

William Harvey / by James Risdon Bennett.

Contributors

Bennett, James Risdon, 1809-1891.
Royal College of Surgeons of England

Publication/Creation

[London] : [C.F. Nicholls], [1880]

Persistent URL

<https://wellcomecollection.org/works/udc4zm6k>

Provider

Royal College of Surgeons

License and attribution

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

Keene had once been kind to me. She did not recognise me, and I did not care to make myself known to her. And all this time Mrs.—Miss Welborn was seeking me, and I was looking for her."

"And a Higher Power, who works His will in us, was also seeking—and finding you."

"Yes. I acknowledge my weakness, and His strength."

Another long pause, broken again by Percy.

"And who shall tell your brother this strange tale?"

"I will. I have done the wrong, and I will atone for it. I will humble myself before him, my younger and nobler. As I left my home, so will I return. Promise that you will tell no one this, my secret, until I give you permission. I have betrayed myself, but you must be changed indeed if you betray me."

"Never, Clarina, never!"

The familiar name was drawn from him by the sudden pathos of her voice and an appealing glance. He forgot, for the moment, her other name, her children, her past history, and remembered only the young girl who had been wont to subdue while obeying him.

"And he is ill—my brother! He who has done so

much for me has none but hirelings to wait on him," she murmured, after a momentary abstraction.

"When may I see Idonea?"

"The day after to-morrow, if possible."

"She must not know who I am. You promise not to betray me to her—to any one? I trust you as myself."

The impetuosity of this speech recalled to Percy the girl Clarina. Possibly the glance that met hers also reminded her of the youthful Percy, for she looked into the fire, and said penitently,

"Forgive me; I have offended you, Mr. Umfreville."

"Offended me! At such a moment! after so many years! Oh, Clarina!" he replied, and with sudden impulse rose and stood by her side.

Both were trembling with some strong emotion, but neither spoke nor moved. At last Percy mastered his, and, as if by some sudden impulse, knelt down.

"Let us thank God for His unspeakable mercies," he said, and in a husky voice offered prayer and praise for her who "had been lost and was found," while tears fell on his bowed head from eyes that had long wept only bitter brine.

WILLIAM HARVEY.

BY JAMES RISDON BENNETT, M.D., PRESIDENT OF THE COLLEGE OF PHYSICIANS.

FAMILIAR though the name of William Harvey is, as that of the great physician who discovered the circulation of the blood, there are comparatively few outside the ranks of his profession who can appreciate what that discovery implied, or the extent and value of the benefits that humanity has derived from his genius.

The name of Linacre will always be illustrious as one of the earliest and most striking examples of the combination of classical literature and general learning with medical science, which, down to the present day, has contributed greatly to elevate the character and promote the utility of medicine as a profession.

But the distinction acquired by Harvey is of a higher and far different character. He inaugurated a new era in medicine. Of Newton it was said with equal truth and grandeur in the well known lines,—

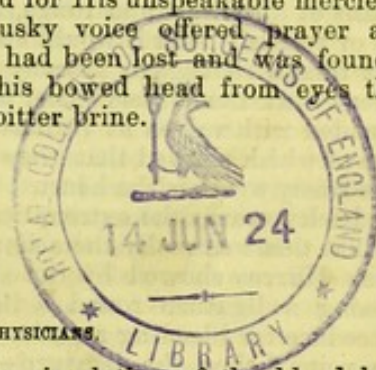
"Nature and Nature's laws lay hid in night;
God said, 'Let Newton be,' and all was light."

