

Agnew. (S.H.)

AN

INTRODUCTORY LECTURE

DELIVERED IN THE

Philadelphia School of Anatomy,

October 17th, 1859.

BY

D. HAYES AGNEW, M.D.,

LECTURER ON ANATOMY, SURGEON TO THE PHILADELPHIA HOSPITAL, ETC.

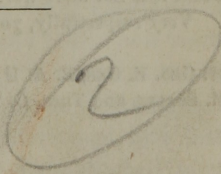
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PHILADELPHIA:

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1859.



CORRESPONDENCE.

PHILADELPHIA SCHOOL OF ANATOMY.

DR. D. HAYES AGNEW—

DEAR SIR: At a meeting of the Students of your Class, held this evening, Mr. Jno. M. Adams, of Alabama, was called to the chair, and Mr. A. Seydel, of Nicaragua, was appointed secretary.

On motion, the chairman was authorized to appoint a committee of five to wait on Dr. Agnew, and solicit a copy of his Introductory Lecture for publication.

We, the committee appointed, take great pleasure in performing the agreeable office assigned us.

Hoping that you will grant our request, we remain,

Very respectfully yours,

GEO. E. GEE,
P. A. HAY,
GEORGE H. PEETS,
N. M. SCALES,
THOS. C. THOMPSON.

PHILADELPHIA, October 28, 1859.

PHILADELPHIA, October 29, 1859.

GENTLEMEN:—

I acknowledge the receipt of your letter communicating the complimentary resolution of my Class, and while I do not feel at liberty to refuse your request, only regret that it is not more worthy of publication.

Very respectfully, your obedient servant,

D. HAYES AGNEW.

To MESSRS. GEO. E. GEE, P. A. HAY, GEO. H. PEETS,
N. M. SCALES, and THOS. C. THOMPSON.

INTRODUCTORY LECTURE.

GENTLEMEN:—

THE practice of inaugurating a course of medical instruction by the formality of an introductory address, has, from long custom, assumed the authority of law, in obedience to which I appear in your presence this evening to tender you, the representatives of a common country; the hearty welcome of one engaged in the same great scheme of humanity, and a warm sympathy in those trials which must necessarily attend the voluntary and cheerful expatriation assumed in search of knowledge which alone can qualify you for the responsibilities and duties of medicine. It seems but yesterday, so rapidly do the weeks and months glide down the stream on which all are embarked, that I bid farewell to the occupants of these benches, and felt, too, that I had parted with friends of whose friendship I am proud; and yet so faithfully are antecedents reproduced in consequents that the present scene appears like acquaintances coming in to assume their accustomed places, and renew congratulations after a temporary absence. Thus it is in the great drill of life, one band pushes up the steep acclivities of fame and plants its standard on some commanding elevation, then leaves the stage to mingle with kindred dust; while new recruits follow in the opened pathway, snatch their colors, and with sturdy stride and brave hearts bear them up to some higher height.

For some time you have been entertained and instructed by the wit and learning of men justly distinguished in the various departments of the profession. I can neither promise you the one or the other, but may probably succeed in compiling something which may be calculated to excite in your minds an interest in the too long neglected literature of that science within whose

portals you are about to enter. A few weeks since, while rambling in the forest of a neighboring State, whither I had gone partly to visit the home of the living and the sepulchre of the dead, and partly to recover from the effects of injudicious application, I placed a finger upon my wrist, as the sailor would say, to make up my log, and as I felt the strong swell of the living tide sweeping along its elastic channel, telling of returning health and strength, like Sancho Panzy, in that inimitable of Spanish fictions, when he invoked blessings on the inventor of sleep, "I thanked God for the man who discovered the circulation."

