Introductory lecture to the course of physiology in the Medical College of the State of South Carolina / by James Moultrie.

Moultrie (Jas)

INTRODUCTORY LECTURE

TO THE

Course of Physiology

IN THE

MEDICAL COLLEGE

OF THE

STATE OF SOUTH CAROLINA,

BY

JAMES MOULTRIE, M. D.

CHARLESTON, NOVEMBER 3D, 1856.

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CHARLESTON, S. C., Nov. 4th, 1856.

Prof. Jas. Moultrie, M.D.:

Dear Sir,—At a meeting of the Students of the Medical College of the State of South-Carolina, it was unanimously

Resolved, That a committee be appointed to solicit a copy of Prof. Jas. Moultrie's very eloquent and instructive Introductory Address, for publication.

In transmitting the above, permit us to add, that your compliance with our request will be sincerely gratifying to ourselves personally, and to the members of the Class generally.

Very respectfully,

A. R. TABER, Chairman,
J. C. FANT,
R. Q. STACY,
WM. H. MOORE,
J. H. PACETTY,
WM. H. DAUGHTREY, M.D.,
W. L. STEELE,
T. J. VANCE,
} *Committee*

NOVEMBER 14th, 1856.

Messrs. Taber, Pacetty, Fant, Daughtrey, Stacy, Steele, Moore and Vance:

Gentlemen,—I have the pleasure of acknowledging the receipt of your kind note the other day, conveying to me a Resolution of the Medical Class, soliciting a copy of my late Introductory Address, with a view to its publication, accompanied with your own assurances of personal consideration.

Prepared hurriedly, to meet the immediately pending opening of the College, I am not conscious that it contains anything of originality, or of sufficient merit, to entitle it to the distinction which the kindness or conceptions of the Class propose to accord to it—nevertheless, they are the judges of whatever good it may havo conferred, or is likely, by its publicity, still further to bestow. In view of this, and in accordance with the gratification which it at all times affords me to respond favorably to the reasonable claims of its Members, I have respectfully to request the Committee to state that the Address is at its disposal.

I remain, Gentlemen, very sincerely, yours,

JAS. MOULTRIE.

Gentlemen of the Medical Class:

Our common presence within the precincts of this public edifice, and the preparations made, and which are making, for our mutual reception and accommodation, call to mind the completion and renewal of a year, which, however oft-repeated, is ever pregnant with the recollection of the demands it awakens on our time and responsibilities. Before entering, however, upon a discharge of the several and respective duties which the occasion is so calculated to inspire, I cannot forego the pleasure of previously expressing my cordial salutation—of proferring to you, whatever of advantage it may be, in my official capacity, to bestow, or of individual hospitality, your own inclination and opportunity may prompt you to seek.

Among the self-evident truths, which daily address themselves to the notice of man, or which have an axiomatic existence in the structure of his mind, there are none more obvious or universal, than that all things, within the regions of space and the limitations of time, have a beginning, a duration, and a termination. Every thing, saving the Infinite and the Illimitable, within these circumscriptions, has, consequently, a recorded or unrecorded registry, or history. And this is true, not only of the outer world, but also of the inner; in the realms of matter, as well as the dominions of force.

So true is this, that if we cast our eyes upon this sublunary planet, or that allotment in the universality of space, or occupancy, within the precincts of time, where humanity has its being, and the fulfilment of its appointed destiny, the declaration of it is made to us everywhere. Its geological verity is attested in every stratum of which it is composed, and in every storehouse of organic relics which it contains. There, sequence after sequence follow in almost mechanical succession, evincive of a purpose, and demonstrative of a career, manifesting the terms and boundaries contained in the statement of our proposition.