So may it be said that till Harvey arose and proclaimed his great discovery, animal physiology, and to a large extent anatomy also, were surrounded by darkness that no one had been able to penetrate. What became of the food that was taken in, and how it was distributed for the nutrition of the body and maintenance of life, no one knew,

A good deal of anatomical knowledge had been acquired by the opening and dissecting of dead bodies, both of men and animals, but for the most part the real nature of the marvellous contrivances that were thus revealed were not understood, and when glimpses of their true purport were obtained, these were too often obscured by the various and absurd theories and speculations with which they were enveloped. Certain facts of the utmost importance

in connection with the circulation of the blood had, however, been well established, which, when duly considered and estimated by Harvey's genius, obtained a fuller meaning, and served him as important stepping-stones to his further progress. From the earliest period of his professional studies he appears to have been impressed with the importance of ascertaining facts for the basis of all reasoning on medical subjects. He, however, entered on the pursuit of medicine with a mind well trained by the study of logic and natural philosophy during his residence in the University of Cambridge, which unquestionably proved of the utmost advantage to him.

W. Harvey was descended from a highly respectable family in the county of Kent, and was born on the 1st of April, 1578, at Folkestone. At ten years of age he was sent to the Grammar School at Canterbury, and at sixteen was entered at Caius College, Cambridge. Leaving this University about the year 1598, he betook himself to Padua, then the renowned school of medicine in the world, and where the celebrated Fabricius ab Aquapendente was Professor of Anatomy. Here he attracted the marked attention of all the professors, and elicited from them the highest estimation of his abilities and attainments. On the 25th of April, 1602, the diploma of Doctor of Medicine was conferred upon him in terms of unusual eulogy, and he forthwith returned to England, was incorporated as a doctor at Cambridge, and settled in London as a physician. Having married a daughter of Dr. Launcelot Brown, physician to Queen Elizabeth, he joined Linacre's College of Physicians, and became a fellow thereof in 1607. On the recommendation of King James I, and the President and Fellows of the College of Physicians, he was appointed Physician to St. Bartholomew's Hospital. In 1615 he was elected Lumleian Lecturer



at the College of Physicians, and in 1616 commenced the lectures in which he subsequently propounded those views on the circulation of the blood which were destined to render his name immortal.

What were the views entertained respecting the office of the heart and bloodvessels up to this date it would occupy too much space to attempt to set forth. It is sufficient to say that they were of the most contradictory, imaginary, and absurd character, and for the most part remote from the truth. The chief reason, perhaps, why Harvey's predecessors were kept wandering in the mazes of speculation, and remained ignorant of the essential character of the heart's functions, were that, on examining dead bodies, the arteries were always found empty of blood, and were therefore supposed to be merely channels for the conveyance of spirits—that is, air tubes, whence their name, "arteries;" whilst the veins were always found to contain blood, which, it was imagined, oscillated backwards and forwards, to be brought, by means of the heart and lungs, into contact with the air or spirits. And it would appear that one of the first things that gave Harvey the clue to his discovery was the observation that the veins were provided with valves at various intervals, the structure of which showed that they allowed the blood to pass freely towards the heart, but prevented its falling back towards the extremities.

That this was really the action of the valves of the veins Harvey showed by the simple experiment of passing a ligature round a limb as in the usual procedure for bleeding a patient from the arm, when the veins below the ligature—that is, on the side away from the heart—become swollen and distended, whilst on the side nearest the heart they are emptied, showing plainly that in the veins, at all events, the blood passes only in one direction, towards the heart. Harvey was not, however, the discoverer of the valves of the veins. His celebrated teacher, Fabricius, had demonstrated their existence, and spoke of their regulating or moderating functions. But Harvey asserted and proved that their real function was to facilitate the return of blood from the extremities to the heart. By a similar simple experiment, though necessitating recourse to vivisection, he showed, by placing a ligature round an artery, that the reverse effect was produced and the vessel became disturbed on the side nearest the heart, and was emptied on the distal side, thus proving that the arteries also contained blood the current of which was from the heart towards the extremities. The power by which the blood is driven through the arteries to the extremities was referred by Harvey to the action of the heart alone, whose contractile and forcing power he demonstrated by experiments on living animals. He remained ignorant of the elastic power of the arteries themselves by which the central power of the heart is in a measure regulated and increased. Nor was he able to demonstrate the connection between the extreme capillary twigs of the arteries and the radicles of the veins, *i.e.*, the method of intercommunication between the outgoing and returning currents of the blood.