In a few months the wonderful apparatus for the circulation of the blood, from its great centre to its furthest outposts, will be thoroughly understood by you all; yet the original discovery and full comprehension of this marvellous assemblage of parts was the work of many centuries. In the course of its elaboration it became the subject of the most violent conflict of opinions, evincing a singular commixture of reason, irony, sarcasm, and ridicule, and involving both the metaphysics and theology of the age. Its discovery was purely an inductive result, reached by logical processes, both positive and negative, and could never have been certainly determined, never furnished a demonstration, without actual dissection. At the very outset, therefore, of our subject we have medicine standing at the door of anatomy, like the ancient inquirer at the Temple of the Oracle, waiting for the voice within. I doubt not the dissection of the human subject was practised in some degree at every period since disease and death entered the world; yet superstition, religion, and law had all uttered their interdicts so often and in such tones as to intimidate and embarrass inquiry, or prevent the disclosure of knowledge which may have been clandestinely acquired; and the frequent anatomical and physiological allusions employed in the way of illustration in the oldest records, both sacred and profane, afford increased probability to such a surmise. Hast thou not poured me out as milk and curdled me like cheese? Thou hast clothed me with skin and flesh, and fenced me with bones and sinews, says the oldest written monograph and the greatest exemplar of patient virtue.

Thine eye did see *my substance* yet being imperfect, and in thy book all my members were written which in *continuance* were

fashioned when as yet there was none of them. I am fearfully and wonderfully made, was the language of the Hebrew poet; and in that surpassingly beautiful description of the infirmities attending advanced years by the *Wise* man, there is a remarkable constructive knowledge of the systems of enervation, circulation, and respiration: "Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel broken at the cistern."

At the period of Herophilus and Erasistratus it was known, and no doubt time out of mind before their day, that there were a heart, arteries, veins, and a fluid called the blood. The latter had announced with certainty as the result of his personal investigations three deductions, not one of which was true, and yet which were maintained by his successors and regulated their therapeutics for four hundred years.

1. That the ventricular portions of the heart communicated directly with each other.
2. That the arterial trunks were conduits for air.
3. That the blood flowed from the centre towards the extremities in the veins.

To us, who enjoy the light which emanates from the accumulated labors of many centuries, it may appear singular how such glaring mistakes could have been committed by one professing to speak from observation, and the respectability of whose intellectual capacities was beyond cavil. The more does such an impression force itself upon our thoughts, when this ventricular communication was a subject which involved no higher exercise of intelligence than a proper use of the eyes, and the direction of the venous current was contradicted by every day's observation. The abstraction of blood was at that period almost as common as in the days of Rush, and the preliminary measure of ligating the limb to arrest the central movement and the section of the vein on the distal side, we are wont to declare, should not have failed to have suggested the correct interpretation. Yet, if we turn our mind over the historical growth of any department of knowledge, ere its paths have been trodden or its sources fully explored, we will find cause for a charitable exercise of judgment; we will discover that medicine forms no exception to the phasal modes of progression, which mark all human acquisition.

It required many thousands of years for the inventive faculty of man to exchange the sickle, which at each circling sweep felled but a hand-grasp, for the gigantic reaper before whose thundering march the nodding grain is levelled as by a tornado's breath. It was by slow and almost imperceptible degrees, although its metallic relations had long been known, that the fire of heaven was trained to fly to the remote bounds of the earth and articulate the thoughts of men. It was a long and arduous task, although mankind was familiar with both the elasticity of aqueous vapor and the philosophy of the lever, before they were so combined and utilized as to navigate our rivers, traverse the ocean, impel the loom, rush like comets over our iron ways, dragging in a single train a colony, or an army, larger than those which Phœnicia planted, or by which Cortes conquered, ploughing the earth, draining our mines, wielding the press, blowing the flames of the furnace, or drowning out the fires which consume a city. It was a period of considerable duration which marked the interval when men embodied their crude religious conceptions in images of wood and stone, and those superb triumphs of genius which adorn the depositories of Roman and Florentine art. And so we might continue to gather illustrations from every field of science or art, all conspiring to show that true knowledge, though simple in itself, is reached with difficulty, from the imperfection of the instruments with which we operate.

The antiquity of Erasistratus's time had uttered its voice as to the anatomical statements which he reiterated; and it is no easy task to escape from the coils of error when interwoven with the earliest elements of education, and bearing upon them the hoary impress of years. The student even at this day is often struck with the fact, when cutting into an artery on the cadaver, to find it without blood, apparently filled with air; and, until the properties of structure are acquired, is at a loss to understand why such should be the case, when the veins are distended with the sanguine fluid. But how did the air reach the arteries, and for what purpose, according to the authority under consideration? It entered the trachea, and by its bronchial divisions reached the lungs, then the left ventricle through the pulmonary veins, from which it passed into the aorta, and so through its branches was distributed throughout the body. What to Erasistratus, there-

fore, and his adherents, was the trunk of the aerial, is with us the trunk of the arterial tree; and, interpreting the physiological idea which he must have entertained from such an arrangement by the language employed (*an innati caloris ventilatio ac refrigeratio*), the arteries were mere pipes for ventilating and cooling the body.

