addresses on a young and unbiassed mind, so I began to submit my little daughter Stella, then a mere child, to the ordeal. With her I found at once that the statistics of death rates—learned, and, as far as such an essay could be, perfectly simple—neither attracted her attention nor gratified her understanding! In short it was a dead letter. But when I got on to the other subject; briefly explained its bearings and meanings, and when on the sands I traced out with my stick the streets and buildings of my proposed city, as an old Greek might have traced it out on his abacus, the scene was entirely changed and the utmost interest was excited. We even named the streets as well as the public places. My mind was soon made up, and the Model City became the theme for my address. Sketched out on the sands at night, the wind would often blow it away, and it had to be sketched out again in the morning. Still it held its place as a presidential effort, and a friendly American critic says of it, “The winds blew it away, but they blew it all over the world,” a result I certainly had not anticipated.

It was appointed that my address should be delivered under the Dome at Brighton on a

Monday, and I had as predecessors at the same place Lord Aberdare, Sir Charles Reed—the Chairman of the London School Board—and Mr. Justice Creasy, the author of *The Fifteen Decisive Battles of the World*. On Saturday the officers, and some others, were invited over to Glynde, the residence of the Speaker of the House of Commons, Sir Henry Brand. We all had an extremely pleasant ramble in the grounds and a delightful dinner, the Mayor of Brighton startling us by applying to the toast of “Sir Henry” the lines of Shakespeare,

“What a piece of work is man!”

and almost killing us when he came to describe his host in the Shakespearian words.

On Monday morning there was an influx of visitors and my presidential turn came. The old document on Statistics of Death Rates still lumbered up my pocket, and might have been drawn out had not the late Dr. Patrick Stewart met me near the platform, and, in gravest tones, assured me that the company was worn out with statistics, and if I had not something more lively to give them than that I had better set the example of going home. Not a syllable more was wanted. I took the chair and delivered the address long so well-known as “Hygeia: a Model City of Health.”

No one was more surprised than myself at the success of this effort. The Dome over my head

seemed to echo the address. Lord Aberdare was in an ecstasy; the late Sir George Campbell declared he had never been more charmed, and all who spoke to me followed suit. Chadwick was quite demonstrative; Sir Cordy Burrows gave me a luncheon, and one old gentleman declared that as he knew where the city was he would at once go to it. All this was as pleasing as it was new, but it was eclipsed by the newspaper comments that followed. The *Times* had it as its leading article; the other papers gave favourable notices; the Belgian *Moniteur* republished it entire, and I was apprised that Royal personages had read it. I received notes and questions from residents of many centres of the habitable world; tradesmen labelled the goods they had for sale as Hygeian; rich old people pitched on Hygeian residences in which to prolong their days, to the disgust of their younger successors; Mr. Punch was good enough, through Mr. du Maurier, to give it in his Almanac a favourable recognition, and the secretary of a literary and learned institution to which I was about to lecture introduced me to the enthusiastic audience simply as "the author of Hygeia."

Acknowledgments such as are here faithfully narrated, pleasant as they may be, are rather disturbing than sustaining. They are apt to lead not only the man who receives them astray, but the cause also he is desirous of representing and upholding. Fortunately this was not the case in

regard to my attempt. It had been my wish to catch the attention of the world on the dry subject of sanitation. "You have changed the nation's tastes," wrote Chadwick, in one of his dry humours, respecting sanitation. "You have shut up drain-pipes, and you ought to be prosecuted." There was no prosecution of myself, but there was, as I had hoped there might be, such a prosecution of the subject of Health that it became suddenly quite popular. In starting the *Sanitary Review* with the utmost zeal the number of names favourable to the hygienic effort only filled one page of the cover. Now every leaf of all the volumes would not afford space enough for them.

I could not for a moment indulge in the thought that the appearance of a single essay could have produced changes we now behold, for the Crimean War, the American War, the Franco-German War, and the labours of many thousands of able, scientific, chemical, mechanical, and commercial men have had their effect, far beyond anything that I can have excited. But Chadwick was right in his saying that my design modified the tastes that were prevailing, and I would claim no more.

For some time before the delivery of the essay on the Model City, Hygeia, I had let the journal known as the *Social Science Review* replace the *Journal of Public Health*, and it included many subjects relating to sanitation. I started it in 1862; edited it

first as a weekly, then as a monthly journal, and at last was obliged to give it up because the claims of practice rendered me incapable of conducting it. There were published in it several papers which helped on, I hope, the sanitary cause. In it I brought out the papers on "Diseases of Overworked Men," but the most original one was on "Alcoholic Phthisis, or the Consumption of Drunkards," which appeared in 1864.

By the time the discourse on Hygeia was delivered it had become a part of the business of my life to help in every way possible the sanitary cause, and, to commence with, those who were promoting it. The late Dr. Lory Marsh had founded the Sanitary Institute, to which its Council elected me their first Chairman. We instituted examinations for those gentlemen engaged in daily sanitary duties under the Medical Officers of Health who had been appointed by the local authorities to supervise their localities in the matter of health. We did our best to bring the Medical Officers into concert, and we began to hold yearly, at different towns in the kingdom, Sanitary Congresses, with exhibition of sanitary appliances. Our first meeting of this last-named kind was held at Leamington in 1877, when I presided, several other gentlemen acting as presidents of sections, with the Mayor of Leamington conducting all the local arrangements. It was an extremely successful meeting, and novel, not simply because

it was the first of its kind, but because there was an exhibit from Coventry of a small set of machines for riding out of doors on two wheels—bicycles—with the first tricycle, a machine worked by the common lever. This machine was afterwards greatly improved by a chain, but it worked well, and I was enabled to ride it along the main road from the Skating Rink—the place in which the exhibition was held—in the presence of a large concourse of people. Sir Edwin Chadwick, who was present, saw, as I did, the importance of the cycle for outdoor health exercises, and up to his death, thirteen years later on, rendered the most useful services in promoting the improvements of the machine and the application of it.

After the Leamington meeting the Sanitary Institute held a Congress at Croydon in 1879, over which also I had the honour of presiding. It has kept up the practice, always inviting some sanitarian to fill the chair.

I presided over the Sanitary Institute for four years, and am a member still, but we came to an unfortunate misunderstanding on a point of opinion. The people of Brighton wished to hold a Congress of their own in their own town, and elected me President. I thought that as the Institute existed for the encouragement of sanitation and for attempting to abolish disease, it was quite compatible to accept the offer, but I was anxious to leave the meeting to the general guidance of the

Institute. The authorities at Brighton held out, declaring that the effort should be purely local and self-sustaining, while the Institute, or some of its active members, determined that its Council should go down and manage the whole affair as if it were its own. They sent to me asking me not to preside over a mere local gathering, a request I respectfully declined, and in the end the Congress, as a local one, passed off brilliantly.*

A few years later, 1889, the inhabitants of the town of Hastings, headed by the Mayor and Corporation, invited me to preside over a local Congress of the same kind in their town, an invitation I accepted. The meeting had the same gratifying results as those which followed that at Brighton, and in a similar manner published its records. I regret the proceeding broke my long official connection with the Sanitary Institute, the Council of which ruled that no one officially connected with it could hold

* A singular circumstance occurred at this Brighton Congress. A large number of Medical Officers of Health met at one of the hotels at breakfast, and a fine ham, which the waiters served was placed on the table. When my slice came I noticed that it had a singular appearance, and inspecting it closely found it filled with trichinæ, the parasite discovered in muscle by the late Professor Sir Richard Owen, and a known cause of severe, and often fatal, disease—"trichinosis." I immediately gave the alarm, and begged the guests to eat no more of the affected food. The caution came too late, and one of them, who had partaken freely of it, was in great disquietude. Luckily no further harm was done, because the ham being well cooked, all the trichinæ were dead and did not visibly differ in effect from the food in which they were embedded.

office elsewhere. I objected, and so we parted. The difference of opinion and action caused, I am sorry to say, my separation from the Institute, but I still maintain that the conduct pursued by me was on the right basis. The Institute does not, and never was intended to, exist for its own displays and none other. It exists for the support of sanitation by whomsoever and wheresoever it may be given. It can set an example, but it cannot grasp all examples, and it ought to have no monopoly.

Happily there was scope for sanitary effort in other directions. When medical men began to be appointed Medical Officers of Health they required the assistance of others, who, under their orders, would go about a district to inspect, report, and carry out the many improvements or reforms needed. I recommended to a medical officer—he had beaten me in a contest for office—the first man who fulfilled the required duty. In time the necessary Inspectors grew into a large body and began to organise. The members of the organisation became Sanitary Inspectors with regular duties, and formed themselves into Societies, with—in the end—a central London Society, over which Sir Edwin Chadwick became first Honorary President. He wished me to succeed him in the office, speaking to me in his latest days about its usefulness and importance. I naturally acceded to his wishes, and have been President of the Sanitary Inspectors now for many years, accompanying them on the

Continent and taking an active part in their practical endeavours. They help the work of sanitation and the abolition of disease amazingly, spreading a desire for health amongst the masses, diffusing the principles on which they act in every locality and homestead into which they enter in an official or general manner. It is impossible to say what, in time, they will not effect for the good of our English community. Sanitary inspection is rich in promise, for the reason that it instituted the first systematic lay element in sanitation we have as yet possessed; of energy its members have any amount, and as their position improves they will take a most important place in the art of abolishing disease.

The incident that occurred at the Leamington Congress in respect to cycling gave me a new inkling as to the reduction of disease and a means of advancing the general health. I argued that if, on trial of it, we could go about in the open air as we did on horseback, it must be healthful to us physically, as it must be charming mentally. The idea led me to Coventry to see the work going on there in the manufacture of cycles, and I saw in it a new trade, a constructive trade, not only of tricycles, such as have been described, but of two-wheel machines also, bicycles. In journeying some time previously, 1868, in France, from Dieppe to the old and ruined Château d'Arc, I had seen in a village a bicycle, known since as a "bone-shaker," standing against a wall, and

had learned that it was the doctor's "iron horse" on which he made successfully his round to his patients. The advance of the bicycle at Coventry gave promises, therefore, of the most cheering character. Irrespective of all the disputes and wars that were then beginning to show themselves in the cycling world, I joined it and became a cyclist, accepting the post offered to me of President of the Tricycle Union, which was then in active life. It soon transpired that, whether on a tricycle or a bicycle, the new so-called "sport" was beneficial to health when it was properly carried out, and that was enough. Cycling had its dangers and its objections, but, on the whole, it did good service. It disseminated abroad what had long been a want, an exercise that would benefit the masses; it let fresh air lave bodies that had been long confined in-doors; it encouraged women as well as men to go, not only out of doors, but out of towns, and it infused into the mind new scenes and new thoughts. The results were surprising, and soon outstripped custom. My desire was to make the new exercise something more than a "sport." I strove to give it a scientific and antiquarian character, and founded the Society of Cyclists in order to carry out these objects, to the advantage of riders of both sexes of tricycles and bicycles. We combined for the purpose of holding regular meetings in London, and we rode out of London, and founded annual congresses in the country. We asked noble-

men and other owners of estates and curiosities to throw open their grounds, houses, and other treasures for our inspection, and we got Mayors of boroughs and kindred authorities to sustain our efforts. We did all we could, in fact, to accomplish our endeavours, and I held office as President of this Society for no shorter a period than ten years. All the world is for cycling now, as if a new pair of legs had been invented, and the advance in health and strength has been unparalleled. By cycling the sanitation of this country, to say nothing of other countries that have adopted it generally, has advanced a hundred years. Personal health has improved; sanitary necessities in wayside inns and public-houses have been introduced; the home life has developed freer than before of disease and care, and outside games, so favourable to healthy life, have become the order of the day. In a word, as advocates for the abolition of disease—as earnest as a Wilberforce or a Clarkson could ever have been for the abolition of slavery—the sanitarians have seen nothing that gave so grand an impulse to the health movement as the cycling crusade, which, with some drawbacks of a slight kind, all removable, is one of the leading features of the century.*

* There are two notes I would like to make on this subject of cycling. (1) It has been insisted upon by many persons that the construction of the cycle was the result of a French discovery. We must admit that the French people have very greatly improved cycling by the invention of the pedal movement, but the origin is unquestionably English. In the first year of the Victorian era

As one of the physicians to the Royal Infirmary for Diseases of the Chest it was impossible not to see the most serious and singular variations from healthy function induced by occupation. This was so obvious a fact that I began to draw up records of disease brought about by the labours pursued, and under the title of "Life and Labour" I published in 1859 a special essay, in the *Sanitary Review*, which attracted considerable attention and contention, and which made a distinct call on my time, although I gained my object of benefiting working people. The subject came before the Council of the Society of Arts, and afterwards I was engaged by that body to deliver a course of lectures on "Occupations in Relation to Health and Disease." In that course I gave a table in which it was shown

1837-8, I was taken as a boy to see a cycle that was in frequent use in the town of Leicester. This cycle was made entirely of wood, was constructed by two brothers who rode it together, and was worked on the principle of the lathe. It did its work uncommonly well, and the brothers were able to accomplish on it many miles an hour upon a good road. The late Mr. George Cruikshank, the famous artist, whom I knew for many years, told me that he recalled the hobby-horse, a machine ridden and propelled by the action of the foot, which he depicted with great skill, drawing comic pictures that greatly amused the people but did no more. The machine seen at Leicester was called the velocipede, and it, together with the hobby-horse, formed the germ of the machine now so universally employed.

(2) In speaking of the invention of the modern cycle it is but fair to give due credit to Mr. John Browning, F.R.A.S., for having shown the fallacy of using large wheels, and for introducing the small wheels now so general among the cyclist fraternity.

that there were in England and Wales people of seventy occupations, and that their lives respectively could be estimated with fair precision, clergymen—with the exception of Catholic priests—standing at the top of the vital scale, and persons connected with the sale of intoxicating liquors at the bottom.

In expounding these natural lessons I was greatly aided by the late eminent Dr. William Farr, F.R.S., Superintendent of the Registrar-General's Office. He was so deeply interested in them that he made the subject a part of his annual report and wrote a summary of it, which I ultimately published in a widespread manual of health, written at the request of the Society for Promoting Christian Knowledge, entitled *Health and Occupation*, having previously published the complete lectures in the *Journal of the Society of Arts*. In preparing the details a sum of fifty pounds was supplied to me through the Society by the late Bernard Shaw, Esq., which sum enabled me to visit the Potteries in Staffordshire and other seats of labour in order to gather the facts from the veritable centres in which they could be witnessed. It was a great opportunity for a sanitarian, living in a country of trade, to have. The field of observation was fertile, and I have many times deeply regretted I had not the means at command to publish all my investigations in a separate and utilisable form as portions of the life-history of England in the century that is fading away.

The subject altogether came into mind in the middle of the century, and I named it to Dr. Farr while I was resident in Mortlake, indeed called upon him in regard to it. He was most kind and courteous, and promised, while encouraging me to proceed on my own account, to give me every assistance in his power, and to introduce the matter into his own papers and reports as he saw the opportunity. He was faithful to both promises, for which I warmly pay tribute to his memory. I ought also to remember the encouragement I met with from Sir Richard Owen, Dr. A. Parkes, Sir Edwin Chadwick, Mr. Bernard Shaw, Lieutenant-Colonel Wilmot, Sir John Forbes, and many other friends who received and assisted me during my researches.

Few of my cotemporaries have presided over so many meetings as I have, and one Society alone has elected me annually for thirty-eight consecutive years. It has also been my duty to deliver an immense number of lectures in the educational centres of the United Kingdom. Both sets of tasks were severe tasks, however honourable they may have been, but I have not shrunk from them, because they gave me the happiest possible opportunities of teaching publicly the lessons I wished at the time to inculcate, and on sanitary subjects they have been the best openings for instruction I could avail myself of. Reference has already been made to some

of these opportunities, but many others occurred in which an endeavour was made to carry out sanitary work. At the Sanitary Institute I once delivered an address as a rider to that on the Model City, in which an effort was made to describe, not a town alone, but a country of health.

The conditions under which health may be maintained amongst the masses were carefully depicted. The people were delineated; their policy was defined; their various games and occupations were pointed out, and taking the country as a whole, it was compared to a vast garden, that might be made, if it be not presumptuous to say so, into an ideal paradise. It is a great temptation to publish in full in this place an account of this sanitary ideal; to show how no artificial lights were required because the people lived by the sun as well as with it, and were thus possessed of an electrical light, the like of which no man has ever invented and never will. It is a temptation to recur to the ideal people and to that nervous system of theirs which took in the outer universe; was stirred by its vibrations; slept as they slept, and found its natural times for work and for rest, the whole lying down like one vast living world to enter oblivion and to wake from it filled with another spell of life, ready and happy to greet another day. But I must not linger on a retrospection, however delightful. It did not fail to stir the sanitary world, but had, I regret to say, too brief an influence.

In another address to the Sanitary Institute, 1883, I took up the subject of happiness, individual and general. The address was entitled "Felicity as a Sanitary Research," and was intended to show that the only perfect condition for felicity was good health, which could only come through sanitary efforts. Some patient, as unhappy in mind as in body, had written to me telling me she had been informed that I had a medicine which not only relieved physical symptoms, but also brought about a state of mental serenity that meant a continued happiness. Would I send her a prescription for the same? Alas! I had no such prescription to send, but the request set me thinking out what were the terms or characters that would answer, not for one individual, but for all, and in the address delivered I endeavoured to write and speak them, not altogether without success. I urged that the tendency to felicity or its opposite is planted in childhood. The parent, the schoolmaster, the schoolmistress, hold the book, not of learning simply, but of Fate. To the imitative mind of the young, absorbing all that its senses can carry to it and that the nervous centres can retain, the character of the presiding mind, ever present with joy or sorrow, justice or injustice, love or hate, cruelty or mercy, has its influence—is the beginning of the end. I strove also to indicate that in the physiological economy man is endowed with two living natures which distinguish him from the lower creation—the

pure animal and the pure intellectual natures—and that felicity belongs to the animal nature, so that an intellectuality which would separate man from the animal would leave him beyond either felicity or infelicity. Happiness, in fact, is, I held, not an intellectual quality; it is not centred in the brain. It is not a quality into which a man can think himself, or directly will himself. It is like the beating of his heart and the circulation of his blood, a vital process going on independently of his volition. He can, by rude process, destroy happiness for himself, as he can for others. He can kill it, as he can stop the motion of his blood by stabbing himself to the heart, but still the quality is so independent that he is often made happy by things, acts, and circumstances which his reason scorns. “Why does this fool of a book make me happy?” said a patient, as he twitched his *Pickwick* to the foot of his bed. Felicity and infelicity are not intellectual faculties, neither are they passions, neither have they any direct relationship to physical pain. They are the only true emotions, and the centre of the emotional felicity is not in the brain. The centre is in the vital nervous system, in the great ganglia of the sympathetic, lying, not in the cerebro-spinal cavity, but in the body itself, near the stomach and on the heart. We know where the glow that indicates felicity is felt; our poets have described it ever with perfect truthfulness as in the breast, whence it comes as if from a fire kindling there. No

living being ever felt happy in the head ; everybody who has felt it has felt it as from within the body. We know, again, where the depression of melancholy is located ; our physicians of all times have defined that, and have named the disease of misery from its local seat. The man who is always miserable is a hypochondriac whose affection is seated under the lower ribs. No man ever felt misery in the head. Every man who has felt misery knows that it springs from the body, speaks of it as an exhaustion, a sinking there. He is broken-hearted ; he is failing at the centre of life ; he is bent down because of the central failure, and his own shoulders, too heavy to be borne, feel as if oppressed by an added weight or burden, under which he bends as if all the cares of the world were upon him to bear him down.

There were, of course, a good many other statements in this address, all of which I left with the audience—a Glasgow audience by the way—for its contemplation. They might, perchance, think of it as an enthusiasm. Never mind, so long as they thought of it. The truths I had endeavoured to implant would grow upon them as a study if they once took root. They would strike them in time as the *summum bonum* of sanitary labour, a re-echo of the divine declaration “On earth peace, goodwill towards men.”

Apart from the Sanitary Institute, I laboured in many other places and in many other ways on behalf

of Sanitation. One effort—a novel one of its kind—had special reference to the sanitary condition of the Jewish population, in which the late distinguished Chief Rabbi, the Rev. Dr. Adler, though he was far advanced in years, took a lively interest. I composed a report on the vitality of the Jewish race, which I read one Sunday afternoon in St. George's Hall to a mixed auditory. The facts narrated surprised no one more than myself, for they showed that in the midst of all their wanderings, dangers, and troubles, the vitality of the Jews remained as the strange feature of the ages, so that their young, even in confined Ghettos, survived very much better than did the young of Christian communities. I wrote another report or essay on the Mosaic Sanitary Code, which I delivered to a large body of English clergy in the Armoury room of St. Paul's Cathedral. I went among the poor Jews of East London on Sundays, witnessed their various ways and works, and delivered to them series of lectures on the health of the people, and particularly on the health of the Jewish people, one of which lectures occupied large space in the leading papers, including the *Times*. The Jews themselves were gratified by these efforts, and many of them have told me that the endeavours tended largely to change the feeling that was current in respect to them and their habits. Sir Edwin Chadwick himself spoke to me of the attempts, and said he thought they were amongst the best I had put forward, particularly in regard to

the elucidation of the truth that suicide is much less prevalent in Jewish than in Christian communities.

In all sanitary teaching it seemed to me to be of first importance to reach, not the wealthier and ruling classes, but the poorer and most uneducated, and I still feel this to be so correct that I visited Manchester within the last two years in order to show the working people that the business of sanitation belongs not exclusively, but rigorously, to them, so that if they would only take it up and lead the way all the country would be converted to sanitary principles. I have observed that well-to-do persons make it a kind of fashion to breed and maintain health. They know that there can be no peace or rest without it, and they like to live and to enjoy life. The poor have no such fashion, and, as they are ignorant of prime principles and disregardful of what they do not understand, they are peculiarly situated, want simple explanations, and ask for instructions which the happier and more widely cultivated look upon as common-place. Some think I have gone too far in this direction of instruction, and that I have done wrong by being, as it were, too simple in arguments and persuasions, because I could if I wished say more competent things. I do not for a moment admit this criticism. We must educate the lowly, and that in their own manner. By this process we transform them into powers, so overwhelming in numbers, probably

twenty millions to one million, that when we get them to move in the proper direction everything must move with them and every movement must thrive. Politics, learning, nay, religion itself, go, and ever must go, with the masses. We make them hope, and Hope is Health.

In a more practical way I entered, at various times, into working details and efforts. Upper London was a conception in which I proposed that gardens and pathways should be carried along the housetops of this great city, thereby relieving the traffic and ensuring the means of disposing of the smoke emanating from the fires below. I proposed, too, that the Cathedral of St. Paul's should not be hidden by houses, but that a grand esplanade and gardens should be made from it down to the river, with good streets extending each side of the building and a boulevard at the back of it, so that the cathedral really might be a grand sight for the Londoner by every line of approach.

One of the best propositions in regard to household health was, I believe, the plan of main drainage which I ventured to suggest. London is said to be drained, and all towns are assumed to be drained, in a fashion. The drainage, however, is inefficient and faulty. My proposition was not to drain a town, but the whole country. It seems to me that the railway system has laid down the levels of all drainage, and that if along the lines of railroads

sewers with proper interceptions were placed, there is not a house in the kingdom that might not get rid of its sewage at every moment, the sewage being distributed on the land for its own destruction and the land's nutrition. In regard to London the late Colonel Hayward, who designed the Holborn Viaduct, computed for me that the metropolis in ten years could be completely drained on the main drainage plan named. The drainage of England would be universal and perfect, and the products derived as sewage might all be restored to the land so as to fertilise it and to let nothing whatever be lost that could be applied to correct fertilisation.

There was something else added to this scheme which met another serious and not infrequent difficulty. If we could convey sewage from towns on one side of a railway we could equally well convey water into towns on the other side of the line, and this to any distance, so that there could never be a water famine anywhere. Our great lakes in country districts might be directly the reservoirs of water for the whole of the country, and we might receive water from Wales, or any other good district, in London just as easily as we receive passengers who come by train from the same districts. In short, were these two plans—for sewage and water—correctly followed out, with the addition of the necessary well-known engineering appliances, England would become altogether the best sanitary

centre in the range of civilisation. We should get all we wanted removed from towns and cities and utilised for fertilisation; and we should get into towns and cities the water we require, in abundant supply, while the two systems would be at every moment in working order.

On the political side of sanitation the practical opportunities afforded me have not been so wide as could have been wished, though I have not been idle politically. When Medical Officers of Health were first introduced I did my best to point out what the duties of such officers would be, and wrote a communication on "The Sanitary Police of London," which bore upon those duties. I also wrote an essay on "The Thames Water Supply," and at Stafford gave an address in 1878 on "The Election of a Minister of Health;" on the departments over which such an officer would have to preside, and on the political and social position he would have to occupy. His position, I argued, should be of the first quality socially, but it should also be a firm position, not changing with change of party, as is usual in the case, since a true Minister of State—in the matter of health—cannot possibly learn his business in the brief period of a ministerial term of office. His duties are fixed by nature, or ought to be, uninfluenced by party feeling, and should, at all times, be progressive under the guidance of pure science.

In local politics it was my lot to take a share of work for a long series of years as a member of the large Vestry of this parish, St. Marylebone. We were not mature in the matter of sanitation, but were, during the whole time, fortunate in the way the Medical Officers of Health discharged their important duties. Our first Medical Officer was Dr. Dundas Thomson, nephew of the well-known professor of the Glasgow University, Dr. Thomas Thomson, whose published works helped to create a new era in science. He was followed by Dr. Whitmore, who entered under unfavourable impressions as to his position and scientific quality, but who turned out to be an admirable officer. Amongst my own efforts in the Vestry I recall one which I still hope to see practically accomplished—the local parochial establishment of workshops, or working offices for the poor. I had been attending, from one of the dispensaries, the children of a poor tailor, who were suffering from scarlet fever. The tailor made his living wearily by the production of riding habits, for which he received from his master lengths of rich and warm cloth. The weather was cold, and on the beds of the stricken children I found spread out over their bodies pieces of the cloth, as though it were sent to make blankets, not riding habits. Of course the cloth was infected, and as it went out as a garment, or garments, it became a poison-bearer to the persons who wore it. It was a trap of disease. The tailor

had nowhere else to work than in his own rooms, and he could not help what was occurring; he was a good tailor and a steady man. I witnessed many cases of the same nature, but what was to be done? Without giving names I put the facts before the Vestry, with the suggestion that we, as a public body, should erect in parts of the parish a number of small buildings included in a court, which should only be occupied by men during worktime. A tailor should have a shop for work, a shoemaker one, and so on. Each man should pay for the shop a modest sum per week, and, under the supervision of special inspectors, should have entire possession; but he should never live there nor entertain there any members of his family, who would reside in his living-house or lodgings, and to his shop he should go as a lawyer might go to his chambers. There still was slight danger of his conveying contagion indirectly, but the shop was a wide improvement and tended to bring contagious disease within bounds, and, under good management, the workmen's court or yard would be at all times well ventilated and clean. To the people, this proposition was most acceptable, and many men applied to me, asking when the plan was about to commence and where the places for work could be secured. By the Vestry it was not so well received. It appealed to many minds favourably and secured a great amount of support, yet on being put forward in

the way of a resolution it was lost, and has never since been repeated.

A trouble sometimes arose in our local administration, having reference to the outbreak of epidemics and the mode of dealing with the infectious sick. We occasionally dealt with the question by the process of erecting some temporary house or hospital in which the afflicted could be isolated and separately treated for the occasion, the hospitals being cleared away when the epidemic was over. All parishes, as well as our own, are liable to the same anxiety; and my suggested mode of meeting the difficulty was that, throughout a parish, there should be erected on the top of some particular house or houses specially constructed permanent iron hospitals, into which the patients, children or grown-up persons, could be raised, housed, and treated. We are inclined to put patients in private houses in the upper rooms, and have at times, in large houses, quite a series of hospitals indirectly connected with the private dwellings of the inhabitants, and we find it as good a plan as can, under the circumstances, be adopted. By my own plan there would be the most marked improvements. The affected persons would be carried up in a lift into the new hospital without coming into contact with anyone except nurse and attendant; they would be carefully housed; they would be completely isolated, and would have all the advantages

of fresh air and separation from the rest of the world. There would be great advantages, too, in the construction of the hospital and in its purification. I proposed that each of the hospitals should have distinct wards, and a plan of ventilation so arranged that the air of all of them, admitted from below, should be drawn through a furnace at the top, in which infective matter could be destroyed by passing through fire. The method attracted so much attention amongst the working-classes that an enthusiastic workman constructed a model in iron work, presented it to me, and allowed me to exhibit it. It had all the properties I have just related, and it could be completely purified in parts or in the whole by the one grand purifier—fire.

It never was obvious why this simple idea has not been carried out. It has been known for years, and, if acted upon, could have saved an immense amount of disease and death at the most trifling comparative expense. One parish could have communicated or corresponded with others, so that all the epidemic sick of a town could at any moment have been properly treated under the direction of the constituted medical authorities, including the medical officers of health; while vans and ambulances would have been abolished, to the immense benefit of the diseased as well as healthy.

Touching the question of hospitals generally my experience, which has chanced to be very extreme in

regard to them, is here dwelt upon. It has always seemed to me improper to favour large hospitals as if they were storages of disease; and with what are called the out-patients' departments nothing satisfactory has ever been fair or promising. It is absurd for one man to sit continuously looking at people, feeling pulses, and prescribing medicines for hours together, getting a poor return, at best, for his services, either in experience or money, and keeping out of employment an army of his fellow-practitioners, who are obliged to wait and starve. It has always appeared to me that small hospitals and efficient staffs are correct principles; and I ventured to propose—in which proposition I was warmly supported by the late Dr. William Farr—that when the great St. Thomas's Hospital, on the site of which we mutually reported, was being sought out, it would be best not to erect one huge building, but to divide it into a dozen at least, and spread them out as St. Thomas's Hospitals all over the metropolis, with a central school altogether apart. The local practitioners of every district could thus be the members of the medical and surgical staff; every practitioner might share in the experience, and every student might see and learn all forms of practice and art that might be obtainable.

These suggestions applied only to the poorer population. For the wealthier I assume that it would be advisable to have numbers of small,

properly constructed, and properly furnished sick houses, to which everyone out of health could retire ; have his own doctor, nurse, and friends, and have every facility for getting well at instant command. This, beyond dispute, would be the best for the sick person, and infinitely best for the family, the members of which would be free of immediate danger, and would be saved the most painful remembrances, the constant sight of rooms in which the sick persons were tended when ill, and sometimes died.

In promoting sanitary reforms I have always been greatly opposed to everything that savoured of compulsion. You cannot, in treating disease, successfully save a life by force ; and I never saw the slightest difficulty in carrying out vaccination until the magistrate and policeman were called into requisition as aids to the skill and persuasion of the doctor. I have vaccinated a whole village when smallpox was prevalent and threatening, without a repulse ; and once, when smallpox broke out in a large establishment of working men, I took a course that was eminently successful. No force was put on at all : but I called together the men ; explained to them in a body the assumed benefits arising from vaccination ; in their presence vaccinated myself ; afterwards repeated the process on the chairman ; and then said that the vaccination officer would appear at a certain time, and would be ready to

vaccinate, without the slightest compulsion, anyone who would ask him, and that he would charge nothing for the service rendered, because we, the governing body, would meet that demand. The effect was instantaneous; the vaccinator did not meet with a single objection; and I am of opinion—though I admit possible error of opinion—that the spread of the malady was promptly arrested. At all events we heard no more about it.

At the London Institution, and other places of a similar kind, I lectured on the question of dress for both sexes. I spoke as freely as I could against black dress as mourning dress; showed how the custom injured health and was a false indicator of true grief; called for substitution of some much simpler device, such as a band on the arm, if any device were necessary, and was not injurious by the effect it had on the mind. I also supported the improvements in plan of attire for the female sex, so as to give it that freedom of movement possessed by man, which has helped to make man definitely a master in creation. He would probably have been no stronger than woman had his limbs been as uncomfortably impeded. The English nation could never have existed if the fashion had been to bandage the feet like those of a Chinese female child.

The years 1862-3 were years of great activity from a sanitary point of view, and the *Social*

Science Review, which I then edited and brought out in weekly parts, teems with articles of various kinds in relation to work and overwork, food and feeding, the taking of animal life, and the management of abattoirs and bakehouses. The great American War was at this time occupying all thoughts and suggesting the most comprehensive lessons. Ladies as well as gentlemen were taking the most active part in everything that related to the health of the people. The Ladies' Sanitary Association had been formed and was doing its best to introduce education in sanitation amongst the masses. A school was formed, and the lectures were largely attended by ladies. I was elected as chairman of a lecture faculty. Professor John Marshall, F.R.S., lectured on anatomy and physiology; Dr. Albert Bernays on chemistry; Dr. Spencer Cobbold, F.R.S., and afterwards Dr. Francis Webb, F.S.A., on natural history; I myself taking public health. One lecture which I gave on "Work and Overwork" on July 13th, 1863, was so much liked I was asked to publish it in full, which I did in the *Social Science Review* of July 18th of the same year. The late Dr. Lankester was in the chair, and the case of a Miss Walkley who died from overwork in a fashionable milliner's house about that time was the talk of everybody and excited many wealthy ladies to determine that they would spend no money in support of ill-conducted milliners' establishments.

