

The Hunterian oration, delivered at the Royal College of Surgeons in London, February 14, 1842 / by G.G. Babington.

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Babington, G. G. 1795-1856.
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Publication/Creation

London : J. Churchill, 1842.

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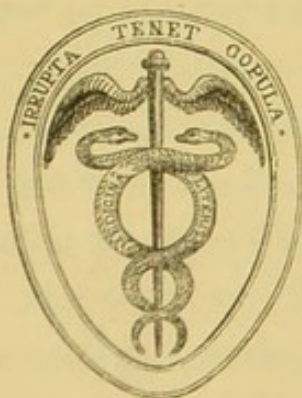
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THE
HUNTERIAN ORATION,

DELIVERED AT
THE ROYAL COLLEGE OF SURGEONS,
IN LONDON,

FEBRUARY 14, 1842.

BY
G. G. BABINGTON,
SURGEON TO ST. GEORGE'S HOSPITAL.



LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.

MDCCCXLII.

PRINTED BY G. ADIARD, BARTHOLOMEW CLOSE.

R35349

HUNTERIAN ORATION.

MR. PRESIDENT AND GENTLEMEN,

No one, I am sure, can have entered this theatre today, whose thoughts have not reverted in the first instance to that melancholy occurrence which interrupted our festivities last year, I mean, the decease of Sir Astley Cooper. The anniversary of his death cannot but renew the grief for his loss, and the recollection of the large debt which we owe to his memory. Yet I feel that this is a subject to which it is impossible as yet to do justice. The twelve months which have elapsed since his decease are too short to temper the general sorrow; and feelings of personal regret must overshadow in some degree the sense of his scientific eminence. Hitherto perhaps we feel the loss of the individual too keenly, to be able to appreciate justly the transcendent value of the surgeon; for though private friendship often magnifies inferior merit, and places it for a time in a position to which it has no claim, it only serves to obscure the light of that enduring fame which is destined to survive personal recollections, which is fed by the daily perception of

enduring benefits, and burns with increasing brilliancy when the virtues of the individual are forgotten. When the urbanity, and the high honour of Sir Astley Cooper shall be matter of interest only to the curious; and the works which he has left behind him shall become, as they assuredly will, the text-books on the subjects of which they treat; the books, to which the student will resort for his first ideas, and the oldest practitioner for guidance in cases of rarity and difficulty; it will then be known, how large a part of practical surgery owes its full development to his labours; and how much of the general diffusion of surgical knowledge is to be ascribed to the clearness of his views, and the simplicity of his descriptions. The power of conveying oral instruction, which he so eminently possessed, will survive in his written works; and generations that never heard his voice will yet owe the elements of their knowledge to those qualities which distinguished him in the lecture-room.

A tribute to the memory of Sir Astley Cooper cannot be paid on a fitter occasion than when we are assembled to commemorate what has been done by his great master John Hunter. From Hunter's instructions he derived in early life the principles of pathology; and all his works, if rightly viewed, are but these principles carried out into practice. His fame, instead of eclipsing or obscuring in any degree that of his great predecessor, does but increase its lustre, as the achievements of the progeny always

add to the renown of the parent stem. The discoveries of John Hunter concern those broad principles which lie at the very foundation of physiology and pathology, and which extend their ramifications through every function of health, and every form of disease. Such discoveries are the parents of many others. They unveil the most secret operations of nature; and when subsequent enquirers trace out these principles into their consequences, and find in them the solution of the phenomena of diseases, as well as the means of curing them, the highest praise still belongs as of right to the original genius who furnished them with the clue by which they have been guided through the labyrinth of nature. John Hunter's discoveries are great in themselves; but their true value is to be found in the number of other discoveries to which they have given birth. They have changed the whole aspect of the healing art. They have constituted an era in the history of its progress. They form the termination of a vista, to which subsequent ages will look back, when they examine the steps by which their knowledge has grown, and the periods of its principal augmentation.

On this account it has always appeared to me that those eminent individuals who founded this annual oration must have had other objects in view than to add to the reputation of John Hunter. For what could be more vain than to imagine that a renown which rests on discoveries such as these,

could be affected by an annual panegyric. The praise of such discoveries is to be found in their fruits ; in the growth of scientific knowledge, in the amelioration of the state of mankind. It rises in a spontaneous chorus, swelling with increased force and depth, as ages revolve, as enquiries extend, as an accumulated progeny of fresh discoveries shows more fully and more vividly the value of their great parent. By the side of such a tribute, the voice of an annual panegyric is indeed poor and contemptible.

