

The passing of morbid anatomy : the Harveian oration for 1912 delivered at the Royal College of Physicians on St. Luke's Day, October 18, 1912 / by Sir James F. Goodhart.

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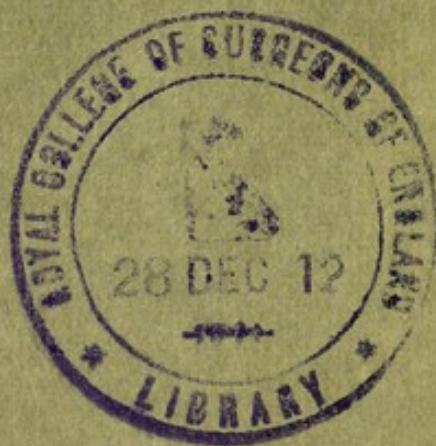
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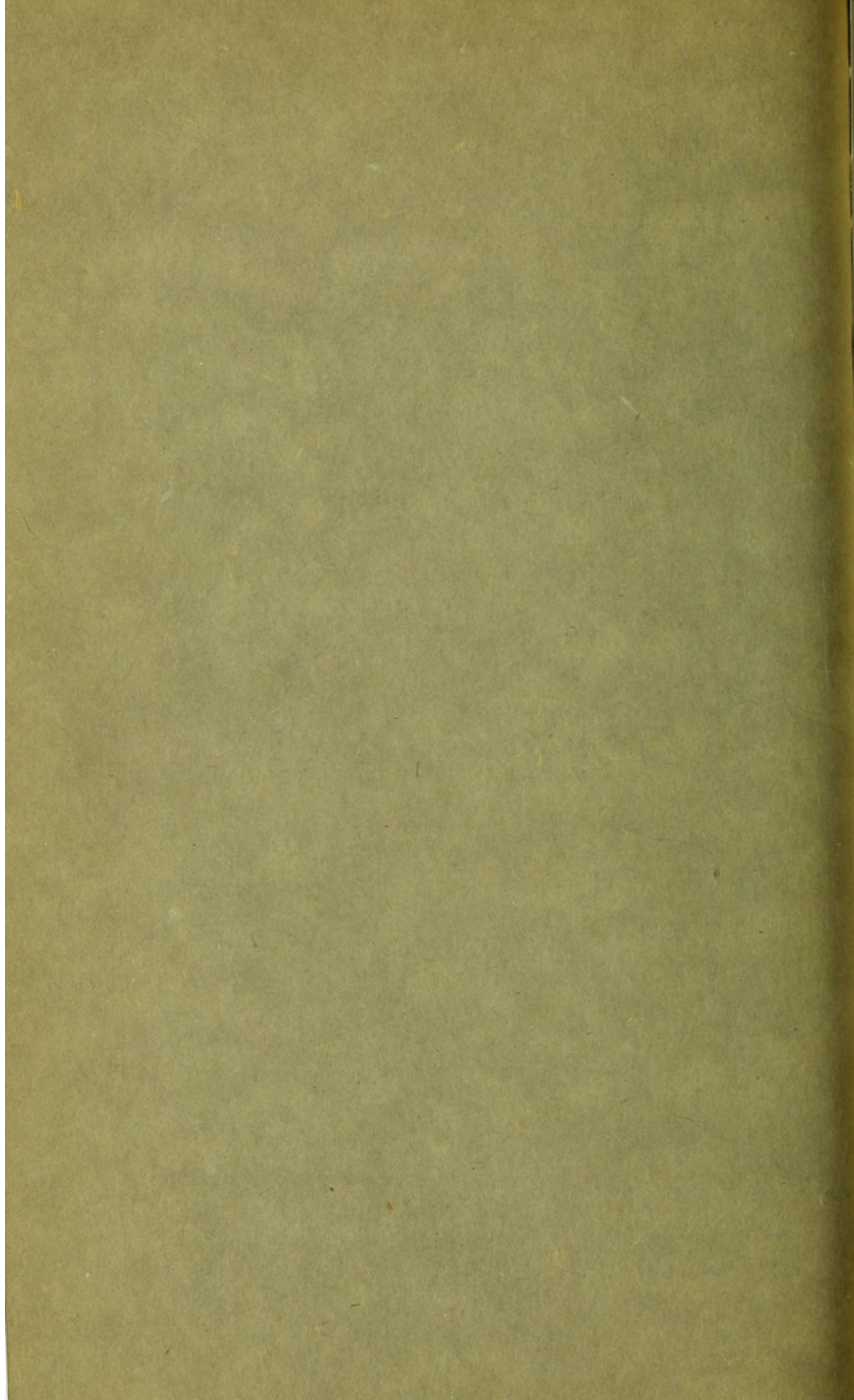
THE PASSING OF MORBID ANATOMY

THE HARVEIAN ORATION FOR 1912
DELIVERED AT THE ROYAL COLLEGE
OF PHYSICIANS ON ST. LUKE'S DAY
OCTOBER 18, 1912

BY SIR JAMES F. GOODHART, BART., M.D., LL.D.
FELLOW OF THE COLLEGE



LONDON
JOHN MURRAY, ALBEMARLE STREET, W.
1912



With the Author's Compliments.

