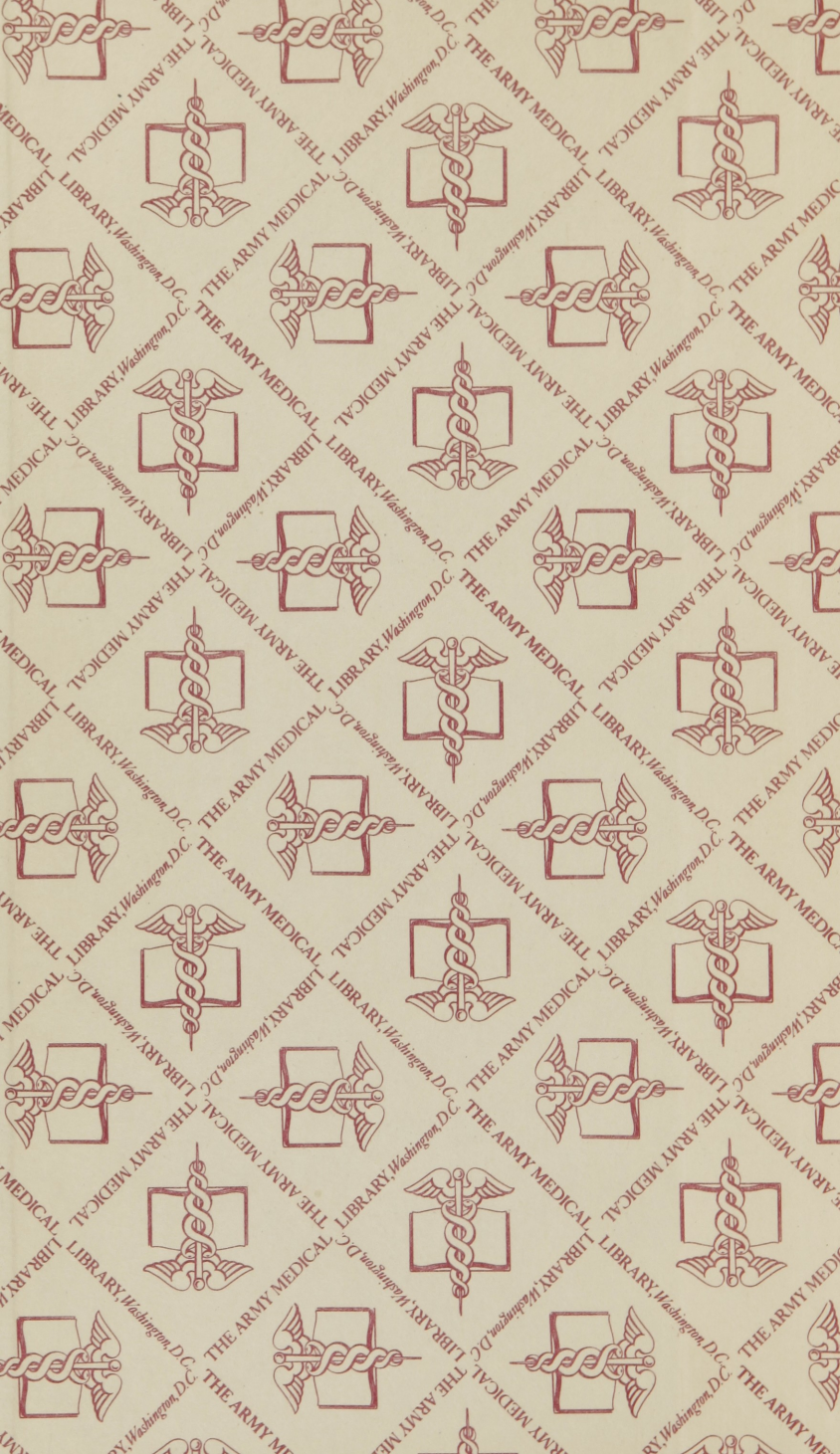
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PRIZE DISSERTATIONS

ON

1. INFLAMMATION OF THE PERIOSTEUM.
2. ENEURESIS IRRITATA.
3. CUTANEOUS DISEASES.
4. CANCER OF THE BREAST.
5. MALARIA.

By USHER PARSONS, M. D.

LATE PROFESSOR OF ANATOMY AND SURGERY, BROWN UNIVERSITY, AND SURGEON U. STATES NAVY; PRESIDENT OF THE RHODE-ISLAND MEDICAL SOCIETY; HONORARY MEMBER OF THE MASSACHUSETTS, NEW JERSEY, PHILADELPHIA, AND SOUTH CAROLINA MEDICAL SOCIETIES, AND MEMBER OF THE AMERICAN MEDICAL ASSOCIATION.

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PREFACE.

Several of the following essays have already appeared separately, in medical journals, at the times they were severally written. Having undergone some corrections, they are now presented in a separate volume.

In preparing them for the press, it seemed proper to give the reader some account of the institution that gave rise to them, of the founder whose name it bears, and of the doings of its committees or trustees.