Bakehouses and modes of making bread came particularly under notice. Dr. Dauglish, a few years before (1856), had got out his patent of an invention of a new method for making bread, and the Society of Arts had awarded to him their silver medal. He was a comparatively young man, for he died in the forty-second year of his life, on January 14th, 1856. Dauglish had set us all astir by introducing the method of raising bread by aeration, or introduction of carbonic acid gas by machinery, instead of by yeast and fermentation of flour. He immensely shortened the process of bread-making and had rendered it delightfully cleanly. Our eyes were thus opened to the condition of bakehouses and the manner in which they were kept. To me the subject was most engrossing, and for months I wandered London two or three times a week during night hours in order to see in what manner bread was manufactured. It was an astounding sight to behold. Flour in the shape of dough was not only kneaded, it was "treaded." The unfortunate bakers were subjected to the severest labour, and nothing but the intense heat derived from the ovens kept the consumers of bread from suffering even worse penalties. I felt it a duty to back up the aerated method, and on every occasion to expound the errors that were common, so that in the end I was invited to take a part in the work of the Aerated Bread Company, which I have maintained as zealously as possible up to the

present hour ; reporting on its methods ; portraying the life of Dauglish himself, and of others who worked coterminously with him, and never failing to suggest such improvements as might occur to me. I think this has been a true sanitary labour, and though I do not pretend that every advance in the manufacture of the staff of life has been perfected, or that improvements have been so widely sown all over the country as are desirable, I am quite sure that in the past thirty-six years we have reaped much health from what has been successfully accomplished.

It has not been in the manufacture of bread alone that I have laboured as a food sanitarian. For many years we have debated the question of animal food and its preparation for our tables. If bakehouses required to be corrected, private slaughterhouses demanded no less consideration, and every opportunity I had for their inspection I made use of. From the manner in which I have opposed the slaughter of animals it has been widely spread that I am a vegetarian, and it is quite true that I lean strongly towards the vegetarian movement. I have not, however, become a strict vegetarian, but have rather busied myself in showing how animals can be painlessly killed and carefully cleansed for the meat-market. I have also introduced, as I shall show further on, the idea that as all carnivorous animals live on herbivorous, it may be quite possible, without employing the intermediate

carnivorous body, to produce in the laboratory, direct from the vegetable world, substance for food that shall have all the qualities of animal food. In the laboratory, working under this thought, I have striven to effect the transformation, and have more than once brought the subject before the Society of Arts and the learned world.

Ten or twelve years ago I made another movement here in regard to animal food and sanitary development. I established the London Model Abattoir Society, and have ever since remained its president. The objects of this Society have been to encourage every town to build its own abattoir; to open the eyes of the public to every method of slaughter and preparation of animals for food; to encourage every improvement that can be suggested; to bring into the slaughterhouse and convey away from it animal bodies in their most healthy state, and to teach on the broadest scale whatever favours economy, sanitation, and civilisation. We are still working at all these projects.

Not to mention several other subjects of a sanitary kind, I cannot pass over one other proposition which I trust will some day be carried out. I mean the establishment all over the kingdom of residential homes in which those who are suffering from chronic affections, or recovering from acute ones, can be healthily and systematically lodged.

I once lived for some months with my family

(Lady Richardson, our two sons, and daughter) in what we were pleased to call "our castle in the air." We were on the edge of a large plain which had as wonderful a history as any place in our island; and we were in mid-air, for we rested above all other residences near. From one window, at which I wrote, we could see, when the air was clear, a place as high as we were at a distance of fifty miles.

I could fill many pages with reminiscences of life and events on the delightful common in which our temporary home stood, and of the history of the explorations we made, but I must be content with the chief result that a sanitarian might arrive at. We were surrounded by what are called Roman Camps, and my observations were chiefly directed to them, and led me to infer that in England we possess many hundred centres that ought to be utilised for our sick men and women, and might become, in truth, winter and summer Palaces of Health with advantages of the best kind for those who should supply the means for fitting them up; for the landlord who should hold them as property, and for the well-being of those who would occupy them and find them beautiful sanitary homes.

It is constantly the puzzle of the English physician to find out what is to be done with those who confide themselves to his care. He thinks what a good thing it would be if such and such a patient could for a time reap the benefits of an Italian climate. As a supplementary means of

health, or even as a change from one pleasant scene to another, we should be rendering an important service. To thousands of invalids who are anxious for a warm winter residence, and who require such residence, there stands in the way the absolute impossibility of going to it so long as it is abroad. One cannot afford the expenses of the journey. A second has an objection to cross the sea. A third has friends whom it is not advisable or not possible to leave. A fourth is really too ill to undertake a journey to the south of France or other spot equally distant. A fifth has been abroad and has not been benefited by the change, or has received a doubtful advantage with so many discomforts or dislikes that return to the same is not palatable. A sixth does not like to be removed from the care of friends to whom he or she is accustomed, or from medical advisers who have inspired particular confidence. Lastly, many require to be at home in order to secure, as suitable for their particular case, certain aids and appliances which may not be continuously obtainable in a foreign place.

Supposing a hundred Mentones or other similar places were in existence, and were all well-filled, there would remain still an enormous population which would be glad to avail itself of the advantages derivable from residence in the ideal health-spots which I am about to describe.

I have thought of these changes as connected with English towns and watering-places, and in

the *Medical Times* of March 15th, 1875, I wrote about Bath specially as such a resort and a good starting-point; but at the moment of which I write I was attracted by these Roman Camps, which have led me to the conviction that by utilising the camps we could send the sick to places of an elevated position where the air is light, bracing, and dry. These I should call camps of health on high levels.

In a great number of places in these islands there exists on the highest ground—with the most magnificent views, extending in some instances to fifty miles of the surrounding country—the elevated site in which was the *Castra Stativa*, or pitched camp of the Roman legions during the Roman occupation of Britain.

Whether these camps were of Roman construction, or whether they existed before the Roman conquest and were merely seized upon and adapted by the conquerors, does not call for notice here. I am dealing simply with the sites as they now are for the purpose of indicating to what a grand use they might be applied.

These sites are centres of health. With excellent judgment, in many of them a pine wood is planted at the south-west point, by which the prevailing wind of these islands is tempered to the camp, and by which the odorous air from the pine trees is wafted over it for more than two hundred days of each year.

The encampment is a square more or less perfect,

including within its embankments eighty to a hundred acres of land. In some which I have measured, the distance round, on the top of the embankment, is two thousand yards, broken in two or four places by the gateways or wide entrances. The centre of the ground enclosed by the embankment is in some cases raised ; in others, owing to the excavations which have been made, the surface is irregular or even depressed in the centre.

Outside the entrenchment there are commonly two ramparts, broad and well-laid ; and from the surrounding country there is a road, more or less perfect, leading up the ascent to one at least of the grand entrances. Few men have climbed more of these ascents than I. I have climbed them at all seasons, and I know no spots more invigorating. The air at the summit is usually light, clear, and bracing, even in warm weather ; dry and bracing cold weather, so that one is almost led to believe in that the great engineers who selected these elevations had the health of the camp before them as the prime consideration.

Some of these camps are placed by the sea, so as to command a grand sea view, as at Cissbury Camp, near Worthing, in Sussex, or at Cadbury Camp, near Clevedon, in Somerset. Others are on the high lands inland, as in the Cotswold range.

Wherever they may be—and this is the point I wish to dwell upon—they are sites for camps of health within our own British territory. Utilised

properly for health, there would be no necessity to send our sick people, who would be benefited by pure air at a considerable altitude, from their native soil. In the strangest manner, these camps are already constructed for the purpose we require. They may remain just the historical mounds they once were, and yet serve the purposes of health as they once served the purposes of war, serving, indeed, still for war—the war against disease and on behalf of health.

After visiting one of these encampments, I once had a sanitary vision of a health-camp stretched out before me. Looking down the line of the encampment leading to the plain or valley below, I saw two ramparts repaired and relaid. Each one of these had a road twenty feet wide, level, hard, and smooth as a Roman road ought to be, over which a carriage could run almost noiselessly. I saw also broad roads from the gateways of the camp, at right angles to the higher rampart joining that with the lower rampart. The upper rampart road was two miles round, the lower three at least. From each gate of the camp, the roads descended into the valley, and connected the camp with the highways and bye-ways leading to the towns and villages of the surrounding country. Outside the great mound the work of the Roman engineers had been so well imitated and matched, that Cæsar himself, or his follower, the architectural Emperor Hadrian, might have said, “Well done!” On the

new ramparts my invalid friends were taking their evening drives, or were sitting about on the western side watching the sunset over the sea.

Turning from the outside to the central part of the camp, I saw in the centre, where, perchance, once stood the Roman Pharos, a beacon or watch-tower still, but of a newer order. In time, as night brings the darkness, there would stream out from above that modern Pharos, not the beacon-fire of the Cæsars, but an electric sun, which would fill the whole place with its light.

Below the beacon I saw also, standing out ready for work, the telescope of the observatory which might show through the night the homes of those star-gods whom the Romans worshipped. Then, looking anew, I imagined the whole camp as a palace of health, pavilion and pavilion spread out fan-shaped from the centre, homes of the sick with gardens of beauty; a palace of health, provided with every art that can tend to bring conditions in which health shall be regained and death defied.

In England alone I could find twenty, at least, now useless encampments ready, under a few months of skilful preparation, to meet, without a touch of historical injury, this great want of our people, MOUNTAIN AIR IN CAMPS OF HEALTH. In these camps, by boring, water would be found in abundant quantity; from them all that is dangerous could be drained away with a facility unexampled. In the

valleys, and on the hill-sides around, farms and industries would spring up to minister to all wants, and what is practically now a desert would soon become a centre of fruitful vitality.

In these suggestions I have referred to England alone, but it would be as unfair as impolitic to leave out of consideration the sister countries. Scotland, especially on her western side, offers the most magnificent scope for palaces and camps of health. It is sinful, indeed, to think that such healthful beauty as Scotland affords should remain unutilised. The same applies with equal force to portions of Wales.

Ireland too has her sites for palaces of health, sites unique in excellence. I remember a valley in Donegal which appeals to me as made for the very purpose. It is like a basin of land, foliage, and pasture, filled to the brim with purest light and brightest, lightest air. Whilst, in the glorious south of Ireland is Glengariff, where, with little more of art than Nature herself affords, a series of winter homes, unrivalled in any part of the world, wait only for patriotic skill to tempt visitors from all lands.

In such a time as this, when nothing but political wrangle is heard high and low, when party is tearing party to pieces, until the body politic is as bare, uncomely, and savage as a moulting eagle, are there none who will help to create a wholesome diversion by inaugurating a new era of national

progress, in palaces and camps of health on native soil ?

En résumé, in all sanitary work and teaching it was my object to hold up Cleanliness as the right hand of Health, and I did not care in how humble a way I could teach Cleanliness either to men or to women. I invented the metal dustbin now so popular, and for a time allowed it to be used under my name that it might be widely introduced. I taught the female sex that the members of it must be, one and all, sanitary reformers, and that there was no place in the household that required to be so clean and embellished as that secluded spot known as the water-closet. In fact, nothing that was conducive to health was to let anything else stand before it. "Sanitas Sanitatis," as one of our statesmen once said, stands above "Vanitas Vanitatis," and deserves a regard as sincere as its rival deserves condemnation.

CHAPTER XVI.

THE MASTERY OF PAIN. RESEARCHES IN ANÆSTHESIA, LOCAL AND GENERAL.

IT has been shown that in my earliest professional life—student's life—the tremendous subject which called for the attention of the medical mind the world over was that of Anæsthesia. To be able at will to master pain, and to inflict acute suffering, as it would have been inflicted, without causing sensation, was considered by many to be a modern miracle, and some of us were immediately absorbed in the investigation of it. I was one of the first of these, and for a good half-century it has never gone out of my mind or out of my work.

The first examples of the phenomena of anæsthesia were presented in the operating theatre, but further extension succeeded. Dr. Andrew Buchanan of Glasgow began to invent a new instrument for inhalation of ether which arrested our notice, and although it did not succeed as it ought to have done, it was sufficient to lead us all to think. It was an attempt to apply the principle of Wolff's bottle to

the administration of ether by inhalation, and it has since been, as improved upon, largely employed. I soon, on my own investigation, went to work at a new mouthpiece for inhalation, and constructed what has been since known as the double-valved inhaler. A hard material, strong leather, was moulded to the mouth and chin, and a valve was attached to it at its lower part, which opened towards the mouth of the patient. At the top section of the mouthpiece another valve was placed, which opened from the patient and let out the expired air. Thus, when the vapour was drawn in by the patient, the lower valve was opened, the upper one closed, and when the breath was breathed out the vapour was shut off, while the breath found a ready exit. I have the remnants of this mouthpiece still preserved, and, although by frequent lendings of it to medical meetings and conversaziones it has somewhat lost its pristine appearance, it survives still to indicate the original design. The mouthpiece was made for me by a shoemaker named Taylor of Barrowden, Rutlandshire, and was first used by me while my cousin, Mr. Henry Swann of that place—a very accomplished surgeon—amputated the second finger of a man suffering from erysipelas, in the village of North Luffenham. The instrument answered well, but the tube running from it to the ether bottle was too narrow, and it was not agreeably adaptable to the mouth. A little later on I showed it in action to Dr. John Snow; he added a larger

tube, a tube as wide as the windpipe, and he also added a turbine and some other useful details. It was then taken up by another friend, the late Dr. Francis Sibson, and immensely improved on. Sibson saw at once its failure in adaptability, and for the hard leather substituted thin lead. The change gave rise to the Sibson Inhaler with Snow's tube, and was adapted by Snow to his bottle or flask which held the narcotic fluid.

While improvements in mode of administration were going on, a great change took place in the substitution of chloroform for ether, chloroform acquiring reputation and soon taking first place. To Dr., afterwards Sir James, Simpson, the introduction of chloroform has usually been ascribed, and there can be no doubt that from his description and use of it it gained its important place. Simpson, however, was neither the discoverer nor the original introducer of chloroform. In the year 1831, Mr. Guthrie, an American chemist, distilled together chloride of lime and alcohol, by which what he called chloric ether was obtained; soon after Liebig separated the chloroform and named it chloride of carbon, under the idea that it did not contain hydrogen. This incorrect idea was put right by Dumas, the French chemist, who separated chloroform from alcohol, defined it, and gave it the name of chloroform. Then chloric ether was made methodically by mixing together chloroform and alcohol, and it was this mixture that was first given by inhalation

after the discovery of anæsthesia by means of nitrous oxide gas, or ether. In the form of chloric ether, chloroform was administered by Dr. Bigelow of Boston, U.S.A., and by Mr. Jacob Bell, the well-known chemist in Oxford Street, London. Dr. Bigelow was not entirely successful, but Mr. Bell was, and under its influence the late Sir William Lawrence, Surgeon to Bartholomew's Hospital, operated successfully with it.

The agent chloroform which really narcotised was detected as the true anæsthetic by the late Mr. David Waldie, of the Apothecaries' Company, Liverpool, and he stated that in Edinburgh in October 1847 he told the fact of the use of chloric ether to Dr. Simpson, explaining that the substance at work was chloroform and recommending Simpson to try it, promising to make him a specimen for such trial. Meanwhile Dr. Simpson tried chloroform alone on his own account, and announced the discovery of it to the Medico-Chirurgical Society of Edinburgh in a paper entitled "Notice of a New Anæsthetic Agent as a Substitute for Sulphuric Ether." The paper met with unusual success, and chloroform soon became so universally popular that it entered into general use, and the word itself was actually modified, so that it was said that a man or woman was "chloroformed," and that a specialist in the art of administration was a "chloroformist."

To Simpson an immense amount of credit is due,

and he was singularly happy in his answer to some theological sophists who urged that pain was a necessity because Scripture said, in respect to woman, "In sorrow shalt thou bring forth children." Simpson's reply was that, when God Himself performed the first experiment on man by removing one of his ribs, He put man under a deep sleep. But he, Simpson, was really the seventh explorer of anæsthesia, the first, as far as we know, being the great Sir Humphrey Davy, who narcotised with nitrous oxide and suggested its employment in some cases of surgical operation.

In the course of research chloroform became the distinctive fluid for purposes of anæsthesia, nor did a number of experiments with it by the great physiologist Flourens, through which its great fatality was shown, in any way seriously disturb its progress.

It was my good fortune to make an early acquaintance with Dr. John Snow. He was at first an administrator of ether, but afterwards gave up ether for chloroform on the ground of its convenience, and tried to discover the action of anæsthetics and their composition. I and some others laboured in the same direction, and in a paper entitled "A Synopsis of Anæsthetics," published in the *Asclepiad*, Vol. II. (1885), have recorded our experiences. I collected all substances known that had narcotic properties and put them to the test, getting quite familiar with every line of procedure. Snow was most energetic in working with "Dutch Liquid"—ethene

chloride—ethylene, and amylene, and, at last, determining for a while that amylene was the readiest and best, he began to administer it to the human subject. He had not used it three hundred times when unfortunately two deaths occurred from it, and obliged him to give it up and go back to chloroform. These deaths affected him very seriously, and his sudden and early demise may, in some measure, be attributed to their effects upon him, for he had given chloroform in most cases and had met with no fatal result. He had not in amylene accounted sufficiently for its insolubility, and it was not until I ventured to show him separation of amylene in the blood, a separation which looked like the formation of minute plugs, that he fully realised the danger.

After this, Snow could never be induced to leave chloroform. Mr. Nunnerley brought in bromide of ethyl; I followed him, and the bromide answered, but it rather too readily underwent decomposition, and, therefore, had to be laid aside. All the substances had some disadvantages when compared with chloroform, and so chloroform held its ground, but with an increasing mortality. I made the round of English hospitals and collected a series of facts from medical men, coming to a general calculation about chloroform deaths. At one period I had no fewer than seventeen thousand cases without a death, but as the round increased so did the deaths, and in the end I was forced to conclude that the average of deaths was one in two thousand five

hundred, a calculation practically confirmed by Dr. Andrews, and which has been, until late times, accepted by the profession as a body.

LOCAL ANÆSTHESIA : ETHER SPRAY.

The more certain the mortality from chloroform became, the steadier I laboured to discover some new and less dangerous method, and by degrees I was brought to study more industriously local, instead of general, anæsthesia. I knew that some centuries ago a Neapolitan fencing-master had produced local anæsthesia by the application of cold to the body. He had put frozen ice into a thin glass flask, and by applying the chilled part of the flask to the skin had deadened it so completely that an operation could be performed on it without pain. I had also seen an extraordinary cotemporary of mine, the late Dr. James Arnott, a man of consummate skill, so deaden a part of the body by the application of ice and salt that no doubt remained as to the effect of extreme cold as a local anæsthetic. It seemed to me, therefore, that cold would answer the purpose if it could be obtained in a ready way. I unfolded my ideas on this matter to Snow, and he obtained for me carbonic acid like fine snow, which so benumbed that it would have done what I wanted but for the circumstance that it was too active; it not only benumbed and froze, but it sometimes killed outright. I sought then whether the method might not be improved by the employment of narcotic liquids.

One night my wife and I went to a ball after I had been busy in the laboratory for many hours. A young lady with whom I was about to dance let a little *eau de Cologne* fall on my forehead, by blowing it briskly through a small tube. The cold produced was intense, and pinching the bit of skin affected by it I found that it was benumbed. "Thank you!" I said, and seized upon the fact. On returning to the laboratory next day I began to evaporate from the skin light fluids like amylene and ether, and found what I was looking for. Then I constructed instruments that made sprays for the light liquids, and devised the little apparatus worked by bellows which afterwards was known as ether spray apparatus, anhydrous ether, as the evaporised substance, being found the lightest, readiest, and cheapest fluid. Other light fluids, such as amylene and rhigolene, were used, but the ether, from a practical point of view, was the most commendable.

A curious circumstance occurred when I first brought out ether spray. I feared that the freezing as well as insensibility would not pass away quickly and safely enough, and that thought led me to freeze large sections of my own skin by way of trial. On one occasion I froze the whole of my forearm before I went up to tea, wondering if any bad results would follow. They did not, and during the meal all signs of the benumbment fairly passed off. I ventured upon this result to let the late

Mr. Peter Matthews of Berkeley Street extract two front teeth from a lady who was under my care. After I had sprayed the gum thoroughly both teeth came out under the pull of the forceps without giving the slightest sensation. Next I exhibited the method to Mr. William Adams, the surgeon, and went with him to the Great Northern Hospital. He had a patient there, a young man who had caries of the tibia in the right leg. I sprayed the parts; he made a long incision through the skin, dissected the skin back, gouged out the portion of bone which was dead, and caused no pain.

The facts of this operation were soon widely known, and another operation, performed by Mr. Adams, was largely witnessed.

I was asked to use the spray for a case of Cæsarian section performed by Dr. Greenhalgh, and did so with entire success. In a few months the use of the spray became almost universal, operations of a very formidable character being performed under it. Teeth were extracted, abscesses were opened, tumours were excised, and breasts amputated under it, without a slip or an accident that I ever heard of. In one of our military hospitals to which I was summoned, the surgeon in attendance, the late Surgeon-General Sir T. Longmore, was able in one day to perform twenty-two operations painlessly under the spray, and in not one instance had he a mishap.

A gentleman who came under my care had six tumours painlessly cut out under the spray, and I have ever found it, in cases suitable for it, eminently successful. I made some variations: I employed it in combination with pressure, and found the combination all that could be desired.

I am told that the local system has fallen into some disfavour, first because it is troublesome in comparison with the general plan, secondly because the apparatus employed easily gets out of repair, and thirdly because human subjects are not easily operated upon when they are conscious. How far these ideas are true it is impossible to say, but I do not conceive that there is any real ground for them. I suppose that some error has lain in the fact that under the local method cases were found that were out of its range, and that no one plan can be universally carried out fitted for every case. Some day the local method, perhaps a trifle modified, will become the sole plan. Pain will be utterly abolished, and as a part of an operation will not be taken into consideration, because it will never be called forth. The advance in this direction will probably be from the action of compressed gaseous compounds.

In addition to the exposition of the benumbing process by cold, and by cold and pressure, I had in view another advance in anæsthesia by the use of a painless cutting knife. When a blade is made to

cut, or a blow is administered with sufficient rapidity, pain is reduced to a minimum by the swiftness of the vibration. The old surgeons knew this, and my friend Mr. de la Garde of Exeter was, before the days of anæsthesia, so brilliant an operator that people went to him from all parts of England, in order that he might use the knife, or knife and saw, on their bodies. William Cheselden, the eminent surgeon, seems to have been possessed of the same quality so strongly that one of his patients sang of him :—

“ So swift thy hand, I could not feel
The progress of the cutting steel ;”

and Dr. Willis told me that his friend Liston was an operator of the same type, one who could amputate the thigh in twenty-five seconds, so that there really was little time for agony. The same truths have been observed in battle, and I knew an officer whose lower jaw was severed by a shot and carried clean away, without his knowledge.

The effects of the painless cutting knife have been exaggerated in some particulars, but the principle was so correct that at a lecture at York I was able to cut through my skin without pain as I stood at the lecture-table. The difficulty that came in the way was one entirely of mechanism. It was necessary to make the revolving blade so fine and sharp that it was liable to splinter and leave portions of itself in the wound, and the haft, or

apparatus that carried the blade, was too large for the pocket.

I tried for a result of the same painless character by means of electricity, and passed through parts of the body electrical vibrations at such a pace as to make distinct obliteration of pain, with a good prospect of further development in this direction.

I tried to make living parts dead to pain by passing through them lethal substances by means of electricity, and gave to the proceeding the name of "Voltaic Narcotism." The parts to be rendered insensible were covered with fluid narcotic, such as carbolic acid, aconite, or aconite and chloroform; over this narcotic was laid a metal plate connected with one pole, the anode, of the battery, and then the current was allowed to pass, while the end of the other pole was fixed to a different portion of the body. The effects were most singular: pain was abolished, and several operations were painlessly performed. Destruction of surface sometimes followed, and a question was raised whether it was not simple absorption that took place and nothing more. An able physiologist, the late Dr. Waller of Birmingham, warmly supported the latter view, but one of my American brethren, Professor Peterson, who, under the term of "Anodal Diffusion," has specially investigated the experimental work, has recently maintained that I was originally quite correct, and that it was a great pity the matter was ever given up.

Another mode of inducing local anæsthesia which occurred to me consisted in the abstraction of blood from a part. The late Dr. James Wardrop, a surgeon in large practice in London before the days of anæsthesia by the inhalation of vapours, had learned that he could bleed a patient into deliquium, or syncope, and while the sufferer was in this exhausted condition could amputate without the infliction of pain. A lady I knew had been operated upon by him for removal of the breast. She felt nothing whatever of the operation, and only remembered that on coming to she experienced extreme lassitude, from which she did not recover for several days. The process was, I suspect, too dangerously extreme to introduce to the profession at large, although, at the time it was practised, bleeding was not thought of moment. My ideal was not to extract blood generally, but to take it locally from the part that was about to be operated on, which ought to answer the same purpose. We cupped frequently at one time, and I noted that if three round cupping-glasses were put on the skin close together, there was left a triangular portion of the body outside the rims which was white, brawny, and from the absence of blood insensible to pain. I took advantage of this fact in order to prosecute inquiry. There had come to London a Continental physician named Dr. Junot for the purpose of introducing and promoting a boot he had invented which was called "Junot's boot." It consisted of

a metallic boot larger than the leg which was inserted in it, and at the upper part there was an indiarubber fillet which grasped the limb. The boot, fixed in its place, was exhausted of air, and acting as an enormous cupping-glass drew the blood of the body into the structure enclosed, and so was presumed to cup the whole body, relieving pressure from the lungs, the brain, and other parts of the trunk when they were inflamed or congested. I called on Dr. Junot, spent the greater part of a day with him, saw all his plans, and worked the apparatus myself. He was a very shrewd and competent operator, giving me his ready assistance. Then I had made for me a metallic boot, which I still keep, but constructed with this difference, that I let the toes project through another indiarubber opening so that they could be seen and felt. The boot, put on in this way, was exhausted, and, according to my expectation, the toes were emptied of blood and remained for the moment lifeless. I had the boot first placed on my own leg, and with the exhaust syringe I pumped out the air, and found that in the toes there was no sensation while the exhaust was on. Detecting this, I unscrewed the syringe and let in the air. I was, however, too rapid in what I did, and the sudden letting in of the air current caused so extreme a recurrence of flow of blood into the toes I thought I should have died from the pain excited; it was like the most violent toothache I had ever experienced, and the skin

became as red as if I had received a burn, or was under an extreme erysipelas, from which no relief could be obtained except under cold and pressure. However, I got the boot off, and all the symptoms quickly subsided. I fixed the boot on a patient suffering from ingrowing toenail, and being master of all the details I made the toe so insensible that Mr., now Sir, Spencer Wells removed the nail with the most perfect success, the patient looking on, experiencing no pain whatsoever, and knowing nothing except that her foot was cold and dead. The blood was re-admitted slowly, and the trial was as satisfactory as it could be.

To this method of abolishing pain there were objections, so it was not pressed. The apparatus was clumsy; its application was very limited; the employment of it called for unusual care, and it passed out of hand as a form of practice. But in a physiological direction it was of great value to me, and has remained of value. It told me that the blood in its natural distribution through the body gives something to the nervous expanses, which, being collected by them, supplies sensibility, and, on the other hand, that when that something is not supplied by the blood the result is insensibility and practical death in the local part, even though there may be movement.

In the many attempts to remove pain by local measures I should not like to forget an assumption

which came from America, that electricity by the Faradic current might be usefully employed, especially for the extraction of teeth. When this was first made public I did my best to ascertain the truth of it, and wrote a communication to the *Medical Times and Gazette* in which I showed it was a kind of repetition of the schoolboy trick, where a hair was pulled out of the head while a smack was administered, any success that might have followed being due to diversion. The late Professor Marshall endeavoured to apply the principle of the battery to cutting experiments, but signally failed, as did many other inquirers. At first it appeared to me that we might have been in error in regard to time, and that the intermitting current long continued would possibly produce anæsthesia. To test this point I asked Dr. Julius Althaus to pass a strong Faradic current through my own ulnar nerve from the funny-bone to the little finger, and to keep it up for a long period. He was good enough to do so, and I cannot deny but that after application for an hour my limb was somewhat benumbed. The process was, however, too long for practical work in which cutting operations had to be performed.

The dentists took the greatest pains with this new method, and, I believe, now and then on the diversion theory were somewhat successful. There was a meeting of dentists at the College of Dentists in their rooms in Cavendish Square, and a Committee was formed, over which I was requested to preside,

in order to see if any real practical utility could be secured. The Committee included some most competent operators, and patients were drafted from all sides to bear witness from their own sensations to the effects of the current. The current was applied by attaching one pole of the battery to the forceps used for extracting the teeth, while the terminal of the other pole was grasped by the patient. We met a great many times, and drew up a report, which, I am bound to say, taking it all in all, declared a negation. Some curious things happened, nevertheless. A gentleman well-known in the medical world by the name of Dr. Elliottson—a man about whom the late Mr. Charles Dickens wrote with energetic praise, who edited the *Zoist*, was Physician to the Mesmeric Hospital, and passed as a mesmerist—sent me a note saying that he should very much like to be present during the experiments of the Committee. My reply was a cordial invitation, and it led him to come regularly and sit by my side while the operations proceeded. There was another gentleman there, a friend of Dr. Elliottson, an earnest mesmerist, and he was allowed to make his passes on every patient, if he liked, the facts being recorded. One day an energetic electrician brought a battery of his own; he attached one pole to the forceps, placed the other firmly on the body of the patient, and requested the operating dentist of the day—Mr. Peter Matthews—to proceed. To my surprise, as the dentist put the forceps on the tooth, the patient,

a small, nervous woman, fell back in the chair in deliquium, or faint, and the tooth was extracted without pain or knowledge. The electrician cried "Eureka!" as did also the mesmerist, who was making passes at the same time; but Elliottson, as well as myself, felt sure that the woman had simply fainted; that the destruction of pain was due to that condition solely, and was owing to the intense shock of the electricity. The electrician and the mesmerist quarrelled, each of them claiming the discovery as his right, and each urging that his respective claim should be placed on the report, against which a large majority of us protested, so that the act was never carried out.

I give these details in order to record fully a peculiar circumstance. Dr. Elliottson, a tabooed man in physic, who had lost his position at the University College Hospital, and who had been severely censured by the late Mr. Wakley, founder and editor of the *Lancet*, walked home with me from Cavendish Square, speaking freely about the phenomena we had seen. He agreed that the electricity merely produced a faint, and also agreed that his friend the mesmerist had done nothing to account for the painlessness of the operation, an admission which led him to make a remarkable statement, I now, for the first time, publish. He said: "You are too young to remember all that I have had to go through for mesmerism, and you cannot imagine what it is to drop from the heights of a

profession to its deepest depths. I believe," he continued, "I was not wrong; I believe that in what I originally saw mesmerism played the parts precisely that I claimed for it. It is a wicked error to suppose that I was a party to a deception, or to a whole series of deceptions, if you like; but I candidly say that the phenomena which have been presented by your committee now show me that mesmerism, at the present moment, has no power to remove pain. It is a mystery; it had power, and I once saw a leg painlessly removed under its influence; but we are now in another cycle, and it seems to me that there are special periods only in which mesmeric phenomena can be induced, and in which there are persons anxious to give them full trial and effect. In point of fact, there are at times, I surmise, some external or electrical influences, of which we know nothing, but which play their part for a season on the mind as well as on the body, so that the most cautious man may be misled by what he sees, without, for a moment, trying to mislead." Whether there was any truth in this theory of Elliottson I was unable to say, but some recent opinions in reference to what is called "hypnotism"—which is, in fact, only a kind of mesmerism—give countenance to the truth of his observation.

Returns to General Anæsthesia.

The new method of local anæsthesia by the

Faradic current melted away, and, as far as I remember, all the history of local efforts has been narrated from personal knowledge. It is time, therefore, that I should return to the general method, about which I may say there are *pros* and *cons*. The arguments for it are that it causes universal insensibility in the form of deep sleep, and that, during the operation, it creates no sensation of alarm or expression on the part of the patient, a signal comfort to the operator and his assistants. The chief argument against it is that with all its excellences it has one bad quality, as bad as can be—it occasionally kills. I would not claim that deaths under it are invariably due to it, for before it existed there were deaths from fear. Nay! I once saw a man under local anæsthesia all but die in consequence of extreme fear while the late Sir William Fergusson was removing a tumour from the ball of his thumb. Very often, however, general anæsthesia actually kills. I have administered general anæsthetics of the most varied kind to the human subject many times, and never saw a death, but I believe that except for some fortunate accidents, which saved me from the sight, I should have seen three deaths that occurred under administrators quite as skilful.

The late Dr. John Snow, to whom reference has more than once been made and who was the leading practitioner in anæsthesia, employed chloroform in four thousand cases without a death; he had two deaths from amylene, but none from chloroform;

he held the first place in his department, and administered chloroform twice to Her Majesty the Queen. He died rather suddenly at the comparatively early age of forty-five years, on June 8th, 1858. His last work was the preparation of a book on *Chloroform and other Anæsthetics*, and singularly, the last word he wrote was "Exit." The work, at the time, was looked upon as a standard, and after his burial his brothers and sisters asked me to edit it and add a Life, which task I undertook. They also invited me to take his anæsthetic practice, but it was not in accordance with my predilections, and so it passed largely into the hands of the late Mr. Clover.

The specialistic position of an anæsthetist did not suit me, but I never ceased to be an inquirer as to the best mode of producing general anæsthesia, of inquiring why it was produced, and of taking means of restoring life after its use.

Bichloride of Methylene.