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TO
SIR THOMAS BARLOW, BART.,
AND THE
CENSORS AND FELLOWS
OF THE
ROYAL COLLEGE OF PHYSICIANS OF LONDON

PREFATORY NOTE

I HAVE alluded to final causes in this address. The origin of things is seldom other than enigmatic, and were I to be asked why the Harveian Oration for 1912 was written by me I should have to reply: A leading article in the *Lancet*, the Reports of the Imperial Cancer Research Fund, and what I believe to have been a telepathic transit between our President and myself, share the responsibility.

In republishing it for circulation in the College I can only hope that it may give some pleasure to those who read it, perhaps even here and there some stimulus to thought, ere it receive sepulture within the Library of our College, a tomb of the most honourable magnificence.



THE PASSING OF MORBID ANATOMY

TWENTY-SEVEN years ago, in delivering the Bradshawe lecture before our College, I stood in the place of a much-regretted Fellow, the late Dr. Mahomed, dead in his early prime, when in a retrospect of his work on Arterial Tension I had the more easy task of recalling still recent memories. To-day, when in pursuance of the honourable duty that you, Sir, in your kindness, have imposed upon me, I try to look back into the mists of centuries, to the full life and ever to be revered memory of Harvey, no longer can one appeal to those personal recollections in which we all could share and sympathize: in place thereof is an influence, a resurrection, and my outlook becomes essentially prospective.

Harvey's influence as it is permeating the avenues of time! What a subject, what an opportunity! Yet when some two hundred and fifty-six years have come and gone, since this annual commemoration of our benefactors was instituted by Harvey himself, what an impossibility, in any but the most spectral form.

May I try to present it to you thus, on the wings of a thought—The Passing of Morbid Anatomy—as it flits across the horizon of pathology, and in so doing touches us and humanity at large. No

doubt it has often been said or thought before, that apart altogether from the coming into being of any particular man, the circulation of the blood, even to the full extent of Harvey's demonstrations, must have become common knowledge sooner or later. Even so, in his time, with anæsthetics still in the womb of the far distant future, with instruments of precision hardly in their infancy, what a magnificent triumph of patient and determined observation was his! and it does but enhance the reverence we owe to him to add that the truest estimate of his fame rests even less perhaps on what he did than on how he did it; less on how he did it than on how he said it, or showed that he had worked it out in thought. It is the completeness of his work that is so surprising, and it is the plan of campaign that Harvey carried out by searching out the secrets of Nature with such deliberate self-content, that will, as a motive power, stretch farther along the ages even than the actual conditions that he demonstrated, great as these truly were and are.

Harvey taught us how to work, and what to work at, and showed that the knowledge of the structure of our tissues goes far to suggest their functions. By actual investigation, by experiment, by what now goes by the name of "original research," and the reasoning and suggestion that emanate therefrom, the anatomy and even the larger details of the physiology of the circulation were worked out, and, in the absence of any adequate powers of magnification, discovery in that direction must then have seemed to have reached its farthest limit. Yet who knows but what Harvey himself, physiologist, physician,

pathologist as he was, foresaw, or at any rate had some ideas about, what the histology of the future was to tell? The book itself had its leaves uncut; but could such a mind as that altogether still the passion of the seer? He saw and taught that the knowledge of the skeletal tissues must come first; that this would open up some of the more pronounced changes of morbid anatomy, and their association with certain signs and symptoms of disease. Next, as opportunity developed, would come an inquiry into the minute structure of the normal tissues, and not till then would it be possible to interpret those finer alterations present in disease or gain any appreciable knowledge of the subtleties of function. Such is, indeed, a sequence of events that has actually come about, and with which we are all familiar.

Within the short span of our own lives this is true for our own time, so let me dwell to-day on our earlier pathology, trace it as now, and prospect its future.

And no more pertinent introduction could I take than the history of the growth of our knowledge of malignant tumours.

Years ago, when the scientific world was pulsating under the influence of the master mind of Virchow and of his Cellular Pathology, many of you, my learned colleagues, kindly here to-day, were hard at work studying and describing the features of morbid growths, and trying to obtain an insight from the histological appearances of how, and perhaps why, they came.

And let me here recall *en parenthèse* what entrancing days those were. I have often heard a doubt expressed about the value of histological

inquiries, in comparison with other forms of investigation, but I venture to affirm that there is no more informing study than minute research into the structure of our organs, and the diseases from which they suffer: it knits together the whole order of creation; it teems with ideas and suggestions about the life-history of cells—the very living bricks, remember, of which we are built up—that to the responsive mind of one struggling with disease is for ever opening up new thoughts, new channels, of inquiry, resource, grip, and hope, that one could hardly have suspected.

What did morbid anatomy and histology—the Cellular Pathology of that day—tell to the Mid-Victorian pathologist?

Well, it was known in those now seemingly far off days that the *autogenous* propagation of tumours was not uncommon—one could see it almost any day in the post-mortem room, in the peritoneum for example, where a tumour originating in one part of that membrane was transplanted to another part, and was well rooted there. It was well known as the result of experiment that exogenous plantings in similar regard were seldom attended with success. Yet one noted that when sewing—skin-seed, shall I call it?—upon large sores some stimulus was forthcoming, something happened, that clearly set epithelium growing, and it often grew with considerable energy. This would apply to *autogenous* as well as *exogenous* grafts, within the common species. I have always doubted if the import of that suggestion of skin-grafting has received quite its just meed of recognition, in its physiological aspect. The observation is full of instruction when we try

to trace the life-history of the living cell, and still more attempt to influence the progress of its nutrition, its growth, even its very nature perhaps, by stimulant or inhibitant, as is the aim, I take it, of the various grafting or tincturing processes by serum now in vogue.