Here, again, we are struck with difficulties which must have suggested themselves even to the mind of Erasistratus in his moments of reflection, unless entertaining a spirit like that recorded of the monk, who, before the anatomy of the perineum was understood, practised lithotomy to a considerable extent, and mostly at the expense of his patients' lives, by thrusting in a long knife, without regard to structure. When remonstrated with by one of the Fathers, on the ground of fatality, he said *his* business was to get the stone, and God's to cure the patient; if the latter failed to perform his part, he could not help it. In this view of the subject, it was our anatomist's business to form a theory, and if the structure would not conform to its support, why—he could not help it. The difficulties were these: if, as he alleged, the interventricular partition was perforated, what was there to prevent the blood from passing into the left ventricle, and reaching, necessarily, those vessels which he asserted only carried air; or the air of the left ventricle passing to the right side, and entering the veins, which he equally asserted contained nothing but blood? It is recorded that Herophilus and Erasistratus were so ardent in their scientific investigations that they even opened criminals alive to solve the difficulties which environed their way and retarded their progress. The historian who thus endeavors to magnify his heroes by recording such acts of wanton cruelty, unwittingly does great damage to their reputation; for if they actually practised human vivisections, then how ill qualified to profit by observation in not discovering that blood flowed from the arteries, instead of air!

The second great historic epoch in the circulation begins with Galen. His name is most honorably connected not only with our present subject, but also with that of respiration. Among the Greeks he ranked next to Hippocrates, and from the nature of his early education, which embraced all the learning of that polished people, no one could have been better qualified for the profession of his choice. Though only six or seven volumes

remain of his works, it is affirmed that not less than two hundred were consumed in the temple of Peace.

He carefully isolated an artery, and, puncturing it, saw the blood leap out, but no air. He repeated these experiments several times, with and without ligatures, and always with the same result; therefore he declared, "*an sanguis sed non spiritum in arteriis naturâ contineatur.*" The air, says this extraordinary man, enters the lungs by the trachea, and comes out again by the same way it entered. This achievement separated the mechanism of the circulation from that of respiration. How much further this man might have advanced in clearing away obstacles which still lay in the way, had not, unfortunately, their removal a tendency to come athwart his peculiar doctrines, both metaphysical and theological, it is impossible to say. For the maintenance of these he had to allow the septum between the ventricles to be open, and the blood move towards the extremities in the veins, for the accommodation of the spirits.

How forcibly does this portray the danger of allowing preconceived opinions to thrust aside experimental evidence, and how imperatively does it demand, for reliable investigation, that the mind should be without dogmatic opinion or bias, starting out like the pilgrim, leaning on the staff of observation, not knowing whither he goeth! Truth is a great abstract composite, constructed from human experiences; and whilst it is possible to build a system framed from a cunning admixture of opinion and experience, which, like some gaudy temple, may dazzle by its airy spires, stuccoed pillars, and profuse artistic extravagances, yet will never prove a Parthenon or a Pyramid; some future architect, following the same route, and guided only by the pole-star of *things as they are*, will detect the unreal and heterologous elements, and, by displacing these, crumble the whole into ruins. The fact established by Galen (that the arteries contained blood) furnished the germ for the distinction of *arterial* and *venous* blood, and perhaps may have obscurely foreshadowed a difference also in quality. Notwithstanding the weight of Galen's authority in relation to the partition between the two ventricles, there were anatomists who refused to assent to any description without corroborating the same by personal inspection. Berrenger de Carpi excited attention to this matter by his description of the septum, in

which he asserts there are openings, but only made out with difficulty; he evidently mistook the muscular reticulations for openings, instead of depressions. And Sylvius, in 1521, described this septum in the following language, without alluding to any perforations: "*Sunt cordi ventres duo, carnis ipsius portione mediâ.*"