But I am persuaded that Dr. Baillie and Sir E. Home had other intentions in founding this annual celebration. Distinguished themselves in the pursuit of science, they wished to direct subsequent generations into the only path by which scientific eminence is attainable. They wished to inculcate the great truth, that high excellence is beyond the reach of genius, unless that genius is combined with great industry, unwearied exertion, incessant application of every power of mind and of body. They wished to establish the conviction that the secrets of nature, the hidden laws which preside over its course, are not to be reached by conjecture alone, nor developed by an intellect pondering on the objects of its internal consciousness ; but must be deduced from a study of nature's works, from an observation of the phenomena which present themselves to the external senses, from the multiplication of experiments, by which the deductions of reason may be verified or disproved. Still further, they

wished to demonstrate that a true interpretation of nature is not to be effected by a limited view of her operations; that the different branches of science are all subsidiary to each other; that, as the whole universe was devised and called into existence by one creative Mind, and is subjected to the perpetual guidance and direction of one presiding Power, the unity of origin produces such an analogy in the different parts of the creation, that they mutually explain each other; and will ever be best unravelled by him whose knowledge is most general, and whose views are most comprehensive.

They thought that these great truths, which philosophers and moralists have from age to age wearied themselves in demonstrating, would be displayed more fully and better in a living instance, than by argument and precept: more fully, because they would be shown in practical operation, traced onward into their effects, with every action and every habit of life subjected to their influence: better, because in a form, in which the feelings as well as the judgment would be interested; in which the admiration of genius, and the sympathy with success, would cooperate with the conviction of the understanding, in prompting to similar endeavours and similar sacrifices. In selecting for the illustration of these doctrines the life of John Hunter, they judged well. It is a text, which it would appear that no perversity of judgment, no caprice of imagination could misinterpret. Amongst all those in every age and nation who have devoted

themselves to medical pursuits, it would be difficult, perhaps impossible, to find one whose biography establishes so fully the different truths which have been adduced. Other instances may be quoted, which more strongly elucidate particular points, but none which so fully combines the whole.

The facts of John Hunter's life are well known. They present the very personification of a character of invincible energy and restless activity. Up to the age of twenty, his life was passed in idleness or amusement, with no definite object, no settled employment; his highest occupation that of a cabinet maker, and his education utterly neglected. At that age he joined his brother, Dr. W. Hunter, in London, and thenceforward devoted himself to anatomical and physiological researches, with a zeal which disregarded every sacrifice, and an industry which experienced no intermission, during the remaining forty-five years of his life. A change so sudden and so complete, bespeaks a mind of no common force. What could have been expected from such an education, but that his powers would have withered from inaction, and that dissipation and indulgence would have destroyed all stability of character, and all capacity for sustained exertion? Yet, from the day of his arrival in London, there appears to have been no hesitation as to his course; no struggle between inclination and duty, between the love of pleasure and the obligation to labour. If, as is said, former habits of life tainted in some degree the earlier years of his career, they served

but to show the power of that master-passion, which soon swallowed up every other desire, and suspended every other occupation. It must be confessed, that evil desires were not so much extirpated by a sense of moral obligation, as superseded by a higher appetite, by the intense craving of a mind, insatiable in its thirst for knowledge and for fame.

It was this love of knowledge which chiefly supported him through his life of continued toil. His labour was its own reward. The wonders of nature, which daily unfolded themselves to his enquiries, afforded a never-ceasing gratification; while the view of still greater wonders which presented themselves beyond, constantly kindled his duties to additional ardour. In the vast field of creation, as there was no want of food for his appetite, so there was no danger of satiety. His appetite grew with indulgence; and his increasing cravings were always answered by fresh discoveries, and a larger conception of the inexhaustible riches of nature.. He never seems to have been dismayed at the difficulty of the path. Minds of lower stamp, as they advance into the regions of science, and obtain a more distinct view of its rugged heights, sometimes tremble at "the growing labours of the lengthening way." With him, the approximation to his object served but to increase its magnitude, and enhance its value; and, in the contemplation of the greatness of the prize, the intermediate labours were forgotten. Hence, age could not cool his ardour,

nor disease or weakness relax his exertions: they seemed, year by year, only to grow in vigour and activity, till they were suddenly arrested by death.