As the synopsis of anæsthetics published in the second volume of the *Asclepiad*, pp. 257-277, will show, I went over the whole field of anæsthetic substances and introduced no fewer than fourteen on my own account, two of which ought to be mentioned—the one, bichloride of methylene, or methylene, as it is commonly called, and the other methylic ether. I was led to bichloride of methylene by ascertaining from experiment that

in the haloid or chlorine series of chemical bodies the danger lay in the presence of the chlorine in them. There are several bodies in the haloid class—namely, chloride of methyl, bichloride of methylene, chloroform, and tetra-chloride of carbon. To understand the series you must open the fingers and thumb of one hand, letting the thumb represent carbon all through, and you see the facts. In the first, methyl-chloride, the thumb represents carbon, the first finger chlorine, and the three last fingers hydrogen. In the second, methylene, the thumb represents carbon, the next two fingers chlorine, and the third and little finger hydrogen. In the third, chloroform, the thumb represents carbon, the first, second, and third fingers chlorine, and the little finger hydrogen; and in the tetra-chloride of carbon, the thumb still represents carbon, and all the fingers chlorine. As the danger lies with the chlorine, a heavy body that does not adumbrate freely and is an irritant, it occurred to me that if I could produce a liquid like to chloroform, with one equivalent of chlorine less than in chloroform and one of hydrogen more, I should have a lighter liquid, a quicker anæsthetic, and less danger. I substituted, therefore, hydrogen for one part of chlorine and so produced methylene, a fluid which had true anæsthetic properties, as I had anticipated, and as I proved by administering it to inferior animals. When I became familiar with it I got the late Mr. Peter Marshall of Bedford Square, in the beginning

of 1867, to administer it to myself. I found its vapour agreeable; went rapidly into a deep sleep; lost all consciousness of pain, and recovered without a sign of danger. Upon this I ventured on the same day to administer the substance to a lady on whom Sir Spencer Wells was going to operate for ovariotomy; caused her to sink into a deep sleep; bear the surgeon's knife without being conscious of it; remain asleep for more than an hour, and finally come to herself without the slightest danger. Since that time I have over and over again administered bichloride of methylene, and have never seen from it a shade of risk. On the point of its safety and efficiency many other practitioners have agreed with me, and none more thoroughly than Sir Spencer Wells, who since its introduction has invariably used it, without any death from its use. Others have not been so fortunate, but there cannot be a doubt that, while it is as easy to administer as the chloroform, it is less fatal. It has been estimated that the deaths from it are one in seven thousand, a figure I cannot confirm, because in one instance, at least, it was not the bichloride that was employed, but chloroform.

One morning when I was at Sheffield a leading dentist wrote to me asking if I would come to see him administer methylene. I went and inspected all his appliances, which were most complete. He had a room filled with patients, and had one good administrator. He made it a custom to narcotise

the patient and operate for the extraction of a tooth in nineteen seconds of time; and I am bound to say that he was successful, and that by stop-watch I never saw him make a slip during half an hour. His plan was to let the patient sit and breathe the vapour for the precise time named, and then, in whatever state he was, he was subjected to the operation. "There is not time," argued the dentist, "for any one to die, and not one will feel." Not one did feel. I questioned each leisurely about the operation, and not one could remember any painful sensation. They could remember what the operator said, and they could obey him as to situation, opening of the mouth, rising from the seat, and rinsing of the mouth, but that was all.

In the above instances I have no doubt that rapidity helped the methylene, but in other instances methylene alone was the factor.

I have written many papers on methylene, explaining the endeavour aimed at in introducing it and the limitation of its mortality when the true substance has been given; but I have never enthusiastically pushed the matter, because I am sure that the chlorine series is altogether a mistake, and that chlorine should be entirely omitted. I am satisfied that the chlorides, whenever used, should be inhaled in the smallest possible dose, and that ample time should be given for the anæsthesia. The vapour of chloroform should be diluted to the utmost degree, eighteen grains of it

being sufficient in the blood to produce the deepest insensibility, while a greater portion is dangerous. Care should also be taken in regard to the temperature of the air, because a low temperature defers the action, a high temperature quickens it.

To a class of medical men, sixty or seventy in number, I made a demonstration of all these facts in a post-graduate course of lectures. I illustrated the action of Snow's Balloon and an analogue of it, known as Clover's Bag, in which the narcotic vapour is so diluted with air that the compound breathed is charged only with five per cent of the narcotic. I have also in practice persistently induced general narcotism by extreme reduction of the volatile narcotic and its very slow administration.

Methylic Ether.

But the great object of my research has been to find a new narcotic altogether that shall make an atmosphere perfectly safe, and, at the same time, perfectly anæsthetic, so that a surgeon himself may, without any hesitation or fear, attend to the giving of it—if necessity should call for that procedure—as well as operate.

By constant inquiry I have come to so near an approach to accuracy that if a chemist were to bring to me a fluid, and recount to me its composition, specific gravity, boiling point, and vapour density, I could tell at once whether it were or were not an anæsthetic; how much of it

would be wanted to cause anæsthesia; what length of time would be required for its inhalation, and what length of time would be necessary for its escape from the body and for recovery from its effects. I am also convinced that there is a new chemical to be found which will destroy sensibility without necessarily destroying consciousness, and the chemical that has appeared to me to present the best qualities for general anæsthesia is what is called methylic ether, a substance on which I have reported several times and have administered over thirty times for surgical operations. I discovered it to be an anæsthetic in 1867, and I repeat what I then said—namely, that it may be considered the safest anæsthetic that has yet been discovered, although it is troublesome to administer and would have to be condensed if it were to be brought into use. It has a curious faculty of destroying sensibility before it destroys consciousness, and recovery from it is exceedingly rapid. Its effects were very well manifested in a patient to whom I once administered it while Mr. Brudenell Carter operated. The patient, though feeling nothing, was quite conscious of all that went on during the operation. I observed also that the gas is so safe an animal under its influence may remain breathing it for twelve minutes without dying, and, if allowed apparently to die, may be recovered by artificial respiration so long as seven minutes after the cessation of respiration—that is to say, after what appears to be actual death.

Means of Recovery.

The introduction of these new anæsthetics naturally took up a great deal of time, but there is another subject in connection with anæsthesia to which it has been necessary to devote the most careful attention, and which, indeed, bears on the chapter on "Reanimation;" I mean the best methods to be adopted for restoring life when life seems to have been extinguished by the administration of a narcotic vapour. No man living can be in a more deplorable condition than the man who, talking for the moment to a patient in a friendly and possibly assuring way, applies something to the mouth or nose, which the patient breathes and is silent for ever. A dear old friend of mine, by occupation a dentist, an accomplished man and a very feeling man, occupying a good position, one morning experienced the sad fate noticed. A lady drove up to his house to have a tooth extracted; she, full of grace and beauty, smilingly sat down to breathe chloroform, and died before the tooth was touched. The poor dentist could not believe the sight that was before him, and he never got over it; it was ever on his tongue and on his heart, and he became an old man in an hour. These and other facts encouraged me to carry out months of experiment to learn how to meet such catastrophes, but, in the end, I got no further than artificial respiration as a remedy, some lower animal being, of course, the subject tested.

A kind of *ad captandum* belief had suggested electricity as the mode of recovery, and unquestionably the current—especially the Faradic—makes quiet muscles move, and gives appearance of vitality; but, alas! it is only appearance, and I found that when the current played upon the heart, it merely wore it out and clinched the danger.

I invented another instrument that would move the muscles of respiration in regular order, using my wife's metronome as the throbbing instrument that governed the current, and imitated natural respiration so orderly that it was hard to tell if the animal were living or dead; but I only wore out the muscles and clinched the danger.

I constructed a third instrument which by the electrical current moved the heart and the respiration at the same time in their natural ways, but fell into the same error. I used baths of various kinds without effect. I invented what I called *artificial circulation* in 1860, tried by it to restore the circulation of the blood, and was so enthusiastic as to possible success that I actually got up in the middle of the night to test its value. I instructed Mr. Osborne, a mechanic living in Clerkenwell, to construct for me an instrument that would, by different movements of the piston, either inject or exhaust the vessels, and, in short, I could not repeat all the mechanical contrivances that were devised and applied, to no purpose.

Notwithstanding many disappointments, I came at last to the conclusion, that simple artificial respiration, promptly applied, not infrequently succeeded, and I gave a lecture to medical men on this subject, which was afterwards published. The effects were very singular, and so striking that I could, and can, if the experiment be in my hands throughout, administer a narcotic until it produces what the world would call death of the animal, and then, by the timely application of a double-acting pair of bellows I constructed—which fills the lungs with air by one stroke and empties them by another—actually reproduce the phenomena of life once more, so that there is positive re-existence with entire recovery.


There was a great meeting of the British Medical Association at Leeds in 1868, and a gentleman was lecturing on anæsthesia. He narcotised an animal until everybody believed it was dead, and he left it as dead on the table. After he had finished his discourse I asked him if I might try to restore the quiescent victim, which would otherwise have been buried, and, obtaining his ready permission, I set up artificial respiration with my double-acting bellows, taking particular care first to exhaust freely. The result—to the surprise of every one—was that after a few minutes the animal began to breathe of itself, and made so perfect a recovery that it ran the length of the table, found its own lair in a box there, and was restored in the happiest manner.

In death from narcotics nothing seems to me to be so effectual as artificial respiration ; flipping, and other methods of a minor character, are trifles which may do good when life has not passed away, but the distinctive method known up to this hour is that of restarting the breathing. More will undoubtedly come, so that if we do not get a narcotic vapour which will not kill, a possession we hope for and have all but got in methylic ether, we have still to anticipate means of restoration even against the effects of more serious agents intended for the extinction of pain.

One suggestion I would merely add in this place. It is that in carrying out artificial respiration the operator should always begin, not by pushing in fresh air, but by drawing out. Drawing out removes any chloroform that may be resident in the bronchial tubes, and causes the blood in the lungs to give off its vapours ; it does more than this—it causes the fresh air to re-enter without any effort or danger, and that, absorbed through the lungs, is a definite assistance. I have often pointed this out to my classes, and have shown that the very question of life or death may depend on the way the respiration is artificially recommenced.

CHAPTER XVII.

IN THE SPHERE OF PRACTICAL MEDICINE.

 GREAT many years of work are demanded before a man can acquire all the details of medical education. Medical life is hard, and often short. The early part of it is singularly arduous and exposed to danger. The studies and examinations are, in severity, beyond comparison with any other. The attendance in the dissecting-room is alone a tax which has to be felt to be understood, and the observations of surgical operations, much as they have been modified by the use of anæsthetics, are severe ordeals. The work at the bedside in the presence of contagious cases calls forth the most uncommon risk, and the variations of speech and mind of the sick are often of the most trying kind. The last named anxiety never quits practice, and is probably, on the whole, the worst. The other troubles, if they do not wear away, are tempered by nature, but the mental tone of the affected never loses its character and rarely its variability. Disease of the body is ever attended with a certain aberration of the mind, or, as usually expressed, "the sick have their fancies."

A truer saying was never uttered, and the doctor must always be ready to accept and meet it: it becomes a part of his duty; he will be praised to the skies for what he has never done, and he will be damned to the lowest depths for what he has never dreamed of, much less effected. People wonder why a doctor of the sick has so little faith in physic, and why he so little relies on any one of his brethren: they would not wonder if they knew. I have been obliged to write at least a thousand prescriptions for medical men, but I never heard of a hundred being taken even casually, nor of ten systematically.

As a body, doctors are good, generous, and industrious men: their anxieties do not immediately increase upon them by the sights they see; they may even leave a dying patient and partake in a friendly meeting as if nothing had oppressed them mentally—a fortunate circumstance for everybody as well as themselves. They are constantly misinterpreted, and on this point they are, as it seems, callous. They get into practice, and stick in a groove for the whole of a lifetime, feeling strongly that “all things are alike to all.” I once so greatly surprised and interested a bishop by saying that the writer of *Ecclesiastes* must have been a doctor, that he—the bishop—formed the same idea, with this reservation, “You mean a pessimistic or a godless doctor,” at which we both had our quiet smile.

The groove in which a doctor will stick is a narrow one, and as people are usually to the world just what they seem to be, the doctor is left to his fate. One of the best qualified practitioners I ever knew in London lived to the end of his life in a house where he kept an open shop. He saw his patients in a neat little room on one side of the shop, in which room he piled up the choicest books, collected the finest instruments that could be obtained, and expressed the best opinions that anyone could listen to. He knew what a qualified man should be; but he was never hard on any member of his profession, so far as I heard, except once in his life, and then he had just occasion, since he was snubbed by a bragging official.

In my own way I was, on the whole, fortunate. I made up my mind early to be a prescribing physician, and found ample scope for my labours in that direction. Four large public dispensaries—namely, the Blenheim Street, the Metropolitan, the Marylebone, and the Margaret Street—gave me fields for practice, and for fourteen years the Royal Infirmary in the City Road did the same—so that sometimes I would see two hundred sick persons a day, and every class of disease common in an English community. The practice was wide, and the customs witnessed were most singular. I remember once that a good soul of a woman who kept a fuel store in a side street off a crowded thoroughfare used to

bring her husband to me in a little cart with his body covered with small coal, under the idea that by this means she was keeping him warm. I found another woman with the medicine she was taking—an ether mixture, and therefore volatile—making it warm in a long pointed tin vessel, such as is used for warming beer, in order that it might be agreeable to take. Several other vagaries of a like kind came before me, but they were all well-meant. Once I was called to visit a servant in Russell Square, who resided in a large, rich house, with kind people who subscribed to the dispensary. They were entertaining a party to dinner, and when I went in I was attended to at once by a motherly housekeeper, who took me upstairs to the patient, afterwards bringing me down again into a charming little drawing-room, while she went to her mistress, whom she brought away from her guests. The two women came into a room adjoining the little drawing-room, and I could not help overhearing their conversation.

“Has the doctor seen Rebecca?”

“Oh yes, ma’am! and we have only to send to the dispensary for the medicine.”

“What sort of man is he, and how did he come? Did he drive?”

“Oh! I think you’ll like him, ma’am; but—poor devil!—he is only a walking doctor yet.”

Then they both appeared before the “walking doctor,” heard his opinion, acted upon it, and became the tenderest and most successful of nurses.

All kinds of professional characters appear in the sphere of medicine. One man considers himself a practical man, and, because he finds it a good card, tells everybody so night and day. He doesn't know the circulation of his own blood, or, even if he did, has forgotten it. But he is a practical man: says that "a grain of practice is worth a bushel of theory," and usually thrives. He is a plausible creature. He never meets you but he puts out of the window of his carriage a strip of paper as long as your arm containing a list of the patients he has to see before he can sit down to his dinner. His wife declares that nobody waits at meals for him, and so she always keeps something ready for him. He gets out of the carriage with a step peculiarly his own; knocks at the door in his own way, and washes his hands in a manner that everybody might swear by. But altogether he is not a bad fellow; and when he retires he may not be sorry to fill up his time by becoming a Bible Reader or by holding the plate at the church door.

I recall with great satisfaction and pride an event which formed a striking part of my career. The profession had read my works largely, and its learned bodies over the world had conferred on me their honours with liberal hand; while several other societies—just out of the domain of physic, but in that of science—sent me their honourable decorations. The Royal College of Physicians of London had

made me one of its Fellows; the Faculty of Physicians of Glasgow, and the Pathological Society of Berlin had done the same; the Royal Society of London had conferred on me its degree—the blue ribbon of Science; the Society of Antiquaries had made me an F.S.A., and my University had conferred upon me the degrees of M.A. and LL.D.; the Imperial Leopold-Carolina Academy of Natural Sciences sitting at Dresden had enrolled me as its Dr. Haller of the nineteenth century; the Academy of Physiological Sciences of Turin had sent me its diploma; those useful bodies the Società Italiana d'Igiene and the Société d'Hygiène Publique of France had treated me in a similar manner; the Philosophical Society of America added my name to the list of those who, from the days of the illustrious Benjamin Franklin, had figured on its rolls; in Wales I was made an Ovate of the Eisteddfod; and on one occasion was requested by a small Welsh village to deliver a scientific lecture to an assembled multitude under the wall adjoining the church on a Sunday afternoon—a distinguished duty I had never expected, but gladly fulfilled. These and other honours came upon me; but there was not one I prized more than that which the Professors of Physic gave to me in the form of a testimonial consisting of a beautiful microscope, worth a hundred guineas, and a purse of a thousand guineas. They gave both, as their Chairman, Sir James Paget, expressed for them, in recognition

of the spirit in which the works by which I was known had been carried out. It is nearly thirty years since this event occurred, and it has ever been a gratifying remembrance, telling me what the members of the medical body felt and the class of work they deputed to me to continue to carry on. It is my privilege to say that the mission entrusted to me by the professors of practical medicine has been faithfully discharged; and although in respect to one grand subject that closely affects medicine both as a science and an art I have been guided by Nature—who is All-supreme—to differ on the question of alcohol from the majority of my brethren, I have no fear for the future. In fifty years the majority will think and act as I have done, and will praise, rather than depreciate, the researches and deductions I will endeavour to delineate in a following chapter.

Books, Essays, and Papers.

Up to the time, or nearly so, when the testimonial was presented to me, the different inquiries I had followed out had been made known in various ways. Public health had been discussed in the old *Sanitary Review*; many social topics had been subjects of discussion, in verse as well as prose, in a journal, conducted by me from 1862 to 1868, called the *Social Science Review*; the old *Medical Gazette*, the *Medical Times and Gazette*, the

Association Medical Journal, and the *Lancet* were periodicals in which a great many of my papers on medicine were written. To the *British and Foreign Medico-Chirurgical Review* I was a regular contributor, publishing every six months, for some years, the forensic Reports of that quarterly, besides other papers ; and at last, in order to keep my communications in form, I started the *Asclepiad* on my own account, commencing with a small volume, and continuing later on in regular quarterly numbers, until, with the first attempt, as many as twelve volumes have been issued, or, in all, some five thousand octavo pages including about five hundred articles. In the *Asclepiad* the attempt was made to submit long-studied clinical observations ; addresses that affected the public health and the public welfare ; practical opuscula useful to those who are engaged in the battle with disease ; outlines of some of the past great leaders in physic ; original researches, and reviews.

It is not possible in this place to enter into details on any of the works named : they must stand for themselves, and answer for themselves in the pages in which they were originally placed ; but there are a few of them I hold in particular memory as roads open for the future studious investigator, to which I might add some records of original treatises published independently of medical journals, and not infrequently in a separate form, as a pamphlet or as a book of different size—as, for instance, “ Diseases

of Modern Life," "The Field of Disease," and "The Commonhealth." The particular labours which have been most engrossing are included in some of the chapters of this volume, the researches on Reanimation and on Anæsthesia holding a prominent place. But others, of interesting character in their way, have been allied. An inquiry into the existence of a nervous ether, or a volatile medium spread out through living animal bodies—a medium that adumbrates under the external vibrations; connects one animal body with another, and is absorbed by the dead structures—excited considerable attention and discussion. An attempt to find out and describe, for the benefit of the world, the absolute signs and proofs of death was zealously and practically made, and the effort to change the colour of animal tissues, and thereby restore the natural complexion and features of dead persons, was, at least twice, successfully carried out.

Lectures.

In addition to the labours incident to the practice of attending on the sick, I had the duty of giving many lectures and demonstrations to my medical brethren and to those who were interested in medical labours. A course of Lettsomian lectures was given at the Medical Society of London on "Certain Phenomena of Life;" a course chiefly on "Medicines" before the Royal College of Physicians; a Croonian lecture, before the Royal Society of London, on

“Muscular Irritability after Systemic Death;” the Cantor courses, before the Society of Arts, on “Alcohol,” “The Preservation of Animal Foods,” “The Diseases Incident to Occupations,” “Nature and Man as Mechanics;” and also some on varied subjects before the Royal Institution and the London Institution.

But the courses that cost me most time and attention were connected with certain “post-graduate” courses prepared for medical men, and delivered in my own private lecture-room, or, when more convenient, in one of the lecture theatres of the late Royal Polytechnic Institution in Regent Street. These lectures, entitled “On Experimental and Practical Medicine,” not unusually extended over many months, and were largely attended. The substance of some of them is included in previous chapters of this book, but not all. Some were devoted to the subject of “The Measurements of Life;” “The Art of Embalming the Dead;” “The Effects of Electricity on Animal Bodies;” “The Condensing Power of the Lungs;” “The Study of Disease by Synthesis;” “The Action of Extreme Cold on the Brain and Nervous System;” “The Effects of Injection of the Nervous Cavities;” “The Action of Chloral Hydrate and of Methylal;” “The Constitutional Character of Remedies;” The Influence of Various Medicinal Agents, such as Amyl Nitrite and the Members of the Nitrite Series;” “The Ethylates;” “The Negative Action of Opium

on Birds and of Tobacco on Goats;” “On Artificial Respiration and of Double-acting Bellows for Emptying and Inflating the Lungs,” with “Demonstrations on the Blood in its Extreme Fluid as well as Condensed Conditions.”

It would fill this volume altogether if I were to attempt to publish these lectures in detail, and it would be republishing what has already appeared in the *Medical Times and Gazette*, the *Lancet*, the *Society of Arts Journal*, in separate treatises, as well as in periodicals like the *Popular Science Review*, *Longman's Magazine*, and the *Gentleman's Magazine*. Two or three, however, deserve special mention because of their bearing on progressive medicine.

Synthesis of Disease.

In treating on the study of disease by synthesis I illustrated that rheumatism could be induced by the introduction into the body of organic acids like the lactic; that cataract could be temporarily induced by raising the specific gravity of the blood—a fact deduced from the experiments of Dr. Weir Mitchell of Philadelphia, and shown to be the result of the action of all saline substances that maintained their composition as such in the body, but not of substances like iodide of potassium, which underwent decomposition. I also showed that the blood is only capable of receiving a certain degree of dilution with water, and that when it is charged with the fifth of its own weight there must be exudation and dropsy.

Electricity.

A considerable interest was taken in my work on electricity. A current was made to flow from one pole to another, nineteen inches apart. Rigor mortis was developed. The current of electricity in various states was made, through various structures, including blood, and white and grey nervous matter. Marks were produced on the surfaces of membranes, and the varied effects of ordinary lightning were displayed as exhibited on animals and on men.

Researches on the Brain.

The influence of extreme cold on the brain was made manifest; and, for the first time, brain centres were artificially frozen, and the effects of freezing different parts were manifested by the perversions exhibited in muscle. The brain could be seen in the frozen state, and when the cold was withdrawn, perfect recovery of the unconscious animal could be observed.

A demonstration that created considerable interest was one showing the effects of injection of the brain. It was made clear that if into the cranial cavity of an animal like a rabbit—recently put to death without pain by the inhalation of a lethal vapour, such as the vapour of chloroform—a hollow needle were immediately introduced through the optic foramen, and if through it, directed by a small

syringe, a column of fluid mercury were introduced into the centre, the injection first appeared in the lower iliac veins, filling them and rising through the ascending vena cava to the heart; the inference was that the cerebro-spinal fluid empties itself into the venous system independently, and that, through venous obstruction caused by an obstacle present in the lower part of the abdomen, pressure of fluid on the brain may take place with symptoms resembling those of eclampsia or vertigo. This truth I once saw corroborated in a patient—visited with Dr. Cooper Rose—in whom consciousness, lost by pressure of fluid on the brain, was perfectly restored by the simple process of drawing off an accumulation of serous fluid lodged in the cavity of the peritoneum.

Cardiac Pulmonic Balance.

Great attention was paid to an attempt to determine the cardiac pulmonic balance, which may be presented in the course of disease. The force of the heart and of the respiration were shown to be due to the two motive powers of the body derived from the two primary forces—the attraction of the earth, which tells on the whole body, and the force of combustion, which develops within the body—each of them regulated during life by the respiring and circulating apparatus. The balance between the two forces, exhibited by the body, was shown to be essential, the balance disturbed being always a cause of danger, and, actually broken, always fatal.

Biometrical Measurement.

A subject that led to considerable discussion had reference to the measurement of life as an exact science in practical work, in assurance of lives, and in other relations, social as well as medical.

Auto-Poisons.

On several occasions the minds of the audiences were drawn to the acceptance of the view that the living body, under a perverted chemical process, could be the manufacturer of its own poisons. This was exemplified in instances of uræmia, and still more strikingly in other septic examples.

From the abdominal cavity of a patient, operated on for ovariectomy by Sir Spencer Wells, a pint of dark septic fluid was drawn from the peritoneal cavity, and was subjected by me to treatment as if it had been a fluid containing an alkaloid like morphia. It yielded a fine acicula crystalline substance, to which I gave the name of "septine," and which I showed to be capable of exciting in healthy animals direct septic disease, its intensity of action being so increased by extension of the infectious process that at last it could be diluted in the most remarkable degree and retain its virulent power. At the moment excitement was being created by what was later called the "germ theory"—a conception which was, in point of fact, a repetition of Dr. Dwight's animalcular hypothesis, founded on a

false analogy, and not, I thought, so clear as what I called the "nervous theory" of spreading disease, depending upon the conversion under nervous influence of specific poisons generated like the alkaloids of excretions and affecting the organism as septic particles that were thrown off by glandular exudations.

It has been fortunate for me that in the delivery of lectures, both at home and abroad, I have often used for brevity's sake words and phrases which afterwards took root, and which, to my own wonderment, became set forms of speech. Thus the term "cardiac apnœa," intended to convey the idea of breathlessness with open air-passages, breathlessness commencing not in the lungs but in the heart, has been employed as a familiar term in the medical sphere; and "hydrops bronchialis" is taking the like course. So, in a still wider sense, the terms "The Lethal Chamber," "The Synthesis of Disease," "The City of Hygeia," "The Devil in Solution," "Brandy Palsy," "National Health is National Wealth," "The Poverty of Wealth," and others of like quality have gained prevalence. The words as spoken suited the occasion in the first instance, and later on occasion suited the words.

Apart from lectures and personal practice, I found in the sphere of medicine much good from outside comminglings.

I once had to carry out a peculiar and special duty. I was commissioned by the late Mr. John

Churchill, the publisher, to write for the *Medical Times and Gazette* a set of essays on "The Medical History of England." I went from city to city, from town to town, and from hospital to hospital, in order to see the practice of physic and state of physic as it existed then; and afterwards—though I did not publish the facts—I got into the way of observing the medical history of other countries in which I happened to move. Here and everywhere the same professional traits were present, generosity being the leading spirit. In England I could not have met with that quality in better form. Every medical man visited was hospitable to the last degree: he strove to make his home mine; he put himself to every inconvenience to assist me; his wife was always his true helpmate; and his children, when he had any—and he mostly had—were his and his wife's second selves. He was more than hospitable in his own house: he would drive me all over the district in which he practised; point out to me its places of interest; recount to me the most remarkable stories of its history; visit his professional neighbours in order that I might personally know them; lead me through the hospitals he knew, and acquaint me with every detail, good or bad, of their construction; describe varieties of practice, and their results, and call my attention to any number of cases of disease. Constantly as we were walking or driving we would meet some person of whom there was a strange life history told to me clearly,

and not unusually corroborated by the person himself; so that if it had been my wish, and time could have been then at my disposal, I could have composed many a story from what I heard—in fact I did keep notes of the most remarkable.

The inquiry for the “Medical History of England” lasted many months, and the account of it extended over many hundred columns. Unfortunately, practice was ever calling me to London. I had to travel by night in my journeys; often had to write in the train, and to work like a slave at all times. My rest was very much broken, but I was in the prime of life, between thirty and forty years of age; was physically built for the task; could sleep on a board; mentally had my eyes open to all that was shown to me, and nothing impeded me. It has since more than once occurred to me to put the history presented, in regard to its more striking incidents, into one readable volume that might be as interesting to the general as to the medical reader: for I saw the pale of physic in its widespread distribution; met with its members in full life, in budding life, and in old age when they could tell stories of predecessors long gone and of customs and practices withered, or even dead and buried. Phantoms of the old friends haunt me in these days; sit by me as they did in the old time; tell me their experiences and histories, and show me their curiosities, so that I myself carry several generations of those within the pale of physic in loving memory.

CHAPTER XVIII.

QUESTS FOR REMEDIES AND MEANS OF CURE.

IN the earliest days it was a part of the work of the physician to go out with his "basket" to seek the means of cure and find the natural remedies that lay at his command. The professors of the art have been divided in their search: some have sought for the means of cure solely in the vegetable kingdom; others have tested the properties of the mineral world, and a few have wandered in both. With the natural instinct of my many predecessors I have gone out to find remedies and means of cure, but have neither made Galen or Patin the exclusive guide.

It has been shown that in my first days the study of ammonia as a medicine engaged my thoughts, as well as the medicines of the haloid or chlorine series. I detected, in working with bodies of the chlorine series, like chloroform, that they possessed the property, when their vapours were inhaled, of reducing the animal temperature; and I several times undertook, with signal success, the treatment of diseases of the febrile type by putting the sick under the influence of the vapours named, inventing for the

purpose the bead-inhaler, in which a string of beads was made to receive the remedy, and from which its vapour might be regularly drawn.

Hydrogen Peroxide.

After I had settled in 12, Hinde Street, London, and had furnished my laboratory, I passed to a new study by the investigation of the medicinal qualities of a chemical fluid which the famous French chemist, Thenard, discovered in the year 1818, and to which he gave the name of Peroxide of Hydrogen. The fluid was water charged with oxygen, which gas it gave off freely on coming into contact with different substances, animal, vegetable and mineral. What led Thenard to discover this peroxide I could never detect, although all his works were in my hands in volumes that once belonged to the well-known historian Buckle. I was not the first aspirant in respect to the peroxide itself, for the authorities of the University of Haarlem had offered a tempting prize in regard to it. I was the first to make the inquiry into it as a remedy; and although the award claimed for me by the late Dr. Macdonald of St. Andrews was withdrawn, I had never any occasion to regret the researches I carried out.

It was in the early fifties I commenced, and the reason for the commencement rested on a dispute then actively in progress as to what remedy was the best in the treatment of diabetes. It seemed to me that to give oxygen freely was the most scientific

course, and, following Thenard's method of manufacture, I made the peroxide, for I could obtain none in any chemical depot, and I could hear of none except a little specimen that had been made for the late Sir Benjamin Brodie of Oxford, a chemist, and son of the well-known surgeon of that name. An immense deal of difficulty was experienced in this inquiry from the necessity there was to get a pure salt of baryta with which to start. At last the difficulty was overcome, and a fluid containing so many volumes of oxygen gas was obtained. Next, I had to ask what volume of oxygen should be used in medical art. Thenard had proceeded up to a high standard of volumes, which I, following him to the letter, could never reach. I easily got up to a strength of ten volumes, and there stopped, so as to make that the medical standard, which, except in America, where fifteen volumes have been used, remains the same. I next had to determine the dose of ten volumes solution, and did this by partaking of it myself in measured quantities mixed with water; and from one to four fluid drachms was determined on. Lastly, I had to administer the substance in disease, and in that direction arrived at the most unexpected results. I found that blood added to the solution became of a brighter red colour, and that oxygen was liberated. This fact led me to try what the effect of the addition of pus derived from an abscess would do. I found that pus caused the most copious evolution of oxygen, and that the

matter derived from the vaccine point was sufficient to start the disturbance or ferment. I tested the question by the microscope, and saw that the peroxide broke up pus cells.

I found also that it could be thrown into cavities containing pus, and would cure without danger, if care were used. In another research the curious subject of colour came under notice. I observed, from the accident of stirring the peroxide solution with feathers, that they assumed a golden colour—a fact exhibited at the Medical Society of London in 1858, when I read the first paper written on the physiological properties of the peroxide. From the fact of change of colour under its use arose the process that once made the hair of our ladies become conspicuously stained or dyed a golden hue.

The original attempt to cure diabetes by the peroxide did not turn out so advantageously as was expected, but a widespread medical use of the solution followed. I discovered it to be of true service in whooping-cough, in phthisis pulmonalis, in typhoid fever, in many other diseases, and of special service in all instances where it could be brought into contact with purulent substance. Thus, in the course of time, in the hands of my brethren it has become one of the most widely used and distributed medicines that has ever been employed.

In manipulation with peroxide of hydrogen I dropped on the manufacture of the substance to

which I gave the name of *Ozonic Ether*—a fluid that has proved of value in disease, and has gained, through the labours of the late Dr. Day of Geelong, a large amount of attention as a chemical test in regard to fluid animal excretions.

Amyl Nitrite.

One day, after delivering a lecture at the College of Dentists, I met a gentleman named Morrison, an Edinburgh dentist, who was reported to be a strange and accomplished man. He was said to possess a spark of the old attachment and admiration which used to be held for Mary Queen of Scots, whose gloves and some trinkets he owned and kept in reverent memory. It was to another subject, however, that he now called attention. He brought out of his pocket a two-drachm bottle—I still retain it—that was three parts filled with a brownish liquid, having a strange, pear-like smell, and which he told me was nitrite of amyl. He related that he was a friend of the eminent Professor Guthrie—a chemist I afterwards knew as occupying one of the chairs of the South Kensington Museum—and that in distilling over from his retort nitrite of amyl, the fluid in the bottle to which I have referred, the vapour was diffused, which vapour accidentally inhaled by Guthrie, made him breathless, as if he had been running. On Guthrie's explanation of this phenomenon, Morrison concluded that nitrite of amyl might be of benefit to dentists; that they

might keep it in their consulting-rooms, and that if their patients became faint they might give them a whiff of it, as they gave smelling salts or carbonate of ammonia. The history interested the Council of the College of Dentists; but Morrison's statement alarmed them, and instead of accepting the remedy at once they moved and carried that it should be placed in my hands and that I should report to them upon it. I accepted the duty, and at once began to make nitrite of amyl a particular study.