Again, we knew, or thought we knew, that seats of worry were prone to take on malignant growth; that the well-known nag of clay pipe, of irritating smoke, of soot, was associated with epithelioma; we knew, or thought we knew, that simple and malignant tumours were liable to be found side by side in the same body—a point that I have repeatedly demonstrated in the dead-house, and that seems to me to cast a doubt upon the claim still maintained, I do not say wrongly so, that malignancy is something altogether apart from ordinary growth. But it was surmised by some from what we saw that a spermatic or perhaps graft-like influence was at work in the one group that was not to be seen in the other, and that, so it seemed to me, this influence gradually communicated itself to the cell structures in the neighbourhood, until they ultimately shared in the process, and fraternized with the ill-tutored agitator.

In this one respect, I may say in passing, the opinion then hazarded is not in accord with more recent work, which, on the contrary, goes to show that malignancy, even to its latest stage, is self-ordered and self-centred, and does not give a pattern to the surrounding elements. And yet, on the other hand, there is a suggestion of some more intimate relationship between the invaders and invaded, even in our latest information, for it would seem that the

more matured tissues in which a new growth finds itself—the old hands, so to speak—may possibly exercise a very effective restraint upon the young bloods, and thus preserve the ordered going of the locality, by the drastic method of starving the newcomers out.

As one thought on these things, who could do otherwise than peer into the future? And doing so, I wrote, thirty-seven years ago,* “What a subject for Darwin would be the cells of a cancer, if only they were tangible, if only we could observe the variations of tumours, under judicious cultivation.”

I have often said during these many years of search for an exogenous germ of cancer that I shall be disappointed if we find one, for malignancy, it may be only upon adequate environic invitation, already finds and fills its place as a *sine qua non* of evolution.

One likened the position then to that of the chemist who, putting together his scheme of elements, finds bits of his puzzle wanting, but, knowing what their form should be, proceeds to look for them, finds them, and fits them in, the whole one purpose and one picture.

And thus regarding Nature, is there anything improbable in such a pathology of morbid growths? Is there not, in the natural order of things, if so I may speak of what in the empire of the corpus becomes *disorder*, a place ready for it, a chance that such a thing may come? Are we wrong to expect that if a complex body is possessed of energy, or many centres of energy, for orderly growth and development, that this disposition

* *On Cancer* (Guy's Hospital Reports, Series III., vol. xx., 1875).

or force will now and then slip its leash and run off on its own? An analogy of this kind seems to me to convey a workable conception of a scheme of malignancy, where ordered growth diverges by successive steps of variation, of indulgence of function, until cancer appears, until malignancy becomes the insanity, shall I say? of function. And does not an idea of this kind foreshadow, and father too, the modern doctrine of the individuality of protoplasm, which I take to be taught by cell eating (phagocytosis) and other forms of irritative response of which now we hear and think so much?

The last effort of the friend of many here, the late Sir Henry Butlin,* who was at work with us in the days that I recall, embodying as it did the results of thirty-five years of research and thought in this very region, surely all pointed to some such conclusion in his mind, for although his introduction of the term "parasite" is liable to misinterpretation, the parasite cell was no other than some derivative of a protoplasmic human cell, and thus was parasitic, if at all, only in behaviour, to which the highest organisms must plead guilty—for are we not all of us at one time or another sponges on the world we live in? And regarding the living animal from the point of individualistic protoplasm, are some of the sports of our gardens so utterly divergent genetically from tumours of natural tissue; from the infective granulomata;† or from the growth of a cancer?

* *Three Lectures on Unicellula Canceri.*

† The infective granulomata form a group of peculiar interest. A special variety has been studied in the dog (*Scientific Reports of the Imperial Cancer Research Fund*, No. 2, Part II., p. 33 *et seq.*), where no microbe could be identified, yet the disease suggests the possibility of origin by intensive cultivation, and may even seem to hint at some parallel source for whilom syphilis.

I should call the difference one of degree of vigour of growth, rather than of kind. Exuberant energy will out.

Think of the fact that X rays so stimulate the surfaces as to lead in the first instance to an excitement and proliferation of the superficial cells of the skin, and then too often to cancer. A most vital acquisition this to our knowledge. An obvious signpost—not too distinct—upon the road we are travelling.

Here life from two worlds is perhaps forming into line, and as in the one, so in the other, say by some direct inducement to the cell, or adaptive alteration of the nutrient juices—photo- or chemosynthetic in kind, maybe—an intensive cultivation is brought about, one may even suggest that the equivalent of a top mulch is applied.

Thus I see in cancer a home-grown weed, or a prodigal son maybe, alas ! by no means yet worthy of the fatted calf, and in my study I seem to light upon the fundamentals of eugenics, and, indeed, to hark back to their earliest dawn.