The compound microscope was not then in use, though invented by a Dutchman, named Jansen, in 1590, and it is by this alone that we can demonstrate in the transparent web of the frog's foot that the globules of blood hurrying through the minute terminal arteries actually pass into the network of vessels, termed *capillaries*, which are continuous with

the radicles of the veins, where the blood is seen to enter on the return current back again to the heart. Harvey, however, maintained the existence of certain channels of intercommunication between the two currents which he spoke of as "*porositates carnis*." An ingenious attempt has recently been made to prove that by the term "*porositates*" Harvey meant "*ferries*"* or ferry vessels, by which the blood is sent across from one side to the other, and in one direction only. But though it may be conceded that Harvey made use not only of spectacles but of a convex lens, there is not sufficient ground to warrant the opinion that by his term "*porositates*" he meant anything more than "*pores*"—the pores of the flesh—implying that the blood was absorbed or sucked up by the tissues and thus passed from one set of vessels to the other. To subsequent microscopic investigations we owe the complete and irrefragable demonstration of the capillary network by which the loops of intercommunication are formed.

From the ms. volume of Harvey's lectures, in the British Museum, which, after having been lost sight of, has been recently rediscovered, he appears to have fully established his doctrines in 1616, but first promulgated them in his lectures in 1619, after reiterated experiments and long and patient study. His immortal "*Treatise on the Motion of the Heart and Blood*," dedicated to Charles I, was published at Frankfort in 1628, when he had attained his fiftieth year, when his reputation as a physician had been long established, and when his brilliant discoveries were the theme of discussion and admiration in all the seats of learning throughout Europe—not that his doctrine was accepted without opposition and even scorn and contempt—for he did not escape the opprobrium and contradictory treatment that has befallen most other great discoverers. At first his doctrines were denied and repudiated, subsequently it was affirmed that they contained nothing that was not already known.

One of the great obstacles to the reception of Harvey's doctrine was the difference in the colour of the blood in the arteries and in the veins, but when it was seen that by the passage of the blood through the lungs and exposure to the air the change from purple to scarlet was effected, the real nature of the function of respiration became known, and a flood of light was thus thrown on the whole field of physiology. The nature of the chemical changes thus effected was not indeed then known, but Harvey's discoveries proved that the blood which was driven from the left side of the heart through the arteries to nourish all parts of the body had come from the lungs in a bright and florid current, and returned to the right side of the heart in a dark and murky stream charged with impurities, and having from the right chambers of the heart been sent through the lungs, there was again purified, to pass again to the left chambers of the heart, thus making the entire circuit of the body.

Although the great work on the motion of the heart and blood is that on which Harvey's undying reputation is based, it does not comprise the whole of his labours. His "*Exercitationes on the Generation of Animals*" seems to have occupied almost as much of his time as his treatise on the circulation. It contains a large mass of facts and observations wholly

* Deriving his Latin phrase "*porositas*" from the Greek noun *πορος*—a ferry or passage.

original, on which he based his doctrine of "*Omne vivum ab ovo*." These observations were made chiefly on the development of the chick in the hen's eggs. He had also amassed a number of observations on the generation of insects, and records of his dissections of frogs, toads, and other animals, all of which were unfortunately lost when his apartments at Whitehall were plundered at the beginning of the Great Rebellion. This loss he never ceased to lament, and said that "for love or money he could never retrieve or obtain them."

With this brief notice of his scientific labours, enough, perhaps, for the general reader, we resume our biographical sketch of this remarkable man. Here too we must confine ourselves to a few leading facts and characteristics. Living as he did in times of excitement and lasting historic importance, the records of his life are mixed up with the public events of his day, and are replete, many of them, with topics of graphic interest.