Research with the nitrite of amyl proceeded in the usual way. I made myself the first victim, and tried the effects of the substance by taking it, both in the form of vapour and fluid. I had also some friends who were willing to follow in my wake, amongst others the late Mr. Kimpton, a dentist deeply interested in the investigation, Dr., or as he was more commonly called, Sir Duncan, Gibb, and Dr. Henry. It came out that the nitrite acted on the organic or sympathetic nervous system; that it was not an anæsthetic, but that it quickened, in the most striking manner, the circulation of the blood. It acted in the same way on the inferior animals as on man, and I discovered that on both it caused the most distinct phenomena of muscular relaxation. I had seen nothing before that completely resembled it, the nearest to it being nitro-glycerine, which had been used by Mr. Field, a surgeon of eminence and of good observation. My description of the effects of

the nitrite was that it relaxed the living muscles of a limb completely ; and one day a medical practitioner, Mr. Stedman, who lived at Sharnbrook in Bedfordshire, and who now and then came to see me, breathed the nitrite so freely, in my absence, that he fell on the floor and laid there for several hours in such extreme muscular collapse I was in alarm for fear he should not recover. He was like a person in catalepsy : he could not move a limb ; but it turned out that he knew everything that was going on and heard every word spoken. He made a perfect recovery, and returned in about ten hours to his own home.

At the meeting of the British Association for the Advancement of Science, held in Newcastle-on-Tyne in 1863, I read the first paper on "Amyl Nitrite" and illustrated its effects. There was a large audience, and I met with an event I did not expect. Professor George Rolleston was in the chair, and was in rather a sceptical humour. I explained that the nitrite excited the circulation ; that it was a substance producing local results like those following the division of a sympathetic nerve, and that the blood-vessels first dilated freely and then became what is called congested. To this statement the Chairman listened carefully ; but when, in pouring some of the fluid on a piece of filtering paper, I explained that the vapour which diffused through the room would, without affecting the consciousness, make every person's heart beat more

quickly than was natural, he smiled incredulously and held out his hand for the paper. Thereupon I handed it to him, warning him not to inhale from it. He disobeyed the warning, however, and, before I could stop him, inhaled for a few moments freely, soon showing the consequences. His face became blood-red; he felt the pulsations indicated, and was obviously alarmed as well as astonished at what had occurred. I was able to assure him that there was no danger; and when he got over his shock, he not only apologised, but explained to the audience the folly of being too incredulous about what they heard from experimental observers.

At a subsequent meeting of the Association held at Bath I returned to the subject, explaining that we possessed in nitrite of amyl the most potent anti-spasmodic we had ever known; enumerated the diseases that might be successfully treated by it—such as asthma, angina, colic, and even spasmodic tetanus, in which latter disease it has been successfully used no fewer than nine times to my own knowledge, the late Mr. Foster of Huntingdon being the first to resort to it in tetanus. At this Bath meeting Bishop Colenso, David Livingstone, and Dr. Hughes Bennett were present. They were all extremely interested by the address. Livingstone talked with me about it and its history, as well as about the old school (Anderson's University) where we were both educated; and Dr. Bennett arranged to

call upon me in London to get further particulars, respecting the nitrite, to introduce into his annual opening lecture coming on at Edinburgh—a visit he duly made, and during which he wrote down the list of spasmodic affections that were likely to be relieved or cured by the inhalation of the vapour.

The readings I had given before the Association had an important bearing on my career: they led the committee of recommendation, at the instance of Mr. Gassiot, inventor of the Gassiot tubes, to vote me a small sum of money in order to continue my therapeutical inquiries, and for some years the vote was repeated. The sum was small, never exceeding thirty pounds, and never approaching the outlay I had to make; but it helped me on, and certainly, as an encouragement, kept me bound to my labours, many of which are reported in the *Transactions* of the Association.

Mercaptan.

In pursuing the quest for remedial measures, I studied the action of bichloride of methylene and the other anæsthetics already mentioned; but many others came under my observation of which something should be said.

One chemical which occupied much of my attention was mercaptan, sometimes, but not quite correctly, denominated “sulphur alcohol,” an alcohol in which sulphur stands in the place of oxygen. It is a most offensive substance to the smell, and

not agreeable to the taste, although by dilution it is just tolerable. I took it because of its singular effects; and it gave me a remarkable suggestion, which I have published. It affects the mind, making it, as it were, turbid and melancholy, under which the impulse or tendency to commit suicide is one of the leading symptoms. Strangely, too, mercaptan is a body that can be manufactured by a perverted animal chemistry in the living organism, and has been detected in the intestinal excretions. I have no doubt that by its veritable presence in the body it does contribute to deranged mental conditions, and that it is specially deserving of remembrance by those who are engaged in the care and treatment of the insane.

Substitutional and Constitutional Lessons.

Previous to the time when these effects of mercaptan had been reported, I had inferred from the researches on nitrite of amyl that a new method of inquiry in regard to therapeutical substances might be carried out.

It had been shown to me from natural phenomena that nitrite of amyl not only relaxed muscular fibre, but that for a long period after what seemed to be death, it caused the muscular irritability to be retained, so that, as stated in the article on reanimation, animals under its influence would remain alive for several days, cold-bloods until the web of the foot showed actual signs of decomposition.

I stated at the meeting in Birmingham, in 1865, that medicines ought to be studied from their constitutional side, and that we might, by a complete knowledge of the action of the elements of which the remedies are composed, see what a combination of elements would perform in a medicinal way. I also taught what might be learned from nature herself as conclusions derived from the action of remedial substances, and suggested three lessons.

I showed, first, from the effects of amylene, iodide of amyl, acetate of amyl, and others of the series, that they might be understood according to the phenomena they seemed to induce, and in a case of hopeless tetanus, as an example, I reasoned that there ought to be no hesitation in administering nitrite of amyl until decided reduction of muscular rigidity was indicated.

The second lesson deducible from the researches brought forward was that in the animal chemistry itself substances might, by a perverted nutrition, produce symptoms that actually resembled disease. Nitrite of amyl, for instance, induced a condition of system allied closely to the disease known as catalepsy. Amylene, again, produced phenomena like those of somnambulism, and caused some forms of paralysis of voluntary muscular power showing peculiar dyspeptic derangements, as if the organism itself made from its own organic material something that in character was allied to an amyl or

starch compound. I tested this point by inhaling ten grains of amylene diffused through one hundred cubic inches of air, and produced in my own body, in the most distinct manner, phenomena allied to somnambulism. Soon after inhaling I forgot myself altogether, but four minutes later was quite conscious again, waking as if with a start. I thought the experiment would not answer; but, glancing at my own wrist, I found I was wrong in the suspicion I had formed, for there were deep marks of pinches at several points, and the bottle containing the amylene vapour had been moved by myself and the stopper re-inserted, so that I had been performing acts preconceived and carefully carried out without remembering any single fact connected with the process: in short, a kind of somnambulism had been induced.

A third and last lesson had relation to the modification of action exhibited by charging the body first with the same chemical base, afterwards with divers compounds of it. I took amyl as the base, and to it added new elements, trying the different effects of these additions. The order of variation was most interesting. A simple hydro-carbon like hydruret of amyl acted as a negative body, not differing from nitrogen in this respect, but destroying motor force and partly consciousness, and nothing more. I introduced the element oxygen to the amyl, and there was added to the above-named phenomena violent and persistent tremor.

I added iodine instead of oxygen, and the phenomena indicated the free elimination of fluid from the body, with vascularity of the extreme parts and increase of the action of the heart and respiration. I changed the combination once more, to bring nitrogen and oxygen into operation combined with the base, and found that the vascular action was raised beyond what is seen from any other substance, followed by a prostration so profound that the still living animal might for a time pass as dead.

It seemed to me, therefore, that in these experimental truths, so simple and yet so striking, we have presented to us a line of experimental inquiry running parallel with that so prominent amongst our learned and more exact brethren of chemistry, and called usually the "law of substitution." "Is there not," I asked, "a physiological law to be worked out similar in character, and might we not, by following it, become sure and determinate in our knowledge by a new and sound application of remedies?" What if, after having learned the exact action on the economy of an organic base, we took compounds moulded on such a base and learned their true physiological values? Surely if we did this, long though the labour might be, we could in time lay down

"this osier cage of ours
With baleful weeds and precious juiced flow'rs,"

and, without forgetting the other words of the wise friar,

“O! mickle is the powerful grace that lies
In herbs, plants, stones, and their true qualities,”

might begin to approach that accuracy of knowledge, the absence of which makes the learned so weak and the charlatan so presumptuous.

Arriving physiologically at a correct knowledge of organic chemical compounds, a plan that would aim at establishing a principle in medicine would soon be accomplished, and the difference in regard to the action of elements themselves be determined upon. In respect to amyl as the base, there can be no doubt that differences of compounds were shown to exist; but elementary distinctions were scarcely less obvious. For example, in regard to mercaptan the difference from alcohol was that, in it, sulphur replaced oxygen, and we were simply introducing the work of sulphur as compared with that of oxygen. Perhaps we were doing the same thing in every case where sulphur was the element representative of oxygen. The same rule might apply to iodine when it took the place of oxygen, for I showed at Dundee in 1867, that when iodine was combined with methyl, making iodide of methyl, an agent was produced which, by careful inhalation, could bring about anæsthesia, but was not so good as when methyl was combined with chlorine, though extraordinary in some other respects, and notable in its sedative effect, about which I have a word to add.

I commenced to learn the use of the iodide of methyl by taking it myself in diluted alcohol. I found that a grain could be taken with perfect safety. I then prescribed it in an inveterate case of specific ulceration, in which iodide of potassium had failed, and, carrying the dose up to three grains, found the most rapid curative result. Further, the great pain and irritability of ulcerated surfaces were singularly relieved by it. Repeating this observation with further success, I solicited permission of Mr. Thomas Nunn, then surgeon to the Middlesex Hospital, to treat some hopeless cases of cancerous ulcers in the cancer wards of that Institution. Four cases were assigned to me, and the suggested plan was carried out by Mr. Nunn himself. His report of the results, after four months' trial, was of the most encouraging character. One case of ulceration was reported as healed, so that the patient left the hospital; another, in which there was intense hyperæsthesia—extreme sensibility of the skin—a symptom which had resisted all previous means, was directly relieved, and the patient greatly improved; in a third example, pain of an extreme kind was relieved, and in the fourth the symptoms were kept in abeyance. Mr. Nunn stated that his observations showed that iodide of methyl could be safely administered for long periods of time; that it removed pain—particularly the form of pain called hyperæsthesia, and that cancerous ulceration might heal under its use.

Amylaceous Origins of Disease and Sleep.

In addition to the lessons given above, I added a fourth, easily demonstrated, but not publicly related anywhere. It was my intention to explain it; but such is the flight of time in the life of a busy man that I put it aside, and allowed it to become forgotten for a period of not less than thirty years. What occurred to me was, that taking amyl as a base, and getting compounds having visible varying effects, the base being itself derived from starch, we might easily account for a whole cluster of diseases, or, rather, causes of diseases, from no harder a task than that of learning what compounds could be made from starch by chemical manipulation. But it was as easy to make starch compounds in the body as out of it, and, made in the body and diffused through it, they could not fail to provoke symptoms of disease just as they did when, after being made outside the body, they were swallowed or inhaled. Amylene induces a somnambulistic state; amyl nitrite a kind of catalepsy; but either, derived from a common constituent of food, might with equal readiness be made out of the body, or by a modified vital chemistry within it, without any conception of our own. I followed up my idea by determining what the result would be of administering for a long time minute doses of amyl nitrite, and by that method synthesised so remarkable a form of phthisis pulmonalis that the symptoms, as well as the

pathology, were the most striking features, extending even to the occurrence of hæmorrhage in the pulmonary organs. It seemed also to me that the common and nightly phenomenon of sleep might be due to the formation within the body, during waking and working hours, of a sleep-producing or, more correctly speaking, anæsthetic compound diffused by the blood.

Colloids and Dialyses.

It would take a volume of itself to record all the practical researches made and the conclusions arrived at. I believe they are mainly published in the Reports of the British Association and in similar works; but I cannot fail to recall two other researches before I conclude.

I became deeply interested in the subject of colloids owing to the teachings of the late Dr. Thomas Graham, the Master of the Mint, whom I knew, and whose able assistant—the late Dr. Frederick Versman—became an assistant of my own when Graham ceased to require his services. The division of organic substances into crystalloids and colloids, which Graham pointed out as naturally existing, was a discovery of singular comprehensiveness, and whenever I visited him in Gordon Square, whither he had retired, his conversation was of the most useful and edifying character. He was an old Professor of Anderson's University, where I had, as before mentioned, been educated, and he could recall

the famous David Livingstone; but the richest of his expositions had reference to the diffusion of gases and to the colloid and crystalloid qualities of matter. Both states of matter claimed my attention, the colloid especially, and the word "pectus," which Graham applied to the term "coagulation" of colloids, was employed by me, subjecting me to the foolish criticism of some commonplace writer who did not understand what the word meant, and whom we never condescended to notice.

It was natural enough for me to repeat the experimental researches which Professor Graham had made on the subject of the colloids and crystalloids, and on the phenomenon he called "dialysis," when bodies of an organic nature are simply separated from each other by a thin membrane. He seemed to me to have alighted on a profound organic law when he showed that osmosis—not endosmosis or exosmosis—must be the term employed in regard to the matter; and in the old *Literary Gazette*, in which I had charge of the scientific weekly article, and of which, I think, at the time the eminent John Morley was editor, I wrote two or three columns on osmosis that Graham highly commended, and from which he explained to me the vital nature of the process according to his views. These views have ever since remained in my mind, and have led me to take up the study of dialysis in various ways, especially in reference to exudation of fluids in

which a crystallisable salt forms a constituent part. I laboured at the work of dialysis in the nervous material, and strove to find if the membranous envelope surrounding the nervous pulp or fluid admitted water through the membranes or absorbed through them, and whether there was a coagulation of nervous substance, as there was of muscle and blood. I gave a lecture on these points before the Hunterian Society at the London Institution, which lecture was afterwards published in the *Medical Times and Gazette*, and another one at the Royal Infirmary at Hull, showing that water could be removed from a colloid like albumen, and that albumen could be left in the solid form and be also transparent: in fact, I artificially constructed transparent lenses so like the crystalline lens that the artificial resembled the natural, and possessed magnifying power.

But the most practical result of the experimentation consisted in the formation of remedial substances in the form of colloids. Fluid colloids, like collodion, were tested in order to see what substances they would absorb so as to produce remedial solutions, and the bodies, afterwards called "colloids," were introduced by me and brought into general use. Styptic colloid came first, and proved useful, not only in stopping hæmorrhages, but in covering and healing wounds, and in covering inflamed surfaces like those of erysipelas. Then followed iodised colloid, which acted like styptic

colloid, with the addition that it afforded at the same time an antiseptic, and provided a means by which iodine could be slowly introduced into the system, or into parts of it. I thus obtained what we found to be truly useful remedies in a practical form, always ready to hand when called for; and I have had the pleasure of living to see few remedies in greater demand. I wish I had done more in regard to the study of dialysis, but I could not have done better, I hope, than introduce the colloids as remedies.

The Ethylates.

The other remedial research to which reference has been made relates to the substances known and used as the ethylates, or, as they are sometimes called, caustic alcohols. I reported on these at the meeting of the British Association at Liverpool in 1870, and the Report will be found in the *Transactions*. As it was a curious research, it may appear in these pages. I had found that some bodies could be decomposed by water, and, while they were decomposing, active remedial qualities could be evinced which would prove of service. This was the case with the ethylates. Sodium or potassium was dissolved in pure ethylic alcohol. When one of them, say sodium, was dissolved in pure alcohol brisk action took place, owing to the circumstance that the alcohol was, for the moment, decomposed, an equivalent of its hydrogen being set free and

becoming replaced by sodium. In this way an ethylate was formed which, with care, could be turned into a beautiful crystalline salt or could be kept in solution by the addition to it of more alcohol. In the form of ethylate the salt could be kept safely so long as water was excluded from it; but when it was brought into contact with water a reaction took place. The water became decomposed; its two elements, oxygen and hydrogen, were divided; its oxygen went over to the sodium, forming caustic soda; and its hydrogen replaced that which it had lost previously, re-forming alcohol, and making ethylate of sodium or a caustic alcohol. It struck me that the water in the tissues, or in blood or albumen, would act in the same manner as ordinary water, and so I treated blood and albumen with an ethylate to discover if this were the fact. The water again was broken up; caustic soda was formed, which acted on the organic substance of the blood or albumen, transforming it into a solid substance concreted or held together, or, we may say, coagulated, by the newly formed alcohol. This was quite a singular discovery, and I soon made it applicable in practice. I found a patient suffering from a vascular tumour who had been surgically, but unsuccessfully, attended by the late excellent surgeon, Mr. John Gay, and I treated the tumour by covering it with a solution of the ethylate. The phenomena were the same as anticipated. The water of the tumour was decomposed; caustic soda was produced which disintegrated

the mass; alcohol was formed which coagulated the organic parts, transforming them into a scale, and the whole was removed by the formation of a dead scab or scale-like surface. The tumour on which this operation was successfully carried out was classified as a vascular nævus, and since then many have been removed by the ethylate. I myself have removed a hundred, and other external uses of the remedial substance have taken place. Much more also is promised by employing the more active potassium ethylate, which destroys with astonishing rapidity, and with which I have removed much larger and more solid tumours than nævi. In many instances, indeed, potassium ethylate might be applied as a successful rival of the knife itself, and, mixed with some favourable local anæsthetic body, like cocaine, might be quite painless in operation.

Mechanical Contrivances.

Hitherto I have referred only to such remedial means as have appeared to me in the medicinal form; but others have come to light of a mechanical, rather than a chemical, nature. The oxygen-holder, or table, by means of which oxygen becomes the bearer of other remedies, is of this nature. The movable electric apparatus which wheels from bed to bed is a useful mechanical arrangement. The serrated scissors, which divide tissues without causing them to bleed, are a mechanical contrivance taken from the observation of the way in which, with their teeth,

female bovine animals divide the foetal cord. The sphygmophone, which renders the pulsations of the pulse audible, and the system of rubber tubes which conveys a hot or cold current of water around the neck, partake of the mechanical character; while the proposal, which met, some years ago, with criticism and incredulity, that an ovarian cyst might be treated without a formidable operation by simply compressing the pedicle through which it is fed, stands in the same category, and will one day be adopted as a mechanical operation worthy of reconsideration.

Embalming the Dead.

Before I conclude this chapter it is well I should devote a few lines to the practice I have carried out in the ancient art of embalming the dead. A great many years ago a French gentleman by the name of Falcony brought over a powder to which his name was attached—Falcony's Powder—and indicated that by means of it he could preserve the dead body. The powder consisted of sulphate of zinc and sawdust, and the dead body was buried in it in an open chest. The water of the body exuded into the sulphate of zinc and escaped by the exposed surface, so that the dead body was really dried down or mummified, and remained in a state of preservation. Mr. Falcony asked me, as the then Dean of the Grosvenor Place School of Medicine, to lend him the dissecting-room for his demonstrations,

which, with the consent of my colleagues, I did. The demonstrations were exceedingly satisfactory in result, and they led me to make the whole question of preservation of the dead a careful study. On this the art of embalming came before me for investigation, and I made so much progress in it that I carried out embalming in no less than forty-eight instances, and introduced so many improvements in regard to embalming fluids that at last I could inject them by needle injection with entire success without performing any post-mortem operation at all. I did not like to continue the art further, for two or three reasons. To begin with, it meant a disagreeable undertaking. In the next place, it seemed to me an idle and absurdly sentimental practice to preserve a body that had served its purpose and could in an hour or so be destroyed or removed in the crematory by the influence of fire. Lastly, in embalming, incidents arose which were not consonant with my nature, and affected me so much I determined to give up the practice; it is many years now since I carried out a task I never wish to resume.

CHAPTER XIX.

THE BATTLE WITH ALCOHOL.

FOR about half my life it has been my fate to be in opposition to the general custom of using alcohol in the form of wine, spirits, or beer as drink. What started the battle I am unable to say, inasmuch as I was not trained to the idea of the conflict by any friend or leader. I was not led into it by habit, as some have been, and of all things ambition or desire to shine in the contest has been the last provocative. The part I have taken has been to many objectionable from the commencement of the fray, and in a certain sense injurious to me.

I was brought up to believe in alcohol, and the brewing of October ale in my father's house is one of my earliest recollections; to me it was quite an event. The arrival of materials for the brewing was to my little mind an important matter; the preparations and boiling of the copper a delight. I watched the washing of the barrels, and fermentation of the malt with admiring wonder, and enjoyed the sitting up late at night, while the occurrences of the morning of the next day are

memorable. The neighbours would all come in to taste, in a wooden bowl, the new brew, or to sip the sweet-wort. I was allowed to use a little wooden bowl, and permitted to see the different classes of the fluid drawn off. The strong beer looked, when it was cleared and the yeast removed, like wine; but the middlings and small beer had to be strained before they were stored; then, some time afterwards, when they were ready, they, too, had to be tasted and tested, taps inserted into their barrels, and marks made upon the fronts that they might be readily recognised. It was a grand day. Beer-glasses were brought, of which I still retain a specimen—long glasses beautifully engraved with a depending ear of corn. With my dinner I was allowed to use a plate which I still have, and which later School Board reviews often reminded me of. On it King George III. was the subject of a well-devised picture. He was robed as a king, and seated on his throne. In front of him stood a sweet-looking, ill-clad little boy, who was receiving from him a book, and hearing the words: "I hope the time will come when every poor child in my dominions will be able to read the Bible."

I also recall that one old gentleman who came to taste and praise the new brew would pipe to us a song, which my grandfather, Richard Ward, who lived a jolly kind of independent life, used, I heard, to sing on similar occasions. His friends gave him the credit of writing the song, which

they said he sang in a fine musical voice; but whether he composed it or whether he borrowed it I could never learn. Anyway, here it is:—

“Says Plato: ‘Why should man be vain,
Since Heaven’s bounty has made him great?
Or why looks he with rank disdain
On those undeck’d with wealth or state?’

“‘Can costly robes, or beds of down,
Or all the gimp that decks the fair—
Can all the glory of a crown
Give health and strength apart from care?’

“‘See! through the air the meteor flies
And spreads along its gilded train.
When shot, it’s gone! Its beauty dies,
Dissolves, and comes not here again.’

“So ’tis with us, my jovial souls!
Let friendship reign while here we stay:
Let’s crown with joy our flowing bowls;
When Jove commands we must obey.”

At the end of the song the doctor of the district, it is said, invariably quaffed his cup, and the parson, doing the same, always said, “I never heard you to greater advantage, Mr. Ward. You should subscribe half a crown to the choir and the waits,” which I dare say he did.

The brewing of beer was not the only picture that influenced me in our little circle. My mother was pronounced on the matter of domestic wine, which she was proud to make and store away. She had her elder wine made from the berries of a tree, under the leaves of which we used to doze in summer weather;

cowslip wine made from the field flowers we used to pluck; mead made with malt and honey; currant wines of different kinds; and gooseberry wine from the fruit of that name, which nearly rivalled champagne. One of these wines would be brought out with cake; and there is still living a nobleman, far advanced in years, whom I remember seeing when I was quite a child, sipping the cowslip as he discussed an election in which he was a candidate, and for success at which he was canvassing.

These feastings, if I may call them so, were general. Scarcely a soul believed that there could be a world without wine or beer. At the annual club-feast beer ruled the roast; at the ordinary feast it did the same. The working man or woman expected their glass; and at the "statutes," where servants were hired for the year, "beer-money" was the order of the day. The harvest supper was incomplete without beer; and a man would ask you for a glass if he only opened a gate for you and your horse to go through; also, if a person were faint or weak or sick in any way, alcohol was resorted to.

In the first case of confluent small-pox I ever witnessed I found wine and spirits familiar remedies, and whenever doctors prescribed they almost always ordered wine. They were not absolutely unanimous; for there was an Esculapian teacher—Dr. Cheyne—who said that when people were

actually sick, wine ought to be stopped, and ought not to be resumed until indications of recovery proclaimed it safe to give it. In Edinburgh also the illustrious Cullen and his school practised a kind of abstinence—a method which the erratic Brown, founder of the Brunonian System, opposed. But taking it all in all the doctors were in favour of wine; and I knew one compromising doctor who, foreseeing the disfavour into which blood-letting was passing, continued to bleed and at the same time administered alcohol freely, as if he thought the one remedy checkmated the other. Things could not be either mirthful or funny unless alcoholic drinks played their part. The Esculapian, under whom I entered the fraternity, gave alcohol its full credit as a reviver of wit and manners, and offered a good many clever illustrations. One night when he was toiling up a steep hill on his trusty steed he saw a man lying on the wayside grass. He dismounted, and, advancing to help, recognised the sufferer, not only by what he saw, but by what he heard—for it was dark. The man was a lay-preacher of one of the sects, and the words by which the doctor recognised him were those of a text from which he was so greatly accustomed to preach that the wicked said he could preach from none other.

“Why will ye die, O house of Israel? Why will ye die?”

“Why, get up from the ground, and don’t die!” responded the doctor. “I know you! Come, get

up!" and so saying he lifted the drowsy man on to his feet, helped him on to the horse, with his face to the tail of the animal, took him to the nearest public house, and there made him preach the whole sermon to the assembled cronies, much to their delight, but to his own future discouragement and the loss of his best discourse.

There was on no side any lack of alcoholic drinks and usages. If two parties played at skittles or cricket, or had a race, it would be for "a half-gallon;" and any book that introduced sufficiently the pranks of the intoxicated, the better the chances of the book and of its publishers. *Squire Weston* was a "good 'un," and the book *Pickwick*, which I have from time to time seen read by men up to the point of death, would be nowhere were it not for the cup that does excite and does inebriate.

In introducing these incidents I simply wish to show that in my early days nothing transpired to lead me to doubt the value of alcoholic drinks, except that I knew a man who, in his cups, lost for a wager all his flocks of sheep, and once saw a clerical lecturer draw from his coat pocket, with a part of the pocket itself, a lump as large as a cricket ball, from which he said, "the accursed stuff" could be distilled by heat. Neither of these events, however, affected my mind; they passed by me like an idle wind.

There was nothing in the treatment of the sick, as I learned it, that suggested a word of opposition.

Every one of my instructors was imbued with the idea that disease could not be met without alcohol, either as a food or as a remedy. Even the accomplished Dr. Andrew Anderson was in favour of a little spirit. I first saw whisky-punch as an addition to the professional table, and I first learned to become quite an adept at making it from a lesson I acquired in the art at the house of Sir John Rose Cormack at Putney at the hands of a famous botanist, upon whom some adventurous student had fixed the name of "Woody Fibre," by which he was generally known in his own immediate circle. There was never a dinner where I took an active part in which I was not selected as the connoisseur. The price of the dinner ticket might be high, but with plenty of wine—and good wine—it mattered little what the viands might be, for the wine would wash them down. We committed the folly of proposing and drinking our own healths in wine; and one gentleman who presided, and whose legs I had bandaged up in the morning—they being dropsical from alcohol—was sitting up in the evening with his feet resting on a stool, while his health and long life were toasted amid vociferous cheering and the declaration that he was a "jolly good fellow" by all who were competent to stand and sing it. But if anything painful had transpired we should have been touched equally by regret. I could laugh then because I did not appreciate the absurdity of a helpless man having his health

destroyed by the very liquor which was the damning cause of his illness; but I could equally have wept if danger had really arisen.

I recall yet another incident. There was a meeting of medical men in a large hall in Birmingham. We were congregated in numbers, and the organ pealed forth its sounds. I was marked as a young man who had just gained a prize and who had many friends. A little group of us—including the late Sir John Forbes, Sir Charles Hastings of Worcester, Mr. Nunnerly of Leeds, and some others—were conversing together in familiar terms, when suddenly there strode up the hall with a firm step a gentleman I did not know. I was struck by the stranger's nobility of look; by the sadness that clouded his brow, and by the calmness which he nevertheless displayed. He walked up the hall, with his beautiful old-fashioned buff coat buttoned, his hands crossed behind him, and as he scanned our little group Sir Charles Hastings left us to go and shake hands with him.

"Who's that, Sir John?" I asked of Forbes, who looked nervously on.

"Oh, that's the well-known Higginbottom of Nottingham," he answered. "Hastings is talking to him, and when he has finished his chat I will say a word to him myself."

Sir Charles Hastings was not long away from us. Forbes walked off, and I, curious to learn the history, inquired of Sir Charles about the stranger.

"What," said I, "has he done to make everybody so shy of him?"

"Nothing whatever, I assure you," replied Hastings. "He is one of the best practitioners in England; has made quite a notable use of nitrate of silver in medicine; is a man of true science; a Fellow of the Royal Society, and strictly honourable in all his proceedings; but unfortunately he has a 'bee in his bonnet'—he denounces wine and all alcoholic drinks, and is himself a 'total abstainer.'"

"What has that to do with it?"

"Nothing at all! I like the man," he replied, "for he has been useful to me as the founder of the British Medical Association. But here's Sir John back again. Did you have a satisfactory interview, Sir John?"

"Perfectly," replied Sir John, and, turning to me, he added, "I never could see any harm in the man."

"Sir Charles seems to like him, and I wish you would introduce me to him," I responded.

"I would with pleasure, though I almost fear it might do you no good. It does not hurt us old stagers, but you might not be equally invulnerable, and we've lost our chance, for there he goes."

Down the open path made by the critical crowd Higginbottom strode, speaking to no one and nodding only now and then to some old friend. It was clear he knew and felt his position: no one could help feeling it; and so he passed away, and I never saw him again.

When he had gone I heard enough about this curious man Higginbottom. There was one comparatively young man very much liked, it seemed—a goodnatured character who nearly split his sides on the subject, but who was not long before he succumbed to the enemy of his health and peace; and there was another strong man who denounced the offender in language such as only a wine-bibber can use.

I very quickly repaired to my own hotel, the “Hen and Chickens,” recalling what I had witnessed—not to laugh or see any fun in it, but to reflect. I had seen a pilgrim father—a man who feared God, eschewed evil, and who would have been as ready to meet the rack or the fire as he was to meet the assembly through which he had passed, and I give this memory of him as sincerely as I hope any future pen may write it. But at the moment the scene had no telling effect upon me: the man, I thought, really had a “bee in his bonnet;” he must be wrong, and the majority, because it was a majority, must be right.

A circle of fine young men sat round the table of a friend of theirs in a country house which I was visiting professionally with a medical friend. It was eleven in the morning, and these men were lunching and “boozing.” They partook freely of alcohol. In three years they were all dead. They partook generally too freely: that was the argument that ruled with me, and it mastered.

A poor, weak, ill-clad woman fell dead near Welbeck Street one cold day, and I was summoned. It was said, "Could she have had a glass of something stimulating, as wine, or brandy-and-water, she would have been saved." But this is what she had had, for a glass of spirits was the last thing supplied to her, and the post-mortem showed that there was still some alcohol remaining in her stomach. The revelation bore no lesson with it: it was part of the admitted experience, and the jury promptly returned as their verdict "Death from the visitation of God."

In the early sixties I became, as told, editor of a weekly journal—the *Social Science Review*—and all social movements and gatherings were referred to in its pages. The temperance cause could not escape notice. I was literally deluged with communications on the subject, and I carefully perused the articles sent me, but they did not affect me in the least. It is true I never reviled, but I could not avoid an occasional friendly critique. We looked upon total abstinence in our pages with feelings of pity rather than of anger. We exposed what we considered the extreme views of its promoters, and I suggested to them to spend their lost time usefully by trying to set up a system of temporary teetotalism, not only for the world to see how it liked it, but also for it to see how temporary abstinence suited. Let a person who felt he or she would be the better for abstinence take the

formal pledge resolutely for a short period—say three weeks, or even three months; if the abstinence did real good, and seemed to suit them, let them go on with it for the same periods or longer, or even for life. But if they began to “run down” or grow weary of it, and especially if the doctor thought so, let them throw up the practice conscientiously and consistently, and make known their experience. The idea was not altogether unsuccessful: some tried the temporary plan, thought it failed, and abandoned it; others found it at fault from the first, and did not go on with it, while a few found it so good that they continued with it until they were complete and permanent abstainers. One of this class was so converted that not many years since he wrote to me to say that he was obliged by the advice he had read, that he had gone on for over thirty years in the “right path,” and that there was not a happier day than that “birthday” on which he had been led to test his fate as I had recommended. The true temperance fraternity on their side were not displeased; the members of it assured me that if their method were only tried, even for a short time, success would be sure to follow.

If anything, I went my own old way in these times more resolutely, if not more logically, than ever. I had written that my old friend Dr. John Snow, who had been bitten by the temperance cause—whose brother, the Rev. Thomas Snow, remained bitten by it until his life’s end, a year or so ago—agreed

towards the end of his life to take a glass of wine. I knew the late Dr. Todd, who was fond of coming into my laboratory to see what experiments I was going on with, and he insisted on the value of brandy both as food and as medicine. I dined often with Sir Thomas Watson, M.D., and always found wine as a supposed necessary beverage. I breakfasted with a distinguished medical Professor at Cambridge, and discovered the Burgundy decanter supplied on the breakfast table. I travelled in the country, and was glad to see and taste the glass of wine that welcomed me at the first meal that followed my arrival. I did not, indeed, object to see, as occurred at some houses, the jug of ale, with bread and cheese, which sometimes appeared as a part of the tea-time meal, and which probably was the meal between dinner and supper before tea was introduced into this country.