The vegetable races, which live, and grow, and decorate its surface, or which ancient or modern researches have upturned from its bowels, tell the same veritable story, whether we have reference to the races, or the individuals of which they are composed. Observation shows a seriality,

as well as a co-temporality, in past time, as well as in the present, from the most simple to the most complex—the most general in structure and in function, in matter and in force, to the most special, with respect to both. The start of each is from a cell -- its career is through like phases of increment and development, and these are followed by but one termination

So of the animal. The implied parallelism is complete. Evidence of this will repeatedly occur, as we shall have occasion to notice in the different parts of our course. The animal organism begins in a cell. The first state of the most perfect animal is a cell, and the simplest animal is also a cell. And what is true of the individual animal and individual plant, and of the races of both, is true alike of the succession, as ordered in geological times. The antecedents and sequents are the same; the differentiations are characterized by the same laws of unity of composition and progressive development. Here, within this aboriginal field of exploration, however, are we alone able fully to realise the fact, that the races, also, as well as individuals, are equally the subject of the rule; for it is only here, that we have ocular proof of the *beginnings* of organic and of inorganic sequences, as well as of a duration and destiny.

The events of daily life render us habitually sensible of its verity with respect to man. He, as we all know, has a beginning, a career, and an end. This we in general, however, think of in a vulgar sense. It is only recently that we have come to recognise it as a scientific truth; it is only recently that we have learned that his start is likewise from a cell; and that in all that he passes through to what he attains in manhood, the states and stages are representations of what has already been described. This knowledge we owe to the recenter investigations of Embryology.

And what is true of the parts is true of the whole. Not alone is it true of man, and of individuals, and of races, and of present and past time, but it is true again of organization, as a whole, as of the universe. Analysis, retracing its own footsteps—in other words, synthisis—manifests a law of construction, in conformity with the same. The complex invariably emerges out of the simple. These, under all known circumstances, are the constituents of those; and it is now a well underderstood aim of chemistry to ascertain what they are; how many there are; as well as their several and respective re-unions and disintegrations. Its application to the organic kingdom, has greatly enlarged the field of its operations, and necessitated a new division of the science, which, in contra-distinction to the old, has been denominated "Organic."

The "forces" observe a corresponding order. The ever-present cause

of all the phenomena which have been described, it could not have been otherwise. As dynamical elements of knowledge, or objects of intellection, we know them only through their results. The doctrine of their correlation, indeed, teaches us that they are modified, and made to appear what they are, by the materials with which they are associated. Thus, concretely viewed, a strong probability obtains, that motion is their rudimental basis; and that, influenced by the above consideration, the order of development is, in a general way, from the inorganic to the organic—from the vegetable to the animal—from the unconscious to the conscious—and from the reflex to the instinctive—and, finally, intellectual.

In accordance with these evolutions, we would, of course, expect to find a like manifestation in the growth of human thought; and so we do. "*Nihil est in intellectu quod not prius fuit in sensu*," is an old maxim, but nevertheless a true one. It implies, according to the sense in which I understand, and mean to apply it, that that growth begins with sensation, which is soon transformed into perception, to become the occasion or antecedent of those still further demonstrations, which are recognised in psychology, as memory, association, judgment, reason and volition; and of all those subsequent experiences, of unceassing accretiveness and method, by which the mind is enabled to arrive at, and to retain, a knowledge of the differentiations implied in the characteristics of species, and genera, and classes, and orders.

It is not surprising, therefore, that we should find in methods of science, as these methods are applied to the investigation and unfolding of truth, a further corroboration. Their historical elucidation, as well as daily individual exemplification, show that their agency is operative in the following order: observation, comparison, induction and deduction; and the reason of it is deducible from what has just been said. What is method, in fact, but the *order* according to which the mind has worked in the discovery, and registration, and communication of truth. Its general history, it seems to me, is the history of philosophy.