After the promulgation of his new views regarding the motion and power of the heart, and the complete circle through the whole body made by the blood, he stated to a friend that his practice as a physician greatly fell off. By the vulgar he was considered crack-brained and called a quack, applying to him the Latin term "*Circulator*" in its opprobrious signification, and to many of his contemporary physicians he became the subject of envy and detraction. His just reputation, however, speedily outgrew all detraction. He was made physician extraordinary to King James I, and, in 1632, physician to his successor, Charles I, by whom he was treated with the utmost regard and favour, and who, with many of his distinguished courtiers, attended his anatomical demonstrations and witnessed his experiments. About this time he went abroad as physician to Thomas Howard, Earl of Arundel, during his embassy to Vienna. During this period, Aubrey records that Harvey would always be making excursions into the woods, making observations of strange trees and plants, and sometimes ran the danger of being lost, so that "my lord ambassador would be really angry with him, for there was not only danger of thieves, but also of wild beasts."

In 1633 Harvey accompanied King Charles in his journey to Scotland, and made an excursion to the Bass Rock, in the Frith of Forth, of which he gave a curious and picturesque description, expatiating on the prodigious flocks of sea-fowl and solon geese inhabiting the island, "more, indeed, than in a clear night, when the moon is absent, there are stars to be discerned in the firmament." Making special mention of the thick coating of the rock by the excrement of the sea-fowls, he describes it as shining with a "white glazing, and the cliffs resembling mountains of the purest chalk, though the native complexion of the stone be obscure and black." This led him to ingenious speculation on the composition of egg-shells, though he could not have known that into the composition of egg-shells there really enter the same chemical constituents as are found in the deposits of the birds.

On the breaking out of the Civil War, Harvey followed the fortunes of the king, and was present at the battle of Edgehill. He himself relates that on the day of the battle, being left in charge of the young princes while the fight was going on, he withdrew with them under a hedge, and took out of his pocket a book, which he began to read. He had not

long been absorbed in his study when a cannon-ball grazed on the ground near him, and made him remove his station. Retiring after the battle with the king and the rest of the royal household to Oxford, he remained there for some time, pursuing his favourite studies and enjoying for a short time honourable leisure as Master of Merton College, to which he was appointed by the king's mandate in the room of Dr. Nathaniel Brend, who followed the opposite party, having taken the Covenant. On the surrender of Oxford to the Parliament, Harvey lost his appointment of warden, and returned to London, when he became the guest of one or other of his brothers, then men of wealth and high standing as merchants. He was then, probably, about sixty-eight years of age, and appears to have relinquished practice.

After living for some time with his brother Eliab, either at his house in the Poultry or at his country residence at Roehampton, he betook himself to a house which he possessed at Combe, in Surrey. Here he indulged in a whim of being much in the dark, and passed a good deal of time meditating in a cave that he constructed in his grounds. It was here that he was found by his intimate friend Ent, the result of whose visit was the publication of the second great work, his "*Exercitationes on the Generation of Animals*." Ent's description of this interview is extremely interesting and graphic. After saluting the great man, and inquiring if all were well with him, Harvey replies, "How can it be while the Commonwealth is full of distraction and I myself am still in the open sea. And, truly, did I not find solace in my studies, and a balm for my spirit in the memory of my observations of former years, I should feel little desire for longer life. But it has so turned out that this life of obscurity, this vacation from public business, which causes tedium and disgust to so many, has proved a sovereign remedy to me. And, truly, the examination of bodies of animals has always been my delight, for I have thought that we might thence not only obtain an insight into the lighter mysteries of nature, but there perceive a kind of image or reflex of the Omnipotent Creator Himself. The whole earth now lies open before us, and the zeal of our travellers has made us familiar not only with other countries and the manners and customs of their inhabitants, but with the animals and vegetables and the minerals also that are met with in each. And, indeed, there is no nation so barbarous which has not discovered somewhat for the general good that had been overlooked by more civilised communities. But shall we imagine that nothing will accrue to science from such advantages as we now possess, or that all knowledge was exhausted in the earlier ages of the world? If we do the blame must certainly attach to our indolence." After further pressure from Ent to give the world the advantage of his labours and genius, Harvey replied, smiling, "Would you be the man who should recommend me to quit the peaceful haven where I now pass my life, and launch again upon the faithless sea? You know full well what a storm my former lucubrations raised. Much better is it oftentimes to grow wise at home than by publishing what you have amassed with infinite labour to stir up tempests that may rob you of peace and quiet for the rest of your days." After making further difficulties, and urging that his work was not complete, and especially that it did not contain his lost observations on the generation of