The name of Boylston has long been associated with enterprizes that meliorate the condition, and adorn the character of man. Zabdiel Boylston, F. R. S. a native of Brookline, Massachusetts, introduced the practice of inoculating in small pox into America, in 1721. He commenced the experiment in his own family upon an only son, and, although it excited the strong opposition of the profession and the clamor of the populace, he soon triumphed, and had the satisfaction of seeing the practice adopted generally throughout the country.

Nicholas Boylston, Esq., (son of Zabdiel) an opulent merchant in Boston, founded a professorship of oratory and rhetoric in Harvard University in 1771, which went into operation in 1805, Ex-President Adams, then a Senator in Congress, first occupying the chair. Mr. B. also estab-

lished a fund to promote elocution and belles-lettres by awarding prizes annually to individuals of the upper classes of the University.*

Ward Nicholas Boylston, nephew of Nicholas, has been called the medical Mæcenas of New England.

Besides making large donations of medical books and plates, he instituted a fund of $500, for the purchase of a Medical and Anatomical Library and Museum, with the assurance, that "during his life he should earnestly endeavor to make every addition to enrich and enlarge the present list of books, so as to make it, if not the first, yet equal to any establishment of this kind in the United States of America," which pledge he amply redeemed. It was on one of these occasions, May, 1800, when transmitting a curious MS. volume to the Library, that he "begged to be permitted to settle on the corporation the sum of one hundred dollars per annum, *forever*, intending, originally, that it should be applied to the purchase of Books till" the Library should be sufficiently enlarged for all the purposes of its institution, and that it should then be distributed in annual prizes for dissertations, on subjects connected with Medical Science.

In his letter, he says, "I am not insensible of the task I impose on the executive part of your honorable and justly celebrated University; but when I contemplate the importance of the object, and the only hands from which it can derive either assistance or protection, I feel less diffidence in asking it, persuaded that to alleviate the pains of sickness, and misfortune, and to comfort that misery, to which the human frame is constantly exposed, will be

* For the particulars here given, I am indebted to the kindness of D. Humphreys Storer, M. D., of Boston.

as gratifying to every individual engaged in it, as it will be consolatory to me, when the period of those days shall arrive in which it is said, 'we have no pleasure in them.'"

In 1803, however, the payments due up to that time, amounting to $500, were set apart as the permanent fund for the increase of the Medical Library, and Mr. Boylston gave his bond of $1500, to provide a yearly income of $100, the intent of which, is thus specified in his bond:—

"The President and Fellows of Harvard College, and their successors, shall yearly appoint a Committee, consisting of not more than eleven, nor less than seven persons skilled in the subjects connected with medical science,* which Committee shall propose and give public notice of, on, or before the 20th of August, in each year, some one or more Theses, upon such medical, anatomical, physiological and chymical subjects, as they may deem useful, one thesis, at least, to be propounded upon a subject properly belonging to each of those classes. And the several authors of the best dissertation, in the judgment of said Committee, or of a majority thereof, upon each of the said subjects, which shall be transmitted and delivered to them on or before the 20th November next after their public notice given of said subjects, shall be entitled to receive from them a prize medal, or the amount in money at his own option, of such value as to the said Committee shall seem proper; provided that the value of all the medals distributed, and money thus paid, in any one year, shall not exceed $100. The judgment of said Committee, shall be made up and declared to the candidates for the prizes, on or before the 1st January next ensuing the

* And in another place he desires that the Professors of Anatomy, Medicine and Chymistry, may always be of the number.

declaration of the subjects, and the prizes delivered or paid to the successful candidates, on or before the 20th of the same January.

"And, if after such public notice as is herein before directed, it should happen that upon either of the subjects propounded by the Committee, no dissertation should be transmitted or delivered to them, within the time appointed, which in their judgment, or in that of a majority of them should be deserving the prize, then the amount of such prize shall be paid to the treasurer of said Harvard College to be placed at interest and appropriated towards a fund for erecting a suitable and substantial building, to be always used for an Anatomical Museum and Library."

In a subsequent letter he requested "that they would renew such question or questions that they may not think fully answered this year to the next, and so continue it from year to year until they are; and that such notice be renewed with the new questions (as may be your intention to propound for the ensuing year) as soon as may be, after the publication of the dissertations, you shall adjudge to merit the premiums, or if no such premiums are granted, as soon after as your judgments are made up upon those under consideration."

The only alterations which have been made in the above directions, are, that the money is divided into prizes of $50, instead of $30 each, and also in the time of announcing questions and receiving dissertations, both of which were approved by Mr. Boylston before his death.

It appears that the first Committee was chosen by the Corporation of Harvard College, April, 1803, and that up to 1810, the following persons had been on that Committee at different periods:—Edward A. Holyoke, James Lloyd,

Cotton Tufts, Samuel Danforth, Isaac Rand, Joshua Fisher, Benjamin Waterhouse, and William Eustis.