We find, upon the further contemplation of the subject, consequently, that the statement is equally true of, and verified by, the history and nature of the sciences. Offsprings of the mind, of knowledge, and of method, it would have been strange had it been otherwise. The "circle of the sciences," a phraseology long familiar to human ears, is an indication of the common faith, long entertained respecting their reciprocal dependencies. From time immemorial, this has been matter of vague and general credence. But the apprehension that they were not of fortuitous

origin ; that they did not come forth at a birth, as Minerva is represented to do in heathen mythology from the head of Hercules, and run a co-temporaneous, unconnected career, accidentally affecting one another ; but that they had their appointed seasons of appearance and growth, and, consequently, that some were necessarily of first existence and contained the conditions of vitality of those which were to follow ; are announcements for which the present generations are indebted to the historical and other labors, which have been conducted amidst numerous and isolated fields of research by the votaries of positive philosophy. Hereafter, accordingly, it must be understood and appreciated, that their co-ordination was a pre-determined fact ; and that neither of them can be adequately studied alone, or elevated to its natural dignity or usefulness, until provision for so doing or achieving has been made, by the preliminary advances of its natural predecessors. This is the declaration of an important principle, which, in its application, is destined to exert no little influence over the progress of, and provisions for, human education, as yet but little understood.

What their normal sequence was, or is, may partly be anticipated from what has been already said. The earliest were necessarily the most needed, and, therefore, those which contained the fewest and the simplest ideas, and which could be rendered most directly available to the wants of an infantile or juvenile humanity. Their historic is their actual order, and is at the same time expressive of the law of their relationship. The enumeration contains, consecutively, the following, viz : Mathematics, Astronomy, Physics, Chemistry, Physiology, Sociology and Ethnography ; and the reason of their differentiated advancement towards their deductive completeness, is the earlier start which some have had than others, as well as their natural simplicity. All, nevertheless, by a common necessity and a common purpose, are tending to some common end, to some prospective good, where the mission of humanity itself, in whose interests they are united, will realise an explanation, and find an ultimate satisfaction.

Where the place of physiology is in the hierarchical sequence, and what are its antecedents and consequents, connections and relations, may be ascertained by adverting to the foregoing. But it has besides a proper registration and history. It has been subject also to alternate expansions and contractions ; and did time permit, we might evoke from this, some information as to the mutations which it has undergone.

The obvious connections of the three general kingdoms of nature—the dependance of man on the lower creations for food, for the chase, for agriculture, and the implements of war, could not fail to bring to his

early notice all of these, and by progressive steps, to lead him to their scientific scrutiny. We accordingly find inceptions of classification contained among his physiological ideas. Crude, as these ideas necessarily were, they indicate nevertheless what was to follow. Where the Priesthood, however, was the depository of all knowledge;—where little was communicated, and much concealed;—and where that communication was conducted in the mysterious language of allegory;—where these ideas were associated with theological creeds, and the superstitions of religion; and men were educated in the faith, that the bodies of animals were animated by the presence of the souls of their relatives; there could be little inducement to enter a field of inquiry, the successful labors in which alone could have emancipated the mind from its ruling delusions; and which, as conducted in the modern spirit of independence, has been the means of elevating the conceptions of a science, which is now regarded as the chief of the age.

We do not look, therefore, to the Indian, the Persian, or the Egyptian, for any of the changes for the better which occurred in these primitive times; but to the Sage, the Philosopher, the Naturalist, the Moralist, and the Physician, who succeeded them. These, seeking for truth for its own sake, uncorrupted by ambition, unsubdued by servility, unbiassed by theology, unprejudiced by religion; with whom knowledge was a first object, its diffusion the next, and influence the last of all, and that only in subserviency to the preceding; were alone in the enjoyment of that freedom, and possession of that mental fitness, for the verification of facts, and the construction of systems, strong enough to assert their own prerogatives, and to endure the tests of a philosophic and intelligent posterity.

In Greece, as in India, Persia and Egypt, the possession and inculcation of all knowledge being still centred in one and the same individual, physiology, for a time, made but feeble advances. The term stood at first, nevertheless, for the expression of an "all-pervading life," which her early philosophers supposed was manifested in the four recognized "elements" of existence—earth, air, fire and water. It subsequently underwent a change, and was restricted to such phenomena only as are manifested in the mutations which characterise the organic kingdoms. As representatives of its newly established position and connections, names somewhat familiar to our ears now appear, such as the profession delights even at the present day to honor. And among these, those of Hippocrates, and Aristotle, and Galen, and Dioscorides, as well as others not material to be recalled. Even as early as this, the germ of a theory is to be discerned, then called the "Unity of the Forces," which modern science,

under the phraseology of the "Correlation of the Forces," has raised to a new acceptancy.