It is worthy of remark, that the circumstances of John Hunter's life do not seem, at first sight, to have been particularly favorable to the pursuits in which he obtained such eminence. The difficulties by which others have been obstructed, the temptations by which others have been seduced, beset him likewise; but his zeal and energy found in them only inducements to redoubled efforts, and additional means of success.

The income of John Hunter was extremely limited. Until he reached the age of forty-six, as Sir E. Home, his biographer and executor, tells us, it was barely sufficient to supply the most ordinary expenses of his station. Yet he must have been aware from the first, that comparative anatomy and physiology are expensive pursuits; that a museum cannot be formed but at an immense cost, nor preserved but by a large annual outlay. He had before his eyes the example of his brother Dr. W. Hunter, whose collection is said to have cost not less than £100,000. His own views were more vast and comprehensive than those of his brother, and had they been fully carried out, the ultimate expenditure on his museum must have been still larger. Against such difficulties very few would have attempted to struggle. Thousands similarly cir-

cumstanced have abandoned their dearest pursuits, renounced their anticipated fame, and in despair turned their labours into other and more lucrative directions. Not so John Hunter. With him the difficulties which poverty interposed served only to cut off more absolutely every other indulgence, to alienate him more completely from every other object of attraction, and thus to concentrate all his powers on the one object which remained, the study of animated nature. If we take into consideration his early disadvantages, it may be doubted, whether his victory over the habits of his childhood is not in part to be ascribed to his pecuniary difficulties themselves.

Constrained, partly by the state of his finances, partly by the state of his health, John Hunter accepted an appointment in the army. He was attached to the expedition which was sent against Belleisle in the year 1761, and afterwards accompanied the troops which were despatched to the aid of Portugal. The situation of surgeon in the army would appear to be in general not particularly favorable to scientific researches. When in the field, the laborious duties of his office engross every moment of his time; and when in garrison or in quarters, it is perhaps difficult for him to resist the influence of a certain atmosphere of torpor and inactivity which pervades everything around him. Nevertheless, it is to this period of John Hunter's life, that many of his most important discoveries

are to be referred. He himself tells us, that the foundation of his great work on Inflammation was laid at the siege of Belleisle; and the frequent allusions, in the "Observations on the Animal Economy," to experiments made at this time, sufficiently show, that every interval of leisure which he could spare from his other avocations was devoted to his favorite physiology. Where others found idleness, John Hunter found leisure. Where others saw nothing but a gun-shot wound, and were entirely occupied by the details of its treatment, his active and sagacious mind passed forward through the series of causes on which the appearances before him depended, till it rested at length in the great primary principles of pathology.

But the perseverance of John Hunter was exposed to the severest trial, when he returned to London, and entered upon the ordinary routine of professional practice. A divided pursuit is rarely successful, especially when neither object is attainable, without great exertion, and earnest and unremitting attention. Extensive physiological researches seem incompatible with extensive practice; since, amid the multiplied distractions of a professional life, they can scarcely be followed with that continuity and steadiness which are absolutely essential to their success. Hence it is generally found necessary, at a certain period of life, to select one of these two paths and to abandon the other: and it must be confessed that the de-

cision is usually in favour of that which leads to greater profit, and more immediate reputation. As professional engagements multiply, the scientific pursuits of early life, attractive as they once were, and pregnant as they are with extensive benefit to future generations, are usually abandoned. Had the option been open to John Hunter, it cannot be doubted where his choice would have fallen. The whole tenor of his life, as well as his recorded expressions show, that he would most willingly have renounced every chance of professional distinction, and have consecrated his whole time and thoughts to the completion of his collections, to the study of the structure and functions of men and animals, to the discovery of those great and primary laws by which animated nature is regulated. But in truth this was not possible : he had no means of prosecuting these latter objects but such as he derived from success in his profession ; to abandon practice would have been to abandon also the knowledge, and the lasting fame for which he thirsted. Forced to combine the two, he adopted the only expedient which remained to him ; he devoted the day to his profession, and the night to science. It is recorded of him, that he always rose before six, and seldom retired to rest before two in the morning : and, as the four hours thus allowed for sleep were insufficient for the necessities of nature, he usually eked out the measure, by stealing one hour from the day, selecting that which could best

be spared from his other avocations. His dissections, his preparations, the writings he has left behind him, were chiefly the work of those hours, when all around him were buried in repose.