insects, he consented, and handed to Dr. Ent the precious ms., with which, says Ent, "I went from him like another Jason in possession of the golden fleece, and when I came home and perused the pieces singly I was amazed that so vast a treasure should have been so long hidden, and that while others with great parade exhibit to the public their stale trash this person should seem to make so little account of his admirable observations."

Harvey was now in his seventy-first year, and the remainder of his life was spent almost entirely in acts of generosity and plans of munificence. Although he does not appear to have been eager for money or to have made much by his profession, having inherited a paternal estate, a widower and childless, and maintaining no costly establishment, he was, at all events towards the end of his life, in very easy circumstances. This, however, was probably mainly due to the prudence and care of his worldly concerns by his brother Eliab, for Aubrey says that "for twenty years he took no care of his worldly concerns." He had long had deeply at heart the welfare and improvement of the College of Physicians and the advancement of the profession to which he was warmly attached.

In 1651 Dr. Prujean, the President of the College, made to them the munificent offer, on the part of an anonymous donor, to rebuild and enlarge the college, and on the completion of the works, Harvey, in the presence of his colleagues, was announced as their illustrious benefactor, and made over to them the title-deeds and his interest in the buildings. The college voted the erection of a statue to him, with the following inscription:—

"Gulielmo Harveio,
Viro monumentis suis immortalis
hoc insuper Collegium Medicorum Londinense
Posuit
Qui enim sanguini motum
ut et
Animalibus ortum dedit, meruit esse
stator perpetuus."

This statue and Harvey's Buildings were destroyed in the Great Fire. In 1654 the college elected Harvey as their president, an honour which, however, he declined on account of his age and infirmity. But in 1666, at the first anniversary of the feast instituted by himself, he made over to the college his paternal estate of Burmarsh, in Kent, which the college still enjoys.

The objects which Harvey had in view in making this munificent gift are set forth in the indenture conveying the estate, among which is the following: "To maintain friendship there shall be at every meeting once a month a small collation, as the president shall think fit, for the entertainment of such as come; and once every year a general feast for all the fellows: and on the day when such feast shall be kept, some one person of the said college shall be from time to time appointed as the president, who shall make an oration in Latin publicly in the said college, wherein shall be a commemoration of all the benefactors of the said college by name, and what in particular they have done for the benefit of the said college, with an exhortation to others to imitate those benefactors and to contribute their endeavours for the advancement of the Society according to the example of those benefactors. And with an exhortation to the fellows and

members to search and study out the secrets of nature by way of experiment; and also for the honour of the profession to continue in mutual love and affection among themselves, without which neither the dignity of the college can be preserved, nor yet particular men receive that benefit by their admission into the college which they might expect, ever remembering that 'Concordia res parvæ crescunt, discordia magnæ dilabuntur.'"

The oration thus instituted has continued to be annually given ever since, but latterly in English, and without the feast.

In 1654 Harvey resigned the lectureship at the college which he had continued to hold, conscious from his age and the inroads of disease that his great change was awaiting him. He had seen his grand discovery of the circulation of the blood universally accepted and inculcated in most of the medical schools of Europe, having been, according to Hobbes, "the only one that conquered envy in his lifetime and saw his new doctrine everywhere established." * Worn down by gout he died June 3rd, 1657. Great preparations appear to have been made for his funeral obsequies, for it was not till June 26th that his body, attended by the fellows of the college far beyond the walls of the city, was conveyed to Hempstead, where it was deposited in a vault prepared by his brother Eliab.