With the Universities, the new substitutes for Lyceums and Academies, which characterised the awakening from the long night of the Middle Ages, these investigations were renewed; and co-equal with them, other honored names appeared—such as Paracelsus, Avicenna, Van Helmont and Stahl; and after these, the less familiar ones of Rondelet and Belon. The results to which they led, originated also the germ of another theory, ascribed to the two last, which future researches, have also greatly illustrated and enlarged. Out of their comparison of the skeletons of the fish and the man, have emerged those doctrines of homology and analogy, which characterise the comparative physiology and anatomy of the present day, and which I shall endeavor to show, in the expositions to come, are amplified in the laws of "unity of composition" and "progressive development."

But as I have already intimated, the history of physiology is not the intent of our remarks. I meant merely to take a few steps backward, in order to enable me, from the retrospection, to indicate its relations and advancements.

A glance at the enumeration before given, will exhibit the position recently assigned it. This, as you will recollect, is immediately after the physical and chemical. When Arithmetic, Geometry, Algebra, Physics and Chemistry, were sufficiently advanced, to furnish it with the conditions of its existence and development, then, and not till then, as a science susceptible of improvement, did it appear—not until then, was it possible; and whatever of exactitude it possesses now, or success it may have attained, by processes peculiar to itself, are, in a large degree, owing to the helps which it has received from them. As animal bodies, inclusive of the human, have parts that are numerable, there is an obvious necessity for arithmetic; as they are possessed of extent and quantity, for algebra; are liable to rest and motion, for statics and dynamics; embody solids, and fluids, and gasses, for physics and for chemistry; and are endued with actions and functions, for physiology. As these, again, relate to society, and pre-suppose employment, there is a further obvious necessity for agriculture, commerce and manufactures. There is a further necessity, too, for morality, which contemplates, through the culture of conscience, and the enactments of jurisprudence, the constraints which are essential to social harmony; and that still higher and more comprehensive exercise of its authority, the peculiarities of which have obtained for it the name of "Sociology," or the "Science of Equali-

ty," the discussion and application of the principles of which, have been the occasion of so many political convulsions in Europe, and disturbing agitations in America, and which, in the effort still to arrive at a satisactory solution and settlement, menaces so grievously the world's happiness and peace.

From what has in this manner been spoken, it is appparent that physiology, as I have said, is once more reclaiming to itself its ancient extent and significancy; and that to know it as it should be known, those who would enter upon the career which it prescribes, must fit themselves for it by varied as well as extensive acquirement. The physiology of to-day is vastly different from what it was in days of yore. Indeed, so greatly do they differ, that were it not for the historic links which unite them, it would not be possible to trace their genetical relationship. My occupancy of a Chair in this Institution, which has been exclusively appropriated to it, and the lectures which I yearly deliver, jointly with my several colleagues, evidences the estimation in which it is held, and its multifarious relations to the respective branches which they teach, as well as to the essential attainments of a medical education. Other evidences of it, also, will necessarily and repeatedly be brought to notice in the course of the observations and reflections which it will be pertinent to make, in reference to comparative and human anatomy and physiology, and their kindred inquiries, phytology and zoology. We shall have frequent occasion, too, to allude to the varied, general relations and conditions to which, as we have said, it is indebted for its origin and progress.