In 1810, the following gentlemen composed the Committee, viz.:—Lemuel Hayward, John Warren, Thomas Welsh, Aaron Dexter, John Brooks, Josiah Bartlett, William Spooner, John Fleet, and James Jackson; and most of them have served several years.

Questions were annually proposed, agreeably to the intentions of the founder, and premiums were adjudged on the following subjects, viz.:—

1804. James Mann. Cholera Infantum.
1805. No adjudication.
1806. James Mann. Dysentery.
" George C. Shattuck. Mortification.
1807. " " Biliary Concretions.
" " " On the Structure and Functions of the Skin.
1808. Daniel Newcomb. Cancer, and the best mode of Extirpation.
1809. Jacob Bigelow. Cynanche Maligna.
" " " Phthisis.
" Thomas Sewall. Complaints in the Breasts of nursing women.

From this time we have regular records, lists of questions, &c. The questions, then as now, were published in the newspapers, and the Dissertations received and disposed of as now, only before the 31st of October, instead of the first Wednesday in April.

1810.

Questions. 1. Hydrocephalus Internus; particularly with respect to the symptoms by which it is distinguished

from diseases resembling it. 2. Epilepsy; its varieties, and the mode of treatment of each. 3. The most proper mode of treatment in Burns and Scalds.

Premiums. Jacob Bigelow on the third. One received on the first.

1811.*

Committee. Same.

Questions. Nos. 1 and 2 of last year. 3. What substitute can be had for Leeches, in order to draw blood gradually, with little or no pain, from small surfaces; and which, from cheapness and facility of application, in the hands of either the patient or the medical practitioner, shall be adapted to general use?

Prizes. George Hayward, Boston, on No. 1 of last year. Two were received on No. 3.

1812.

Committee. Same.

Questions. No. 2 of 1810, and No. 3 of 1811. 3. On the Medicinal Uses of Carbonic Acid Gas.

Prizes. William J. Walker, of Medford, (now Charlestown), on No. 2 of 1810. John F. Waterhouse, on No. 3 of 1811. Two others were presented.

1813.

Committee. Same.

Questions. 1. No. 3 of 1812. 2. On the criteria by which to determine when the use of Mercurials, in cases of Syphilis, should be discontinued. 3. On the reciprocal changes which take place in the blood and in the air, in the process of respiration.

* By this I must be understood that the questions were announced in 1811 and adjudged in 1812, &c.

Prizes. John Fothergill Waterhouse, Philadelphia, on No. 3, 1812. Do. on No. 2, 1813. Enoch Hale, Gardiner, Me. (now Boston), on No. 3, 1813.

1814.

Committee. Instead of Lemuel Hayward and John Fleet, I find David Townsend and John G. Coffin; but when elected I know not.

Questions. 1. Structure and functions of the Urinary Apparatus. 2. Effects produced on the System by Bloodletting. 3. On the tests of Arsenic, the effects produced on the system of those who swallow preparations of this article, and the treatment best adapted to the removal of those effects.

Prizes. John Ware, on No. 1. Abel S. Peirson, Biddeford, Me. (now Salem), No. 2. J. Freeman Dana, Boston, No. 3. Six others received.

1815.

Committee. Same. Two questions, with $50 premiums, are offered instead of three of $30 each.

Questions. 1. On Sweating as a remedy in disease: how does it operate? in what cases should it be employed, and to what extent or degree in each; and what are the best means of inducing this evacuation in the several cases in which it is advisable? 2. On the composition of the substance commonly called Oxy-Muriatic Gas.

Prizes. John Ware on No. 1. J. Freeman Dana on No. 2. Eight more received.

In this year Mr. Boylston signified his wish that the Committee should be permanent, nominating for all vacancies by death.

1816.

Questions. 1. Is there any communication from the stomach to the bladder more direct than that through the circulating system and the kidneys? 2. On the vegetable articles, the growth of the United States, which have been, or may be, advantageously employed as emetics or cathartics.

Prizes. No dissertations offered.

1817.

Questions. 1. On Hæmoptysis: its different species, and the method of treatment adapted to each. 2. What are the best means of promoting Suppuration?

Prizes. John Ware, Boston, No. 1.

1818.

Questions. Same as 1816.

Prizes. Enoch Hale, Jr., Boston, on No. 1.

1819.

Questions. 1. No. 2 of 1817. 2. On the diagnosis and treatment of Cynanche Trachealis, or Croup.

Prizes. John Ware, on No. 2 of 1817. William Sweetser, Jr., Boston, on No. 2, 1819.

1820.

In consequence of voting to propose questions two years in advance, no adjudication seems to have been made for this year.

1821.

Questions. 1. On the diseases of the Liver, both functional and organic; their varieties, and the treatment adapted to each. 2. Can Medicinal Substances be safely

and advantageously introduced into animal bodies through the medium of the veins?

Prizes. John C. Dalton, Chelmsford, on No. 1. Enoch Hale, Jr. on No. 2.

1822.