There is a fine full-length portrait of Harvey in the College of Physicians by Jansen, which corresponds with the description of his person given by Aubrey, who tells us that "he was not tall, but of the lowest stature, round faced, olivastic complexion, little eye, round, grey-black, full of spirit; his hair black as a raven, but quite white twenty years before he died." "In temper he was like the rest of his brothers, very choleric, and in his younger days he wore a dagger, as the fashion then was, which he would be apt to draw upon every occasion." He and all his brothers lived together in singular affection and peace, and there are many indications that attachment and friendship were marked characteristics of his nature. More than one widow and helpless woman was provided for in his will, which contains numerous small legacies to friends and relations that they may buy something to keep in remembrance of him. "He had unbounded confidence in Nature, and was keenly alive to her perfections and bounteous adornments. He had the most profound veneration for the Great Cause of all those wonders with which he was so well acquainted. He was accustomed to say that he never dissected the body of any animal without discovering something which he had not expected or conceived of, and in which he recognised the hand of an allwise Creator. To this particular agency, and not to the operation of general laws, he ascribed all the phenomena of Nature." (Willis.)

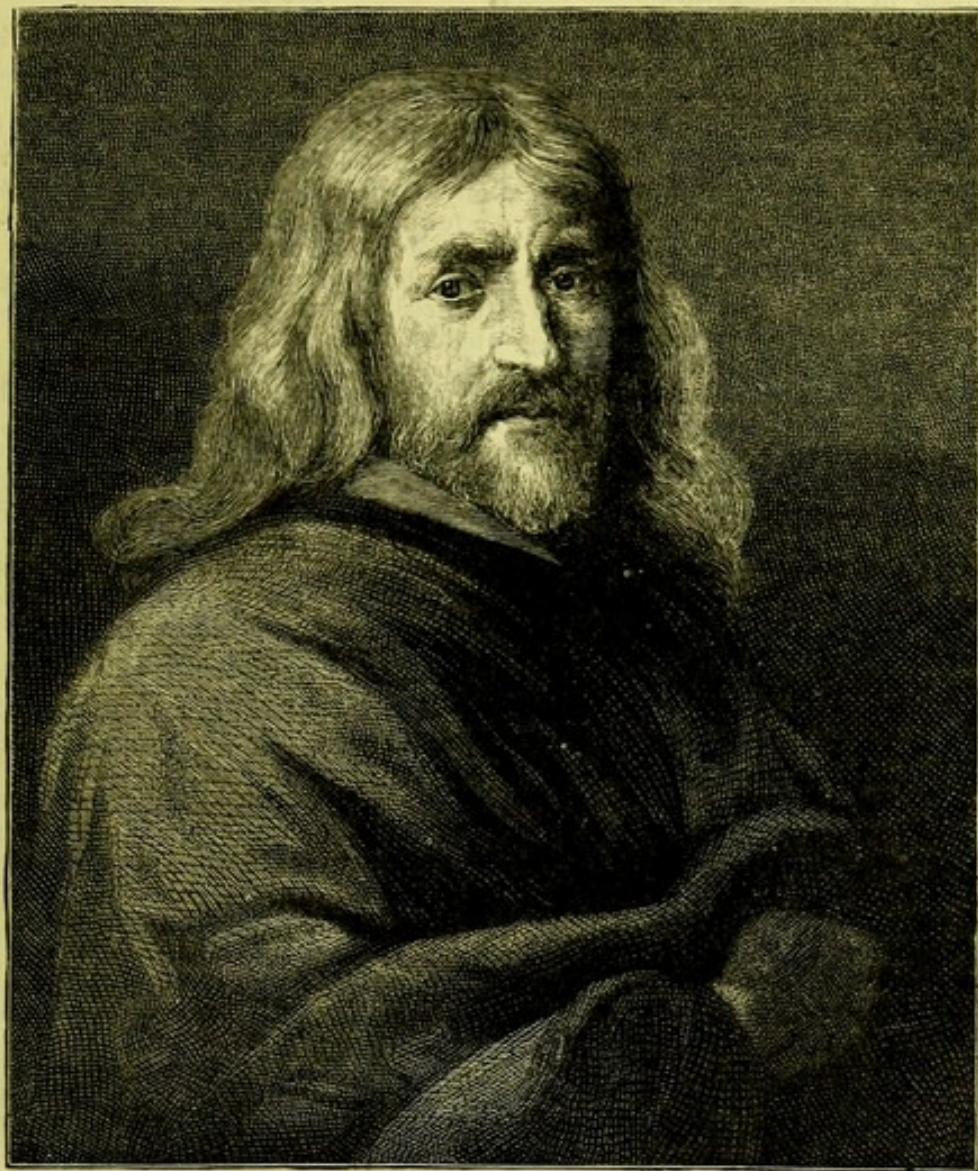
His mind was well stored with knowledge on subjects outside his professional pursuits, and he was a great admirer of Virgil, with whose poetry he is said to have been sometimes so transported as to throw the book from him with exclamations of rapture.