At this time a young man, a disciple of the former, and educated at Padua, with modest yet unmistakable firmness pronounces the septum to be entirely destitute of any openings; a complete partition, admitting of no communication whatever between the two ventricles. That man was Vesalius, the father of modern anatomy. His great work, entitled *De Humani Corporis Fabrica*, will ever remain as a monument of industry and research, more enduring than brass. He was born at Brussels in 1512, and studied physic in Paris under Sylvius, a name most honorably connected with the literature of anatomy. In 1537 the republic of Venice made him Professor of Anatomy in the University of Padua, where he taught with unprecedented *éclat* for seven years. He was called by Charles V., and afterwards by Philip II., to the honorable position of king's physician; after which, having a desire to travel, he visited Syria, a land full of glowing and holy associations. Here Vesalius, of a contemplative, pensive cast of mind, found the amplest sources for enjoyment. Often, we might suppose, would he follow the little path which led from the City of the Great King to Bethany, made sacred by the *Man of Sorrows*, who, after the daily exercise of his sublime functions in the Syrian metropolis was over, and the shades of evening gathered around, was wont to turn his weary footsteps up its steep ascent, that he might enjoy a few hours of calm retirement, and receive the humble but sincere ministrations of Mary and Martha; sometimes would he plunge into the depths of Lebanon, and muse amid the embattled pinnacles of the Dahr June, more familiar in modern days as the residence and the grave of that brilliant but eccentric niece of Pitt, Lady Hester Stanhope; or from the pinnacle of Mûnarâh gaze upon the vast plains of the Hulêh, dotted with villas, hamlets, and tents, teeming with all the exuberance of a tropical flora, and presenting a panorama which was in that day, as it is even represented by travellers in the present, the grandest which the human eye can take in. It was on his return from one of his evening rambles that he was suddenly called to

attend a Spanish nobleman, whose disease afterwards proving, as was supposed, fatal, Vesalius gained the permission of the young man's parents to examine the body. On opening the chest, the heart was seen to pulsate, and the horror-stricken friends, not satisfied with prosecuting him for murder, charged him with impiety towards the inquisition, hoping thereby to subject him to the rigor and cruelty of a punishment more terrible than death itself. The clemency of the king, however, was interposed, and his pardon secured on condition of making a pilgrimage to the Holy Land; on the return from which he was shipwrecked, and perished on an island in 1564.

By this discovery of Vesalius, it will be seen, the heart was shown to be a double organ, consisting of parts having no direct communication. He advanced a step further, by stating that the blood from the right ventricle, not being able to pass into the left, entered the lungs through the pulmonary artery—but here he stumbled—returning again, says he, by the same vessel, thus comprehending only one-half of the truth.

In the Royal Library of France is a little book still preserved with religious care, discolored by fire and smoke, and bearing the imposing title of the *Restitution of Christianity*. It is a singular combination of truth and error, of genius and intolerant imbecility. It is the work of Servetus, who was burned at the stake in consequence of controversial difficulties between himself and Calvin, and which was rescued from his person after the flames had been kindled. The author, in the investigation of certain allusions in regard to the blood and life spoken of in Genesis, sets about explaining how the soul, according to his material preferences, was formed from the blood, thus merging the theological into the anatomical. Aware, from previous discoveries, that there was no per-septal communication between the ventricles, he says the blood is conducted from the right to the left ventricle by a long and extraordinary route. First into the lungs, through the pulmonary artery (thus far he had followed Vesalius, but now he advances), where it is agitated, prepared, and becomes yellow, and from the artery into the pulmonary veins, and then poured into the left ventricle.

It will be perceived that Servetus established two extraordi-

nary facts, the pulmonic or lesser circulation, and the true function of the lungs, that of changing the character of the blood. Servetus the theologian expired in the flames which consumed his body, but Servetus the discoverer of the pulmonary circulation will live throughout all time. It is true, the claim of priority has been awarded by some to Realdo Columbus, by others to Cæsalpinus; but the earliest of these makes no record of such knowledge for six years after Servetus, and moreover couples with his description an error which the latter did not, namely, that the air passed with the blood into the left ventricle. Almost everything else which Servetus wrote upon anatomy was exceedingly absurd, and could never have been the result of personal observation. His accuracy on the pulmonary circulation seems to have been due to a rigid subordination of everything to the elucidation of a moral question—the subjective to the objective.