What ideas may prospectively be formed of its development and availability, we are in no condition now adequately to determine. From what has recently been accomplished, however, we are entitled to expect infinitely more. The services it has already rendered to psychology, fully justifies the remark. All the sciences have their being in the mind. Hence psychology has been called the "Science of Sciences," and that all look to it for "first principles," to guide them in the several tasks which they have to perform. A clear and comprehensive natural philosophy of the faculties and operations of the understanding, has long been a desideratum in mental science: for the moralist turns to it for light to illumine the chambers of conscience; the legislator for a standard to measure the degrees of crime, or of guilt, and a sanction to award their punishment; the educationist for data to organize systems of instruction, which shall conduce towards the promotion of, rather than counteract, the fundamental teachings of nature; the physician for correct and clear ideas of the nature of insanity, and apt contrivances for its preven-

tion and remedy; and the theologian for a solution of the problem of the origin of evil, and a true elimination of those super-sensualities of the soul, which have been commissioned to lift it above the sphere of earth, and to wing it to those elevated regions, where it may commune with thoughts pertaining immediately with the Infinite. Their appeals, however, have not as yet been answered. While, in cotemporaneous language, it has borrowed light from all, it has shed none upon them in return. The question naturally arises, therefore, as to why is this? It is because psychology has been without an appropriate guide, and has for ages been wandering in speculation and hypothesis. Until very recently, its home has been in the region of the abstract; but it has, at length, passed from this, into the domain of the concrete. It has become a factor of physiology, and in common with it, commences to rebuild a new structure on the anatomy and function of the nervous system. For this change, it is indebted to positive philosophy; and in its renewed activity, promises, from its recent gains, inconceivable advantages to be hereafter won in fields of inquiry that have only been partially explored.

Who, in this new connection, have been most distinguished for their researches and successes, the annals of the present day very unequivocally declare. Among them, may be found the names of physiologists and physicians. And the reason of this lies in the special nature of their calling. The Physician, unless he prove unworthy of the title which he bears, must necessarily be a physiologist. To him, for a long while, was entrusted the cultivation of this science and its congeners, and the exclusive management of the insane: an intelligent consciousness of the essential characteristics of that disorder must always have been experienced by him, therefore, as a painful and pressing necessity. Out of this source consequently, has come much of the illumination which has been shed, and to which we owe better ideas of the nature of intelligence. The course of investigation into which he was thus led, and which he has pursued with so much diligence, relative to the structure of the brain, and spinal marrow, and nerves, together with their functions and disorders, as well as other related objects, could not fail to introduce new results, and thereby to prepare the way for, as well as to lay the foundations of, a renovated psychology, which, under the guidance of its new and positive methods of inquiry, bids fair to clothe itself, in due season, with the certitudes which have already invested its predecessors and cotemporaries.

In elucidation of the above, it would be easy to cite examples; but passing by the names of many, it is sufficient to enumerate, from among the living, the conspicuous ones of Bell, of Hall, of Carpenter, and of

Noble. With their labors, we shall become partly acquainted shortly. It is only proper to remark here, that these writers, in the important discoveries which they have made, relative to reflex action, instinct, intelligence and volition, have created an epoch in the history of that science. The nervous system, as an entirety, now stands forth, as the great organic mechanism of all their varied phenomena; the link between the forces which are resident within, and the forces which environ them without; the substratum, through which they severally correlate; and by means of which, the relations of the interior are enabled to co-ordinate with the relations of the exterior. Progress and development thus have asubstantial, as well as a speculative, basis, and its records are rendered permanent, as well as practicable and consecutive. Experience, the primordial basis of all knowledge, is provided with a fixed habitation, as well as a name; is no longer an abstraction, intrinsically and isolatedly related to mind; but a concrete, which has a being in staties as well as dynamics, in structure as well as action, in matter as well as force. Experience is organizable, and organized. It becomes, in other words, a constituent of organization, and may be integrated; and in this fact, lies the perpetuity of the sciences, and their improvement,as well as the perpetuity of society, and its civilization. The "organization of societies" a phrase so rife in human parlance, and so essential to the language of the statesman, the politician and the common people, agreeably to this doctrine, is not merely a metaphor, or fiction of expression, but a conventionalism, denotive of a structural and functional truth, having the same organic establishment in man, *ceteris paribus*, as that which the instincts have in the beaver, the bee, the termite and the ant. The essence of materiality, and the essence of immateriality, are propositions of the inconceivable, and no longer find entertainment within the legitimate exercises of philosophy. But if experience, which is science, and civilization, and thought, are concretes; if every thought is accompanied with some movement among the constituent primordials of the brain, and these give rise in turn to correspondent activities of thought; then may they severally and reciprocally entail upon one another the influences of their mutations, whether these be for good or for evil. This observation, let it be remembered, is momentous; for it affects alike the physical, and moral, and intellectual, and theological education of the world. If pedestrianism augments the muscularity of the leg, and the muscularity of the leg augments the capabilities of pedestrianism; if labor at the anvil develops the muscularity of the arm, and the muscularity of the arm enhances the capabilities at the anvil; if thoughts alter the volume, too, and the form of the several parts of the brain, and those altered parts of the brain enlarge,