Questions. 1. Diagnosis and treatment of Pertussis, or Chincough. 2. Medicinal use of the Prussic Acid.

Prizes. Abel L. Peirson, Salem, on No. 1.

1823.

Questions. 1. On the functions of the extreme Capillary Vessels, in health and disease. 2. What textures of the body, when punctured or lacerated, are liable to bring on the disease called Tetanus?

Prizes. William Sweetser, on No. 1.

I find Dr. Gorham's name among the Committee.

1824.

Questioms. 1. On the Diseases resembling Syphilis, and the best method of treating such diseases. 2. How long may the human body remain immersed in water, without extinction of life; and at what period after immersion would it be useless to employ restorative means?

Prizes. Samuel Cartwright, of Natchez, Miss. on No. 2.

1825.

Questions. 1. To what extent has the Vaccine disease been found to be a preventive of the Small Pox? 2. On the history of the Autumnal Fevers of New England. [Intending a mere description, &c.]

Prizes. John Bell, New York city, on No. 1.

1826.

Questions. 1. No. 1 of 1824. 2. Whether the Veins perform the function of Absorption.

Prizes. D. Humphreys Storer, Boston, on No. 1 of 1824. Samuel A. Cartwright, Natchez, on No. 2, 1826.

A vacancy in the Committee by the death of John Brooks; John Dixwell elected. Also James P. Chaplin, vice D. Townsend, resigned.

1827.

Questions. 1. No. 2 of 1825. 2. On Inflammation of the Periosteum, both acute and chronic.

Prizes. Usher Parsons, Providence, on No. 2.

1828.

Questions. 1. What are the circumstances in which the drinking of cold water, in hot weather, proves injurious? What are the diseases which arise from this cause, and what is the best mode of treating those diseases? 2. On the disease called an Irritable state of the Urinary Bladder; its nature and treatment.

Prizes. Usher Parsons, Providence, on No. 2.

1829.

Questions. 1. No. 2 of 1825. 2. What Insects in the United States, and particularly in the northern part, are capable of inflicting poisonous wounds; the phenomena of such wounds, and the best means of remedying their ill consequences?

Prizes. No dissertations offered.

Committee. Vacancies occurred this year by the resignation of Drs. Spooner, Jackson and Coffin, and the deaths of Drs. Dexter, Gorham and Chaplin. Filled by Drs. Rufus Wyman, George C. Shattuck, Jacob Bigelow, John B. Brown, Walter Channing and George Hayward.

1830.

Questions. 1. Whether Fever is produced by the decomposition of animal and vegetable substances, and if by both, their comparative influence? 2. On the connection between Cutaneous Diseases which are not contagious, and the Internal Organs.

Prizes. Charles Caldwell, Lexington, Ky. on No. 1. Usher Parsons, Providence, on No. 2.

1831.

Questions. Same as 1829.

Prizes. No dissertations.

Added to the Committee; John Randall, vice Thomas Welsh, deceased.

1832.

Questions. 1. What is the cause of Fistula Lachrymalis; and what is the best mode of treating the disease? 2. No. 1 of 1828.

Prizes. Robert W. Haxall, Richmond, Va. on No. 1.

1833.

Questions. Same as 1829.

Prizes. No dissertations.

1834.

Questions. 1. What is the true nature of Polypus in the nostrils; and in what manner may the disease be best treated? 2. Are restrictions on the entrance of vessels into port, called Quarantine Laws, useful? If so, in what cases should they be applied?

Prizes. Charles Caldwell, Lexington, Ky. on No. 2.

1835.

Questions. 1. What diet can be selected which will en-

sure the greatest probable health and strength to the laborer in the climate of New England—quantity and quality, and the manner of taking it to be considered? 2. What are the diagnostic marks of Cancer of the Breast; and is this disease curable?

Prizes. Luther V. Bell, Derry, N. H. on No. 1. Usher Parsons, Providence, on No. 2.

Added to the Committee; Enoch Hale, vice John Dix-well, deceased.

1836.

Questions. 1. How far are the external means of exploring the condition of the internal organs, to be considered useful and important in medical practice? 2. To what extent is an active medical practice useful in the common continued Fever of this country?

Prizes. Oliver Wendell Holmes, Boston, No. 1.

Two others were presented on the same subject, of such high merit that one of the Committee, Dr. George C. Shattuck, now President of the Massachusetts Medical Society, with his characteristic liberality, furnished the same sum, which was awarded by a vote of the Committee to each of their authors, whose names were found to be Robert W. Haxall, of Richmond, Virginia, and Luther V. Bell, of Derry, N. H.; and the three Dissertations were published in one volume, under the auspices of the Massachusetts Medical Society.

1837.

Questions. 1. To what extent, and in what places, has Intermittent Fever been indigenous in New England? 2. What is the nature of Neuralgia, and what is the best mode of treating it?

Prizes. Oliver Wendell Holmes, Boston, No. 1.

" " " " No. 2.

1838.