Even when labouring under a most depressing malady, suffering from a sense of weakened powers, and in daily expectation of sudden death, John Hunter found in these afflictions only incentives to redoubled exertion. We are told that he was tormented by the fear, that he should be snatched away, leaving his many discoveries unrecorded, the investigations he had commenced, interrupted and incomplete, and his immense collection, the great work of his life, unexplained and unintelligible: and that, under the influence of these apprehensions, he laboured more assiduously than ever, not only devoting his own time and efforts, but availing himself of every assistance from others, which friendship could persuade or money could purchase. If he did not entirely succeed, if he was cut off before he reaped the harvest of his exertions, this is but the lot of humanity:

“The fair guerdon when we hope to find,
Comes the blind Fury, with the abhorred shears,
And slits the thin-spun life.”*

The edifice which he projected was perhaps too vast to be erected by one individual, or to be completed within the limits of a single life. Yet what

* Milton's Lycidas.

he did achieve remains a memorable example of what can be effected by the powers which Providence has allotted to man, provided those powers are employed without stint, without intermission, and without distraction.

If this representation of John Hunter, as he actually was, while it contains much to be admired, contains also something to be regretted; if he may be charged, not unjustly, with having been so absorbed in the pursuit of science, as to have paid too little attention to the futurity which was immediately impending; yet, when we compare him with the multitudes who waste their lives on trivial and temporary indulgence, we cannot but acknowledge that his choice was the wiser; and that in the discoveries which he made, and the gratitude and admiration of succeeding generations, his industry has been crowned with a reward, compared with which the gratifications of the idler and the sensualist are utterly worthless.

But the industry of John Hunter would have been of little avail, unless it had been employed in the only true path of philosophical discovery, the path of experiment and induction. He had never read Lord Bacon, but his mode of studying nature was as strictly Baconian as if he had. Born in an age, when the course of philosophical enquiry was no longer confined to the track of ancient authority; associating with those, who were themselves experimental philosophers; and endowed by nature

with a mind eminently practical, and a body of untiring activity, he pursued that course which reason and nature dictated, assuming nothing but the truth of what was evidenced by his senses, and ascending from this basis to those higher principles which are cognizable only by the intellect. He is a living example, and on some accounts the best that could be found, of the high value of that system for the interpretation of nature which was introduced by Lord Bacon, which has already pervaded every branch of physical science, and has laid the foundation of an edifice, the future height and breadth of which cannot be estimated by human powers, since it must continue to grow, as long as there are parts of the universe unexplored, or time is left to carry on the investigation.

The Baconian philosophy is so well known, and in general so justly appreciated, that it may seem superfluous to say a single word in its praise. It has obtained a decisive victory over every rival, less by the reasoning and the eloquence of its great author, wonderful as these undoubtedly were, than by the practical experience which mankind have had of its benefits. The two hundred years, which have elapsed since the appearance of the *Novum Organum*, have been so fruitful in discoveries, the previous time was so barren, that few indeed have been able to resist the conclusion, that the older philosophers failed because their efforts were misdirected, and that the true path of inves-

tigation, at least in physical sciences, was first indicated by Bacon.

But this opinion, though general, has not been universal. There have not been wanting, even in modern times, those who have contended, that the Baconian system of induction, as generally understood, is erroneous; that the first principles of philosophy cannot be deduced from the facts of experience which they are intended to explain, but must be developed by the pure light of reason, undistracted by sensible impressions, and operating on the objects of its internal consciousness alone; that then, from these first principles, thus ascertained, as from a geometrical axiom, are to be deduced in a descending series, those secondary and tertiary laws, which are of more partial operation, and by which the phenomena that present themselves to the senses are directly explained. With every respect for those by whom these doctrines have been advocated, I cannot but consider them as so opposed to all sound philosophy, so dangerous to the future progress of discovery, and moreover so contrary to the example of John Hunter which we are assembled this day to commemorate, that I feel I should ill fulfil the intention of those who founded this oration, were I to pass them over in silence. When the foundations of all modern science are endangered, it becomes necessary to survey them with the view of ascertaining their solidity. Nor is there any better protection

against the intrusion of error, than an accurate comparison between it and truth.