But, however this may be, the trend of all recent work carried out by that splendid Imperial Cancer Research Fund realizes the dream of the bygone pathologist, for a large part of the monumental labours of Dr. Bashford and his fellow-workers during the last ten years, although showing that *exogenesis* is possible, and defining its limitations, has gone to point the fundamental necessity of the study of the life-history of the individual cancer cell, and, as you know, this has now been done and followed up in short-lived animals (the mouse), where alone it is possible, the results seeming to show, not that the environment, but

that the individual cell is the master of the situation, and that the dominant issue that comes up is: What is there in that cell or influencing it that gives to it such an inexhaustible power of propagation? whence comes that boisterous energy of which I have spoken?*

So in this quarter of study, as in others I must mention, we seem to have come to what is still but a mirage, to an inaccessible land, where histology perhaps may no further help, and where organic chemistry and physics must take up the running, and show what part they play in the origin of life; or if not that, we must search for and find the homologue of cancer in some still more embryonic stage of existence and inquire of its habits there.†

Thus what we call pathology is growing up. But are we sufficiently alive to the fact that it is no series of stationary phenomena, but constantly on the move, like all else in Nature, and in being so shifts its ground?

That it changes absolutely you will, I think, readily admit. As I think of disease in the post-mortem room forty years ago, what alterations have we not seen! Pyæmia may be said to be wiped out; typhus is wellnigh forgotten; typhoid fever has altered; diphtheria seldom attains the initial severity that so often characterized it of yore, and is much more amenable to our attack; scarlatina is of a

* V. Hausemann is said by Bashford to have been the first to attempt to investigate objectively the actual cell processes responsible for the growth of cancer; and to have found, as he thought, alterations in the character of the normal mitosis (Anaplasia) (*Scientific Reports of the Imperial Cancer Research Fund*, Part III., p. 92).

† This has already to some extent been attempted by R. Hertwig in the protozoa.

much milder type ; * erysipelas is more of a rarity ; malaria and Malta fever have been run to earth ; the late results of syphilis seem to me to be far less often in evidence ; † lardaceous disease, so very common in our early days, is now seen but seldom ; and we have come at grips with acute rheumatism, and let us hope with tuberculosis. Probably as much might be said of other diseases, and all will, I suppose, admit that good *old* age is both more prevalent and enjoyable.

It is true that the ills named belong to the great group of epiphytic disease that has been abolished in direct response to the researches of Pasteur and Lister, and that there is no evidence of any general move all along the line ; but make away with even one large group of maladies, and how much of the morbid anatomy of the organs must alter too, and even then how little account would be rendered of numberless arrested purposes that make for the beginnings of other diseases !

Pathology not only changes but it shifts its ground, when we really pursue it. There is no more striking confirmation of this than a comparison of the practice of the Pathological Society of London forty years ago and now. Our meetings then were crowded with specimens of all kinds, a set discussion came only now and then as a sort of

* A man of my own age told me but the other day how he sadly remembers of this disease : that two coffins lay in his own house, and five in another across a field, all at the same time. One may hope that such a thing will never be seen again.

† I mean only to convey that late syphilis seldom now comes under my notice. What the neurologist may think with general paralysis and tabes dorsalis frequently in evidence I do not know, but tabes, at any rate, was wont to be considered a degenerative result of the scar of a bygone disease, taking years to mature, and then incurable ; and it has yet to be proved that this is not so.

relish in the general menu. Now I am told that morbid anatomy is much less in evidence—we have left all that behind, and discussions of the intricate problems that are behind it occupy the attention of our members. Whereas we used to display disease in the gross, the results of disease that is, we are now able to recognize finer changes and more minute evidences of bioplasmic unrest that are behind these results, and they are the goal that we make for now. I say that these results must long ago have been suspected. I remember in the early days of ovariectomy making the observation that those who succumbed thereto were mostly those who had suffered from hæmorrhage into the parts concerned—especially, of course, into the peritoneal cavity. And examining the blood extravasated under these circumstances, one could see it peopled with countless hosts of minute bodies, that the bacteriologist is now in some measure able to name and to classify. It was evident even in the rude experiments of those days that blood was a favourable soil for their production, and one even had a suspicion that intensive cultivation lay there, but failed to detect its presence.

And pathology still is shifting! We have not yet reached finality. Even bacteria are probably results and not causes; they strive or cancel with one another to ulterior ends, and *we* are gliding on in advance of the most painstaking morbid anatomy.

As I have just now suggested for cancer, look how near the chemist and biologist have come. I struck a hybrid the other day—a biochemist! In devoting himself more and more to the minutest germs and particles of protoplasm, the biologist is not far off the investigation of gases, and the

chemist in concentrating his attention on gases is apparently overlapping pure physics, which seems to have established that many media supposed to be gaseous are really clouds of solid particles of inconceivable minuteness, borne along by a velocity of which no words can convey any adequate conception. It seems, therefore, not altogether within the realm of fancy to suggest that we may all be working now in some intermediate zone, on the confines between the three kingdoms of living energy—for the colloidal states of inorganic life, the crystalloids of biology, may perhaps allow of this expression of the facts—whose language at present we do not understand, and whose purposes or meanings we are therefore unable to interpret. I wonder.*

Animate or inanimate, we are never outside life. Montaigne puts it very quaintly† when he says even as nature makes us to see that many dead things have yet certain secret relations to life. How like is Radium in all but death to what I would call the aureole of life. Here seems to be one substance that is always spending yet is never spent; that has power within it to re-gather of its loss, and by its action on the cell may even be said to originate the function of vitality. But does the spirit of life die? It may correlate with other forces of nature; it may, perhaps, transfer itself to other forms of being; may it be that we begin to see that it might transcend the firmament of space.

* All plants appear to be able to form proteid substances, although these may be entirely absent from the food material. The production of proteids by synthesis is a step towards the formation of living protoplasm (Pfeiffer, *Physiology of Plants*, English edition, vol. i., p. 288).