Questions. 1. What are the anatomical characters of Typhus Fever, and what is the best mode of treating this disease? 2. What are the causes, seat, and proper treatment of Erysipelatous Inflammation?

Prizes. Edward Warren, Boston, No. 2.

From the foregoing account it appears that the questions are proposed by the Boylston Committee two years before the time of adjudication. Thus, in 1834 there were four questions announced, the two first of which were announced the year previous for adjudication in 1835, and the other two were intended for adjudication in 1836, and so of succeeding years. The four questions are announced in August, and the dissertations on the two first are presented on or before the first Wednesday of April following. From this time till the August following they are in the hands of the Committee, who examine them individually, and at their annual meeting in August, each gives his decision in writing before making it known to others, and the one most meritorious in the estimation of the Committee, even if at variance in doctrines with their private opinions, secures for its author the prize of $50, or a gold medal suitably inscribed, of that value, or, if the author prefer it, a piece of plate with an inscription. The names of successful writers are wholly unknown till after the premium has been awarded to their manuscripts, and the names of unsuccessful competitors are never known, unless they choose; as the packets inclosing them, are all burnt without breaking their seals, and their dissertations are returned them if demanded at any time within a year. The successful dissertation is at the disposal of the Committee,

and the author of it is informed by the Secretary of his success and the manner of receiving his premium.

The liberal policy adopted in inviting competition for the prizes from the profession at large, deserves special notice, as contrasting well with the selfish course pursued in some States, where the field of competition is restricted to the medical men within the State. The Boylston premiums of Harvard University are obtained sometimes on the branches of the Mississippi, and at others in distant cities of the sea-board.

The present Boylston Prize Committee, appointed by the President and Fellows of Harvard University, consists of the following Physicians, viz.

John C. Warren, M. D.
Rufus Wyman, M. D.
George C. Shattuck, M. D.
Jacob Bigelow, M. D.
Walter Channing, M. D.
George Hayward, M. D.
John Randall, M. D.
Enoch Hale, M. D.
John Ware, M. D.

Some ten or twelve years since, Mr. Boylston established another prize fund in connexion with a society of young gentlemen belonging to the classes of the Boston Medical School, the object of which, was to improve them in the art of writing upon medical subjects. Beneficial results have been annually produced by this Institution. Such early exercises serve to discipline and strengthen the young pinions of candidates for fame, and to prepare them for soaring to loftier heights in after years, when their minds are enriched by study, and matured by reflection. Some of their essays would do credit to any graduates in medicine. The late Dr. James Jackson, Jr., presented a successful one on Pneumonia, before he had completed

his second year of medical studies, and which was a fit presage of the brilliant though brief professional career of this extraordinary and lamented gentleman. Whoever has made the attempt will avow that the careful observation, wide research, and cautious induction necessary to prepare an essay for adjudication, give to the mind a most wholesome discipline that will be felt through life.

In conclusion, it is but common justice to say, that when munificent individuals give such strong incitements to exertion in the promotion of sciences that tend to meliorate the thousand sufferings that flesh is heir to, and to elevate and adorn the character of man, they deserve to be enrolled among the foremost of public benefactors, and to have their name and fame embalmed in the hearts of every philanthropist. Such men were, Zabdiel and Nicholas and Ward Nicholas Boylston.

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INFLAMMATION OF THE PERIOSTEUM.

DISSERTATION.

ON INFLAMMATION OF THE PERIOSTEUM, BOTH ACUTE AND CHRONIC.

The remote situation of the periosteum, and the silence of most elementary writers respecting its diseases, lead the student of medicine to think it an uninteresting subject for investigation, and one of the most sterile kind that could be proposed for a dissertation. A due consideration, however, of the functions and properties of this membrane; of its connexions and relations with the bones, which are often diseased and wounded; of the reciprocal influence which the diseases of both textures have upon each other; and, lastly, the fact well known to practitioners, that both these textures frequently participate in secondary venereal affections;—these considerations, I say, present the subject in an interesting point of view, and as one that, from the very circumstance of its being so casually and briefly noticed by authors, is the more deserving of particular investigation.

In commencing this task, our attention is first drawn to the structure and nature of the periosteum. It is a

fibrous membrane, which, as its name imports, is applied to the surface of the bones. It covers all the bones of the body, even the ossicula of the ear. Some are covered by two membranes, as the flat bones of the head, where the dura mater partakes of the nature of periosteum. It pervades the whole surface of all the bones, their apophyses, eminences and cavities, with the exception of the articulating surfaces and crowns of the teeth. The ancients described it as extending from one bone to another over the articulations, and thus forming a continuous sac for the whole skeleton; and, indeed, so intermixed are its fibres with those of the capsular ligaments, that there seems to be some foundation for this opinion. It sustains direct connexions with the greater part of the fibrous system, and is considered by Bichat as the centre of this system. It furnishes points of support to the broad fascias that surround the muscles, and receives the tendons which are more or less expanded at their insertion. It is imperceptibly lost in the ligaments, and blended, in the different parts of the body, with sheaths and fibrous capsules. A large number of prolongations establish intimate connexions between the periosteum and dura mater, both through foramina and through the sutures.