"His religious sentiments appear to have been active, and the exordium to his will is unusually solemn and grand, and throughout the whole of his work on generation he seizes every opportunity to

* Hamey quaintly describes this event, "Gulielmi Harvaei fortunatissimi anatomici desit sanguis moveri tertio die Junij 1657, cujus aliqui perennem motum in omnibus veripime asserverat."

give utterance to his sense of the immediate agency of the Deity. Like many of the ancient philosophers, he viewed the universe and its parts as actuated by a supreme and all-pervading intelligence, but on pure Theistic notions he unquestionably grafted special faith in Christianity. He speaks of 'Christ our Saviour as of men the most perfect,' and in his will 'humbly renders his soul to Him that gave it,

Methinks in art's great circle others stand
Locked up together hand in hand :
Every one leads as he is led ;
The same bare path they tread,
A dance like that of fairies, a fantastic round,
With neither change of motion nor of ground,
Had Harvey to this road confined his wit,
His noble circle of the blood had been untrodden yet."



[From the Portrait Exhibited in the National Portrait Exhibition.

and to his blessed Lord and Saviour, Christ Jesus.' There is no reason to think that his Christianity was of the type of Socinus, Hobbes, or Lord Herbert of Cherbury, his contemporaries. He was, indeed, acquainted with all the men of letters and science of his age, and has been commemorated in the poetry of both Dryden and Cowley." Cowley's ode, not very well known, is deserving of quotation :—

" Thus Harvey sought for truth in truth's own book—
Creation—which by God Himself was writ ;
And wisely thought 'twas fit
Not to read comments only upon it,
But on the original itself to look.

Harvey's grand distinction as a physiologist consists in his constant appeal and adherence to facts as opposed to speculation and theory in establishing the truth of his grand discovery. In this he is an example to all succeeding students of Nature. In the course of the angry controversies to which his discovery gave rise, he repeatedly complains "that his views have never been opposed on the ground of an appeal to facts." "The circulation of the blood," he says, "has now been before the world for many years, illustrated by proofs cognisable to the senses, and confirmed by numerous experiments; but no one has yet attempted opposition to it on the ground of ocular testimony. Empty assertions, baseless arguments, cap-

tious cavillings, and contumelious epithets, are all that have been levelled against the doctrine and its author. But even as the waves of the Sicilian Sea, excited by the blast, which dash against the rocks around Charybdis, and hiss and foam, tossed hither and thither, are they who oppose sophistical and false reasoning to the evidence of the senses."