† *Essays*, Book I., chap. iii., p. 21.

The physician thinks not of *death*, but of the *tenacity of life*, and of how long, save by catastrophe, it takes to bring the machine to a standstill.

Even in the presence of the pathologist death may be disputed. Many years ago there was what may be called a pathological axiom, that the pus cell was a dead cell. Yet it was at the same time evident that, unemployable or even obnoxious as regards its influence in the home, it had colonizing proclivities that were charged with great possibilities in some new world. Dead indeed it might be from one point of view, yet from another one might say of it, as Lord Curzon said once of the British Empire: "It is not a moribund organism, it is yet in its youth, and has in it the vitality of an unexhausted purpose." Where, indeed, is the demarcation in a degenerate cell—we call it so from a narrow self-centred aspect—between life and death? We know of none, for even desiccated it does but pass into some more minute state of atomic subdivision, that is almost certainly capable of renewed energy, although it may not as yet be within our ken to give an answer to the question "With what body does it come?"

"One may change, but one does not die."

All living things are rhythmic. Is it altogether otherwise with matter devoid of life? Within the cadences of that rhythm are the moan of disease, and the pause and silence of death, but the resurgam of life is ever the dominant of the song. And this is well illustrated by our growing appreciation of the activity of the pus cell. Laudable pus, as it used to be called by a seeming contradiction in terms, I suppose on the altruistic plea that some-

where deep down in the worst of criminals there lies a warrant of nobility.

I know not whether *now* it has still further *lost* or *regained* a character, when, reappearing as the leucocyte of to-day, as hungry chickens rush for food, it revels in cannibalistic orgies, or else, as some may prefer, it fulfils the more useful, if more subservient, function of scavenger or destructor to the community. Then as my dreams suggest, reinforced by such omnivorous gatherings, by ionization, shall I say? amalgam, symbiotic fusion, or combine, these lusty atoms disintegrating and ambushing into still more minute particles, rearrange themselves within the confines of the body politic, in which they find themselves, and thus perhaps reincarnate some of the bacilli, cocci, and such other early and unstable existences as nature seems to have in store for us for good and ill, within the cycle of living things.* It seems, indeed, quite within the possibilities of the revelations of the future that germ and sperm of a sort are here at work, and that a primer lesson is thus conveyed not alone on the origin of communities but on the very beginnings of existence.

Now all these changes and shiftings of ground suggest to me the existence of a struggle on the part of the pathologist to find out some morbid change for every disease, and it is indeed admitted that we have been ever more and more reducing function to terms of structural change. But now the time has come when it seems worth while to

* Live apparently they needs must. The *Bacillus coli communis* seems, like mankind, to embrace a vegetarian cult, as it has been recognized in plants. And of other bacteria some are said to be carnivores, some vegetarians (J. R. Thornton, Department Agriculture, U.S.A., *Lancet*, vol. ii., 1911).

insist that all this work upon the foundations, whether it be anatomical, histological, chemical, physical, has, unconsciously perhaps, but none the less inevitably, been ushering in another point of view than that from which we started, and the latest phase of pathology is this more intricate one that concerns itself with the investigation of function. It is now no longer so much the morbid change as the prejudicial function that is to be our quarry, or rather the passage of the one into the other. It is to this point that the researches on cancer have come. As pathologists we are now trying to identify as it comes and passes that coign of clinical medicine—

“ When that which drew from out the boundless deep
Turns again home. . . . ”

where a detrimental method of function commences devolution, and sets towards decay.

And what numberless instances are there where, with no accessible morbid changes, this is the problem. Perhaps it may even be said that there is no disease, however much we think we know about it, in which this is not the problem still. Take this latter case first as exemplified by arterial tension (*de motu sanguinis*). It came first into more precise recognition in clinical medicine as a symptom of what we have known as a form of Bright's disease—a disease that is of structural change. But before very long it was noticed that it might be present under conditions when the examination after death showed no alterations in the kidney of any moment. So Bright's disease has been rechristened, and now we hardly hear of it. That postal address is now “not known,” and you must inquire for

arterial sclerosis. This disease is constantly being brought under our notice. Why so? Because particular signs are supposed to betoken it. But do they? Would it not be more true to say that they indicate its occasional origin? The point is that the search for a structural change has shifted its ground on to a functional disturbance—quite properly, as I think—and then incorrectly the arterial state has come to be regarded as due to the condition (sclerosis) of which it is in all probability the cause.

Then *de motu cordis*. Much work has been done of late upon the irregularities of the cardiac muscle. This work is well known to you and is of the very best, and not by a breath would I belittle it, for it is no doubt gradually emancipating a difficult subject of research from the mists of ignorance that envelop it, and by true Harveian method. But I may perhaps be permitted to say as a caution that it is possible to attribute to disease of the muscle more importance than by right belongs to it, and I believe it will be accepted in the future, as the result of further clinical observation, that many a case of arrhythmia, where we now seem to be inclining to muscular disease, is in truth an aberration of the higher cardiac centres, and as such no true example of pathological anatomy.*

* Catarrhal jaundice is for me another remarkable instance in point. We have always been so hard up for a morbid change in this malady that we have come to accept as sufficient the existence of a plug of mucin more or less natural to the part. But can it be that the proper performance of a function so important as the passage of bile is in danger of being arrested by an everyday circumstance such as this? Some temporary check to the driving power seems much more probable. The old ideas of splanchnic melancholia and abdominal megrims were not without warrant, and, indeed, they are worthy of rehabilitation.