The periosteum has not the shining whiteness of the dura mater, but is of a white greyish color throughout its whole extent. Its adhesion to the bone is greatly strengthened by age, to enable it to endure the greater pulling and wrenching, by muscular action, to which it is subjected. Of its two surfaces, one is contiguous and adherent to the bone, the other is

united to the surrounding parts by a cellular tissue. The bond of union between the periosteum and bone, is, by blood vessels passing from one to the other, and by very delicate fibrous sheaths transmitted from the periosteum as an envelope to the blood vessels. These prolongations are numerous in those parts of the bones where the cellular tissue prevails, as in the vertebræ and heads of the cylindrical bones. The periosteum furnishes also a sheath, which accompanies the nutritient artery of the long bones, and which is probably prolonged with a diminution of its thickness, throughout its ramifications. On the outside, the periosteum receives the tendons, ligaments, and aponeuroses, and is separated from the muscles by cellular substance.

The periosteum is composed, as before observed, of very compact unyielding fibres, arranged generally in the direction of the bone which it covers. "Examinations of thickened periosteum in cases of elephantiasis prove," says Bichat, "that these fibres placed upon each other are of different lengths, the superficial ones being longest, and those contiguous to the bone running but a short distance."

The blood of the periosteum is derived from the surrounding parts. Its vessels may be seen in the minute injection of young subjects. They hold such an intimate relation to those of the bone, that they will be better understood, if we describe the vessels of both textures together. They consist then of three kinds; one, derived from the periosteum, being a continuation of those vessels sent to the membrane from the contiguous parts, and which are distributed to the compact texture of the bones; another set of vessels

is sent to "the heads of the cylindrical bones that have cells; a third kind, which is transmitted to the marrow of the long bones, through a foramen near the middle of their shaft." "The first two kinds going to the substance of the bone, appear to be especially destined," says Bichat, "to deposite the phosphate of lime." The third passes through the foramen above-mentioned by a single vessel to the marrow, where it divides into two branches, which proceed in opposite directions towards the ends of the bones, where they ramify *ad infinitum* "in the medullary organ, and their last branches are lost in the commencing cellular structure of the heads of the bones;" or there meet and anastomose with the vessels that are sent to the cells. By this communication of the two sets of vessels, they mutually assist in performing each other's office. Bichat found, in a case where the nutritient artery going to the marrow, had been obstructed and obliterated at its entrance into the foramen; that its two great branches within the medullary cavity were, notwithstanding, completely filled with injection, which must have past to them from the anastomosing branches of the cells.

Although lymphatics are not discoverable in the periosteum, no doubt can be entertained of their existence. The same may be said of their nerves, their existence being proved by pathological observations.

In respect to the *properties* of the periosteum, it is admitted to possess animal sensibility, but peculiarly modified. Those stimulants that put this property in action in other textures, as mechanical, chemical, &c. cannot develop it here, unless it is in an inflamed state.

"Separated, in fact, by its deep position from every external excitement which can act upon it chemically or mechanically, it has no need like the cutaneous system, for example, of a sensibility which would transmit the impression of such agents."

"The vital activity is much greater in the periosteum, than in the bones or cartilages;" this is proved by the greater rapidity of its cicatrization. In laying bare fractures made for the purpose in animals, it has constantly been observed, that the fleshy granulations coming from the periosteum and medullary organ, are all formed, whilst those furnished by the bone itself have hardly commenced. Still, however, "there is a remarkable slowness in the vital activity of this system." We see it in mortified limbs, where gangrene, like the inflammation that precedes it, makes rapid progress in the cellular texture, muscles, &c., while the periosteum still remains sound.

"The periosteum, as well as other parts of the fibrous system, is remarkable in its not contributing to the formation of pus," the matter which sometimes collects from inflammation being a gummy exudation.

Like all the fibrous system, the periosteum has very little extensibility; yet it is not altogether void of this property. It yields when tumors form on the bone, or when matter is effused under it, and is enlarged in rickets. It possesses a cellular substance, which sometimes becomes swollen and distended, and conceals the fibre which is the base of the periosteum.

Respecting the *functions* of the periosteum, it defends the bones which it covers from impressions of the movable parts that surround it, and probably also

moulds the surface of the bones, since this becomes changed and deprived of its smoothness, whenever the membrane is separated from it and prevented from again reuniting, as will appear in experiments hereafter to be mentioned. Besides giving shape and protection to the bones, this membrane sustains the circulation in the exterior part of them, and gives passage to the nutritient arteries going to the medullary organ of cylindrical bones, and to the diploe of such as are tabular.

PATHOLOGICAL EXPERIMENTS AND OBSERVATIONS.