Notwithstanding these predilections I had my rebukes, which were not wanting in character. On an extremely cold day the late Alexander Henry, a scholar of excellent repute, was walking with me from the nearest railway into Newport Pagnell. We were getting on well, but felt the cold air, and, passing a place where mulled drinks were sold, we spontaneously went in and had a modest draught. It seemed at the moment the very thing we wanted; but when we went out, and resumed our walk, we were so soon exhausted that we had the utmost delay and difficulty in reaching our homes. We

arrived quite collapsed, and although the warm fire rallied us, and the good food restored our strength, we were glad to find our beds and sleep off our depression. We were like the Arctic voyagers whom Admiral Sir Edward Belcher, Sir John Richardson, and Dr. Rae, the northern explorer, described to me as men beaten by the two powers that run together—spirit and cold.

Another rebuke lay in treatment. By one of those strange coincidences common to medical life, two patients suffering from acute carbuncle came under my care. They were both advanced in years and of almost the same age, about threescore and ten. They had both retired; but one lived in luxury; the other despised what the world usually calls luxury, and cared little for assistance—liked, indeed, to be left alone. The first, and most comfortably situated, and it might be presumed the safest, had friends and doctors all around him. He was treated *secundum artem*, and he was steadily supplied with wine and other stimulants. Nothing appeared to be omitted that could sustain life; and yet, despite all, he died—sank is a better word—he sank into death. The other, less numerously tended, and, some would think, less comfortable, although not an abstainer, refused stimulants in every form because he was ill. He suffered from a larger carbuncle, which discharged freely, and on water treatment, varied a little by milk and cooked fruit, went through a sharp ordeal, but recovered

splendidly, and lived on for seventeen years. One of my own children—a boy of the most active and intelligent nature—was taken suddenly unwell. I had the advice and assistance of physicians of my own immediate circle, and we left nothing, as we believed, undone. We treated with the best wines we could obtain, and yet our patient sank before our eyes. What the pang of his loss cost his parents none but those who have similarly suffered can tell; and though thirty-two years have fled, the sorrow is still alive.

I saw a person live to be ninety-seven years of age and die in what was really second childhood and natural decay, who, for sixty years, had never touched an alcoholic.

It would be possible for me to fill many pages with the memoirs of these rebukes were it necessary; but I only want to add emphatically that they had at first no influence on my mind. I thought rebukes natural occurrences, and so impressed was I of the value of—nay! the necessity for—alcohol, that if ever a patient wishing to insure his life came to me for a certificate and told me he was an abstainer, I did not fail to state the fact to the directorate, which I knew well they would accept as adverse to the claim.

At last, as I worked onwards in my own way, a medical substance to which I have referred—nitrite of amyl—came before me for investigation, and in time I was naturally led to the methyls or methylic

group, in which alcohol is included. There was not a particle of variation in research, and if I expected anything it was that the ordinary opinions respecting alcohol would be verified. The second member of the group was common alcohol, ethylic alcohol, or that fluid which forms part of alcoholic beverages; but some of its allies—methylic, propylic, butylic, amylic, and heptylic—did not escape observation.

It happened that I was, by another means, made unusually familiar, in a physical way, with ethylic alcohol in alcoholic drinks. One of the philanthropists in London had taken great interest in the amount of the spirit present in the beverages then being sold to the public, and from all parts of the metropolis brought some specimens of these beverages to me for analysis. My able assistant and friend, Dr. Frederick Versman, obtained for me from Dresden an admirable alcohometer that worked by heat, and set it up in my laboratory.

With a clear experimental foresight, as it seemed to me, that the temperature of the animal body would be raised or sustained by alcohol, the most careful trial on the point was instituted, and repeated over and over again with attention to every detail, when, to my surprise, the fact elicited was that alcohol does not raise the animal temperature. For a short time it causes a little glow and that sensation which, by the common people, is called tingling of the hands and feet, with temporary

flushing of the countenance, as if a faint blush were produced; but these symptoms invariably pass away, and the body loses its warmth, becomes in truth, cold—so cold that, if the alcohol be carried far enough, there is danger of death from cold. Cold and alcohol go hand in hand, and a complete reversal takes place from what is expected, while the products of respiration caused by internal combustion are reduced systematically. I laid these facts out at a meeting of the British Association for the Advancement of Science at Birmingham in 1866, Professor Sir Henry Acland being in the chair. Brisk comment was made upon them by Dr. Kelburne King of Hull; by Dr. Heaton of Leeds, and by the chairman and other debaters present. It was unquestionably the opinion that I had made a mistake in observation, and my report was handed back for correction. It was held to be absurd that alcohol taken into a living body chilled it, banked out the animal fire, and reduced the products of the animal combustion: but recurrence to the inquiry only confirmed the fact more, until at last it was not only admitted, but was held to be an accepted fact; proved by the experience of Arctic travellers; proved by the circumstance that if two persons were found insensible, the point whether the insensibility arose from brain disease or from alcohol could be determined by the thermometer, which rose if disease were there—brain disease—fell if alcohol had produced intoxication; proved by the observa-

tion that some children inadvertently rendered unconscious by drinking whisky were brought three degrees below their natural temperature.

That which to me at first was a wonder was fully confirmed by all the observations made, and I then studied the effect of alcohol on vital processes, with the result of discovering that muscular collapse and failure, which we see so perfect in the drunken man—the dead-drunk person—is but a failure in degree, commencing so soon as the first drop of alcohol is imbibed. I found that the smallest quantity interfered with muscular action, leading to muscular failure. I found also that it created digestive disturbance; that its effects on the nervous system were to produce disturbance, and to give no quality of strength or precision of motion. I was led from these to other observations which I have repeated in my published books and lectures, and I was induced to study the degenerations that occur in the tissues themselves by the presence of alcohol in them. It was a new field, although we had seen “gin livers” and found other modifications arising from alcohol. I now, for clearness’ sake, employed the words “alcoholic degenerations,” and also applied the word “alcoholic” to describe diseases—as “alcoholic phthisis,” “alcoholic heart disease,” and the like—a term which was extended by others to alcoholic paralysis and various forms of disease, as if, in short, there existed a pathological alcoholism, a statement too sad and too true. I also found,

in considering occupations as causes of bad health, that those who were most exposed to alcohol were the most exposed to the dangers of death. It was quite impossible to traverse the whole field of observation, it was so entirely different from what I had expected, and so convincingly revealed new phenomena. I heard all the moral denunciations against alcohol, and found that in principle they were correct; but here was the physical evidence, and what more did I require? The moral evidence did not stir me into action: it was impossible to find fault with it, and, properly stated, it was impossible not to admire it and give it sympathy. But the physical was the strong and immovable evidence telling that alcohol was not only quite unnecessary for life, but an enemy to life; and as that was my knowledge, so it was my duty to proclaim the truth. I did this in the old medical paper, the *Medical Times and Gazette*, designating alcohol as "a deceiver from beginning to end," and naming it "a temporary shroud, in which the ignorant man covers himself—a process as foolish as that of the man who, in dark caverns, should wander in search of illumination until all is night."*

For the half of a long lifetime it has been my duty at all hazards to make these revelations more and more distinct to the world, and I am neither ashamed nor tired of the effort. By tongue and pen I have denounced alcohol, and see no reason to cease

* *Medical Times and Gazette*, December 7th, 1869, pp. 703-6.

or to repent. I have tested its medical value in the treatment of human maladies, and, while admitting it to be a stimulant, a quickener of the circulation, have seen that the very act of using it in this sense is a mistake, causing the heart and the nervous system to wear out the more quickly, without giving to them any more capacity or any more sustainment.

I have, by election, taken the head of a medical society of hundreds of members supporting these views. I have, by request, been, and am still, physician to a hospital that receives all cases, and where we never use alcohol. I have tried the action of the other alcohols named before. I have tried the resisting powers of alcohols to electrical currents, and in various ways I have given to the alcoholic group of chemical substances all the attention in my power; but I have never been able reasonably to return to my earlier views and predilections concerning it. I have no prejudices in relation to it; no dislikes concerning it; no feelings of a personal kind for or against it; and if I could logically see the slightest value in the use of it I would employ it with the utmost satisfaction. If alcohol were good, and something else were as good, I would take or give the alcohol first in consequence of old associations and predilections; and if any brother physician could, with prudence and logical exposition, show me that there were occasions when alcohol was absolutely required as a weapon of our

medical armoury, no one would be readier than I to listen to him and arm in the same manner as he. But no less a course could lead me to conviction, and a temptation of the kind has never been offered or presented. I have stood the "hazard of the die" over and over again, and have not once been cheated or seen cause for regret. On the whole, everything has shown abundantly safe argument and practical benefit on the abstaining side and has proved beyond dispute the old proverb, "Wine is a mocker, strong drink is raging, and he who is deceived thereby is not wise."

To be as clear as possible it appeared to me, and appears so still, that in the construction of a living body, whether man or animal, the weight of the fluid, that under heat gives the motion which indicates life, must be a prime necessity. Water—not alcohol nor alcohol blended with water—is the fluid of the proper weight as well as of the proper diffusibility, and the one necessary thing. Water does not merely distribute the particles of solid matter; does not merely give form or shape; does not simply give flexibility; does not simply carry away the used up parts of the organism; but it expands and condenses so as to produce motion, and is, in fact, the cause of motion—the means of motion.

The living body is a water engine. It could not carry on the work it does on any other system. It is as much a water engine as a steam engine is, although I cannot deny that other fluids than

water will act as motors, for I have seen a spirit engine : but the body is not an engine of this class, and no one can treat it as such. Some try to make it one ; live as if it were one, and at last get themselves into so morbid a condition under it they feel as if alcohol were the only natural fluid, even though fatal, so that the smallest accident may snap the machine or break the balance between mind and matter.

A certain temperature raises water to the heat required for the transformation of water into vapour or steam in the engine ; and then, under correct adjustment, comes the action, like life, manifested in the steam engine. It is the same precisely in the animal engine itself, excepting only that a lower heat for evaporation is perhaps demanded ; but it is water and nothing else that is called for. At the same heat a lighter fluid, like spirit, would be too evaporisable and would cause too much distension, so that if the parts which the vapour distended were as they are in a living thing, elastic, they would only act while the elasticity held good, and being too severely strained, would, as they often do, give way or burst. It appears indeed as if dead-drunkness and even something short of it were nothing more than the undue distension of vessels charged with the vapour of a fluid that has been driven off by the temperature of the body—a fluid not wanted if water alone played its part, as was originally intended. I have more than once

defined the phenomena of intoxication as being excited in the mechanical manner here pointed out, and I have explained that the philosophy of craving, or desire, for more and more liquor does not indicate central impairment, but that the consumer of the alcohol feels that he wants to live on a more ethereal fluid than that which nature supplies to him.

I would leave the reader to ponder well over this explanation of inebriety: it explains what he daily sees; it explains the nature of the mental shock of drunkenness; it explains the cause of unnatural distension of vessels and their too early failure in the inebriate; it explains the certain occurrence of organic lesions and the diseases of organs that take place under pressure; it explains congestion, vascular rupture, and sudden death; it explains effusion, and, above all, it explains why an animal engine, damaged by the constant work of a false fluid, becomes an engine permanently weakened, and calling for a lighter fluid than water, that it may work on from hour to hour.

In nature altogether I was forced to remark that water alone suffices for what has to be done. It is only men, and not all men, who ask for a modified mode of motion which they themselves must invent. All other living machines are water engines, be they large or small. The merest insect works on water; the largest mammal does the same—so that the mite and the whale are both water engines. Swiftmess,

strength, agility, endurance, are the results of the same motor fluid, and it is simply man who assumes to correct the order of the First Cause he pretends to adore as his Creator, Designer, and God.

It is often urged against us abstainers, who have the strongest, simplest, and best reasons for our beliefs, that we are not progressing in the way we ought to do. That is not my belief at all. I think we have progressed rapidly. We were the citizens a generation or two since of an alcoholic world. Alcohol literally, as well as nominally, ruled the roast. A man or woman who would not offer a glass of wine was branded as mean, ignorant, or vulgar. Not a medical consultation could be held but that in the consulting-room were found the wine-bottles and wine-glasses. They are rarely, if ever, there now. Every solemn act, down to the preparatory gathering at a funeral, was solemnised by wine. The solemnisation has disappeared. Feats of speed, of courage, of hard work, were encouraged by wine. The encouragement has lost its bearing. People who were about to insure their lives were rejected if they were abstainers. They are certainly now daily rejected because they are imbibers of the very substance that once secured them. All great responsibilities are accepted and welcomed if they are undertaken by abstainers, and they are considered vulgar who press the wine-cup. At one time ministers in the pulpit were in fear whenever

they raised their voices against the use of strong drink as a beverage or sustainer. Now they compete in speaking against drink wisely and well.

The greatest change, however, I have observed is in medical opinion. I recall most painful scenes in regard to physic. It was impossible to broach the subject of avoidance of strong drink without some insult or indignation. I had, for instance, an old friend, who, with other friends at table, proposed to give George Cruikshank and myself a dinner round the Aldgate Pump, and I saw daily the manner in which abstaining men were treated, while in the present hour nothing is ever mentioned at table that could annoy the most fastidious. You may even take a part in a masonic banquet and not hear an adverse syllable because you happen to abstain. The bills of a public dinner are printed as at a given cost, exclusive of wine—a proceeding of the utmost significance, as testifying change of sentiment to such an extent that a cost of £2 14s. per head, which I once had to pay, has fallen to 10s., with a better fare than was given at more than five times the money.

A most important change has also taken place in the treatment of the sick. Wine, wine, wine, was the cry of a quarter of a century ago, and the head was despairingly shaken if the liquor were not dispensed. Brandy was the so-called “sheet-anchor.” It has been all but universally taught that, whatever could be said about total

abstinence amongst the healthy, alcohol was nevertheless a remedy in the treatment of disease. "Give wine unto him who is about to perish" is a saying that has rarely had its equal in repetition. The saying is going out, and from many has gone completely. It was bound to go in the course of time, as men began to consider that what was not good for the healthy might not be good for the unhealthy; while the theory of medicaments as special agencies began to retreat from the medical mind, and prevention commenced to take the place of cure. At last alcohol, even as a remedy, has ceased to retain influential sway, either as a food or as a medicament. As a logical consequence I have witnessed two events: a hospital erected from which alcohol is practically excluded, and a society formed consisting of medical men who treat the diseases under their care without alcohol. At the same time there have also gradually appeared medical men who, although they do not think it wise to denounce alcohol publicly, or to belong to any institution that is adapted to teetotal principles, are yet strong in their own abstinence, and, whenever they see the opportunity, are willing to treat the sick on abstinence principles. There were, and are, hospitals in which alcohol still finds its place, and at times the nurses may be met carrying their trays with the measured glasses of spirit for the patients as it may have been prescribed.

"Why," says abstaining physician A. on this

point to his colleague B., "why do you gorge the lungs of the patient with pneumonia by giving him brandy, which can only have the effect of making his heart pump in more blood, of which there is too much already?"

"Because I have been taught to do so," replies B., but in a manner that expressively signifies his doubt and makes him think and hesitate.

And so things stand, while the alcoholic public, ignorant of the merits of the controversy, waits for the Faculty to decide, making excuses of all kinds, and wondering how it will all terminate.

Abstinence, meantime, marches on in physiological order. The society, of which I have the honour to be president, reaches nearly five hundred in numbers, and young men student-associates keep on adding their names. The hospital, in which I am senior member of the staff, continues its course. In twenty years it has used alcohol seventeen times only, and for some time has never resorted to it at all. In my department I have rigorously insisted that severity of the case shall be the first reason for admission, and, that the experience may be as fair as is possible, I have forbidden, not only the administration of alcohol, but of any substitute for it, and in no other establishment in the world are the curative results better.

So far every movement is progressive and satisfactory, leading to the consummation we, who are engaged in the battle with alcohol, would expect.

We are strong; we have divine nature as our commander-in-chief; we win as we encounter or as we are encountered; we have no fear of defeat, and the people look on fairly, if not ecstatically. Let it not be supposed, however, that, with us who have led, it has been all glory. Far from this, it has been all toil and danger. For my own part I remember nothing like the mischief that befell me in 1869, when I made the first sortie. Before then my lecture-rooms had been filled by medical men, who liked to see new experiments and to listen to what might now be styled "post-graduate courses." Afterwards the rooms were simply vacant. From the outside world the sick sought me: I never sought them, never jockeyed anybody, doctor or patient—and life was on the crest of the wave. The charm ceased so soon as I declared for the principle of abstinence, and nothing could have been more disastrous. In a city in which I had once given a demonstration on chloral, a grand supper was spread for me; an eminent medical citizen was in the chair, and I was toasted with highest honours by one of the largest and liveliest assemblies I have ever seen. A few months later—it was by accident—I happened to be present at an important ceremony in the same city, meeting the same men; but I was marked, like Higginbottom, with the sin of disbelief in the ancient faith, and was known by only one friend. The others kept at that cold distance from me at

which I had seen him placed, and I do not hesitate to say that his conduct gave me comfort and resolution. I had done none of them a shadow of wrong, and I had left them all in peace and happiness; but I had let nature lead me, and was no longer one of them. Such has been the effect of my altered views for many a long year; it was no more than might have been expected, and no more than has had to be gently tolerated.

The battle with alcohol still rages. We hear the wild cries for and against it, and I am in the front of the battle as firm as ever; but I keep to my quarter of it, mixing with those who stand on the physical side. It is not a battle that will last many generations, because our alcoholic opponents must give way. They fight wildly, trusting in their own numbers, wealth, and influence. In another age it will be thought wonderful how the battle could have been fought at all, and alcohol will fall into historic oblivion both as a food and a medicine.

From the moment when my own eyes were opened to what I felt to be the truth I can faithfully say that not a stone has been left unturned in support of the cause I was led to espouse. I explained my views in every place I could and in the most open manner. I lectured on the subject in every available spot in our islands, visiting and traversing Ireland and Scotland, as well as England and Wales, on behalf of the crusade, addressing, in twenty-five

years, great multitudes of our race—it has been estimated amounting altogether to more thousands than I dare venture to state. In these addresses nothing was held back, nothing put forward, but what was duly weighed, so that they fell short of hesitation on the one hand and exaggeration on the other, yet showed that a world without alcohol would be, not only a happier world than we have seen, but a more active and healthy world than an alcoholic.

I have never denied that alcohol may be a medicine when properly understood in regard to its action ; but it must be employed either in determinate and distinct doses with water, or in measured combination with other medicinal substances. I have treated with it occasionally on this basis in medical practice, and have observed the important fact that, as a rule, better results were obtained when it was omitted altogether. At the same time I never entered into personal controversy with those of my medical brethren who, thinking their skill strengthened by a continued administration of it with observation of its action, let it run as a stimulant amongst stimulants, and hold that direct stimulation may be an aid to those environments in which, in emergencies, we place the sick, so that, as far as we can arrange, they cannot die—the *summum bonum* of our art. I have been always ready to use alcohol in a commonsense and harmless manner, and remain in the same mind in respect to its services as an antiseptic, a local counter-irritant, or a medium for remedies we could

not use unless it dissolved them equally and carried them effectively.

In the end I wish it quite to be understood that I fully admit what is commonly called a stimulating action. For a short time it quickens the motion of the heart; whips on the circulation; excites the nervous system; raises temporarily the warmth of the body, and seems to urge on the processes of life. But this expedition of the vital processes does not convey to me the mending of them or their maintenance. If it did, alcohol would be remedial without the dangers it so systematically induces.

NOTE.—One remarkable advantage of the temperance movement has been its influence in bringing men of different sects, creeds, and positions into common action. I have attended meetings in which representatives of different creeds, and of Medicine and Law, have joined in one object. The union has also brought together Jew and Gentile, Parsee, Buddhist, and Mussulman. I was strangely affected on two occasions by what transpired. I heard, the Chief Rabbi discussing with English clericals a lecture of mine on the Mosaic Sanitary Code in no less a place than St. Paul's Cathedral; and in another instance I was still more personally affected. The Jewish community invited me to preside and to distribute the prizes at one of their schools. I did so; and after the ceremony the choirmaster begged me to sit another moment, and, turning to his choir, bade it sing to me, without any prearrangement, two verses composed by the late Rev. Lee Richmond, beginning

“Forgive, blest shade, the tributary tear,”

verses which, fifty years ago, I had had engraved as an epitaph on my own mother's tomb, and which I had never heard or seen from that time. It was a touching indication of the communion that has commenced to exist between Christian thought and Jewish sentiment and sympathy.

CHAPTER XX.

THE NERVOUS CENTRES AND EXPANSES.

THE opinion that has been generally put forward in my time, and which has been accepted for a long series of years—I had almost said ages—is that the nerves of the body spring, as it were, from the brain as a centre, or from the elongated spinal cord, and, spreading out in all directions, return to it. We have been told with great minuteness of the construction of this cerebro-spinal system; we have examined it after death; we have examined it experimentally in various ways, and, practically, it has been the one nervous system. We have known, however, of another nervous system, the ganglia of which are planted in the body near the great vital organs, like the heart, the stomach and liver, and which has had given to it the name of the “sympathetic”—the organic, or the vegetative system. Its nerves have been traced from its centres along the blood vessels to their extreme points. It was a nervous system that especially interested the great Bichat, and many have followed his descriptions; but it cannot

be easily reached so as to be examined. I once saw it in its entirety, owing to the industry and skill of the late Dr. Amadée Deville; but I have known many medical men who have never seen it at all, and who, in their daily work, have never taken it into account in regard to seats of disease. To my mind the sympathetic system has been neglected, and the cerebro-spinal, much better known, has often been misinterpreted. To me it seems that the nervous fibres everywhere in the skin, or in an organ of sense like the retina in the eye, are simply expanses laid out to catch the impressions of the universe, which impressions are conveyed and stored in their centres, so that feeling, seeing, or hearing are practically the same acts, and that whatever difference there may be in the two nervous systems is in the centres, the cerebral centres being those of reasoning and of impressions or memory, the sympathetic of impulses and promptings to action—perhaps even centres of motives. I touch an expanded nervous surface of the skin, and the impression made is conveyed from the external vibration to the nervous centre in the brain; is recognised there, and may return by other filaments it meets there or only by those which brought it. The food taken into the digestive canal may, and does, feed the organic centres, which centres become seats of impulses communicated to the cerebral centres, and light up the reason or intelligence: hence injuries and surface irritations produce

markedly the symptoms of disease. In brief words, impulses spring from the organic centres, or, as it is vulgarly but correctly expressed, from the heart, and the reasoning power or management of them from the brain, the circulation of which, like all other vascular parts, is under the control of the organic life, and may be excited or relaxed altogether. Thus primary animation rests on the organic bases, and is derived from, if not directed by, them alone. The feelings of fear, joy, grief, love, hate, hunger, thirst, all the animal qualities, have their centres there, and failure and death are the same phenomena modified simply in degree. There might be life without a brain: there could not be without an organic nervous system; and the place where the organic and, in so far as life is concerned, the reasoning centres meet in the higher animal, must indeed be vital. Nature, the true experimentalist, teaches us on this matter on the widest and most unmistakable scale. She performs the first and greatest act of all, without which there would be no life—namely, the reproduction of the species by means of a comparatively small surface of the organic nervous system, the cerebro-spinal system having nothing to do with the impulsive desire.

In brief, the generated force of the body in health or disease is lodged in the organic or vegetative centres; the direction of the force in the cerebro-spinal.

CHAPTER XXI.

THE BREATH OF LIFE.

EVERY living being nurses life—life, which rests as a film over the face of every living world. It is not necessary to look for life as a variable thing, influencing by its own varied nature and accounting for caprice, but rather as an invariable thing, which, entering the animal substance more or less, and moulding it, animates it, enables it to grow, to move, to live. We should be vain if we supposed that the film of life existed only on our little planet, for the suggestion is that it extends through all the mighty space, and is the soul which envelops each planet that is alive. The wonder is that so many millions of suns and planets, vastly mightier than our own, should not have furnished richly trained beings who could more frequently have visited these smaller spheres and dealt with us according to their might, as we have dealt with lower creatures than ourselves when we have visited obscure and remote corners or parts of our globe. I suppose it is merely a matter of time, which, in the grand total, is after all nothing to the Founder and Governor of all. It concerns us, however, in our

little ways, to feel and know that we are of two parts—of an instrument, mouldable, pliable, variable, of the earth earthy, and of a soul, comparatively eternal and unchangeable. With such an ideal before us such terms as materialism and spiritualism, as separate systems of belief, pass away.

The atmospheric sea of life in which we breathe may be expressed as meaning the existence in which we are, for the moment, cast, so that as we are moulded and maintained in the mould we are what we are. Our differences depend, not on the animating spirit, but on the mould that receives it, and we are progressive or stationary, civilised or uncivilised, according as we are corporeally fitted. The first and prime duty, therefore, is to adapt the instrument to its correct uses; to adjust the fleeting body, assured that the animating soul is provided for us eternally, as we understand the phrase. The breath of life will respond to the instrumental constructions, whatever they may be—the minutest insect, the man, the bird of the air, or the monster of the sea.

All nature opens to the candid teacher and expounder of Life the two manifestations, (1) the breath of life, (2) the impressionable body or instrument. The breath of life exists in every human being, in every animal, in every flower, and even in the earth itself, rendering parts alive, in a certain degree, which, from their apparent motionlessness, may be considered dead. We may look upon this presence of life as a breath, and may account for the pheno-

mena of the highest character as understandable on the ground of its invariability and immortality. I live, but I converse with Cæsar, who lived ages before, and Cæsar and his followers conversed with those who lived ages and ages before their time in chaos, as chaos was according to their conception. We live, in fact, eternally, as the breath of life—our true potential—while our material half is undergoing the very havoc of changes from day to day.

It is our material half that does change, and makes us what we are—a passing crowd of moulds under the influence of a permanent power. In ourselves we are mere earth moulded into form, changing, changed: here present, there gone; but, while extant, changed, animated, and moved by that which exists but cannot be touched, measured, or weighed; by that which to us is strictly immaterial, and yet, like time and motion, is, ever has been, and ever is to be.

The universality of the breath of life is the universality of the world, and accounts for that which has never been attributed to it. We, mere passing shadows, in all our presumed greatness or debased lowliness, know, as a rule, nothing more than what we see, hear, taste, and feel. The breath of life we know not, although it is the primary part of our nature and our existence. No disturbance influences it, yet all disturbances influence through it—for it fills all space in us, and we cannot, in the

minutest part or for the shortest time, be physically changed without it in so far as we, personally, are concerned—affecting it as if it were a wave of motion that has been touched, and being touched by our physical nature is felt, indeed moves, in us, and, for anything we are conscious of, throughout all the spheres.

The breath of life is staid as well as widespread. It never corrupts, and, therefore, is immortal; so that death of the instrument or animal body is the one perfect purification of the soul or eternal spirit that animated it. There is in my memory a man—very many men are there, but one particularly—who feels the breath of life and at the same time does not feel it; he is to me both alive and dead. From a purely physical cause he began to die in his foot, and the foot refusing the breath, his breath of life, became corrupt and died, whilst the rest of him did receive it and lived down to the line that lay between the living and the dead—a strange and wonderful phenomenon.

I have seen the dead many times: they are not in a condition to take in the breath of life, the soul in which the living animal world is enfolded; but the physical conditions go on just as iron rusts, and they decompose, or, in common language, become corrupt. In plain words, the change of the physical, and therefore visible, has taken place, while the breath of life, which is not visible, continues the same for ever.

The breath of life binds together all living things, animal and vegetable, man and beast, world and world, as far as worlds are animate. In respect to it the cat at my foot, the bird that flies by the window, the fish that float in the glass bowl, and the flower that stands in earth in the balcony, are all one. All the difference is that I am of a different shape and form, which distinguishes me as apart from them. So all beings of the human sort on the earth, big or little, young or old, are one, as all living things are. They may differ through the effects of place on the earth, of temperature, of height, or depth, or construction, but that is merely physical difference; they are one with me as regards the breath of life, they are in regard to it everything or they are nothing, except in respect to the breath, or enveloping life.

Sometimes we wonder how we can know so much and be so little. I once met on a pleasure trip he whom we men, in our physical way, recognised as Adams the astronomer—Neptune Adams—who first pointed out to wondering men the place, time, and character of one of the orbs that roll round the sun. He was much pleased with a little spectroscope of mine which I had the delight of presenting to him, and which he placed among his treasures. We were in a steamboat and as we leaned over its side, peering at the big waves that passed us, we conversed on many scientific subjects. He charmed me by pouring into my ear how he had found far-distant

Neptune. He explained how he, originally a very plain, simple, and homely lad, had traced mere lines on maps, sometimes on nothing more than bricks and mortar, to the great astonishment of his parents and schoolmates. Then he had gone on, even to his own astonishment, and by study of lines in varied forms had become, under education, a mathematician. It was a simple, yet wonderful and artful science he had mastered; it seemed to him beyond every possible expectation. In time he was a teacher; in further time a professor, and amongst the envied. His eye turned into the illimitable space; he conjured with his lines there, and discovered a body he had neither seen nor heard of. He told the world, through the Royal Society, where it was he found the planet, and when. In his calculations he was right to the letter—the first right amongst all men. From the words and thoughts relating to physical discovery we passed to other subjects bearing on the field of astronomy, when, for my part, I ventured to wonder why we, such small and, compared with the universe, petty creatures, should be able in our intelligence to grasp the infinite and write on paper the widest and greatest problems of suns and worlds. Adams agreed in the idea. It was wonderful, truly, to know and weigh a sun which could not be seen without a glass—that glass a mere man's invention. And so we spent our day in wondering consideration.

I saw Professor Adams more than once after that interview, and I heard from him more than once ; but we never met without a recurrence to it, and it has many times rested in my mind. It recurs less since I formed this conclusion about the breath of life as the eternal animator, and the body as an instrument moved by it. It is not startling any longer to me why the owner of such a breath, even for the briefest period, should be familiar for the time with all that can be grasped and retained. The whole universe is his universe ; he is immortal while he can hold, but when he falls to pieces physically he is dead, and is no more immortal than the thing on which he has written his learning—a parchment, or, better perhaps, a stone, and is just as mutable. The breath of life never dies, although the instrument that receives it may everlastingly perish.

The breath of life connects us altogether,—suns, worlds, human beings, animals, plants,—and we are in respect to it all one while we have it. Entirely passive itself, it adumbrates or vibrates through immensity, if I may use such a term. It is neither old nor young : it stirs or influences all that it enters ; it never decomposes, calls neither for food nor drink, wearies not, nor sleeps. Like light, it is ready for any instrument or organ that is fitted to receive it and be animated by it—and is eternal.

That which seems to be stronger than the breath of life, and as invisible, is what men call attraction—

attraction of the earth, that in its way governs the animal instrument. A man, as an instrument, wearies because the attraction of the earth is pulling upon him. A man falls from the same cause. A man bends, and we say he is getting old, while the fact is that it is a mechanical bending of the instrument in obedience to the attraction of the earth. A young man is so placed that he can draw in the breath of life, and by the power it gives him can resist the attraction; but he matures, gains his full capacity as an instrument, and then begins to decline, because the persistent attraction, ever present, gradually overcomes his vitality. So the needle of my galvanometer stands at a fixed point, as the earth bids it stand, until I vitalise it with an electrical current, when it diverges so long as the current is supplied, but not a moment more. The attraction in the end wins. Invisible, therefore, and as mysterious as the breath of life itself, made obvious only through an instrument, attraction is a primary power, ruling probably over life, the key of the world's vitality.

What is the vital power that moves an engine?

When we construct an engine of our own we use a power for movement. We may not know the nature of the power, but we know it by name—heat, light, or electricity. But when we watch the movements of a living engine we do not know the motor or propelling power, that appears to act spontaneously. We may give it a name, but we are not sure

about it as yet, and this is what has ever been the case, although recent investigations tend to bring us nearer to the truth.

It is not necessary that we should unite the vital power with the vital understanding: they may be one, or two, or more in combination; yet the vital power or force we ought to understand, for it is something universal and possesses distinct properties. The ancient fathers seem to have conceived that it was light, and the expression in which they spoke that "God is Light" gives a grand definition of their idea. To one looking with modern eyes at the subject the old idea has presented much that is valid. Light is everywhere, promotes many things, and even in some instances—as in the muscular fibres of the living iris—creates motion, all of which acts are in its favour. When Galvani found muscular motion was excited by electric force, everyone jumped at the idea that "electricity was life," and there is no force we have investigated, in regard to its vital activity, with more care. When Samuel Metcalfe, an American philosopher, produced two volumes on *Caloric and its Vital Agencies*, a book I have studied ever since it fell unnoticed from the press over fifty years ago, he insisted on the existence of a subtle power which he called caloric, which repelled its own particles and attracted all those of other bodies, and by which he endeavoured to account for the commencement and continuance of movement. We have since inferred that there are

other powers which are none of these named, or are some of them in subtle combination. They are spiritual essences according to our limited appreciation, but they are as mighty as subtle, and the breath of life is one of them.

CHAPTER XXII.

THE ANIMAL BODY AS AN INSTRUMENT.

IN all my researches, medical or experimental, the one ideal presented to me has been that the body, whether of a man or of a lower animal, is an instrument played upon by nature, and can only be accepted as such—as distinctly so as a violin, or a steam engine, which latter it wonderfully resembles, because a steam engine has a kind of stomach from whence its work emanates. Everything points out what the body is. It is not the body that lives, but the soul or life with which it is endowed. Nothing proclaims this last fact better than the inspection of the body while it is endowed, and when it ceases to be endowed, with life.

Still more curious it is that the body in all its various parts is mechanical in build: all parts fitted to obey the prime and working outside power. The eye is purely instrumental; the ear is an instrument—so is the heart and other muscles. The quality evinced is according to the instrumental capacity: thus I found that the pulmonary artery, which carries the blood of the lesser circulation, is exquisitely proportioned to the aorta, which carries

the blood charged with the vital oxygen over the body.