Diabetes shall be my between-maid—in part functional, in part perhaps otherwise. What morbid anatomy have we not sought in this disease, and have not found it? Long indeed have many of us hovered over the alterations we had *hoped* to find, and have not found them.* Changes in the nervous system; in the pancreas; in the liver; in the blood, and so on.

To my mind there is no more splendid and yet pathetic figure in the whole range of medical history than that of Pavy. In early life he set himself to unravel the pathology of diabetes, and in so doing he planted himself with correctly forecasting eye at the spot that made victory certain—and to my mind he won it by taking the first parallel; but it may be doubted if he himself quite realized that he had done so, and there are those to-day who certainly think that he was defeated. I am not of that opinion. It has always seemed obvious, when one considers how greatly the output of sugar varies even under the most rigid system of dieting, that the excreted sugar could not be a mere output of what has been taken in—that the human kiln has, in fact, the power of in some way coining sugar out of its own constituent elements; and I believe that Pavy's ultimate credit for a real step onward in this still most intricate disease will rest upon his observation that the proteid molecule is in some way split up, and that a carbohydrate molecule emerges therefrom. Still other parallels need assault. The question has now to be answered, What causes this seemingly inveterate sugar craze

* This is not to say that morbid changes are never present, but only that they are seldom adequate to cause the disease. I have many times seen cancer and glycosuria together.

on the part of the proteids? This curious reversion, may we call it, to a plant-like metabolism in thus compounding with carbon to the rejection of its natural affinities. Is it nervous inco-ordination, or toxic disorganization, or what? Again we seem to be driven back, cancer-like, upon a loquacity of function, upon some misapplied vital energy behind the scenes with which as yet we cannot grapple.

Who till within quite recent times would have thought that a proteid molecule could give birth to sugar? * I trust there is no chemist here to-day. To one of decadent age it seems quite a surprising outcome, yet I understand that biochemistry is already quite familiar with it, and regards it as an everyday occurrence, whether in the physiology of plants or animals. And how this must enlarge one's horizon of the subtlety of energy that lies within the human kiln! The mills of God, the engines of life, are indeed wonderful examples of an indomitably complete performance. They seem able to enforce within the organic confines of the body that extreme atomic disintegration we are now learning to recognize in the inorganic world, and which seems to suggest that even the stability of the primary elements, as they were wont to be called, is not immutable; that our gold, for instance, at some future geological day may lose its caste, and rank as some inferior substance.

Brought under such conditions of continuous performance, no wonder that our reactions are thus delicate and complete: not that we manufacture something out of nothing, as might seem to be the

* Carbohydrates may be combined and form a constitutional part of the molecule of certain proteid substances—*e.g.*, glucosides such as mucin (Pfeiffer, *op. cit.*, p. 69).

outcome of my argument, but that by such means a much greater and a more absolute resolution of ourselves is possible, and our primary elements, being unfettered, renew their potential energy to synthesize again by some of Nature's seductively elastic methods as now still unknown or but guessed at.* There is nothing strange in this. Our environment in diverse ways, known and unknown, is essential to the working of the machine, of course, but I *am* contending for the possibility of *still more direct* methods of combination that have become conceivable in these days of progressive physical knowledge. And from this point of view it becomes legitimate perhaps to try and catch a glimpse, behind the veil of present attainment, of the working of the obviously potent influence of climate upon temperament, constitution, and disease. For it is at any rate conceivable that light or electricity split up, energy in one garb or another liberated in this way or that, might make to waver between negative and positive some weak-kneed member of our society of constituents, might loosen the force of attraction that had hitherto kept its atoms bound, might thus katabolize our tissues, and involve new varieties of function, in some hitherto unsuspected way. How, for instance, should plant-life have photo-synthetic metabolism all to itself?

It is to points like these, unsubstantial, even visionary, though they seem, that pathology is now compelled to turn its attention. And in so doing, although there is still much to be done in the post-

* "If Nature worked by rule and square,
Than man what wiser would she be?
What wins us is her careless care
And true unpunctuality."

The Garden that I Love.

mortem room, it is leaving its terra firma, of morbid anatomy (I say it with lingering regret) mapped out so well by the great masters of the past, by Baillie, Bright, Addison, Peacock, Bristowe, Jenner, Wilks, Payne, and many another still happily with us, and to be betaking itself to aviation, a deadly dangerous, albeit, as it must be, an earnest pursuit. Let us remember lest we forget.