It will be observed, then, that the two systems of philosophy which have been described, differ in the *basis* on which they rest, in the *course* which they hold, and in the *proofs* to which they appeal: nor can the difference be better stated than in the words of Lord Bacon himself. As to the original *basis*, he describes the one as an *anticipatio mentis*, the other as an *interpretatio naturæ*; that is, the one as resting on human notions rashly and prematurely formed, the other as resting on the facts of nature carefully collected and interpreted by cautious reasoning. "*Omnes ante nos,*" says he, "*qui ad artes inveniendas se applicuerunt, conjectis paulisper in res, et exempla, et experientiam oculis, statim, quasi inventio nil aliud esset quàm quædam excogitatio, spiritus proprios, ut sibi oracula exhiberent, quodammodo invocârunt. Nos verò, inter res cautè et perpetuò versantes, intellectum longiùs a rebus non abstrahimus, quàm ut rerum imagines, et radii (ut in sensu fit) coire possint.*"*

As to the *course* which they hold in their progressive development, he tells us, that the one having established by hasty anticipation certain wide and comprehensive principles, deduces from these by logical inference the *axiomata media*, the less general laws which are applicable to the

* Bacon, Nov. Org. Præf.

practice of life : that the other ascertains first by careful observation the *axiomata media*, and then ascends by gradual and regular induction to the more general laws of the universe. The former method, though easy and compendious, is attended with this grievous evil, that an error in the original principle affects all the conclusions which are deduced from it: the latter, though longer and more laborious, corrects in its progress any error which may have been admitted, and thus establishes its conclusions on a certain and irrefragable basis. His words are remarkable : “ *Ordo demonstrandi planè invertitur. Adhuc enim res ità geri consuevit, ut a sensu et particularibus primo loco ad maximè generalia advoletur, tanquam ad polos fixos circa quos disputationes versantur ; ab illis cætera per media deriventur, viâ certè compendiariâ, sed præcipiti ; et ad naturam imperviâ, ad disputationes verò proclivi et accommodatâ. At secundùm nos, axiomata continenter et gradatim incitantur, ut non nisi postremo loco ad generalissima veniatur.*”*

Then as to the *proofs* to which they severally appeal. The one assumes that the notions of the human mind are necessarily correct, and appeals therefore to each man's consciousness for the justification of its doctrines : the other rejects all confidence in the notions of the intellect, unless their truth is demonstrated at every step by observation

* Bacon, Nov. Org. Dist. Op.

and experiment; by their accordance with the evidence of the senses, and the results of experience. "*Quod attinet,*" says Lord Bacon, "*ad notiones primas intellectûs, nihil est eorum quæ intellectus, sibi permissus, conguessit, quin nobis pro suspecto sit, nec ullo modo ratum, nisi novo judicio se stiterit, et secundùm illud pronuntiatum fuerit.*"*

I have been the more particular in stating, from Lord Bacon himself, these essential characteristics of the two systems, because it is to be feared, that, while we have been engaged in rearing the superstructure of science, its foundations, as laid by that great man, have been in some degree forgotten. How otherwise should it be, that the errors he refuted should be reproduced as newly-discovered truths? Nay, that the authority of Lord Bacon himself should be claimed for a system, evidently identical with that which it was the great labour of his life to overthrow.

Here then are two ways, by which we may seek to unfold the laws which the Creator has imposed on his works. The one is to read them in the works themselves; the other to discover them by solitary contemplation. The one investigates by the evidence of the senses the facts of the world around, and endeavours to discover, by reason and varied research, that order which the Creator has been pleased to establish in it. The other puts man, if the expression may be allowed, in the place of

* Bacon, Nov. Org. Dist. Op.

the Creator, and determines, *à priori*, what laws must be ordained by Infinite Wisdom for the regulation of a world which Infinite Power was about to create. Can anything equal the presumption of such an attempt? That a mortal man,—his knowledge limited to the little corner of the little planet he inhabits; his life but a span; half of that span passed before his intellect has attained its maturity,—should imagine himself able to construct the wonderful world which surrounds him, with its infinite variety, its regular gradations, its perpetual flux and reparation; including within it innumerable millions of distinct volitions, each capable of independent action, each influenced by its own individual motives, yet all cooperating to fulfil the designs of one unerring Prescience; that, I say, man should imagine he could construct such a world, is a presumption which almost exceeds the possibility of belief, and which would doubtless be disowned by those who nevertheless avow the doctrine of which it is the legitimate inference. For is it not so? He who, never having examined a watch, yet devises its construction, is equal to the original inventor. He who could sketch the plan of the universe, not from the contemplation of its form and operations, but from the suggestions of his own intellect, could not but approach, if the expression may be permitted, to that Infinite Wisdom,

“In whose thought the world
Fair as it is, existed ere it was.”*

* Cowper.