There are also in the body the two kinds of oxygen which it wants—the free and the condensed. The free oxygen is in the vital blood, transfusing in all directions and supplying vitalising energy; the condensed is locked up in every organ, giving a considerable weight of matter, and perhaps seizing and fixing hydrogen, so as to constitute water, but acting as a condensed thing, and having no relation with that free spirit with which it is combined when inhaled—adding to the mass, but losing its energy.

Sometimes the structure of the body is purely instrumental—as it is in a valve like the mitral—there is no escape from the conviction concerning it, except on the supposition that man has invented valves out of the body in imitation of those found within the body. In a course of lectures I delivered before the Society of Arts on “Mechanisms of Nature and Mechanisms of Man” I did my best—not altogether with the success I had hoped for—to show that the divine and human mechanisms are distinct, and that the human are not mere imitations of the divine; nothing more clearly demonstrates this fact than the valve. Nature and man are one as mechanists, and, although Nature is primary, are one and the same. Even pain has its analogue.

The body on the earth, as an instrument forming a part of the earth, is a visible and obvious thing—obvious in its parts as in its whole: a temporary

instrument, acted upon by an influence which lies around it outside, we may truly say, in the air, invisible and immortal.

To a medical mind the distinction is as clear as day. The charged instrument plays to nature just as it is allowed. It is the prime duty of the doctor to keep it in tune, and, as far as he can, to keep it alive—that is to say, ready to receive vibrations or impressions. This duty gives a higher position to medical men than was ever assigned to them in the ages that have passed, intimating that they ought to lead the living world and keep it in order. To man generally the distinction indicates that the visible instrument spoils or degenerates, while the invisible spirit lives in it according as the instrument is in a condition for the reception of the spirit. There once was no instrument. Then one was made: “God breathed into his nostrils the breath of life, and man became a living soul.”

It seems to me that this view best of all explains qualities and most clearly differentiates species. All living beings breathe life and are under the universal influence. How they develop the influence depends on the form they take, singly or combinedly, whether it be physical or mental. Hence variety of character and hence variety of species and even the difference of sex. In other words, if two animal instruments were in every respect the same, they would be in act one instrument, and, though they might appear

as two, would behave as one. The varieties of what is vulgarly called constitutional formation or temperament are necessary, in order to have differences of kind or species, and the instrument is according to its construction. Memory itself in this way becomes nothing more than an impression, fixed or fleeting, according to the condition of the surface that receives it and, so to speak, retains it. To the common view there is an endless variety of instruments,—but that is not the fact: the moulds are comparatively few, although there may be many shades which seem to indicate a large number; and there are outside influences which create changes of appearances without instituting actual change of substance. A black animal is not essentially black because of its possession of a particular colouring principle, but because it absorbs the colours which come from the sun, while a white animal reflects them—facts which constitute the difference between the white and the black races with intervening modifications.

The force that is evolved by the instrument, and which to us is invisible, is known only by its effects as we are enabled to see them in animal movements. Once I was summoned to see a sick man and when I arrived he was dead, so I could enter into no converse with his force or spirit as manifested in him himself. And yet I did so. Some hours before he ceased to breathe he had wound up his timepiece by his bedside, and it was still going; that is


to say, his vibrating, indestructible part was still manifesting itself in another instrument that was giving me certain information his lips, earlier in the day, might have given me. The hands of the clock he wound up told me the hour, in fact, in another language, and he, although dead, was still speaking.

To treat the animal body as the instrument of a superior power is reasonable; is in accordance with speculation, and with the fate of everything that has been, is, and is to be. The power is eternal; the instrument, through which it displays itself, mutable, so that seven ages of the instrument would mean seven men. The endowed instrument may make the race better, raising all that is below the common towards the highest. We civilise the earth in this way, and construct out of it many things that before were practically dead.

As instruments we are everything, so long as we are endowed with the power that animates us; but when we cease to be endowed and are dead, we are no more than matter waiting to be resolved, recast, and filled with life.

CHAPTER XXIII.

UNIVERSITY ECHOES.

N the borders of the northern sea there lies a city, the university of which has, until recent years, been almost forgotten. The university I refer to is that of St. Andrews. This, the oldest university in Scotland, was once the light of learning of the country. A pope organised it. It was the seat of much commotion in the Reforming period; and one of the leaders of the Church, Cardinal Beaton, was killed there. John Knox, a leader of the reforming Church, preached there, and his pulpit still remains. It is said that the cap which the Principal puts on the head of a candidate for a doctorship as he pronounces the ancient Declaration is made out of a remnant of the nether garments of the Reforming hero. Dr. Samuel Johnson and Boswell visited this venerable city, and the first of them made the anglicised grace delivered at dinner the subject of critical remark. The university, full of history, unfortunately did not at all times retain its fame or its magnitude. The more active living centres of Edinburgh,

Glasgow, and Aberdeen shot before it; it still held its rights, and was able to confer degrees as it willed. There was a custom in Scotland that its universities could confer medical degrees on receipt of the necessary fees, and men of eminence, such as Arbuthnott and Jenner, availed themselves of the privilege at St. Andrews. As time advanced the proceeding, though not confined to one centre of learning, was modified; the introduction of an examination for degrees of medicine was instituted, and numbers of men who held medical or surgical diplomas of practice took advantage of the privilege and flocked to the northern city to be examined and to obtain their title. Useful as this was in meeting the wants of a large community that had been duly educated, but were not students of a regular university, it fell under censure. The universities of London, Durham, and that of Ireland, followed out the method with success as well as St. Andrews; but the latter was the most popular and the most unduly criticised. After the year 1868, therefore, the number of its medical graduates was reduced to ten annually, each of them to be men in practice who had reached forty years of age.

In the year 1854, the new rule not having been introduced, I and many more qualified men went to St. Andrews to undergo the requisite examination, and nothing could have been more fairly conducted. The written examination, prepared by Professor Day,

M.D., F.R.S., the professor of medicine, was a model of its kind, and was supplemented by verbal examinations by himself, Professor Andrew Anderson of Glasgow, Dr. Connor, and other distinguished men. The examination lasted altogether two days. The strictest impartiality prevailed; the rejected candidates were as well known as the accepted, and there was no shadow of complaint. I was one of the legally constituted new doctors of medicine, and on my return to England took my place as such.

A considerable number of medical men were brought together as graduates of the ancient university, and became a powerful medical body. It included some who had been in general practice for several years, and who were ready either to expand their practice by means of their degree; to accept some local office; to accept the membership or fellowship of the colleges; to become local consultants, or to retire from the labours of public work. It included also younger men, who, having missed the teachings of a university, were ambitious of taking honours by examination.

For a few years no change took place in the organisation; and it might have continued, but comment was made upon it, not by the older universities of Oxford and Cambridge, nor by the private and external schools of any city; not by London, Durham, or Dublin, but by the other universities of Scotland. It was the most absurd opposition

even for themselves; for when once a man had graduated at St. Andrews he theoretically became a Scotch physician, proud of the Scotch universities, and ambitious that all the young students under his care should, if they qualified for medicine, enter the Scottish universities, which taught as well as graduated. We were all of one mind in this particular; but when once a thorough-going blunder is set afloat there is no checking it.

In course of time a blunder was set afloat. It was agreed that St. Andrews, not being a leading school in medicine, ought not to be considered a place fitted for examining and conferring degrees, and a Bill was brought into the House of Commons to which the names of the Right Honourable Mr. Cowper and of Mr. Brady were attached, giving the powers of graduation to the universities of Edinburgh, Glasgow, and Aberdeen, but withholding such power from their more ancient and venerable colleague. Mr. Cowper, in commenting on this proceeding, urged that St. Andrews was omitted because, practically, it was not a university; it existed as such only in name; "it was now merely a fishing station." I thereupon summoned a number of graduates to consider the matter. We had all passed a meritorious examination; we were by law doctors of medicine; we had duly paid the money we were called upon to pay, both to the Government, for the stamp, and to the university; we knew and felt the advantage we had gained, both

by money and labour, and was it possible that we were to be the last persons who would share the benefit?

We agreed that the public should also be considered, for the public were benefited as much as we were. Medicine is a progressive science, and, in view of its professors, was year by year making new advances which its representatives were forced to follow and practise for the public good. It was well, therefore, that practitioners should be obliged to pass through the new trial as they endeavoured to acquire new qualifications—and how better could they do this than by passing through a new ordeal bearing on professional activity and knowledge? Further, we considered that it was positively advisable that they should prove themselves advanced men, not in an institution that was a school possessing prejudices of its own, but in one that was free and independent, and only represented in science and medicine by those who were appointed to test the candidate.

We were ourselves singularly happy in regard to the examining Board we possessed. The Board of Examiners was, in fact, complete, and in the method of its examinations was as strict as it could be, framing its course by the light of the other examining bodies, such as the Royal College of Physicians of London.

Appreciating these facts, we graduates of the University of St. Andrews found that in Fellows

of the Royal Society, in Fellows of the Royal Colleges, and in various public positions, as in magistracies, and in the institutions of the nation, we were as soundly represented as were the members of any other body, while in our own profession we were as much trusted as we could possibly expect.

All these points considered, we made up our minds to institute an organisation, to be called "The St. Andrews Medical Graduates' Association," and in this determination we were warmly supported by Professor Day and his colleagues. The new central committee did me the honour of electing me as their president, and from then until now they have annually repeated that honour—a space of thirty-eight years—a repetition which I look upon as one of the eventful features of my life. Dr. J. H. Paul was soon afterwards elected treasurer, and a large council was formed. Names of members came in from all parts of the world, and we were soon constituted into one of the strongest associations of medical men.

We naturally, being of one mind, made ourselves felt, and although we did not carry all we desired, we changed the aspect of things. The first step we took was to see Mr. Cowper and Mr. Brady. Mr. Brady was himself a medical man as well as a member of Parliament, representing Leitrim; he sympathised with us warmly, and quickly arranged a consultation with his colleague. We met at

Mr. Cowper's residence in Hertford Street, Mayfair, and I, having at my fingers' ends all the facts about St. Andrews University, was soon able to show that we were infinitely more than a "fishing station," and that we had legal rights, learning, and numbers. Mr. Cowper, who afterwards became Lord Mount-Temple, confessed himself wrong as to the statement he had made, and promised to help us, but did not see his way to suggest the appointment of a member of Parliament for each of the four universities of Scotland: indeed, he was of opinion that even three were too many. I saw the point, and suggested two: one to be a member for Edinburgh and St. Andrews; the other for Glasgow and Aberdeen. No proposition could have been more readily received, and, giving me a pen, he begged me to put it upon paper, and so I drew out the clause that is embodied in the Act giving the two universities, Edinburgh and St. Andrews, the seat filled first by Lord Playfair and now by Sir William Priestley.

Organised as an association, we went on our way with energy. We took an active part in the formation of the new Medical Council, in which we were this time elected to take a representative part in combination with Glasgow, and which prevented the extinction of the university as a medical examining body, although unfortunately the graduates admitted were reduced to ten a year—a most illogical compromise.

Notwithstanding all opposition we held together

and maintained our views by starting the publication of a series of *Transactions*, which lasted for many years, most ably edited by our learned honorary secretary, Dr. Leonard Sedgwick. To those *Transactions* a large number of the members contributed. I wrote several essays, including addresses given at our annual meetings; but that one which gave me most satisfaction, in a practical sense, was on "The Treatment of Wounds by the Second Intention," in which I indicated what method ought to be pursued when the treatment of wounds by the "first intention" failed.

In addition to our other work we held our regular meetings for scientific discussion, and gave our annual public dinners and conversaziones. They, from first to last, have been attended by eminent men, well-known to the world, such as Professor Allen Thomson, Sir Richard Owen, Dean Stanley, Principal Tulloch, Sir Sterndale Bennett, Admiral Sir Edward Belcher, Sir Andrew Clark, Thomas Woolner, R.A., the Marquis of Bute, Lord Elgin, Lord Balfour of Burleigh, Sir Charles Cameron, Mr. Hepworth Dixon, Professor Bell Pettigrew, Professor Donaldson, and others, who charmed us with their eloquence. The best post-prandial speech Professor Owen ever made came to us from his lips in response for "Science."

After a few years the University graduates elected me as one of the members of the University Court in place of Lord Jerviswoode, who had resigned.

was elected as General Assessor; represented the graduates—graduates of Divinity, Arts, Medicine—and held that distinguished post, with one short break, for no less than sixteen years. The Court, which had in its hands the governance of the University in all supreme measures, and which owned the University Chest, in my time, comprised the Lord Chancellor—His Grace the Duke of Argyll; Principal Tulloch; Mr. Whyte Melville—the father of the author of that name, and one of the best golf-players in the United Kingdom—with the Lord Rector. Mr. Stuart Mill, Lord Selborne, Dean Stanley, Mr. Froude, and Sir Theodore Martin served in turn as Lord Rectors; their Assessors being Mr. Skipworth and the Earl of Elgin; the Assessors of the Senatus were Principal Shairp and Professor Fischer.

The University Court is now a little modified, every faculty having its Assessor, but its power and functions remain unchanged.

The position of Assessor to the University for a long series of years brought me, of necessity, into communion with many men of learning, besides affording me the most interesting sights of travel and facilities of communication. I journeyed to Scotland from England frequently, and when in Scotland was invited to lecture at the great centres—Edinburgh, Glasgow, Aberdeen, Dundee, Perth, Stirling, and Forfar. I was also led to make good friends, such as the late Sir William Collins, who

took me on pleasure trips down the Clyde, or on yachting expeditions along the western coast, in which many incidents occurred which could not possibly escape the memory, and, as impressions, are still alive—pictures retained in the organ of the mind.

Since the days already referred to some changes have taken place. An attempt has been made to unite Dundee with St. Andrews, but the effort has not succeeded, and at the present moment St. Andrews stands as an independent school with three additional chairs; one of Botany, another of Materia Medica, and a third of History. Anatomy has also taken its position there, and in addition to the red-gown male students, ladies have entered its colleges, and in very considerable numbers have taken the degree of LL.A. and even M.A. As an Association we graduates remain the same except that our numbers are smaller.

CHAPTER XXIV.

REVOLUTIONS IN PHYSIC.

Blood-letting.

THERE is no greater revolution of a medical kind I can recall than that relating to the treatment of disease by the letting of blood from the body. It is the rarest thing in these days to see a doctor carefully carrying about him the means for instantly producing venesection, and I have lately seen two who thought it necessary in bleeding a man to proceed by exposing a vein with forceps and scalpel, neglecting, at the same time, the old-fashioned fillet which we were accustomed invariably to use, and which everyone knew how to apply. The transformation is astounding. I have in my waistcoat pocket a pretty tortoiseshell case holding two bright little instruments called lancets, which were presented to me on Christmas Day, 1844, as a first necessity in medical practice. The people went with us heart and soul by their commendation, and thought nothing of our drawing off even a pint of blood. Nor was the doctor alone in this ancient art, for although the writer of *Gil Blas* had

fiercely and widely exhibited Dr. Sangado, and had possibly produced a good effect, blood-letting went on. Even after *Gil Blas*' day the surgical barbers set up their poles, with the red and blue lines, representing arteries and veins, and the customer walked in to be bled as readily as he does now to be shaved or shampooed.

It was not always that a person who went to be bled was in bad health, for it became a popular idea that regular bleedings at "spring and fall" were necessary, that the body might be kept in health. The collecting of persons to be bled became a steady source of income, and one of my early friends, in buying a practice, was actually obliged to pay specially for "spring and fall venesection." The fact that anybody ever died from the practice was unheard of, and the skill of a man in performing venesection was frequently a recommendation to his patients, while at this day the practice of systematic bleeding has almost passed away.

Why blood-letting became in a few years unpopular so that few men now dare to encourage it, is difficult to say, for it was really a remedy, and Dr. Munk has recently told how a President of the Royal College of Physicians—the well-known Sir Henry Hallford—fell into disrepute because so late as 1845 he failed to bleed an ailing practitioner who was travelling with him, leaving him at Tring to be attended by Mr. Dewsbury—a local surgeon who had no punctilious scruples. What also is strange is

that blood-letting was both old and potent, and that, considering the body as an instrument, it was on the right tack. If it had never been known, and was only now just discovered, it would probably be on the crest of the wave, and the adopters of it would ride thereon amid acclamation. It may yet revive, and another old plan may also come to life again—that, namely, of drawing off blood from a diseased body and transfusing into another vein of it a healthier blood.

The art of blood-letting collapsed, but it did not drop suddenly and altogether, for when the once familiar lancet ceased to hold sway, the lighter local methods, by cupping and leeches, still prevailed. I knew a gentleman—a dentist by profession—who was so expert a cupper that he was sometimes called upon to cup as often as five times a day, and, with that and the dental work combined, had his hands quite full from morning to night. I also knew a professed cupper—the late Mr. Beck. Lastly, I knew a firm of doctors who paid £250 a year to one house for the leeches they required.

Blood-letting, in its course of more than a thousand years, was not always wrong. The late Sir George Paget of Cambridge was, some half century ago, in consultation with me at Elmdon in Essex in the case of a Mr. Clarke. Mr. Clarke was lying near to death with double pneumonia, a disease that had followed the act of leaning out of his bedroom window one cold night. We

feared he could not recover, but as a last chance we drew from his arm a full pint of blood. It was magic ! it was like pulling him out of a pond. His dark and troubled face became ruddy, and, to make a long story short, he began to breathe by the affected lungs and to recover from that hour, living for many years after, and honouring me by calling on me in London on several occasions. I once saw the late Dr. Willis of Barnes save the life of a child, convulsed from congestion of the brain, by drawing off blood from the jugular vein. I feel quite sure that I myself have saved life by bleeding in apoplexy ; like Galen, I have noticed the relief of pain from the abstraction, and, as already stated, the late James Wardrop, when anæsthesia by vaporous inhalation was still unknown, produced deliquium or faintness, and therewith insensibility, by bleeding, and then performed, painlessly, operations which would otherwise have caused great suffering.

Some think that the cessation of the abstraction of blood was nothing less than an evolution of the science and art of medicine. It was, however, a very rapid evolution, the like of which has never before been seen. It has been so rapid that in my own career I have been the cause of stopping two legal trials based on entirely opposite extremes. In my early life some men driving a cart rather furiously were thrown out in trying to pull up at a public house, and one fell so heavily that he was

stunned and quite insensible. A neighbouring rival young surgeon was called in, and, being imbued with the new ideas just coming in about blood-letting, refused to draw blood from the wounded man. It was an unexpected refusal, and in the end the friends of the man commenced a legal action for malpractice. They came to me for evidence on the old and established side, as they thought. I, seeing the difficulty, and also inclined towards the new ideas that were springing up, persuaded the relatives of the supposed neglected man not to pursue the course they had commenced, and resolutely refused to give any evidence in their favour, as did also the members of the firm with which I was then connected; in the end the pleadings were withdrawn—so that my opposition to the practice of blood-letting had its influence.

Much more recently a practitioner in London, having attended a lady in her accouchement, saw symptoms for which he thought it right to bleed, but the lady died. Her husband, therefore, came to me complaining, and begged me to give evidence against the practitioner, in an action for malpractice, on the ground that blood had been improperly abstracted. I could not, for I had actually recommended it as a remedy for the very class of case in hand, and the action was withdrawn.

In the history of the world and of the habits and beliefs of mankind there is no revolution more remarkable than this of blood-letting. If the blood

is the life this revolution means the saving of life ; and I think I may say that when the life-blood was let there was one disadvantage, namely, that the patient was very often an undue time in regaining power. I never saw anyone killed by a system, which the long antique pole in varied colours, before it was rotten to the core, proclaimed in every village.

A man one day, when thunder was in the air, sought the shelter of a windmill. A flash of lightning came across him and laid him low. He was carried as a dead man to the nearest chirurgeon, and I remember his helpless body being borne into the garden and placed on an old-fashioned settee. The surgeon had no fears : he had learned his art, and performed it bravely. He exposed the two arms of the man, and tried to draw blood from both at the same time. It was his only chance, he said, for taking off the tension of blood ; but it was the right chance—it succeeded, and the helpless mass that was carried in by other men's aid walked out by its own. The fact is far too tense and demonstrative to be forgotten, and blood-letting can only be laid aside absolutely when it is seen with full perspicuity in the clearer light of the future.

Mercury, Opium, Antimony.

The revolution that took place in regard to blood-letting has not been, by any means, the only

revolution that has occurred. The administration of mercury, especially in the form of calomel, or calomel and opium, was almost as general a practice, and it is curious to remember how mercury commonly ran in concert with blood-letting. We were told to bleed and then to mercurialise, and salivation or complete mercurialisation was accepted as a definite line of treatment. I have seen swollen gums and loosened teeth from mercury many times, and have come into contact with several persons whose teeth had been completely destroyed under the mercurial *régime*. In some institutions, as, for instance, the Haslar Hospital, mercurial inunctions were the order of the day, and not infrequently were carried on until salivation developed itself. In the treatment of acute pneumonia mercurial treatment was for a time set aside in favour of antimonial. We were advised to give antimony in the form of tartar emetic, *coup sur coup*, until the system was completely palsied by it. The patients were rendered sick literally; the action of the heart was reduced, and the pulse extremely lowered. Sometimes it even seemed as if patients died from the treatment, and they always were brought into a state of debility from which they slowly recovered. The times have altogether changed, and antimony as well as mercury have passed out of date in civilised medicine. Antimony seems almost to have lost its place, and mercury is merely claimed by a comparatively small number

as necessary for the treatment of specific disease, or occasionally as a purgative of the alterative kind.

Counter-Irritation.

Together with blood-letting, and mercury or antimony, blistering as a counter-irritant had its full swing, and in writing the Life of John Snow I have recorded what he told me—namely, that a master of his who had a large practice kept a drawer in which a returned blister from one patient was used for another, such was the demand for counter-irritation. The idea of counter-irritation has not altogether died away, and I must confess that, although I have never used a blister that has previously been used, I do sometimes apply blisters for particular purposes, not without effect of a favourable kind. I and others frequently employ counter-irritants of a milder nature, such as mustard and other allied medicaments. We have, however, in regard to counter-irritants, greatly modified the tone, and we certainly are much less disposed to poultices of all kinds, especially to such as press heavily on the chest and affect the breathing.

Purgation.

I remember very well when the Hamiltonian system of medicine was in high favour. Hamilton was a northern physician, and taught that it was always a good plan freely to relieve the bowels.

He was fond specially of saline purgatives, and there was a good story told by the late Sir Astley Cooper which bears on the purgative method. Sir Astley was accustomed to meet a Scotch physician who would say to him,—

“Weel, Mr. Cooper! we have only twa things to keep in mind, and that’ll serve us for here and for hereafter. The first is always to keep the fear of God before oor een, and that will serve us for hereafter. The next is always to keep oor boo’els open, and that’ll serve us for here.”

There is a good deal of sound common-sense in this northern teaching, and I sometimes think we do not adopt it in this present day as we might do, but whether that be so or not we have mightily changed, and apart from some watering-places where there are springs of a purgative nature, we rarely think of following up persistent purgation as a means of cure.

I need not dwell any further on what has been said about the gradual disuse of alcohol in disease, neither need I touch on the abolition of pain as the most striking feature in this century of medical advancements.

The Stethoscope, Sphygmograph, and Sphygmophone.

The stethoscope was coming into common use when I entered physic, but I knew of at least one doctor who had never employed it, who considered it useless,

and who, when he saw it in the hands of someone else, would ask, with a good-natured laugh, "whether it were possible through it to hear the grass grow?" It was not professed that we could hear the grass grow, but the stethoscope instituted a true revolution in physic, and we, in our later day, were reaping the benefit. We followed our masters, Laennec himself, Hope, Andral, Louis, Chambers, Latham, and Williams, as our authorities, and we were not wanting in knowledge, but we were not content. Soon after the middle of the century we formed in London a Society which we called "The Society for the Study of Chest Disease," and were industriously but quietly engaged at new work in investigating diseases of the lungs and heart. We met in the evenings at each other's houses, partook of tea and light refreshments, and then proceeded to work. Most of us, if not all, were engaged in hospital practice, and we were able to request some patient to come to us, whose case we carefully examined and discussed, by which means, in the end, he became as much benefited by our combined experience as we were by our observations. A great many of us, deeply interested in chest disease, were thus bound together in useful work, and a few are living still, though the majority are dead. The observers I best remember, as if I could speak or write to them still, are John Snow, William Baly, Francis Webb, Andrew Clark, Francis Sibson, Ridsen Bennett, George Johnson,

Frederick Anstie, John Cockle, and Thomas Hawksley. Snow was a genius; Baly, a consummate German scholar, who translated Müller's *Physiology* and was a clear observer, became appointed Physician to Her Majesty, and would have made a great mark before now had he not been killed in a railway accident; Webb was one of our classical scholars and physicians, an F.S.A. of strong antiquarian tastes; Sibson was a fine clinical artist; Andrew Clark was keen and penetrating; Ridsen Bennett, who became a President of the Royal College of Physicians, was exact and critical; George Johnson was minute, critical, and cautious; Anstie was zealously acute; Thomas Hawksley was never so satisfied as when he was hearing the views of his colleagues, and John Cockle was most suggestive.

One day there came to London a Mr. Groux, who had a singular development of the chest. He resembled, in the way of construction, a man presented by William Harvey to King Charles I. in order that the King might place his royal hand over the heart. The bony structure covering this part was incomplete. The bony structure over the heart of Mr., afterwards Dr., Groux was also so deficient that the movements of the heart could be seen and its pulsations felt as if it were a distinct organ. Several of us had Mr. Groux before us for examination, and watched the pulsations, both of his heart and arteries, by fixing feathers with wax over the pulsating centre. Out of these and pre-

vious researches sprang the instrument called the sphygmograph, by which we caused the pulse to write its own message, an entirely new art. The sphygmograph was most thoughtfully devised by Professor Meyer and simplified by Anstie, Mahommed, Pond, Dudgeon, and myself. I made the sphygmograph, when in use, cut the lines on which the movements of the pulse could be traced. I caused the body to be inverted so that the pulse could be read while the body was standing on its head, or was laid at any angle. Also, after Professor Hughes had invented the microphone, I constructed a new instrument—the sphygmophone—which caused the pulse to deliver sounds through a telephone, so that it could talk as well as write. We had now two new ways of taking pulse-records in addition to the process known from time immemorial of feeling it, counting it, and guessing at its quality.

Hydropathy and Homœopathy.

It has often been asked of me what I think of the introduction of new systems of medicine such as hydropathy and homœopathy, and what is my experience of them as I have seen them in the course of my life. I may say candidly, and without any desire to be hypercritical, that no system of medicine, standing apart from the old high-road of medical science, has ever impressed me as a new and great development. I recall

hydropathy springing into great position for a time through the labours and ingenuity of a German peasant named Priestnetz, and I have known the introduction of hydropathic establishments at home and abroad. They have provided little specially curative, but have induced numbers of people to sally forth from their homes and places of business to get fresh air and rest. Arbuthnott wrote to Dean Swift to go to Geronker "because the Geronker waters would not carry," by which he slyly conveyed that it was not the waters that cured but the journey, with change of air, habit, and scenery. We might apply the same reading to modern hydropathy, and, acting on this very principle, many of us physicians have often recommended, with the best intentions, the hydropathic process of living, and apparently, in numerous instances, with the best results. In fact hydropathy, revolutionary as it has sometimes seemed, has been occasionally an aid to scientific medicine.

In the early days of my career the system called homœopathy had come into full prominence, the physician named Hahnemann having been its promoter, and, some think, its founder. He does not appear to me to have been the founder, but he certainly was the first expounder. In the same University where Hahnemann taught, the University of Hallé, there lived through a long life Michael Albertus, and he, the great journalist of his time, published three essays, one styled "De

Curatione per Similia ;” another, “De Curatione per Contraria,” and a third, “De Curatione per Expectationem.” The three embrace the whole art of medicine from the first to the last, and he is the wisest physician who adopts them all as occasion may call for them. Hahnemann, after some fluctuations, seized on the “Per Similia,” built a system upon it, and established a schism, under the term “similia similibus curantur.” We must understand the plan to understand the man. He began by giving large doses of physic ; saw the evils ; dropped to infinitesimal doses ; saw the good ; and then, in order to account for the results of the contrast, invented the dogma about similars, a convenient invention that seemed to account for everything he saw. In plain words, he took Nature into his firm and then did not acknowledge the partnership, or perhaps did not know of it, a concession we ought to allow. Hahnemann made a great commotion and division among professors of medicine, the like of which had never before been seen since the days of Paracelsus, if then. It was, perhaps, a necessary commotion, but as we saw it in its early times it appeared to be an error, and gave rise to much anger and tumult, in which the public took part. It led to the introduction of the absurd opposing word “allopathy,” as descriptive of a system which we never saw ; it fixed in the mind of the people the impression that when a doctor was called in something must be done, even though a globule were

concerned, and it gave rise to all sorts of silly notions as to the effects of globules and infinitesimal doses. The homœopathic administrations also were not always sincere; they were sometimes really active remedies like bichloride of mercury in full dose, although in globular form, and created curative effects that could not be acknowledged. Some accounted for symptoms, misled by the fanciful statements of the naturally recovering sick, and claimed the advantages from the new system to be superior to those of the older. Nature does not try to save, but in her course she often saves without going out of her way, and the homœopaths had the advantage of this fact. We, of legitimate physic, could not sympathise with their system, and they could not help, in accepting it, separating it from ours as if they felt separation their safety, even though, in examination for their diplomas, they concealed themselves under what they might conceive to be the allopathic veil.

As time has gone on matters seem to have become a little more settled. It is felt that to brand a regular profession with the term "allopathic" is simply grotesque, and that, as a descriptive term, allopathy is just as ridiculous as homœopathy, while treatment by expectation is becoming day by day the safest, and very often the quickest, of our endeavours after cure—natural recovery. It will take a good many generations to repair the damage that has been done by the breach that has occurred. It is impossible

for men of legitimate physic, however liberal they may be, to foster a delusion, and it is hard, if not impossible, for men who have committed themselves to an error to make the acknowledgment.

Surgical Revolutions.

Up to this time I have dwelt only on the revolutions that have taken place in medicine, and now it is necessary for a moment to refer to those that have taken place in the field of surgery. In early days, as has been already intimated, the object of the surgeon was to be very quick in all his operations; celerity was his fame, and to see an observer take out his watch in order to note the seconds during which a Liston, a Lawrie, or a De la Garde could remove a limb was a perfectly natural event. Anæsthesia has taken away this art of celerity to so considerable an extent that every bold and thoughtful man, physician, surgeon, or general practitioner, can perform an operation at his comparative leisure, if not pleasure. Anæsthesia has also permitted many operations, and with success, which could not previously have been dreamed of.

There have been certain other advances which have belonged to our time. Through the labours of the late Dr. Strohmeyer, and in our country the late well-known Dr. Little, the art of subcutaneous surgery, which John Hunter seems to have glanced at but let alone as a practice, has been most wonder-

fully developed, to the great advantage of those living bodies that are deformed, crippled, and unable to carry out with facility the ordinary duties of mankind.

Another great advance has been in the performance of such operations as ovariectomy, by which from the female subject the ovarian cyst, loaded with fluid, has been removed entirely from the abdomen, and the lives of women previously doomed to death by disease have been saved. I have already shown in *Asclepiad*, Vol. XI., p. 98, that the suggestion of this remarkable operation was first made to Erasmus Darwin, on March 29th, 1793, by Mr. Power, a surgeon of Market Bosworth in Leicestershire, but it has required a full century for complete development, a development which has led it to become one of the most startling improvements in surgical art, the chief steps of which I have seen taken, with all the controversies connected with them, in my own short life.

Treatment of Wounds.

The greatest advance of all, perhaps, has been made in the treatment of wounds. In my young days disease was a field of uncleanness and a mass of corruption. The sick-room and sick-ward were almost as bad as the dissecting-room. Wards were kept closed, and the excretions of the patients were barely concealed. The excretions were literally

stored in the utensils beneath the couch that they might be preserved for the doctor's inspection. In these days cleanliness has become universal, and the improvement that has taken place in water-closets alone is one of the most astounding characteristics of civilised communities. Preventive art has changed the whole system of cure, and, such has been the progress, it becomes difficult to trace out the value of individual methods. Many think the introduction of antiseptics was the cause of prevention; some others believe in purity—pure air and pure water—as sufficiently remedial, and that nothing extraneous is wanted. It has always seemed to me that iodine and similar bodies that may be called antiseptics have played a conspicuous part in the results, and I was probably amongst the first to use iodine in its antiseptic form, but it is so obvious that the evolution may have been due to cleanliness alone, it is hard to come to a conclusion.

Remedial advocates, by mixing up many subtle questions, such as the action of antitoxin, immunity agents, and assumed bacteriological inquiries, have made some of the worst failures, and have not cleansed the world, as they have proudly supposed, of its current causes of disease, while they have, unfortunately, drawn the minds of men away from some of the most important physical problems in regard to the relation of disease to heat and cold, to climate, electricity, influence of journeyings in space.

and effects of heredity, problems that lie straight before the sight and that will have to be solved.

Treatment of the Insane.

No greater change in medicine has taken place in the two past generations than in the management of those members of the community who differ from the mass of their fellows in being of what is called unsound mind. Persons of unsound mind have ever been the mystery of mysteries of this mortal life. They may be built outwardly like the rest of the world, as it seems to us, but inwardly are evidently different. They have the same general construction, but their actions are special and often apparently wandering and objectless. They are at best the irregular verbs of existence. Whatever their peculiar characteristic depends upon, it is not of recognisable quality. Insanity is ruled by laws of its own, and it seems to be hereditary by a reproduction which descends along the chain of life. The insane organisation is like an instrument out of tune, and, as the wolf in a violin, insanity is never actually absent from any animal instrument whatsoever. Insanity is a thing of itself, but as it usually takes the human family to develop in, it forms an element of humanity. It is not entirely confined to the human family, for there are insane animals—insane horses, for instance—but it is most notably seen in the human form, and has played most important parts in the human family. It has

shown itself at the head of the social group, ruling it according to its own manner; ruling it beneficently or savagely, usually savagely. Anon insanity has taken its place in the religious sphere, stamping itself there, and occasionally making for itself a name or reputation for virtue or other qualities that call together worshippers; gets itself into the niches of temples or the pictures of art, and at last is recognised in living forms, running amongst its fellows as pitiable or dangerous, or requiring to be kept under watch and control, and calling forth either sorrow or laughter.