And of the many pathological phenomena that I think emphasize this still more, and which I would fain call unequivocally functional, in their origin at any rate, I must yet mention one or two. It used to be said that acute disease is mostly an outburst from a chronic one. This is but very imperfectly true. It is true that many an acute attack of disease is supposed to be *de novo*, when, as a fact, further investigation proves that it has followed upon pre-existing changes. But then these, in their turn, have come about in so insidious a manner that they have never been capable of recognition as disease at all; and I am here to-day to contend that the future of pathology will be a physiological one, the study of erratic function that has confirmed itself into an habitually baneful one. And I see no reason for limiting the pathology thus engendered to function only. It is surely permissible to hold that morbid function may bring about structural change. There is not an organ of the body of which this is not true, but how largely and obviously so when applied to the brain. A large part of the structural disease of the brain is led up to by slow and insidious misapplications of thought and action that ultimately declare themselves as pronounced disease,

insanity thus becoming a cancer-like mood of the cells of thought, as well as a mood of growth.*

Admittedly there is plenty of gross disease in the brain, but it is as nothing compared with the many forms of misdirected energy that we call insanity. I would venture to call as witness the late Dr. Hughlings Jackson on this point, for, starting out on his work with inferences concerning function based upon definite lesions, he passed onwards to the wider sphere to which I say pathology is turning, where disease is the outcome of misdirected function. There is much of what we call insanity that is of this character: a man of impulse or emotion indulges his weakness—or his strength, is it?—and increases it. Little by little he loses his control, and the balance sinks to mania. A lethargic mind refuses first one fence and then another and another, until all really *effortful* response fails, and a mere sensori-motor existence is the result. Take also the class of functional paralyses where movement and sensation suddenly disappear: surely thus to close up the book of one's existence over so large an area must profoundly interfere with the trophic changes in the tissues, and, if protracted enough, lead to stasis, condensation, atrophy, all of them active instigators of structural change. There is much hope in this way of looking at things. How largely the world of the insane exists because it has harboured the fateful presentiment that thus it *must* be! It were better to spend one's time in perfecting some mechanism of the will that should damp down such mendacious forecasts.

* Sir George Savage has developed a similar idea in an interesting address entitled "Morbid Mental Growths."

Another instance may well be fatigue, for it nowadays is a disease. What more common than to meet woman or man who is "so tired, always tired."

We all know the machine that will not spark aright—every movement an effort, even rest a pain. You know too well that there is nothing to be called structural change, and that even rest furnishes you with no remedy. It is clear that what is required is a fresh stock of some form of energy for charging up the machine that we are as yet not able to supply. So far away, and yet perhaps so nigh. These are they who are born out of due time; the day of their like has yet to come. And with fatigue might well be coupled pain, for there are those who almost seem to be born in pain, and of a sort that no remedy seems able to assuage. Says the poet :

"The sweetest thing in all the world is pain
Consoled by love."

but that is *extra medicinam*. Even more than death pain is our hereditary foe—no quarter given. In olden days hysteria stalked abroad, but to-day a broader view of physiology would teach that pain is no certain indication of any existing morbid anatomy; that its intensity is always subjective, individual, aloof from standardization; and it is evident that in such chronic pain one needs to recreate the nervous elements, or to instil them with some electroid that shall reset the spring of the machinery in motion, and guide it smoothly on its livelong bent. Nor, though it has been the quest of æons, does this seem to be inexorably beyond the knowledge of the future.

Of other groups of disease that might be men-

tioned, few are of more abiding interest than that which concerns itself again with Harvey's realm and the finer processes of the circulation. How little we as yet know about these conditions, but surely distraught function is busy with them! Think what suggestions are contained in such an hypothesis as that of vascular spasm, or, to put it more generally, of peripheral stasis! Long years ago our trusty and well-beloved Fellow, Sir Clifford Allbutt, now Regius Professor of Medicine at Cambridge, wrote a short paper on Mental Anxiety as a cause of Granular Kidney. It was to me one of those illuminating suggestions that have added an interest to my life. I believe it to be as abundantly true as I do that similar malign influences, by dislocation in some way, as I suppose, of our correlated impulses, make for cancer. You must have often seen the nervous, anxious, worried man, with the phenomena of high tension, and have felt able to predict, *in posse*, the future disease of this organ or of that. Such conditions, real diseases though they be, are but functional, but what a wealth of pathology is wrapped up in them!

Thus, as it is with life, so, in a measure, is it with its diseases. Life itself is a developing function; it comes to each one of us from the past, with innumerable atomic differences gathered by the way, and it passes on to each of our successors, similarly changing. So that Professor Arthur Keith, from another place, can say to us that a thousand years is as one day, so like is *this* to *that*; yet also one day is as a thousand years, and in that day so multitudinous and infinite have been the changes that *life now* is *another life*—the same, yet not the same.

This all too brief survey must suffice to show how

much pathology there is yet in front of us, if the future is to be disentailed of its heritage of disease, and how difficult it must be to acquire the information necessary to enable us to bring the aid we would to sick humanity.

The outcome seems clearly to be: Experiment, and ever more experiment. We come, indeed, back to Harvey's teaching—to search out the secrets of Nature by such means. But, to that word "experiment" attaches no narrow meaning, and it is to humanity at large that I would now say, that it is quite as much your duty, as far as in you lies, as it is that of special scientific inquiry, to search out thus, by way of experiment, those secrets of nature that are seemingly so elusive.

Look a little closer into this matter, O man of the world! To give an illustration that may appeal to you. To touch effectively that liver of which we are all so tenderly conscious, and regard with such blind solicitude, we have to deal with an organ that is occupied in coining the energy of its life out of elements, organic and inorganic, that are for it, as yet, outside life. The continuity of life, therefore, itself becomes an experiment. Will this grouping of substances, this biochemical combination, come off, or will the individual atoms fail to synthesize, and fall back again into the sea of odds and ends, still waiting for their purpose to appear?

Will the action, whatever it be that may be done by you, help it, hinder it, or be quite inoperative and unsuited to the end? Who can tell? The vitality and activity of the organ are pioneering on the outskirts of the origin of life, where their very existence is always at stake, and where the requisites are quite unfamiliar to you and me.