The power to create might be wanting, but the skill of the Creator must be there. Nor is it sufficient to say that the mind does but read off what has been impressed on it by its Author; does but develop by reflection that instinctive wisdom which was implanted in it when first called into existence. Such wisdom, whether implanted or not, the human mind does not possess. We can only hope, by the closest employment of the senses, aided by every adventitious means; and by the utmost effort of reason, rendered acute by constant exercise, to attain some limited insight into these "the lowest works" of Divine Intelligence; some partial comprehension of those antecedences and sequences which we call the laws of nature; and some occasional power of using these laws for the relief and advantage of mankind.

As far indeed as the benefit of mankind is the object of science, the question between the two systems may be considered as decided by experience. The curse of barrenness has been laid on those sciences, which, to use an expression of Lord Bacon, have been arrogantly sought in the cells of the human mind. They have been prolific only of disputations, but barren of practical results. Where is now the philosophy of Aristotle, of Descartes, of Galen? They have disappeared from the face of the earth, leaving behind them no progeny to perpetuate their memory; no beneficial consequences to claim for them the grateful recollections of the

human race. Whilst, on the other hand, the discoveries of Newton in astronomy and mechanics ; of Lavoisier and Davy in chemistry ; of Harvey and Hunter in physiology and pathology, are hourly felt in every transaction of life, and every material comfort which surround us. It is on the foundation of the experimental sciences, that the useful arts, the arts which mankind bless, and by which they are blessed, have been reared ; while, at the same time, these same sciences have supplied the highest exercise for the human intellect, and the most extensive and sublime views of the administration of the universe. Difficult, and apparently trivial in their origin, they have been gradually increased by successive contributions, till the streamlet has become a stream, and at last, under the guidance of genius, which has combined different branches in one, they have swelled into a mighty river, scattering fertility and enjoyment through every part of their course. Nor does it appear to us that they have yet attained their full magnitude. On the contrary, the progress which has been hitherto made, has served only to bring into view a still wider expanse which is beyond, and to lead to the confident anticipation of an ultimate insight into nature's works, to which the conceptions of the earlier philosophers never approached.

That John Hunter is to be reckoned among the highest order of experimental philosophers, needs no other proof than the incomparable museum he has left behind him. Museums are not collected by

contemplative philosophers, who need nothing more than their own instinctive consciousness, but by those who build on fact and experiment. It was in visible facts that John Hunter found his theories, and it was by experiment that he tested their truth. "I think," he writes to a friend who had given a conjectural solution of a phenomenon, "I think your solution is just. But why think? Why not try the experiment? Repeat all the experiments as soon as you receive this, and they will give you the solution."* It was particularly fortunate for him that he lived in an age, when the principles of philosophical investigation were rightly understood. His mind was naturally excursive and ambitious, impatient of the limits by which his knowledge was bounded, and eager to grasp at some higher and more transcendent truth, of which he thought he saw an outline or shadow looming in the darkness beyond. These qualities had not been chastened or regulated by early education; they existed in their natural roughness and vigour, not emasculated indeed by artificial cultivation, but, on the other hand, never taught to obey the rein, nor endowed with that additional power as well as security which order and method bestow. It cannot be doubted that such a mind, transported by its very force and activity, would have carried its possessor into the regions of unbounded fancy, and rather impeded than furthered the progress of discovery, had it not been constantly fettered by experiment and obser-

* Hunter's Works, Palmer's ed., vol. i. p. 56.

vation, which restrained its extravagance, corrected its errors, and suggested more distinct and truer notions than the human mind can ever engender on itself. There was never a better illustration of the truth; “*Hominum intellectui non plumæ addendæ, sed plumbum potiùs et pondera, ut cohibeant omnem saltum et volatum.*”*

It may surely be hoped that the sound and practical genius of England will continue to tread the path which has been hallowed by the labours of Bacon, of Newton, of Harvey, and of Hunter, unseduced by the specious and lofty pretensions of rival systems. The domain of metaphysics may suffice for the theoretical philosophy:

“*Illâ se jactet in aulâ,*”

amid the perpetual strife of unstable and insubstantial elements. But the physical sciences, those which are definite and palpable, may surely be kept sacred from its intrusion. They belong as of right to another sovereign, under whose rule errors are detected and extirpated, solid and substantial certainty is attained, and a rich harvest is reaped of results really beneficial.