Whatever form it takes, and however obscurely it may manifest itself, insanity is, by comparison, weak; its irregularities cause it to bend, and it may, conscious of its feeble guidance, be glad to be guarded, ever distrusting itself, and wanting companionship and support from what it may even consider enfeebled aid. Savage it may not be, though it often is, showing itself off by unexampled deeds of violence. It may build a tower that shall try, like Babel, to reach heaven; it may strive after fame by finding heroes and inventing wars with all wantonness and bloodthirstiness; but in the end it falls and its deeds are set at nought because it has no cohesion.

We are beginning at last to understand better the meaning of insanity. We feel it indicates a faulty instrument requiring superintendence, and so we are becoming more humane in its treatment, as who

should say, "May not any of us become mad?" or as though we say, with truthfulness, "Do we not, as we creep into old age, become childishly insane?" as if we were played out and laughed when the rest wept, or treated as a joke that at which the rest wondered.

The way in which, in the history of the world, the sane, as they are believed to be, have treated the insane, is the most curious of pictures, often, in fact, as if insanity had governed insanity and as if nothing but force prevailed, or as if the insane could be made to change their nature and become rational.

If the sanest man in the world were to breathe for a few minutes a simple gas, like nitrous oxide, put before him, he might lose his mental balance and do the silliest things and acts that could be imagined. If Dame Nature were to diffuse through this atmosphere a little of the same gas, which she could easily do by means of her electrical vibrations, and which, for anything we know, she may do, or may have done, all persons exposed to her humour and rendered practically insane might die laughing at the scene, caring nothing about it. If the sanest man in the world were to drink too much of a liquor, such as alcohol, he might go stark, staring mad; and if all the world did the same, the world would share his fate, and do stranger things than are done in any asylum, a fact we can easily learn by seeing what happens when one drunken person advises or tries to correct another.

I have not digressed, but that which I want to recall is the great change that has taken place in my recollection as to the nature and treatment of the insane mind and matter. We seem, at last, to acknowledge that every man and woman born has two natures; that these may not be truly balanced; that they may take into themselves, willingly or unwillingly, agents which upset the balance; and that kindness is the only corrective of that class of human ill, disordered or unbalanced mind.

I remember when, in regard to the insane, there was nothing in force except Law, and that Law barbarous. A mad person was a mad person; he was unaccountable for many of his own acts, as he is still, but he was under the eye of the Law, and they who had charge of him were not. The madman was treated much as a lower animal, although altogether distinguishable from one; or, being on the borderland of insanity, he might be recognised as above the same, and might be supported in doing what affected the mass and what nobody else dared to do. He might, in fact, be worshipped, or he might be cursed. The worshipped mad are objects of idolatry; the cursed are objects of oppression. How they have divided, or have been divided, is a strange feature in the life of man, for while some quite common by birth have risen by their madness to be kings and emperors, others born as kings or emperors have been sent by their cotemporaries

to durance vile. One man whose name we all remember was born of such a generous nature that he declined the legal robe because in it he would have had the duty of condemning some of his own kind to death, and yet in the end became one of the most incomparable of murderers, and himself died a felon's death. Another man, born to nothing, rises for a season to everything; puts himself at the head of a great slaughtering power; loses his place altogether, and as a mere slave dies in mid life declaring himself what he is not, the *tête d'armée*. A third man, born in the purple, and considered by some a good man, rises eventually to his full glory, and, sitting at the head of the rulers of the land, to their wonder addresses them as "My Lords and Gentlemen, and Woodcocks cocking up your tails;" and then, condemned as a lunatic, is taken to a place of confinement; put under the care of an ignorant, bloated-looking old man, dubbed a doctor; is shown to the people at a shilling a head, as if he were a curiosity of the place; is actually whipped by a keeper, whose son, the bearer of his father's clothes, I have myself seen, and from him heard the details. The victim, as artists have shown, becomes an entirely altered man in physique and expression, but, recovering, for a brief period tastes his glory again and then fades away.

In other examples the differences between faith, failure, and sin has been manifested in the same person, and over and over again the difference

between sin and faithfulness, or, to speak more plainly, between sin and righteousness, has been seen in the most characteristic personal manner, and yet it is not until our own times that we have known the sane and insane so marked and managed that the sane should take an intelligent view of the insane, and should, being fortunately the more numerous, be allowed power, tempered by intelligence and humanity.

It looks as if the marvellous change that has taken place in the treatment of mental perturbations is the most extraordinary the world has ever witnessed; it is a change far more astonishing than anything physical we have observed, and I was once commissioned to find out how the change commenced. The duty was rather a difficult one, but fortunately, in an insane asylum at Lincoln, I was able to trace the basis of it, the details of which I supplied with great care in the old *Medical Times and Gazette*, and may again set forth in a narrative form. It is sufficient here to point out as a revolution that the humane treatment of insanity has been one of the great features of the reign in which we all have had the good fortune to live. In the change Love has cast out Fear.

Social Changes: Lady Doctors.

References have been made to the revolutions that have occurred in regard to various modes of treatment of disease, but some social ones have been

developed that deserve notice. I refer first to the admission of the female sex to the duties of physic. The time was when the apparent impossibilities of this change stared us in the face, but now lady doctors, numerously exist and promise to continue unless the fashion wears itself out. It was always selfish of men to try to stop it, and the very effort to kill it encouraged the growth, as I once had proof. Even women's discouragement itself favoured the growth. There has never been the faintest moral reason why women should not become doctors, or mathematicians, or chemists, or anything professional they might find themselves fitted for and that could be appropriated by industry, but if the race is to continue there are natural physiological reasons that must ever stand in their way. Wives and mothers cannot by any device or industry rival men. No provision has been made for such a contest; on the contrary, Nature seems to declare that what she intended the female to be as a part of the race was a good mother, as the first business. Nature is so determinate in all long runs of her own designing, that an imperfect generation might spring out of the choicest female doctors, unless we could succeed in changing the sympathetic nervous build, and establish an organisation in which the brain and its parts should reign supreme. Meantime it is surely very bad practice, to say nothing of manners, for men to interfere in this matter by act or word.

The Art of Pharmacy.

The changes that have taken place in the work of medical men generally have, as a matter of course, influenced in a remarkable way the art of Pharmacy—have, in fact, instituted a new order of society. I recall when the chemist and druggist was recognised as nothing more than the dispensing half of him—physician or surgeon—who was considered the consultant. It is true that the general practitioner who met the consultant in practice usually took charge of the prescription and dispensed it at his own surgery, but in time the prescription began to be sent to some leading chemist, and this especially in large towns. Originally the prescription bore no other names but those of the consultants, the physician signing his initials, the surgeon his name in full. Richard Bright would sign simply “R. B. ;” Brodie would sign beneath that “Benjamin C. Brodie,” the general practitioner leaving his own name out altogether. The custom underwent revolution ; the general practitioner began to sign as well as the rest, and did so in the form of initials, like the physician, and at this moment does so, generally, while not infrequently the consulting surgeon follows the same course. It has also become not uncommon for the chemist and druggist to dispense medicines systematically for a general practitioner. I do not think it is a good plan that the physician or surgeon should merely

prescribe. Galen held that every man who treated disease should supply his own remedies, and I have no doubt he was right. The prescription is a danger. It passes from one hand to another, and, as I have known, is sold; in its dog-Latin it is read by the afflicted and understood by them, so that they know what they are taking as well as the doctor himself knows. The sick can thus compare one man's remedy with another's, to the confusion of everybody. A sick gentleman came to London; consulted five physicians as well as myself; went home laden with our prescriptions, and got the local druggist to select and prepare that which he considered the most suitable. The whole affair becomes ridiculous, injures physic, and undermines that confidence and faith which every patient ought to feel in his medical practitioner, be he physician, surgeon, or general attendant.

The revolution in the dispensary business is quite remarkable. The druggist was once a remnant of the old apothecary of the *Romeo and Juliet* type, and it was hard to distinguish between the apothecary and the druggist. The druggist inoculated, bled, cupped, drew teeth, and kept an open shop. Sometimes, indeed, he did something more; he kept stores or groceries, and was quite as *au fait* with raisins and currants as he was with blue pill and rhubarb. Now all is changed, and the chemist and druggist is a kind of semi-qualified man who seems to live by dispensing drugs for the

sick under the care of some member of the medical fraternity.

The actual change that came over the life of the chemists and druggists was initiated by Jacob Bell, one of their own body, a popular pharmacist of Oxford Street, London. Bell has been dead a long time, but I knew him personally very well. He was a Quaker; a very marked and ambitious man; an admiring friend of the late Sir Edwin Landseer; industrious, rich, and active. He was like a spark—always brilliant. For his own fraternity he had, I am sure, the best feeling and intentions, and founded the Pharmaceutical Society, a very distinct and able organisation, having its own Council, its President, its other officers, and its Journal. It has had for its support influential men of the world, and does not fail to tempt the doctors themselves.

I have followed the history of this Society through the whole of its course; have witnessed its advance in science, and have suggested its closer connection with Medicine in a form which Medicine does not like to recognise, but which is as sure to come as day follows night.

The most striking mode by which the pharmacist becomes a new feature in physic is his bold advance on a presumed scientific principle. As physic has advanced, the administration of medicines and so-called cures has receded. In the first number of the *Journal of Public Health*—1855—

I ventured to predict such a revolution in the following terms:—

“The tendency of medicine, which, a century ago, was directed towards the division of diseases into many hundred forms, and the formation of the most elaborate and complex nosologies, is being in this day reversed; and the whole meaning of modern medical inquiry is to prove that disease is a unity, with a variety of phenomena, and that the causes of disease are reducible to a few elementary forms. This philosophical yearning after fixed principles as to the nature of disease is influencing the whole system of medicine. If the elements of diseased action are few and simple, the principles of prevention or cure are, it is thought, few and simple also. The *materia medica* is thus undergoing a thorough revision and curtailment. The viper no longer yields its body to the formation of a ‘specific’ medicinal broth; the philosophic oil of bricks has become a droll myth, despite its magnificent name and former great reputation; a smell of the blooming dog-rose is now held to be as remedial a proceeding as the deepest draught of an infusion of its lifeless leaves, and these, and a thousand other *remedia admirabilia* which we might mention, are gone or are going into the catalogue of the things that have been. Meanwhile a new Pharmacopœia comes in sight, which all can read. Its principles are preventive, its objects wide, and its elements—some seven only, and the world’s general property—are no more

than *Pure air, Proper nourishment, A regulated temperature, Bodily exercise, Cleanliness, Mental education, Good morals.* Thus, in some of the most important sections of the community, there is, as before said, a general improvement and simplification of knowledge on those great and vital questions, upon the correct solution of which so much of the world's happiness and progress rests."

This prediction has proved true to the letter, is certain of fulfilment, and strangely influences and modifies the position of the dispensing chemist. He advances as a scientific man, but he does not advance merely as a dispenser of drugs. On the contrary, he recedes, and tells you plainly that, were he to depend on the putting up of drugs from the prescriptions of the medical fraternity, he would simply starve, which he does not do. He cannot himself legitimately prescribe even for the most trivial ailment in the ordinary way, so he will do it in the extraordinary. He will invent, advertise, and sell his own articles by becoming the proprietor of his own formulæ. Every day he deluges the breakfast-table with notices of his new foods or physio or hygienic contrivance, and if he can invent a new name for an old thing so much the better. One morning lately a most intelligent and busy member of the fraternity called upon me to show me a portmanteau full of his preparations. I told him honestly all about them, and he admitted every criticism, only responding by asking, "What

am I to do? Starve I cannot. To beg I am ashamed."

Thermometric Readings.

Quite a revolution of a striking kind has taken place in regard to the estimate of the temperature of the body. In the middle of this century we were accustomed to take into our consideration the temperatures of the bodies of our patients, and we used to feel the body in various parts to distinguish the differences of warmth; also we had become acquainted with the uses of the thermometer for many chemical and scientific experiments, and the late Dr. John Davy had unquestionably used it for taking the temperatures of different animals. As a rule, however, we had not systematically employed it in the determination of disease, and I quite well remember the application of a small curved thermometer that could be inserted under the tongue in order that, in fever especially, we might know at what temperature the body was working. Gradually our learning in the matter of temperature increased, and, as it increased, no instrument told us better the facts we wanted to know. We fixed the standard of normal temperature; we gave the standards of fevers; we learned the point at which life was threatened, the point at which it was stopped, the degree in which it sometimes rose at the time of death, and estimated the safety or the danger of the patient by the readings

we were enabled to take. We then saw the development of the thermometer called the clinical thermometer, in which the mercury not only varied according to the state of the body, but registered accurately for our information. And now we have arrived at such perfection in thermometrical readings that no sick-bed is considered complete unless it be furnished with a thermometer, and no person is considered a good nurse unless she can supply the doctor with the facts of temperature, which are just as important as those of any other kind.

In the art of taking the temperature of the body in disease I have been one of the learners; have followed the improvements step by step as they have been brought before me, and have found the study not simply advantageous, but so extremely instructive that in walking round the sick-wards under my care I have felt that the thermometric reading was almost of itself sufficient to tell me what course a patient was taking, and whether the disease were increasing, fluctuating, or declining. Indeed, I recall nothing that is so decisively an advance in the practice of medicine as the use of the thermometer. Even the people are often guided in their judgments as to the state of the sick by what they hear from the physician in regard to the thermometer, it is so decisive, and so simple.

To me the thermometer has, at the same time, not been merely an instrument for observing the

symptoms of the sick under treatment. I have used it largely in physiological research, and particularly in determining whether parts of the body, during health, carry on their work at different temperatures. It seemed important to inquire into this subject of the warmth of different organs, and I made the curious observation that the nervous centres are ordinarily under the temperature of the more vascular organs. For example, I noted that in warm-blooded animals the temperature of the brain is under that of the liver by no less than two degrees Fahrenheit, as if a modification of temperature in particular organs were necessary for the continued maintenance of perfect life.

Special Practice.

I remember that in the early days of medical life there was no decided appearance of specialisation, as there is now. A few persons did seem to be peculiarly advanced in the details of certain inquiries as in stethoscopy, in the use of instruments for crushing stone in the bladder, or in operations on the eye-ball. There were also the grand divisions of medicine, surgery, and obstetrics, which constituted a kind of speciality principle, but there were no minute specialities as there are in this day, and a remark which I remember to have once heard as from Sir Benjamin Brodie, when advising a young friend we both knew, "A specialist is half a quack,"

caused no wonder and gave no offence. Gradually, however, the practice enlarged until the patient, a man or a woman, looked upon himself, or herself, as made up like a watch, each part requiring its own doctor, and selected the man according to circumstance, as the old Egyptians are supposed to have done in their day.

There are two sides in relation to specialism. The body is made up of many organs and mechanisms; it is possible for one man to study an organ specially, and it is certainly true that one man may be better gifted than another man to perform a special operation. On the other side, specialism, too far permitted, is liable to endless confusion, charlatanism, and neglect, for, with care, all men may become just representatives of every department of our art, and unless skill is as widespread as disease, and the means are at hand for rendering aid, some must inevitably suffer who might be spared suffering. I have no doubt that, practically, all medical men can learn alike, that one man will be held as good as another, and that the idea of specialism will stand no higher than Brodie prized it. In the transition state, now manifested, the attempt that is most desirable and most worthy is to have men trained to exactitude in every step of their way, and to let medicine altogether be the one speciality, with an educated public as the patient, whatever the disease to be contended with may be, and however developed. The late Sir Thomas Watson, one

of the wisest and fairest physicians I ever knew, told me there was nothing more apparent to him than his own incompetency, except the number of occasions in which he was asked to see and rectify, if he could, the manifest errors of some specialistic devices.

Social Co-operations.

Thirty-two years ago it seemed to me desirable that we medical men should be bound together for assistance, so that in sickness we should be provided for by securing the aid of a medical club. At the meeting of the British Medical Association at Cambridge in 1864, I, therefore, started a Medical Provident Society, and a large number of medical men joined it. They agreed to pay a certain sum each year, and, when they met with disease or accident, to take relief from its funds. The late Dr. Alexander Henry was elected Secretary; I was elected President, and a considerable body of older and richer men contributed donations, so that we started on a sound basis. The late Mr. Tidd Pratt, of the Friendly Societies' Office, was much interested in our favour and gave us the most seasonable instruction. We did not, however, succeed as we expected. Members paid and kept the funds up to the mark, but it did not seem that any member was willing to apply for help when he was ill, because he did not wish the facts of his illness and distress to be made known. Years went on before we had one

application. A member had broken a limb, but when he found what the general feeling was he refused to accept the relief that was due to him. Pratt said he had never known anything so curious, and he advised me to divide the money on a plan he drew up, or suggested, and return it all to donors or subscribers, with interest to donors. We held a final and most friendly meeting, and did as he advised in due form.

After the dissolution of the Provident Society I was asked to be President of a Medical Protection Society, accepted the post, and held it for some few years. The duty was not always congenial, but I thought the intention of the members good, and therefore agreed, as their wish was very freely expressed, to act for them. We ceased at last, as if not wanted, and imperceptibly appeared to be absorbed into other organisations, so that I was relieved of my duties without any trouble or formality of resignation.

I do not think I was precisely constituted for enforcing protection against what was assumed to be wrong. He always seemed to me the best practitioner who treated the sick man in the same way as he treated himself; I acted upon this ideal from my earliest days, and taught it from the moment in which I commenced to be a teacher, while I always disliked any form of charlatanism as much as others did. To continue the two attempts, one of tolerating and the other of limiting

for the sake of medical protection, was at times typical, but the results were not so satisfactory as I could have wished. It seemed to me better for all of us to improve in knowledge, and to lead the world—which has no real wish to be deceived—to follow our standard over safe, rather than over slippery, ground. I think so still, and feel no regret at having been relieved of a task which, at the best, I could but have technically accomplished, which was not universally acceptable or unitedly supported.

Minor Revolutions.

There have occurred many other revolutions in physic which, though minor, are not without their significance. In the old days it was the invariable custom for the physician to follow the general practitioner into the sick-room and to leave it first. The physician was in this manner always in communion with the patient in sight of the general practitioner, which was a good system and prevented what Watson called “jockeying.” The rule is often broken now, or at all events, is not so scrupulously kept as it was, or held to be of the same importance.

In early days physicians used to ride in the chariot, very commonly in the chariot with the hammercloth—originally a cover of the box-seat that held the tools by which the carriage could be repaired if, on a bad road, it was damaged. The

hammercloth on the big chariot has faded away altogether—I have seen it in the square in which I reside, but there have been none this last fifteen years or more, and the last hammercloth chariot I saw, of medical type, stood for some years in a carriage store in Oxford Street; it first cost three hundred guineas, but fell to fifty that it might be sold in a revised form. I actually have seen outriders to the physician's chariot, but they ceased before the hammercloth was abolished. People now want the doctor simply to reach the patient as quickly as possible; they are content with a landau or brougham at their doors, and they do not even despise a cab if it bring the doctor.

The door of the old doctor bore his name alone, so that it was more or less conspicuous, and the inhabitant of the house was recognisable by the number. In this day you see three or four names on one door, and you cannot tell to whom the house belongs, because there may be several consulting-rooms under one roof.

The old physician and practitioner wore a special and recognisable dress: his coat was cut as a barrister's is now; he often had knee-breeches and Hessian boots; he displayed a white necktie and flowing shirtfront with frills; he wore ruffles, and occasionally carried a cane with a perforated box at the top which held camphor or some other smelling substance. He wrote a large hand on

prepared paper, and, taking him all in all, was a distinctive gentleman whom every one knew as a doctor. All this has departed, and the doctor now is clothed like other men.

The old doctor was great at giving dinners; he would often have twenty or thirty practitioners at his table, which was laid at considerable cost and decorated with handsome design. Copland told me that he sometimes gave five and twenty dinners a year, every one of them showing a good party and costing a great deal of money. Richard Bright, I understood, was also fond of dinners, and, to be short, the entertainment was a kind of institution that could never be ignored. Presidents of colleges and societies, as well as consultants, encouraged dinners, and he who omitted the ceremony was deemed not worth his salt. The practice is entirely changed in these degenerate days, and the dinner is rather the exception than the rule, a revolution that is all to the advantage of the practitioner and the benefit of the patient. There is, moreover, an improvement in the consultation itself: the wine-glasses, decanters, and wine, common to the consulting-room in a patient's house, have, as already stated, mainly disappeared.

Apart from revolutions in physic alone I must not exclude those which strongly affect it. The volunteer movement, started originally by a doctor of physic, who still lives, has taught us the value

of regular out-door exercise on the one hand, and the dangers arising from over-work and excessive exercise on the other. The ambulance movement, which has been evolved from the volunteer system, has led medical men into a new line of experience, which they have voluntarily and freely communicated to laymen and laywomen generally, to the great advantage of all who are subjected to physical injuries and require professional attention quickly. Lastly, the demands of nursing have been studied with scrupulous insight. Women have been trained to duties which once belonged to the male nurse, and which have never been so faithfully carried out as at the present day. This indicates in the most practical manner what a nurse can contribute to the art of healing under the guidance of the Esculapian brotherhood.

CHAPTER XXV.

ZYMOSIS AND THE GERM THEORY.

THE marked change that of late years has agitated us most is that in relation to germs and the development of a science called by its advocates "bacteriology." It is a theory only, or, more correctly speaking, an hypothesis, and, as I have shown from the first, rests mainly on analogy, a dangerous support. The animalcular hypothesis, to which Phillips alludes in his book *A Million of Facts*, was current until 1835, and I have heard Dr. Dwight quoted as its inventor; but the germ theory is of later date and character, and is popular at the present time.

The germ theory assumes that we live in an atmosphere of invisible bodies called germs, as if in an element we could inhale. Germs, it is imagined, sometimes produce in the body bacteria in numerous varieties, traceable by the microscope as causes of disease; that we can shut germs out from the living body; can kill them; but that while they are living in the air, disease due to their presence will never be annihilated. The theory is simple,

and, by the labours of the late M. Pasteur in France, fashionable, and the application of it by the distinguished Sir Joseph Lister in this country, in regard to the treatment of wounds, has attained immense popularity.

On my own part I have never been able to accept the theory propounded, for I have never seen a germ, and could never determine how a germ could grow into a micro-organism. Bacteria I have seen to any extent, but it always appeared to me that it was easier to suppose they were from the animal tissues themselves, undergoing some modifications of disease, than from germs which could never be demonstrated. I knew that the parts of fresh wounds, brought neatly together, would heal, as they do when the injured carpenter surrounds a cut with glue spread over a shaving of wood. I saw that tendons divided under the skin, that is to say, excluded from air, healed without suppuration, and I remembered and published old Belloste's singular argument on the treatment of wounds by exclusion of the air. Further, I could never fail to accept that that which we recognise as antiseptic seems to encourage good healing, or, at all events, prevents suppuration, and very early I employed iodine; I also made styptic colloid, in which preparation benzoin, used by the old friars in their balsam, was mixed with tannin and collodion with good effect, the collodion itself having apparently the property of cutting off the air from a surface over

which it might be spread. This was strong evidence, and gave credit to antiseptics like carbolic acid. I invented another antiseptic, in which benzoic acid was dissolved in chloroform and made to cover wounded surfaces; it was called benzoated chloroform, and acted uncommonly well for disinfecting towels and other linen. It was also efficient when sprayed over the hands during attendance on infectious cases, and I have found it very superior to the weak solution of chloride of zinc, discovered as a disinfectant and deodoriser by the late Sir William Burnett, a solution, the late Mr. Campbell de Morgan, surgeon to the Middlesex Hospital, told me he had successfully used in the dressing of wounded surfaces, but had found it, undoubtedly, rather irritating as an application, the irritation, to some extent, counterbalancing its antiseptic virtues.

On the other side, I was obliged to learn that, in truth, antiseptic agents were not wanted at all, and that absolute cleanliness was alone sufficient as a remedy, and marched side by side with advancing sanitation, which is the mode of cure that stands before all others. In an address at Leamington in 1877, published in *Nature*, I entered into this subject largely, dealing with the nervous origin of animal products and zymosis instead of the bacteriological. I looked on the fact that the force of production of disease is equal to the force of secretion, and that animal poisons are limited by the number of secretions

which the body eliminates. This seemed to me more logical than the idea that we live in a world of living germs, and that we take in from that world varied forms of disease. I thought, in fact, that if we ourselves are not entities derived from germs, probably diseases are not, although some of the ancients thought diseases were entities.

Ophthalmoscope and Laryngoscope.

Up to this point, respecting the revolutions that have occurred in my time, I have omitted to mention two which affect medicine generally, that is to say, both in its medical and surgical character. I refer to the introduction of instruments for research, for investigations on the eye, and on the larynx. The instruments are called the ophthalmoscope and the laryngoscope, both of which it has been my privilege to see brought into practice. The ophthalmoscope was the invention of a considerable number of observers, and it is difficult to name any particular originator. I was struck by the labours of a young surgeon named Avery, a Charing Cross man, and by those of Wordsworth, an ophthalmic surgeon, who was very early in the field, and who used my own eyes for his observations. In regard to the laryngoscope I was more fortunate. Avery showed a tube ten inches long, through which, by reflection, he could see an object. I knew Benjamin Guy Babington, already referred to, who made some

primary efforts to examine the larynx, as did another gentleman, Professor Garcia, whom I also knew. Finally I met with Professor Schermak, who came to England with a practically perfected laryngoscope, and who did me the honour to lay all his improvements before me. By the laryngoscope, as well as by the ophthalmoscope, there has been effected a complete revolution in positive science, for which we cannot be too grateful. They assist to signalise the Victorian era.

CHAPTER XXVI.

RECASTS AND FORECASTS.

IN glancing over the proofs of this book nothing strikes me more forcibly than recollections of omitted incidents. In writing so busy a life as mine from the medical side, the side that first interests me, it has been necessary to omit outside narratives which medical men, more than most men, can supply. The subjects related in this chapter, therefore, are recasts of incidents that have accidentally been omitted.

“The Asclepiad.”

Some years ago, in order that nothing might escape from me which seemed of moment, I started the publication of a book in parts and called it *The Asclepiad*. The first volume was published in 1865, and consisted of several essays of an experimental and practical kind, including one on “Cardiac Apnœa, or Breathlessness, with Open-Air Surfaces;” on “Urea and its Physiological Influences,” and on “Scarlet Fever.” The work was discontinued for a season and was then re-started

in quarterly parts, of which forty-four have been published in eleven volumes, containing reference to a considerable number of subjects, to which I must refer as if they constituted portions of the present work. I shall now only retrace, in abstract, papers, many of which—but not all—will be found in those volumes.

Researches on Foods.

It has never been my fate to be what is called a vegetarian, but my sympathies have been with vegetarianism, and I have for quite thirty years tried to lead it into a new path by endeavouring to make the vegetable world the source of foods that are animal in taste and quality. If I have been slow to produce foods for the market, I am certain as to ultimate success, so that in coming days we shall no longer be savages, going out to kill animals lower than ourselves that we may live on their mutilated bodies.

In experiment it has been a pleasant surprise to find how near we can get towards animal food derived from the vegetable world by operations carried out in the laboratory. I have approached so near to the manufacture of milk that one or two improvements will enable men to produce the most vitalising of animal fluids at their pleasure, quite as freely as they now produce beer, and so cheaply that any quantity could be obtained in all places as a food fitted for purposes of all eras and free from any possibility of creating disease. Solid foods,

by the treatment of vegetables in the experiment-room, are also sufficiently advanced to make it a question how they shall be moulded, in the form of joints, or of shapes which have no appearance of a part of an animal body.

It has been urged on me that what I have done is not going far enough on logical grounds, if we move any step at all, and that we might, as it were, eat the very earth itself irrespective of life altogether, and rest on the primary substances, the actual elementary principles, for our bodily construction, into which life would enter as air would, and out of which shape and form would be manifested. I would not dispute this argument, and the change may come, if civilisation and the earth go on long enough; at the moment, however, it is a correct and sufficient attempt for us to transmute vegetable substance into animal substance for our own sustenance, and in this attempt alone the work of ages lies concealed. I have tried to give the effort a start and it seems to be making its way, while, at the same time, I have endeavoured to ameliorate the strictly animal method and bring it nearer to the world of civilising tendencies and aspirations.

There are many reasons why the transmutation of vegetable, into what is practically animal, food should proceed. In the first place, it is not a difficult advance. Nothing more is required for it than industry and courage. The possible absolute

necessity of the change also lies before us. Daily requirement of food is absolute, while supplies of direct animal kind are dependent on the most capricious conditions. In a large population like that of London we may be limited, even in times of wealth and peace, to three weeks' supplies. In an isolated, coast-bound country like England we might be cut off suddenly from food, if we should depend on animals that die. Again, in promoting the exclusive animal system we cultivate cruelty, disease, uncleanness, and the growth of a population we cannot expect fully to defend our laws by their testimony. The risk is altogether as bad as it can be, and is not met even when the fish or the mammal monsters of the sea are taken into consideration. Throughout the land we want scientific factories of foods, not slaughterhouses—manufacture, not slaughter. The temple of life is too sacred for the mutilation of even inferior animals, for our own support, and, veritably, “all flesh is grass.”

Model Abattoirs and Slaughter Reforms.

Meanwhile, as humane science awaits development, and while the customs and tastes of mankind are being newly educated, while old tastes and customs still linger, I have been fully alive to the endeavour of introducing improvements of every possible kind into the ancient practice. I have persuaded all I could reach to depend, as far as possible, on the

vegetarian system. I have commended it to those who have trusted it and have not trusted it, and, never ceasing to teach transmutation, have done all I could for amelioration by founding the Model Abattoir Society—of which I have long been President—and by trying to introduce a perfectly lethal and painless mode of killing all kinds of animals.*

It is fair to say that to this movement there has been much more encouragement given than might have been expected. A great many towns have erected model abattoirs, and ingenious methods have been introduced for making the sacrifice of animals both rapid and merciful.

Tobacco.

In a preceding chapter great labour was spent in pointing out the method that has been followed in fighting the battle against alcohol, but nothing yet has been said about the contest that has taken place with tobacco. This is not because the contest has been considered unworthy of notice, but because it is of less pressing moment. I have not a line to write in favour of tobacco, and for a long series of years—twenty-five at least—I have scrupulously avoided smoking because of its bad effects on health and vitality. Smoking is not simply a dirty habit, but one that injures the body. It is not in character with the work of the animal machine. It stupefies

* In this work I was ever assisted by the unwearying efforts of the late Mr. H. F. Lester, the Honorary Secretary.

the mental organs; deranges the blood; impairs the circulation; weakens the digestion, and stunts the growth. It also produces local mischief and is most distinctly provocative of some fatal forms of disease. No child ought ever to be inducted into its use, and in a sanitary world conducted on sound principles indulgence in tobacco would be unknown.

Rest and Luxury.

A saying of mine has become popular, namely, that there has been assigned by nature to members of the human family a term of life reaching to one hundred and five years. The idea is fair, and the experience of years has most closely demonstrated to us its correctness, so that the writer of Genesis is much nearer the truth than the after-writer, signalised as David, who gave three score years and ten as the natural duration, and who only can be accepted as witnessing a more luxurious, and, therefore, more treacherous, time. I have seen and conversed with at least four persons who, without doubt, had passed a hundred years, and one, not the worst of the number from a physical point of view, was no less than a hundred and seven. I do not presume, however, that all bodies are susceptible of such length of days. There are some so active and busy that they practically live a hundred years in two-thirds of that time, and are old by work rather than by years. There are some, too, who kill them-

selves by rest, and large numbers who do so by luxury, while all are exposed to the dangers of death in the shape of accidents and diseases, and to risks incident to hereditary type or construction of form and build. We must consequently admit a shorter mean average than the maximum natural term, and, while we do our utmost to attain the full age, must be content to accept the average in our own individual persons, knowing the worst and striving for the best.

Pulmonary Diseases.

Some years ago, in writing about the epidemic catarrh called influenza, I threw out the idea that the symptoms of congestion seen in the lungs, and so often fatal, arose from paresis of the pulmonary vessels, owing to the fact that their nervous supply from the sympathetic system was deranged or cut off, so that the heart could inject them with blood. It was urged against this view that there was no sufficient proof that the vessels of the lungs were supplied with sympathetic controlling branches. I was astonished at this statement, but, conscious of the possibilities of my own error, commenced to inquire, and to my surprise found that the criticism was correct. On thinking over the lungs as mechanisms for conveying blood over a surface exposed to the air, I could not fail to see that it would have been a very bad arrangement to have

had the blood-vessels of the lungs under the influence of the sympathetic, because it would have placed those vessels under impulses derived from nervous impressions of the mind. The lungs, under such circumstances, would have blushed like the cheek, or paled like it, whenever a mental change took place, and sudden death from congestion on the one hand and syncope on the other would have been of constant occurrence. Wisely then, the blood-current flowing through the lungs was obliged to make its course passively, uninfluenced by any direct internal emotion, and only influenced by such variations, as heat and cold, that could affect it directly from the air which the bronchial tubes inhaled or gave forth. This would be the correct mechanism which we, as animal engineers, would follow if we were constructing an apparatus that would cause blood to absorb oxygen from the air or give off carbonic acid.