Clearly every single dose of medicine, every act

done to influence such occult conditions, is an experiment. The social instinct is very hypersensitive to the use of this word in relation to disease; but why? We all, when ill, become the prey of experiment. Even the man who does nothing is not exempt. I suppose that there has never been a dose of medicine administered, however much we think to have divined its action, that has not been in some measure an experiment. "It subdues pain," you say. Yes. "It strengthens the heart." Maybe. "It arrests disease." No doubt. But how and why? These are the questions. And if it does these things for one of us, why does it fail for others? Further, what else is it doing in the economy at large? Is its mission ended when your behests are accomplished? What about thyroid extract, Coley's fluid, atoxyl, and all the vaccines, sera, and so on, that are now coming into use—all powerful, even heroic, attempts to cure disease, what are they all in their use but experiments? And although the wind be tempered as far as possible to the shorn lamb—it is here that knowledge and experience come in—they are, and must be, experiments attended with risk. There are some who think and speak of experiments as if they were performed only upon the lower animals and the poor who cannot help themselves. The fact is that by experiments the worlds have grown, that experimentation is the one fundamental necessity of all progress, and the whole of animal life—life of every kind—to reap the benefit must share the risks and chance the pain. So each and all of us must think on these things, and try to give such individual thought and observation as may be possible to the how and why of ordinary physiological reactions. We depend upon leechdom too

much, and spend our time in thinking our leeches fools on the one hand or an all-knowing providence on the other, and seem to be prone to handle the wrong end of the stick when it comes to a pinch. But it is not wise to leave these matters entirely to the republic of letters. Let us learn to steer our own craft amid the smoother eddies and currents of life's stream, so that when the call to the pilot comes we may be able, as we shall be, to help him to apply his principles, derived from wider sources and more tutored insight, to the special needs of our immediate stress. As pilots we also may take heed of this.

And then, what of the prospect?

With problems such as these before an expanding science, it cannot be one of royal pageant or of easy achievement, and it is certain that the future triumphs over disease will only unfold themselves to an ever-widening horizon that embraces all the latest advances of physical science as they bear upon the function of living. Yet would the possibilities seem to be limitless. With all the added information of recent years; the suggestions that have come to us from all directions by way of electricity and light, and the ether that surrounds us; with all the forces that make towards us and for us, merging all nature into one ordered whole, who can do other than put to himself the question: Can it indeed be that we are come to look unto the rock whence we were hewn? Yet with spectroscopic insight, with darkness dawning into light, with mental flashes borne across the storm, with all these new aspects of nature surging on us, who shall say that we are now familiar with all forms of living energy, that there are no other sources still to be made known to us? In the sigh

of the wind ; the spirit of a voice ; the magnetism of a presence or a touch ; or that ineffable something in face or form that the painter tries to catch, is there nothing travelling that other way ?

“ I trust the larger hope.”

To inquire into final causes, it has been said, inasmuch as they are beyond the grasp of the human intellect, is not the pursuit of a scientific mind. Such an opinion, since it would seem to ignore the stimulus, the insight, the instigations of the imagination, must be belated if ever it could have been true. Still, reverencing as I do that attitude of mind, thus expressed not long ago by Mr. Arthur Balfour, that to make the best of the future one must never ignore the past, you may perhaps think that could Harvey have returned to us for this afternoon he might have looked askance at the future to which I have committed the influence of his immortality, and the trend of the set purpose of his life. But methinks he would have absolved me ; for where is that knowledgeable man—let him step forward that we may look at him—who has deliberately forsworn that pleasure, I will venture even to say profit, of a mind set free to roam awhile, who does not dream even while he works, whose mood is not rather :

“ And I, who with expectant eyes
Have fared across the star-lit foam,
See through my dreams a new sunrise,
To conquer unachievèd skies,
And bring the dreamer home.”

RICHARD MIDDLETON : *Poems and Songs*.

It is thus that past, present, and future hold in one, why the Harveian Orator at this annual festival is bidden by our Master's expressed will to commemorate the Past. And the Fellows will

count it indeed happy and appropriate that on such a day, by the filial and devoted generosity of its President, Sir Thomas Barlow, the College should receive its latest and priceless benefaction of eleven recently discovered autograph letters, the very *ipsissima scripta* of William Harvey.

Alive as these are, with human interest, how the shade of Harvey seems to become re-embodied, and the passage of time to have been, for the moment, stayed !

The Past !

I sometimes think, Sir, that the mundane casket of our Harveian Librarian must be as full of ghosts as a queen bee is of embryonic honey. These walls are alive with memories of benefactors of the College. The dead herein still speak to us, and here is harboured the tomb of many a brilliant but buried thought, awaiting its emancipation that still tarries. And with Pavy, Hughlings Jackson, Wilks, Allchin, and others dear to us, all gathered to the Fathers of Medicine almost since St. Luke's Day last, what an addition to the supporters of the Arms of this our ancient College, even within the bygone year ! And of the less recent Past, who is there entering this Library, and making his obeisance, Sir, to your Presidential Chair, that does not experience the charm of a great contentment, when he remembers that the afterglow of Harvey and his followers still guides him on, to that yet more perfect day of ever-increasing knowledge and less disputable truth ?

" But, though long sunk from sight, I know,
The glory of your afterglow
Will never wholly fade."

Lamia's Winter Garden.