It was formerly believed, that the periosteum, when raised from the bone, could not reunite and resume its functions, and that necrosis, more or less extensive, would necessarily ensue. Tenon first proved that the opinion was erroneous, and the same is confirmed by the experiments of many physiologists, among the most recent of whom are the celebrated anatomists, Beclard of Paris, and Cruveilhier of Montpelier. Their numerous and ingenious experiments prove, that the periosteum supplies the outer surface of the bone with osseous matter, yet when cleaved from the bone, it may be readily reunited without the intervention of exfoliation or necrosis, even where the bone itself has been wounded, provided the subject be young and healthy.

To remove all doubt in respect to the power of the periosteum to reunite to the bone, and resume its functions after having been separated, Mr. Cruveilhier detached it from the tibia, in a great number of hares,

to two thirds at least of the circumference and extent of the bone. After ten, twenty, thirty, and sixty days, he found the periosteum reunited, and scarcely any perceptible difference between the surface of the bone and that of the opposite side, excepting a slight increase in thickness. A hare, upon which he separated the periosteum from the whole circumference of the bone, died in consequence of the injury two months after. The exterior wound was cicatrized, but the denuded bone was surrounded two thirds of its circumference with a copious deposition of matter of a caseous appearance. The anterior face of the bone was covered by a thick bed of new formation which shot forth irregular sprouts, two of which were more than an inch long, stretching backward like wings. These experiments prove, that the periosteum furnishes the external layers of bone. That it secretes and deposites osseous matter on its internal face, when detached from the bone, is proved by the following experiments:—Upon a very young hare, Mr. Cruveilhier separated the periosteum the whole length and circumference of the bone, and interposed slips or lamina of brass between it and the membrane. On killing the animal one month after, the tibia presented considerable diminution of volume at the place of the brass rings; a slight effort served to break the bone at this place; a cartilaginous and osseous bed was formed over the brass, and the periosteum was reunited throughout the rest of the length of the bone. Upon another hare, Mr. Cruveilhier passed between the tibia and periosteum a layer of sheet lead, half an inch broad, fastening it to the bone by waxed threads: and

two months after, an osseous swelling of considerable magnitude was formed around the foreign body.

"Every time," says Mr. Cruveilhier, "that I have seen the periosteum in contact with pus, I have never known ossification to take place; and surgeons have long since observed, that pus or blood interposed would effectually prevent a reunion of detached periosteum, so as to prevent exfoliation." How is this phenomenon to be explained? I think it may be done by considering the nature of the process of ossification. Thus, when the periosteum is separated from a dead bone, it retains its attachment to the heads or articulating ends of the bone. These swell and soften, and continue to retain between them the sequestrum or mortified bone. The periosteum thus detached, swells and secretes from its internal face a small quantity of reddened fluid, at first very thin, like moisture bedewing the membrane. Its quantity and consistence gradually increase till that which was a limpid fluid becomes a jelly, which thickens daily and passes into a state of cartilage. In this, osseous fibres are deposited, and finally the fluid and cartilaginous substance disappear, leaving the new bone perfectly formed. Now, while pus or blood are lodged between the bone and detached periosteum, the very thin fluid secreted from the latter to form cartilage and bone mixes with the blood or pus, instead of congealing and ossifying, as it does where, in place of such fluids, flakes of bone or metallic substances are interposed.

The foregoing experiments establish satisfactorily the nature of the office of the periosteum in the cure of superficial necrosis. No one can conclude other-

wise than that the new bone is the product of this membrane. Dupuytren has, however, ascertained that where a small portion of the periosteum is excised from the bone, and the integuments are carefully brought in contact with the denuded part, that even muscle will adhere to the bone and fulfil the office of the periosteum in furnishing osseous matter. Still, however, the opinion of Wiedman holds good in the main, viz. that in order for good bone to form, the periosteum and medullary membrane concerned in the nutrition of the original bone must have been spared from destruction; for, in cases where the tube of a cylindrical bone has suffered necrosis throughout, the bone is never after reproduced, if the periosteum has also by inflammation, or other causes been destroyed.

The periosteum limits its work of furnishing osseous matter of cylindrical bones to their surface, at the same time it gives passage to the nutritient artery going to the medullary organ, and numerous vessels to the cells of the bones. The first mentioned set of vessels going to the surface of the bone can, however, build up its whole shaft, provided the dead bone in the centre be extracted; and from these same vessels, probably aided by the vessels in the heads of the bones, there will ultimately be formed a new medullary organ. When, however, the outside of the cylindrical bone is necrosised, and the supervening inflammation is prevented from extending to the medullary organ to destroy it, this organ by means of the blood sent to it through the nutritient artery, will secrete new bone, and supply it to the internal layers or central portion

of the bone; or, even should this artery be destroyed with the external layer of bone, the branches within may derive blood from the cells, as the case mentioned by Bichat of obstructed nutritient artery proves, and the central portion may, in this way, receive a supply of nutriment from this source and be preserved. So that, while one pathologist shall present a cylindrical bone inclosing a dead one, in proof that the periosteum is the organ of ossification in necrosis, another may produce a living bone inclosed within a dead one, to prove that the medullary membrane is the organ of ossification.