There is yet another point in which the example of John Hunter is most instructive, I mean the extent and variety of the objects which he comprehended in his researches. Every form of animated nature, from the lowest animals, and even plants, up to man, is embraced in his museum. He traces

* Bacon, Nov. Org., Aph. civ.

every vital function through all the gradations of being, and places in juxtaposition the organs by which it is discharged in each of them. The magnificence of such a scheme was beyond the comprehension of his contemporaries, but subsequent generations have known better how to value it. It was not adopted in the wantonness of a curiosity which was insatiable, but from a deep and settled conviction that there was no other road to the discovery of the general laws of pathology. It was a principle with him, that physiology was necessary to the knowledge of pathology, and comparative anatomy to the knowledge of physiology; and hence comparative anatomy and physiology absorbed a large part of his time and attention. If we look to the result, it is not possible to doubt that he judged rightly. The great principles he has established in pathology have given a new aspect to the science, and rendered the works of all previous enquirers comparatively worthless. By studying the functions of health, he obtained such an insight into the course of nature, such a knowledge of her designs and her means, as guided him to a right interpretation even of her aberrations. Whether in health or in disease, the design of nature is for the most part the same, to preserve life, to guard against suffering, to maintain all the bodily functions in their integrity, to restore what is injured or lost. The means are also the same, namely, those natural powers with which the different parts of the ma-

chine are endowed. The same structure, the same actions, which in health tend to nutrition and enjoyment, under circumstances of injury are used for relief and reparation. Hence it is utterly impossible that pathology can be successfully pursued by any one who entirely neglects physiology.

The utility of the comprehensive system adopted by John Hunter, cannot be better shown than by comparing him with his brother Dr. W. Hunter. Dr. W. Hunter greatly surpassed his brother John in education, in method, in clearness of conception, in powers of reasoning, in facility and elegance of expression. He was also eminent for industry, and enthusiastic in the pursuit of science. Yet he has left behind him scarcely anything to perpetuate his memory, except the work on the Gravid Uterus, which, though undoubtedly of great merit, has had no very extensive influence on the progress of knowledge, and cannot in any manner be compared with what has been effected by his brother. The one great distinction was this, that, while Dr. W. Hunter confined his enquiries for the most part to human anatomy and human pathology, those of John Hunter were carried through every part of the animal creation.

Nor is this any novelty in the history of medicine. If we look back to the steps by which medicine has advanced to its present condition, we shall find that each advance has been rather attributable to the cultivation of some subsidiary science,

than to any increased attention to the phenomena of disease themselves. The value of these subsidiary branches of knowledge has at the time been little understood, and those who have prosecuted them have been considered as deviating from the plain and practical course, by which they might have benefited their fellow-creatures, into matters which were more amusing than useful: but posterity has rectified the judgment, and has honoured them as the greatest benefactors of mankind. When at the close of the 15th century, medicine, in common with the other sciences, experienced a revival, it was the cultivation of anatomy, and not any closer attention to the symptoms of disease, which restored it to life. Vesalius was undoubtedly considered by his contemporaries, as wasting, in the gratification of an idle curiosity, energies which would have been more usefully employed in the study of disease. Yet, while those who held this language are forgotten, Vesalius is justly celebrated as the founder of modern medicine. He first laid a solid foundation, on which the science has been erected by others. When, a century later, Harvey drew from anatomical and physiological investigations the discovery of the circulation, it is recorded that his fame as a physician was injured, because his talents were supposed to be devoted to pursuits foreign to the science of medicine. Yet this physiological discovery is now universally confessed, to have first introduced the true knowledge of disease, and the

true principles of treatment. In the same manner John Hunter was considered by the majority of his contemporaries as a theorist; as one who was rather a physiologist than a surgeon, and whose pursuits had little connexion with the practical improvement of his profession. Yet the works of the greatest surgeons of the day, of Cheselden, of Sharpe, or of Pott, were trivial and transient, when compared with the vast and enduring results which have proceeded from the theories of Hunter.