We append a photographic copy of a fragment of the Harvey MS. in the British Museum, which Dr. Sieveking showed to his auditors when he delivered the Harveian Oration in 1877, together with Mr. Bond's skilful deciphering of the crabbed notes and Dr. Sieveking's translation of the same.

It is noted in the fragment that the blood is continually transfused through the lungs to the aorta—as by the two clacks of a water bellows to raise water. The fragment also mentions the perpetual motion of the blood in a circle, effected by the beat of the heart, and the question of whether this is for the sake of nutrition or for the preservation of the blood and the members by the infusion of heat; the blood, cooled by warming the members, being warmed in turn by the heart.

"WI Constat per fabricam cordis sanguinem per pulmones in aortam perpetuo transferri—as by two clacks of a water bellows to raise water.

"Constat per ligaturam transitum sanguinis ab arteriis ad venas.

"Unde Δ [demonstratur] perpetuus sanguinis motus in circulo fieri pulsu cordis.

"An? hoc gratia nutritionis, an magis conservationis sanguinis et membrorum per infus. calidi, vicissimque sang. califaciens membra frigidifactus, a corde calefit."

Rendered thus by Dr. Sieveking:—

"WI. By the structure of the heart it appears that the blood is continually transfused through the lungs to the aorta—as by the two clacks of the water ram for raising water.

"It is shown by ligature that there is a perpetual motion of the blood from arteries to veins.

"Whence Δ it is demonstrated that there is a perpetual motion of the blood in a circle, effected by the beat of the heart.

"Query: Is this for the sake of nutrition; or rather for the preservation of the blood and the members by the infusion of heat; the blood, cooled by warming the members, being warmed in turn by the heart?"



CURIOSITIES OF COMMERCE AND TRADE.

THE AMERICAN LUMBER TRADE.

IN books about America the English reader will remark the prominence given to the lumber, or, as we would call it, the timber trade. In the North-western States of the Union, and also in Canada, it is one of the chief industries. We are not going to give any detailed account nor formal statistics, but only a few notes of what we witnessed in one great centre of the lumber trade.

In looking over the map of Chicago there will be noticed, in the south-western part, a number of indentations in the river, as though it had so many tributaries running into it. They are slips, or canals, 100 feet wide, and varying in length from 1,000 to 2,000 feet. Each of them has a name, as Joy's Canal, Sampson's Canal, Empire Slip, and so on. They are all cut into the land for the accommodation of the lumber trade, so that vessels can come in and unload their cargoes on the wharfs.

There are so many vessels engaged in the trade between May and November, that out of the 10,233 vessels which arrived in the river in 1878, it was computed that two-thirds of them were freighted with lumber.

Along the river, and on the lines of the canals, for about a mile and a half, may be observed piles of lumber, lath, shingles, cedar posts, and timber, till the eye wearies with the sight. The spaces between the canals are filled with it, except so much as is left for roadways and railroad tracks. For a long distance it is nothing but "lumber." Travellers are amazed at the quantity as well as the height of the piles, and wonder how perfectly straight they are piled, as if gauged by a plumb-line. It is quite an art to pile up boards so evenly, but men learn to do it by making a business of it, and continuing at it year after year.

Between every course one inch of vacant space is left; thus the air passes freely through to dry the wood. When first put up into piles it is as full of water as if it had been soaked, and it is reckoned that in the first ninety days from the day it is piled it loses one-third of its weight by evaporation. The question naturally occurs, How much is there of it, and where does it all come from? It may not be so difficult to see where most of it goes to, when the growth of the North-west in population is considered. As to quantity, it of course never remains the same two days in succession, because fresh lumber is all the time coming in, while that which is partially dry is as constantly going out.

There were by a recent return 159 regular lumber yards where nothing is done but receive, pile, sell, unpile, and ship away. On the 1st of January, 1878, those yards contained 385,560,024 feet of boards, or about 73,022 miles of boards. Now as the globe is said to be 25,020 miles in circumference at the equator, there was on hand on that day nearly enough to make a path three feet wide around the globe.