by reciprocation, the comprehension, and adhesiveness, and versatility of thought; then have we attained to a concrete explanation of the fact, that many actions which, in their incipiency, are conscious and difficult of performance, by uetude are in due season rendered unconscious and easy; that the voluntary simulate the reflex, and the reflex the voluntary; and that those which, in the inferior races, are instinctive and automatic, in the superior, are changed into the intelligent and free. The law of unity of composition and of progressive development, thus finds its illustration and exemplification in the differentiations of species.

Human society, for these reasons, as well as human civilization, is dependent, alike with comparative society, upon structure and function. Both have their seat in the neurine material of which that structure is composed, and in those correspondences of internal and external relations and adaptations, in which we have found the very essence of the experience which distinguishes the former, to consist. Hence its indelible registration, and transmissibility from generation to generation.

It is the province only of superior minds, however, to contemplate the exalted relations which physiology has been thus imperfectly shown to bear to the hierarchy of science, or to carry forward the investigations to which their meditation leads. The subject has been introduced at this time, therefore, for the simple purpose of elucidating its variety and extent, and of affording a glimpse merely of that noble field, in which you are invited to labor, and to win, if you choose, an enduring crown. As it now presents itself to our reflections and study, it is the complex result of thousands of minds, professional and unprofessional, severally and unitedly at work, simultaneously and consecutively, century after century; and in all that lengthened and lengthening period, there is no science, which has not, as has justly been remarked, been tributary to its progress. Who, then, it may be asked, in view of this complexity and comprehensiveness, of its retrospective, present and prospective relations and developments, is competent to embrace it, or to undertake the instructions called for, by the requirements even of this Chair? I know of none. From its complete performance, I do not hesitate to say, I involuntarily shrink. The fulfilment implies an amplitude of attainment, correctness of knowledge, and scientific readiness, which few are permitted to aspire to, and fewer still to attain.

To the Medical Profession, in view of its own conceived utility and dignity, and as that dignity and utility are offered to the world, its cultivation and diffusion is of the utmost importance. It should not only be cultivated by its votaries, but it should be insisted upon as a separate and indispensable branch in every College, of a medical education; and no

pains should be spared to introduce the study of its outlines into our elementary schools; so that children may acquire some knowledge of its value, and its extension thus become universal. No greater boon could be added to the provided means of civilization than this. It is the only specific against quackery. Professor Draper remarks that "Empiricism could not flourish as it does, if the structure and functions of the body of man were better understood.

I rejoice at the efforts, therefore, which have recently been made to give it this direction; and that the success which has attended them, justifies their continuance. I rejoice, too, at the necessity which the freer diffusion of the knowledge of it will impose on candidates who offer for the honors and emoluments of the Diploma to become well acquainted with the treasures which it contains. "A great revolution," I am persuaded, in common with the author before mentioned, "is impending in the practice of medicine," and that "in the future, the greatest physicians will be the greatest physiologists;" and in closing, take occasion to superadd my further testimony to his, that "He can best correct the imperfections of a machine, who best understands its structure and action."