Clarification and Resolution.

The earlier surgeons deserved great merit for the success with which they removed substances that had become opaque, like the crystalline lens. William Cheselden earned immense credit for the course he took in regard to cataract, but the time has come when the surgeons should begin to think of something beyond mere removal, that is to say, they should begin to study the process of clarification of substances that have become opaque.

In a paper I wrote on the synthesis of cataract, I showed that the crystalline lens could be rendered opaque by raising the specific gravity of the blood with any substance that possessed a crystalline character. Dr. Weir Mitchell, in the most original observation, had shown that excess of sugar in the blood would most distinctly produce diabetic opacity. I moved from sugar to other crystalline substances, and produced cataract of an equally definite kind, by soluble salts like chloride of ammonium, and similar bodies. I saw that if these were removed from the body affected by them, the lenses were cleared as easily as they were rendered opaque. Sir David Brewster had supposed that in cataract the transparent lens was made opaque by aberration of its fibres; others compared the opaque lens to a scratched glass. I saw Sir David on this point, and showed him my own experiments, which indicated that the lens could be infiltrated and rendered as opaque as glass is when it is covered with a solution of a saline substance like Epsom salts. He quite agreed with me in this, and at the time I maintained the policy of the treatment that should extend into clarification. I made some attempts in that direction, and Mr. Brudenell Carter supplied me with lenses he had removed in order that I might try to clarify them.

The field is open still, and a means will certainly be found by which the lens can be clarified, as by the continued use of distilled water as drink, and,

perhaps, by means of a local current, such as an electric current, by the aid of which I have made artificial lenses that were quite transparent.

In all probability this question of clarification extends beyond the crystalline lens. It may lead to the resolution of hardened parts like ligaments, membranes of joints, and lining of arterial vessels.

The Heart as a Pendulum.

The healthy heart seems to act as a pendulum. It gets blood direct from the viscera of the abdomen as they derive it by the digestion of food, and its animation is direct from the visceral chain of ganglia and nerves. It is liable to variability, to slow action, over-exertion, under-action, and to hesitation or intermittency, according to the state of its primary. It may stop altogether if it fails to get, or gets too much, of either matter or force; but in health it regulates.

Further Researches on Blood.

At intervals all through my experimental career studies relating to the blood have been pursued, many of which have been related, for the blood is a fluid that stands first in the investigation of living phenomena. Moses is credited with saying that "the blood is the life," and men of science, whether they sympathise with him or not on the other subjects he discusses and the laws he lays down,

may accept that saying as substantially true. The blood *is* the life; in what way it is so remains to be determined, and is the question ever recurring to me, how—as an animal engineer—I could, in construction, make it perform work. In these studies my researches have been specially directed to what I have called the pyrophorous blood, and to blood as an excitant of electricity. By these methods extremely curious results have been obtained. I have found oxidised blood, as it is oxidised in respiration, a very fine oxidiser of metallic bodies like zinc, mercury, and phosphorus; have obtained currents by these means, and have got formations so closely resembling living ones that a complete new road has been made visible to me, just as poor Mayow saw when he began to investigate the phenomena of what he called “nitro-aerial spirit,” but some trifling want of perspicacity has, so far, blinded me to some great truth which has yet to be solved in regard to blood as an excitant.

I have also sought, and sought again and again, for the means of dissolving blood when it has coagulated or formed itself into a clot, convinced that if that art were accomplished a marvellous step would at once be made in the discovery of the mystery of life and in discoveries relating to disease—indeed, at this very moment my experiment table is charged with specimens of solid blood subjected to processes under which the clot might undergo solution.

Causes of Death from Chloroform.

The number of fatal accidents from chloroform has recently been very great, and I have been applied to many times by members of the profession, and of the public also, to say whether death under chloroform occurs from failure of the heart or injury to the respiration. In answer to this question I would recall the fact I have often stated, namely, that chloroform and its chloride allies are injurious or dangerous in consequence of the chlorine they carry with them and of its excitant effects on muscular fibre. Presuming, therefore, that the heart, which is a muscle, is unduly feeble, chloroform, however carefully administered, may produce excitation, and, causing an extreme spasm, may kill by that excitant action, when death will be correctly stated as from the heart, that is to say, by syncope. But the larynx also contains its muscles which are exceedingly sensitive, and when the vapour of chloroform is allowed to diffuse through them they are sure to pass into a state of spasm more or less distinctive, in consequence of the presence of the vapour, and then death may take place owing to the contraction which they produce. Death in that instance is due to contraction of the larynx and ensues by what is called asphyxia.

Thus there are clearly two modes of death from chloroform: one by the centre of the circulation—the heart; the other by the respiration through

the larynx. Considering that we give chloroform in these days very freely so as to produce a quick anæsthesia, death by the larynx is probably far the more common occurrence of the two; is not infrequently quite instantaneous, and naturally betrays no affection of the heart, if that be looked for before the administration. I should lay it down as a principle that that mode of administration which is very slow and is felt not at all in the breathing is by far the best, although it may not be so practical as an urgent administrator may consider requisite.

In the administrations of chloroform to the lower animals until death was produced, I invariably found, immediately after death, a difference in regard to the circulation in the pulmonary circuit. When the death has been very sudden the lungs may be discovered actually destitute of all blood, and of milk-white appearance, as if the heart had thrown a current suddenly over them and had left them blanched or in a state of what may be very properly designated as pulmonary emptiness, or apnœa.

Further Research in Reanimation.

If I had my life to live over again I would spare no labour in repeating the researches on reanimation, but from what I have learned I should recommence at the central seat of power, the organic circulation. I have noticed two things: one, that

in setting into motion an ordinary engine we do nothing by merely moving the visible apparatus like the hands or wheels except to make a show of action : two, we have to start from the mainspring if we are to do any real service ; for in the animal body I have observed that so long as there is ever so little supply from the centre into the other parts, there is continuance of the evidences of animation. Hitherto we have been too confined to the notion that if we could excite a movement or set of movements that looked like those of respiration or circulation we need not wait for the central action. In the future we must wait for the central movement, and hope that the rest, or secondary movements, will follow, however extraordinary it may seem. This is what happened in the examples, already given in Chapter XVI., of hibernation, and although the secondary movements may be useful when judiciously made they are not alone of use. If we could feed all the nervous centres with animating spirit, we should, without doubt, get manifestations of vital action, but that must be sustained as well as merely manifested, that is to say, the battery must be fed and fed ; a process that only can be kept up by steady feeding of the central system, and of the secondary systems from it as their primary.

Apparent Seats of Disease.

It is a common and natural error to attach too much importance to diseases of a particular kind.

Thus we often consider the kidney as the origin of the disease diabetes, when it may not be the seat of origin. The disease named diabetes is one in which sugar is largely made in the great central system in the abdomen, the system of organic life, with its sympathetic nervous supply directly or indirectly at fault. The sugar circulates through the body; sets up a number of abnormal phenomena, which are symptomatic, and meanwhile the kidney goes on very actively eliminating the sugar in performance of its regular diuretic duty. We then get developed the leading sign by which we derive the distinctive name of the disease diabetes, and we try, by variation of foods, to control the disease. The kidney may undergo change of structure from its over-action, but it is not necessarily deranged in the first instance, and is not actually the *fons et origo* of the complaint. The same explanation might be given of other diseases.

Transparency of the Body.

In 1868 it was a labour of mine to make parts of the living body transparent. I endeavoured to invent a tube through which sun-rays could be transmitted and pierce through parts that were hidden. I brought the matter before the British Association at Norwich in the year named, and exhibited some curious experiments bearing on the point, making sunlight rays go through the skin and softer structures, but not with the same readiness through

bones. Thus, I could make the bones visible and could render some so transparent that I could read large words through them. Afterwards I used this plan for diagnosing and destroying tumours in soft transparent parts.

These experiments lay dormant until the present year, when they became revived by the labours of Röntgen, who has used the light emanating from a Crookes' tube to illuminate all structures except bones, and to make bones, in shadow, perfectly visible by photography. It is a great advance, and it shows clearly that I was shortsighted, however difficult the feat might be to confirm my observations on the mere light-rays so as to give them the power of penetrating and illuminating animal tissues, as described in the paper submitted and published in the *Transactions* of the British Association twenty-eight years ago.

Vulcanisation of Elastic Tissues.

While I was busy in the vulcanisation experiments it came to be tried whether the elastic tissues of animal bodies could be vulcanised so that such tissues might resemble the hardened structure made out of elastic rubber by the dentist, and on which he fixes artificial teeth. I, therefore, vulcanised the elastic substance found in a large artery, like the aorta of an ox, and I certainly obtained some singular results. I got plates that closely resembled,

and possibly were the same as, vulcanite, and the hardness of vessels which is derived from age is to a considerable extent made demonstrable if length of time be allowed to replace intensity of action.

Electric Carbon.

I am of opinion that carbon is the conductor of electricity all over the body, and that, according to the electricity, the carbon combines with other elements in proportion to their capacity for blending with it. Thus, oxygen will combine with it in the proportion of one to one or two to one; chlorine, in the proportion of one to three with hydrogen as an addition, or one to four. And so with all bodies that conduct an electric current. But the subject is too enticing for the writer of a book like this to be led away by.

Crystallisation.

In watching the way in which solid forms are produced the subject of crystallisation has been always evoked. The straight lines look as if they were dependent on the attraction of the earth, and were fixed by it. The quietude of organic forms is strangely related to crystalline development, and the crystallisation of nervous structure is singularly demonstrated both in sleep and in death, the first, indeed, seeming altogether to depend on it. It has often been my intention to delineate a book as

illustrative of the crystallisable forms of nervous matter. It would contain a most useful series of plates, and would be as beautiful as was Mrs. Glaisher's work on *Snow Crystals*, but the labour was too serious, and the subject too entrancing for me to write upon. Nervous matter speedily crystallises at points at the termination of nerves and on terminal surfaces. These observations afford a splendid field for further research.

Two Modes of Observation of Natural Phenomena.

There are two modes in which natural phenomena may be proven: one by observing what nature herself may be doing, and which we have not previously seen, although the work is every moment in progress, and the other by tracing out the directions in which she seems to carry out her designs. The first of these will lead to accidental discovery of great phenomena; the second to systematic or philosophic discovery, which may be the work of many men, and may be linked with them all when it is complete.

The Colour of Animals and Races.

I have worked very hard at the colouring of animals. The colour of the skin entirely depends on the power of the skin to absorb or reflect sun-rays. A white man reflects, a black man absorbs,

rays, and this constitutes the difference. We can change the blood with some salts, like nitrate of silver, and so make the body black, and there is no reason why we should not find out a substance that would make the black body white. We can apply solutions like peroxide of hydrogen, which rejects partially and leaves a surface of a golden tint. I once changed the colour of black beetles by immersing them when dead in a solution of peroxide of hydrogen, and got golden, instead of black, beetles.

But the most curious observation was on a child suffering from cyanosis, in whom the hands were quite dark. By keeping one of them immersed in peroxide solution it became, visibly, of white colour. Ordinary black skin would do the same, and there is no reason why one colour should not distinguish all races of men. Two men, to my knowledge, were equal in competition and resembled each other equally except in colour; but the white man ultimately won, because he had to labour amongst white people, a result to be expected.

Nervous System as a Director of Power.

The brain as it fills the skull is composed of two centres, one large, the cerebrum, the other smaller, the cerebellum, and each of these is of two hemispheres. The whole, having a dual function, is apparently constituted of one organ. This, as the

late Dr. Wigan was the first to show, makes a distinct duality of the mind, as I have expounded in the *Asclepiad*, Vol. IX. for 1892 pp. 349-70.

The subject of the directing power of the different parts included in the cavity of the skull is one that I have tried with much care to unravel. I have tried it on the experimental side, and I have tried it by observing the changes of movement that may occur in the body of an animal when parts of the brain are subject to disease or shock, and the results have been fairly uniform. I have never ablated sections of the brain or destroyed them mechanically, but I have devised means by which sections could be temporarily suspended in function by extreme local cold, and have recorded what occurred while the suspension was maintained, and what happened before, during, and after it.

It was obvious that the effect of suppression of the hinder parts of the brain, and especially the cerebellum, was to destroy forward movement, so that a backward somersault was made, while the effect of suppression of the fore parts, particularly of the *corpora striata*, was to weaken backward movements of the body, and allow the propelling cerebellum to send the body forward at all risks. Thus, when persons are awed by looking down a steep precipice, the effects of the checking power of the front centres being reduced, the impulse is for the body to cast itself down the precipice. I have recorded the case of a man considered to be out of his mind, whose peculiarity

was a determination to rush forward whatever might be the obstacle in his way, and after his death it was found that he suffered from diseased condition of the *corpora striata*. I have further pointed out that birds shot fall forward precipitately if a shot has passed through the *corpora striata*, but fall backward if the shot shall have passed through the back parts, such as the cerebellum.

It came out, in fact, that there are in the brain controlling or balancing centres by which the direction of the body is correctly sustained or incorrectly intensified. The manifestation of the condition of the brain is extremely important in the study of disease, just as important, in fact, as paralysis, or convulsion of a limb, as indicating the place of injury of a nerve, a centre, or of the spinal cord.

Water Pressure on Brain.

In a previous chapter I have described the condition produced by injecting water into the cerebro-spinal fluid and the provision that is made for its removal into the circulation. It looks, thereupon, to me that there may be in the body increase or decrease of spinal fluid itself, and that this being increased or diminished pressure may modify the tension of the nervous substance both in health and disease and set up natural or unnatural phenomena such as sleep or coma.

Brain Storage.

I have spoken of the heart as a piece of mechanism, and I look upon nervous matter as a storer of the force by which the body is moved. I have reduced nervous matter to the state of pulp; filled glass vessels with it, and fed it with positive electrical supply from the prime conductor of a machine. In this way I have succeeded so well in storing the brain that the conductor, immersed in the brain pulp, which receives the shocks from the electrical machine through a knob, derived electricity so distinctly that other bodies brought near to it and suspended by a silken thread would revolve around it.

Changes of Mind.

The minds of human beings change in the most extraordinary manner in the course of years, as if the mould in which they were cast had undergone modification and held new life, so that the saying "Ye must be born again" admits of a new and strict scientific interpretation. We notice the fact very much in our own careers, and the world around us never fails to notice it. When I was young I was active in all kinds of work, but in none more than in organisation of surroundings. I never remember feeling a shade of envy, while I detested malice, hatred, and all uncharitableness, but I attached myself to those principles which I, rightly or wrongly,

thought were just, and advocated them without hesitation or fear. In time the tone of mind and action were modified, the accidental environments seeming to change in their whole nature, so much as to alter both taste and action. I cultivated more and more an old and firmer love for general and omnivorous reading both of books and of nature. I clinched in my own mind the early determination that in my profession I would do nothing to anyone that I would not willingly have done to myself; I taught the same doctrine to all students and colleagues, and have ever been happy in carrying it out, although it has not always been obviously advantageous. I retired largely from circles in which I once liked to move, and from pursuits I once delighted in following, making the laboratory, library, and consulting-room more than ever my home centres—practically a hermit life, in which the reading of a book, the writing of a song or story, the performance of an experiment, the preparation of an *Asclepiad*, or the attendance on a sick and helpless person, seemed the chief obligations and satisfactions. Grown men, no doubt, undergo changes in their nature, by which the kaleidoscope of their lives is varied, and it is good that this should be the case, because it causes variety, and really peoples the earth with different classes of population.

Second Childhood.

It is often made a matter of contempt that in the life of man there should be a stage of what has been written of as

“Second childishness and mere oblivion.”

I never could see it in that light. To me every one of the seven stages of life is the production by nature of a distinct instrument—at last an instrument that is out of tune, practically dying to all the vibrations surrounding it; laying up no vibrations—storage of force—for itself, but, pleased by passing events just for the moment, soon forgetting all about them. These are most merciful facts. Their occurrence may mean imbecility of the instrument, but it is actually a blessed occurrence to the instrument itself; it keeps it in the world, and it draws the veil over the act of death, so that death comes as if nature had her foot on the cradle and was rocking the body into the final sleep.

An old man I knew tied a string, before he died, to a burning stick of wood; revolved it, and, like a child, was pleased with the rings of fire that the motion of his arm produced. He could not have been better occupied, granting always that he was taken care of by his friends until he ultimately ceased to play his part.

What could have been a fitter termination? The young could not be better engaged than in learning

and preparing themselves for some such second childishness, so that death should be as painless and unknown as birth. Good and pure homes for second childhood and decay should become national institutions, tributary offerings to all mankind.

Sensations and Disease.

What it is I know not, but I am certain that feelings are not always governed by circumstances. I have known a man as merry as a lark when his surroundings have been specially unpropitious, and I have known a man as sad as a dirge when all around him seemed bright and fair. This must be due to some simple variation in the animal instrument which we have not yet mastered, the mystery of which has yet to be interrogated, and which seems to depend on food or air rather than on any other provocative cause.

Psychical Causes of Disease.

I have known fear act as a cause of disease, and am sure that this origin of disease deserves to be much more carefully studied than it has hitherto been. Habit is another singular psychical condition. It often leads to a permanent perversion, and checks that variety which makes the whole organism find scope for action and live throughout to the end. Travel does good very often merely by breaking habit. Imitation is another psychical cause of

disease, a fact that is wonderfully shown in suicide, and is exhibited constantly in supposed deeds of valour or adventure where a man does a thing simply because another man has done some dangerous, though perhaps quite foolish, act.

Proximities.

It has always seemed to me in the course of a medical life that there is much more influence in proximities than is usually supposed. A stone only clashes with the earth when it comes into proximity with it, and it is just the same in living things. It is only by proximity that the passions of love or hate are manifested, and thousands of children owe their existence to proximity alone. Grief is greatly intensified by proximity, and I have seen a woman stricken with the saddest affliction on the death of a child she loved, who would have taken the event with positive complacency if it had occurred at some far distant spot. It is the same in regard to time as to place. If a person should read a review of his or her book, recently written, he or she may be delighted or outraged; but if the book has been written many years ago the same author or authoress, though he or she may never have seen the article before, may have no feeling about it whatever.

A man I knew was maddened up to the borders of suicide by a review, and the ill-grained person

who wrote the review would have been a gladdened and more conceited fool than ever if the madness he had called forth had gone its entire length ; but the writer escaped suicide, and ten years later looked upon the attack in its true light, as mere rubbish, and actually proffered ten guineas to aid the needs of the perpetrator of the criticism.

In the treatment and management of diseased people proximity becomes an astonishing element. The proximity of either doctor or nurse may change the whole aspect of a case. One of my artistic friends, speaking of a very ugly physician, begged, in sober earnestness, " If I am ill do not bring that man to me, good as he may be, for he offends my artistic soul and his proximity is always a curse to me." This was plain speaking, but I have not a shadow of a doubt that the man who spoke felt strongly what he said.

Hallucination as a Reality.

I once attended an old gentleman who began to figure as a spiritualist, and who said he held communion with a mutual past friend—the late Mr. Robert Chambers—with his own wife, with Dr. Arthur Leared, whom I also knew, and with others. I am sure he was not deceiving either himself or his friends. His nervous system being gradually modified from the failure of some parts of it, he was practically living on what remained, and, by

necessity, changed the natural into the supernatural, an error we often fall into and from which the most singular beliefs and manifestations assume temporary reality. Visions, perhaps, are of this character, and some persons are built with singularly constructed mental forms, which dominate. When I was a boy I often traversed distances without knowing them and without noticing objects that occupied surrounding space, my mind being entirely bent on some one object, as the making of a kite, or the building of a machine by which we could fly or travel. I have, also, in professional life, during sleep, had visions of, and seeming communications with, those in whom I was at the moment specially interested. There was always some perversion of the actual, as if the apparent and the real were admixed, but there was enough to constitute a vision, if I had liked to accept some parts of it as reliable.

Medical Destiny.

No medical man can reasonably be a materialist, for he is charged with the animating spirit that is eternal. But it is his particular duty to deal with the mutable instrument through which the immutable manifests itself as an animal; to keep it attuned to its surroundings; to adapt it to what it is formed to receive, and to create an universal harmony. He may even consider pain as unnecessary to a high civilisation, disease as an

accident, and death as the one visible sign of life, that is to say, of the universal life by which the animal body is animated and which never fades away.

The Spirit or Anima.

It is unnecessary to add that the search into the nature of the spirit or animating principle that exists in the universe, and enters the body, moving it according to its build and construction, has ever been under consideration. To the mind it is analogous to the forces with which we are acquainted. We have compared it with electricity, and in a course of lectures I delivered in 1869, using in experiment a coil of enormous size, many facts were derived which were of the most striking character. Its electricity brought active living instruments into rigidity and quietude. It traversed them in lines, or rejected transmission. It spoke in thunder; it whispered; it had a silent voice; it was everywhere diffused, so as to give no indication of itself; it gathered particles together in an instant, or separated them; it hid itself; it displayed itself.

I made a box covered with plate-glass; put into it different substances derived from an animal instrument in its dead or quiescent form; showered down upon the same the wonderful electrical spirit; made the substances move like things endowed, for the

moment, with life, attracting or even repelling each other, but falling in obedience to attraction when the animating spirit was withdrawn. In many respects this subtle spirit of the universe seems to animate, but whether it is the working power of another supreme and mightier power has to be revealed. We say that God is light, and that He is clothed with light as with a garment, so that light may be a superior power to electricity and may itself be a power of something still superior. Caloric stands before us in a similar way, but all has to be revealed, it may be by our own labours, or it may be by wiser beings who shall visit us from other centres of the universe, retaining still their instrumental form and animate quality.

Body and Spirit.

In the end the message which science seems to give is that the natural body, mutable, mortal, and built out of the materials of the earth, remains under the care and dominion of man for civilisation and improvement, while the spiritual part, which we have not as yet been allowed to see, remains under the care and dominion of Him who is so inconceivably greater, grander, and wiser than we are—the Creator and Giver of Life.

Vitality and Mortality.

There can be no doubt that the prophecy, "Death will be swallowed up in victory," will come true,

This may be by some discovered art or science by which men will treat animal bodies, but it may be also by the correct knowledge which all persons will attain of the nature of death, the continuance of life, and the progressive removal of the natural body no longer fitted for holding the spiritual. Then death will have no sting, the grave no victory.

Spiritual Departure.

Persons become so attached to their own and other animal bodies as animated forms of instruments it becomes painful to them to think of their eternal parts sailing into the infinite, leaving the perishable and transmutable instrument in the earth to be destroyed by dissolution into the elements, to be re-formed, and in another shape to live again. But as the conception is gained and held, it is really, if it be not perverted, rather pleasant than otherwise. It promises a boundless universe, an everlasting existence, a solution of what now seems inscrutable.

Physiology of Sin.

The Biblical statement that we are born in sin and shaped in iniquity is as true and beautiful a sentence as was ever written. There is a most perfect physiology in it. As we are constructed so we are, and we show what we are, sinful or righteous, shapen in purity or shapen in iniquity.

In one of my conversations with the late Cardinal Manning this topic was considered in regard to alcoholism. I told the Cardinal that there was a phase of alcoholic disease in which telling untruths became a symptom, however good the person affected might originally have been. He fully assented, and I was led to say that falsehood was not an inexplicable vice, because alcohol deranged the construction of the organism and that this was typical of the origin of vices. He was deeply interested, and when I related that I contemplated a work on the subject, to be called *The Physiology of Sin*, he seemed moved in my direction of thought. I regret I have not completed my design.

The late Dr. Phillpotts, Bishop of Exeter, must have been moved in a similar way. He wished to create in the Church an order of Medical Deacons, men who by their medical training could become accomplished priests and instructors of mankind. He much desired me to set the example. The late Frederic Barton, B.A., a Positivist and translator of Comte's Catechism, who lived with me for three years before I was married, taught the same lesson, namely, that ministers ought to be medically educated. Dr. Congreve, originally a clergyman, afterwards a leader of the English Positivists, practically emphasised this view by passing the examination as a member of the College of Physicians.

The Morituri.

In our civilisation there always exists in our midst a population to which I have given the name of the "morituri," persons ready to die. In the age of the Cæsars they were specially recognised amongst the gladiators. There are numbers of them now, and although they are not truly gladiators they are on every side. They show themselves all round as morituri, on the Bench, in the pulpit, in the consulting-room, addressing a multitude on some political trouble, and even in the perfect rest of sleep. They fall more commonly when they are about to undergo some slight risk, as in having to bear the shock of an operation under chloroform. They are a fixed number in the community, so that I have been able to calculate that there is one of them in about every three thousand.

Physical Attraction.

In every line of experiment I have had to follow it has appeared to me that the primary motor power has always been, and is, attraction—attraction of particles for particles, of the world for all particles. This at first appears to be strange, since it suggests that whatever draws a thing steadily and firmly to itself must mean rest, and in regard to life entire quiescence, veritable death. The thought of rest is dispelled so soon as we see the effects that arise

from the acts of a bell-ringer, and if we can only imagine the centre of the round earth always pulling towards itself, we can see the source of motion from all parts, whenever and wherever upon the attraction a temporary opposing force is set up on and against the attraction.

The needle in the galvanometer is set by the attraction in a given direction, and is held there permanently so long as there is no opposition, but if I set free a counter-force the needle moves in obedience to it, although the central and primary force maintains its undying energy. In the same manner attraction is a force of life. I only walk or move by virtue of a power generated in me that is temporarily in opposition to the permanent and primary. I am weak ; I fall. I am buried when the permanent primary—attraction—is not overcome by the secondary and temporary faculty which I call my strength, because there is not distributed in my own organism the equivalent, at least, of that power with which the needle is endowed when the galvanometer is in play.

Lethal Chamber.

Since the origin of the Lethal Chamber, which I had the good fortune to present to the world in name as well as in fact, it has surprised me to see how many persons have demanded its use, not only for the lower animals, but for themselves, or for purposes

connected with condemned criminals, who, it is ignorantly supposed, ought to be made examples by capital punishment. I have never been able to respond favourably to these enthusiasts.

In instances where life cannot be saved and where pain cannot be quenched the chamber is both merciful and legitimate, but I see no further use for it in so far as the human being is concerned, and the idea of letting it to the public executioner for his insane quackery is one of the most repugnant employments of it that could be proposed, stripping it in fact of its mercy, defiling it, and turning it into a mere centre of barbarous and pretended utility.

Life on the Floor of the Sea.

Why the earth is left with so much sea in comparison with land is a very curious question, and what constitutes the bottom or floor of the sea is equally singular. We may know all some day; we shall certainly eventually put limits to the oceans if nothing else of a natural kind arises to produce the same effect, for the old Apocalyptic vision, "There shall be no more sea," always sounds a true prediction; but whether that prediction will be fulfilled by a natural means over which we have no control, whether we shall build up the sea from substances on the land, or whether we shall learn how to live under the sea and

shall explore its foundations, are great engineering questions that have to be solved. The last idea, that of existing below the sea, appears to be the most remote, and yet in a physiological point of view it is nearest to truth, for we really could live under the sea.

A few years ago a Frenchman named St. Simon Sicard, exhibiting at the old Panopticon in Leicester Square, did succeed in living for a time under water. But a more curious thing took place later. In November 1879 I was fetched by one of the directors of the old Royal Polytechnic to see a man walking about under the water of the great tank in which the diving-bell used to descend. I found the gentleman, who was named to me as Mr. Fleuss, walking about quite coolly many feet under the surface of the water, and I discovered that in his waterproof suiting he was supplied with oxygen gas compressed in the helmet he wore; that he had a means of breathing from that source; that he could fix the products of his respiration and continue the process for an hour at least. I made numerous observations on Mr. Fleuss by immersing him in other substances than water, such as carbonic acid and coal gas, but he was proof to them in the same way, and he could carry a lighted lantern, which lived just as he did, to illumine his path and show him his way. I published in the *Asclepiad* all the facts about Mr. Fleuss, who actually could live under the sea, and I have no

doubt that, by an extension and advance upon his method, hosts of men—better equipped—could explore as they wished and keep on the floors of the illuminated seas as distinctly as on the land. We should then say, rightly enough, “There shall be no more sea,” and St. John would rank as a very distinctive physical prophet. Fleuss, who has the courage of a lion and the insight of the accomplished natural experimentalist, still lives. I once saw him on the floor of a huge tank of water at the Royal Agricultural Hall walking about, getting up and lying down, as unconcernedly as if he had been in the air, and I once saw him, in a tank of carbonic acid, try in vain to light lucifer matches by the usual mode of friction. Nature very often carries out the same process in the fish, but in a different way; she puts the oxygen into the water and constructs a gill, or breathing surface, to absorb the oxygen, at the same time arranging the instrument in many ways to meet the new conditions; and we might succeed in making an engine work in water in some similar way, but it would cost much money, time, and labour.

Ideal of an Older Earth.

I have entertained a conviction that the surface of the world on which we now live and enact our parts is not the first surface that has been, but that there was once a larger surface equivalent

to what there would be if the moon were incorporated so as to form one planet combined with the earth. If that were ever the case everything on the earth was individually larger than it now is; living things existed that were larger than they now are, and many of the marvellous legends regarding them which we retain and prize were not mere inventions but remnants of records of past developments. Once I ventured to express this ideal in the ears of a well-known geologist and professor of geology, who listened with deep interest and was inclined to think I was correct, but said that the certain existence of strata and of fossils stood in the way. His remarks about fossils led me to experiment, and in the old *Medical Times*, and later in the *Asclepiad*, Vol. IX., pp. 411-29, I related how I made mixtures of earthy substances, buried in them dead animals and plants, and subjected these little masses, in a vulcaniser, to a heat of three hundred to four hundred degrees of water-gas, afterwards drying the masses down until they could be broken in pieces. Then—as I have told—I found the remains fossilised, so that it was explained that fossils of the most commanding size could, in a mighty convulsion of the planet, be made to exist, not as evidences of the work of long ages, but of a few years, or even of hours.

I was struck with the sight of flints buried in chalk, and heard it said that they were proofs of living things that once accumulated or had built

up the stone. I made a solution of silicate of lime, put it in a glass vessel, and allowed carbonic acid to bubble through the fluid, upon which chalk was found, and in it were deposits of silicic acid; they dried into little hard bodies like flints, some of which I have still in preservation. Flints, therefore, and chalk might easily have been constructed by the mere ebullition of carbonic acid through a silicate sea, and in a few hours, as compared with millions of centuries as is generally assumed by the learned. The learned, of course, may be right in their surmise, but they are open to correction.

The Journey Round the Sun.

I noticed in the first lines of these chapters the journey made round the sun. There is no other such journey that we know of. We all take it, and I humbly submit that medical men ought to know that journey better than any. We ought to understand as far as we can what are the regions we go through; how we are affected on the way, and how we ought to protect ourselves, if we are able, or at any rate prepare ourselves for vicissitudes. Preparation of this kind, which requires common-sense observation, though it may ever be imperfect, may be far more perfect than we expect, and may illuminate the paths of ages yet to come.

CHAPTER XXVII.

VITAL PHOSPHORESCENCE.

THE writing of the last chapters of a book I have often found to be a more anxious task than any other; it is so now, but I think it best to devote them to what has been an all-absorbing study of my life. It has all through seemed to me a duty to accept the new theory which Liebig introduced, namely, that the leading point to remember in regard to the body is the oxidation of carbon, and to hold the idea of that as a producer of animal heat and of the great vital functions. Receiving this, however, I could never forget another element, phosphorus, and another process, phosphorescence. When Frobisher, over one hundred and sixty years ago, at an expense of some £10, first showed phosphorus to the Fellows of the Royal Society and described some of its properties, he could scarcely, I think, have been aware of the enormous fact he was elucidating. He had obtained the element from living structures like bones, and on questions of vitality it has continued to hold a promising place, and the phenomenon called phos-

phorescence of animal matter has more than once been dwelt upon.

I cannot stay to enter upon the many labours of preceding observers, but it is necessary to indicate in a few passages what has most engaged my own attention.

Luminosity of the Brain and of Nervous Matter.

I have tried the effects of phosphorus in giving the luminosity of its oxidation to brain-pulp in the dead form, and these experiments, still incomplete, have been most instructive and curious.

Brain-pulp was put into a solution of phosphorus, and the pulp was permitted to receive oxygen from the air at blood-heat, the air passing through and agitating it with steady motion. In other words, phosphorised brain was allowed to breathe, and its immediate luminosity was obvious.

We sometimes see phosphorescence in living tissues, and the late Dr. Stokes of Dublin had a patient who exhibited luminosity in parts of the body, so that they would even light up printed matter. I have seen the same phenomenon exhibited in a still more curious manner. The brain of a deeply anæsthetised animal was once seen by me to be very faintly luminous in the dark for some seconds, suggesting that the nervous structure fed with blood carrying oxygen created an animal fire. I have also seen phosphorescent lines of light on a nervous surface, as on my own retina.

In living nervous matter, centric or diffused, it may be that a kind of phosphorescence is in progress as a source of vibratory motion causing the formation of acids that have to escape from the nervous structures into the blood, and even leading to the evolution of warmth and sensibility. In fact, the old view that warmth of the body is diffused by nervous distribution may, after all, be the correct view, and it is quite possible that since the era of Liebig we have been fundamentally misled in respect to animal heat. I would rather not be dogmatic on this subject, but am certain that the whole of it wants to be re-studied, and that phosphorus as an element of the body calls for a new and great investigation, for we have neglected phosphorus as a vital element in the most serious degree.

CHAPTER XXVIII.

A LAST WORD.

BUT I must close somewhere, and it is at this point.

I have set myself to record a medical life from the medical side of my own life, not in any sense as a model picture, but in the earnest hope of the day when men of physic shall find in the study of the natural body the grandest work the human intellect can command.



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