At this stage of our subject we may pause a moment and see how far we have advanced. The arteries contain blood, not air; there is no opening in the ventricular septum allowing the blood to pass directly from one cavity to the other; the blood passes from the right heart to the left heart through the vessels of the lungs.

The next step towards the demonstration of the greater or systemic circulation was taken by Cæsalpinus. He had observed that when a band was placed about a limb, the veins swelled up below, and not above. This should not be, said he, if the blood flowed from the heart towards the extremities. These veins, therefore, convey the blood to the heart, where it is made pure, and from thence is conducted by arteries to all parts of the organism. How near the long approached goal! so near, indeed, that some rays of the momentous truth had flashed upon his soul as he moved within the very circle of her illumination. He had the fact dimly shadowed amid clouds and fogs in the materials of his knowledge, just peering out into undefined visibility, but he wanted that omnipotent faculty of combination, and that only, to have plucked the glory of English medicine.

Another barrier is removed; exploration is reduced within smaller compass; and as the currents become more rapid when gathered into narrower channels, investigation quickened her pace.

Fabricius ab Aquapendente, another of Padua's pupils, in his dissections discovered within the veins little gates or valves so disposed as to effectually prevent the blood passing in a retrograde direction, which, connecting with the demonstrations of Cæsalpinus, enabled him to assert that the blood which goes from the heart through the arteries towards the extremities, goes from the extremities towards the heart in the veins.

The materials are now complete, though in chaotic confusion, the data all accumulated; but where is the divinity who is to command the light, who is to bring forth the order? where the artist who is to construct the temple, the master to make the demonstration? It required some forty-seven years to answer this demand. Padua, the very school of the prophets, sends forth her pupil, Harvey. With a superior power of generalization, he began by noticing and describing the movements of the heart. He first perceived the alternate acts of the right auricle and right ventricle, the emptying of the former followed by the filling of the latter; on the left side he recognized the same succession of movements, clearly indicating that what passed from one was received by the other. He saw gates or valves so adjusted that while they offered no obstacle to the passage of the blood towards the ventricles, refused to allow it to pass back; he saw the pulmonary artery springing from the right ventricle to receive its blood, and gates at its root to prevent that blood falling back again into the ventricle; he saw the veins emptying into the left auricle from the lungs, and the aorta rising from the corresponding ventricle, with valves similarly situated to those in the pulmonary artery; and, possessed of these facts, he unites the separate links into a chain of necessary sequence. The blood, says he, goes from the right auricle to the right ventricle, from the right ventricle into the pulmonary artery to the lungs, from the lungs it enters the left auricle by the pulmonary veins, from the left auricle it is emptied into the left ventricle, and from the left ventricle to the aorta. There was no falter here; the description advanced in consecutive steps, directed by observation and fortified by the teachings of structure. Still, there remained some points requiring explanation. The pulsation of the arteries, which had been known for centuries, having been spoken of by

Herophilus, which Erasistratus alleged was caused by respiration, and Galen attributed to a mere propagation of motion along their tunics from the heart, next attracted his attention. The blood, when an artery was wounded, he noticed, issued per saltem; that the throb of the pulse was coincident with the ventricular contraction, and when ossified, though the pulsation in the vessel was destroyed at the diseased point, yet the property remained below; from which considerations he correctly concluded that the pulse was produced in the vessel by an impulse communicated through its contents.

Again, when an artery is ligated it swells up above, and, containing no valves, the blood must move from the heart towards the extremities; on the other hand, when a vein is compressed it becomes distended below, and being supplied with valves, the conclusion is obvious the blood moves from the extremities towards the heart. Finally, if an artery of some size be divided, all the blood of the body flows out; therefore all parts of the bloodvessel system communicate with one another. In this last experiment the capillary order of vessels was conceived. It was from the possession of such data that he was fully able to embrace the whole subject under two most important propositions.

First. The blood passes from the right auricle into the right ventricle; thence to the pulmonary artery and lungs, through the pulmonary veins to the left auricle; then into the left ventricle, and last to the aorta.

Second. The blood by means of the branching of the aorta reaches all parts of the body through the arteries, and these communicating with the veins is by them returned again to the heart. He had now encompassed the whole subject; his mind had grasped the unity of the plan, and he was able to announce, with the authority of demonstration, one of the most beautiful operations in the human body.