In truth a microscopic view of a particular fact will never bring to light the great laws on which it depends. The errors of the senses are not sufficiently corrected; the reasoning powers are not sufficiently called to aid. The eye, to borrow an illustration from Lord Bacon, must be so far removed from the objects of its contemplation, as to allow the rays proceeding from them to converge into one focus. Then only will analogies be perceived; what is obscure in one subject will be solved by what is obvious in another; the regular gradations of nature will be made out, and all the links of the chain brought distinctly into view. It was not by a concentrated examination of the course of projectiles alone, that Newton arrived at the great law of attraction. It was by comparing projectiles on the surface of the earth with the motions of the heavenly bodies; it was by combining astronomy with mechanics. For the adaptation of the laws of pathology to practice, attention to the practice of

medicine may be sufficient; but the laws themselves can only be ascertained by the aid of physiology.

It is under a deep conviction of this truth that the College of Surgeons have always considered the encouragement of physiology and comparative anatomy as forming an essential part of their public duty. The direct encouragement of practical surgery is indeed scarcely in their power. They can offer no inducements to its cultivation which can be compared with the inducement of professional distinction; nor can they supply any means for the study of it, which can be compared with our large hospitals. But in the subsidiary sciences, they may hope to give efficient assistance, and hold out the prospect of advantages which are not to be found elsewhere. With this view they have published a descriptive Catalogue of the Museum in a most elaborate form, which has rendered its treasures readily accessible to all; they have, at great expense, made large additions to the collection; they have established an annual course of Lectures on physiology and comparative anatomy; and lastly, they have instituted three Studentships in anatomy, open to public competition, in which the successful candidate secures at once a reward for his proficiency, and the best opportunity for the further prosecution of his studies. As to the mode in which the catalogues have been executed, and the value of the public lectures which have been delivered

by the Hunterian Professor, it is not necessary to speak; nor could I say anything which could add to the high and general reputation of Mr. Owen for anatomical and physiological knowledge. It has been no small advantage to him, to have studied the ideas of John Hunter in the only record in which they are fully expressed, till he has imbibed something of the spirit by which Hunter himself was animated. The same fountain, with the assistance of the printed catalogues, is accessible to others also. Those who will be at the pains thoroughly to examine and comprehend the museum as it now exists, will find that it contains a more complete system of physiological science than is to be found elsewhere in the world.

With the exception of the fossils, the whole of the collection has been catalogued; but the constant addition of fresh specimens, and the progressive extension of the plan render it necessary, from time to time, that the catalogues should be revised and enlarged. It may be confidently hoped that each successive edition of the work will show that the museum has been greatly enriched in the interim, and that it will be always kept on a level with the progressive advances of science.

For it is impossible to doubt that science will be constantly advancing, and will daily approach nearer and nearer to perfection. To trace the course of future discovery is indeed impossible. To do that would be to effect the discovery. The obscurity which surrounds us is impenetrable but

to the eye of genius, whose glances are radiant with light, and pour the brightness of day on every object on which they rest. To all others the future is inscrutable ; yet the law of the physical sciences is continual progress, and we may confidently believe in discoveries which we yet cannot distinctly foresee. Nor do I think so poorly of my countrymen as to doubt that a great part of the merit and the glory of such discoveries will be theirs ; that the energy and intellectual superiority which have obtained for them the first rank in the political world will always ensure them a similar station in the world of science ; that as England has in past times been eminent among the nations for its success in the higher departments of physical science, so its progeny, through successive generations, will emulate their fathers' fame, animated by the same thirst of knowledge, and the same admiration of the works of the Creator. To use the words of the great Harvey, "*Pudeat in hoc naturæ campo, tam spatioso, tam admirabili, promissisque majora semper persolvente, aliorum scriptis credere, incerta inde problemata cudere, et spinosas captiosasque disputatiunculas nectere. Natura ipsa adeunda est, et semitâ quam nobis monstrat insistentium : ita enim, dum oculos nostros consulimus, et a minimis exorsi ad majora promovemus pedem, ad intima tandem ipsius arcana penetrabimus.*"*

* De Gen. Animal. Præf.