Such, gentlemen, have been the slow and laborious processes attending the discovery of the circulation of the blood. Since the day that Harvey explained this mechanism to Charles I., and Dionis, in the king's garden, to Louis XIV., our knowledge of the human body has been steadily advancing, until, as regards normal anatomy, it may be said to be complete and perfect in

most of its details. It forms the vestibule of that temple which you are about to enter, and its extended domain, it must be confessed, demands no small amount of labor at your hands. Let me urge upon you, therefore, habits of industry and study, as essential to your progress and success.

Could I command the voice of a trumpet, and deliver myself in words of fire, it would be to impress on the heart of every individual before me the value of time. The present is the most precious period in your lives; the soft and plastic character of the mind will receive and retain its impressions with a degree of certainty which obtain at no other period of life. This is the great seed time; if you sow tares, then tares you shall reap: "for whatsoever a man soweth that shall he reap." Life, too, is exceedingly short. In all ages the language of figures has been taxed to convey a proper sense of its brevity—"a span, a flower, a shadow, a vapor." So fleeting, indeed, are our personifications in the drama of life, that we seem barely to be thrust into visibility when we are as quickly withdrawn. Yet even these similes, fleeting and transient as they appear to be, carry with them ground for hopeful encouragement. The light vapor which hangs as an airy veil along the mountain side will sometimes, under the influence of an ardent sun, soar aloft to other heights, and gendering in its mysterious bosom the lightnings of heaven, rush down amain from those giddy battlements to startle the world with its breath of fire and tones of thunder. Or the little cloud, which hangs like a speck on the distant horizon, may suddenly spread forth its sombre wings, overcasting half the visible heavens, and, unlocking its secret springs, distil their humid treasures in copious showers to clothe the valleys with pasture, and gladden the hill-side with flocks. So in the compass of this brief span you may accomplish a work which shall perpetuate your memory, and write you as benefactors on the records of all those generations which are yet to fill up the future.

Large cities, gentlemen, are great centres of both good and evil. In them are collected all the elements of wealth, power, intelligence, and refinement; and so also all the influential agencies of poverty, ignorance, and vice in their most concentrated forms. The three great missionaries of the devil are wine, harlots, and

gaming. These have made this otherwise fair world a place of tears, sorrow, and misfortune. Wine will mock your strength, debase your intellect, and sting your heart like a viper; the harlot will rob you of your manhood, banish all self-respect, and thus soul-polluted, conduct you by the shortest route to the profoundest depths of ruin and self-degradation; and gaming will beggar you in circumstance, and drive with the lash of infatuation to the most desperate issues. Let the honest monitions of the one who now addresses you; let the counsels, anxieties, and prayers of honored parents; let the fear of God, and the pride of your own manhood, enable you to pass such a strait of temptation and trial unfallen and unscathed, and maintain a character which will command the approval of your own conscience, and like Cæsar's wife, challenge suspicion.

I am aware that in attaching to my subject the appendage of a moral disquisition, I may incur the charge of a strait-laced sermonizer; but I can do no other. The subject is one which calls up so many painful recollections, that I should heartily despise myself were I to treat so grave a matter with either ridicule or levity. When my reason is convinced as to the rectitude of any particular course of action, then, gentlemen (and I say it in no spirit of boasting), I will not look one way and row another; but I dare to do or to suffer, and leave consequences to take care of themselves. I have in the last few years enjoyed as intimate and confidential an intercourse with the medical students of Philadelphia as almost any other teacher; and while as a body I can most unhesitatingly bear testimony to their superior intelligence, correct deportment, and noble generosity of soul; yet I can call up many instances of young men who left the paternal roof with unsullied characters, pure minds, and sound bodies; in the exuberance of animal life, and the simplicity of an unsuspecting nature, with no voice raised to counsel or to warn, have gone as the ox to the slaughter, and who have carried back to sorrowing homes enfeebled bodies, polluted minds, and a conscience as if set upon by a thousand furies. Start out, then, with the determination to resent as personal insults all invitations to unlawful indulgence; regard your opportunities and talents as moral trusts, to be faithless in the use of which involves higher consequences

than those of mere intellectual indifference; let the spirit of systematic study and industry penetrate your minds, and a proper moral sentiment imbue your spiritual nature, and you will have erected a breakwater against which the waves of metropolitan vice and temptation may beat in vain.