Various opinions have been entertained in respect to the share of labor performed by the periosteum in consolidating fractures. M. Beclard has bestowed such attention on this subject, that the point in question seems now to be well settled. He has observed that "when a bone has met with a simple fracture, it may easily be perceived many days after, that the surrounding integuments are swollen; this first phenomenon," he says, "is already accompanied with some degree of strength in the part fractured." After some days the tumefaction diminishes, and is concentrated almost immediately around the place of fracture; still later, the tumor which surrounds the bone becomes hard, solid, and, finally, after more than three months, the tumor has nearly subsided, leaving the bone firmly united. If the fracture be examined during the resolution of the tumor of the soft parts, when it hardens and applies itself immediately upon the bone, there will be clearly seen a kind of belt or ferrule of bone formed by the ossified periosteum; the thickness

and consistence of which goes on diminishing towards the point of the fracture, to within an inch above and below it. At this time, the surfaces of the fractured ends have scarcely undergone any change, but soon they become softened, and the softened texture fills up all the intervening space. Eighty or one hundred days after the fracture of a tibia or femur, the periosteum has recovered its organization, the medullary canal has formed itself, and the cicatrix of the bone is completed. Thus, after these researches, it is evident that when callus forms, the periosteum swells in the place of the fracture, becoming in some degree a cellular and vascular net-work, and is afterwards transformed into a bony hoop or belt, which preserves the two fragments in contact during the progress of ossification ; and, finally, when the cicatrix of the bone is completed, the periosteum recovers its original texture and natural organization. Mr. Cruveilhier, whose authority was before quoted, repeated the experiments of Beclard, and obtained the same results.

Mr. Bell, in his usually positive manner, asserts, that "callus may be produced *equally well* from any part of the osseous system ; from its periosteum, from its medulla, or from the substance of the bone itself;" and in proof of it, states, that "in fractures of the patella or kneepan, where there are no medullary vessels, the pieces are united by a callus, which is secreted from the vessels of the bone itself." Before acceding to this doctrine, it may be well to examine the bone and ascertain if, as he states, it can of itself repair fractures without the aid of the covering and lining membranes. The instance he cites is not so

well adapted to his theory, as some others; for the patella, though destitute of medullary vessels, has a periosteum, and is plentifully supplied with blood from it. A case more in point is, where the head of the os femoris within the capsular ligament, which is destitute of both a medullary and of a periosteal membrane, is fractured transversely; and are such fractures often consolidated? Sir Astley Cooper thinks they never are.

It is true a union took place in this part after a longitudinal fracture, made by Sir Astley, on the thigh bone of a hare, where the socket acted as a compress and support, and preserved them in exact apposition, so that the divided vessels in the bone may have had their communication reëstablished. But here, simply a bony union or adhesion was all that took place, a process very different from that of forming callus, in the manner and to the extent that is done by the membranes of the bone. Sir Astley, in his attempt to prove that apposition is necessary to effect the formation of callus to any extent, relates cases which show, that ossification by the bone alone, is very limited, if it take place at all. Where the tibia alone had been fractured, and the ends sawed off, were prevented from coming in contact by the fibula, a consolidation never took place. "Again," he says, "I sawed out one seven-eighth of an inch from the radius of a rabit, and the ends of the bones never united to each other, but only to the ulna. In another rabit I took out one-ninth of an inch, with the same result. The failure of ossification, in this case, was evidently attributable to the destruction of both

membranes by the operation. Had these remained entire, as in simple fracture, or had the medullary membrane only been broken, as when the fractured ends are thrust by each other, or are separated from each other more than half an inch, callus, even then, might have formed, and filled up the intervening space.

"Desirous of observing the comparative agency of the periosteum, and the bone, in the formation of fractures, I fractured the radius and ulna of a hare, and with the aid of counter-extension, separated and confined asunder the fragments one-third of an inch. Callus formed and filled up the intervening space, and the limb was that measure longer than its fellow of the opposite side. Again, I fractured the radius of another rabbit, then dissected down carefully to the bone and raised the periosteum for quarter of an inch each way from the fracture, then applied a thin plate of silver round the ends half an inch wide, which served to keep the bones in exact apposition. I then healed the integuments by the first intention, keeping splints on the limb, in addition to the support it received from the belt and from the unbroken ulna. After fifty days I found the outside of the silver belt covered with cartilaginous and osseous matter, the broken ends were diminished in size and some change was induced at their junction, but no progress made towards consolidation. Again, I fractured transversely the radius of a hare, and interposed between the fractured ends a thin layer of silver, the diameter of which was equal to that of the bone, so as to project no further than the surface of the bone, the periosteum being cut

through on one side only to receive the plate. The integuments were closed over and dressed, and after ninety days the bone was found united by a belt of callus surrounding the fracture, and which must have been furnished by the periosteum alone. These experiments fully established my opinion, that the membranes of the bones, particularly the periosteum, are the chief organs that form callus; and that the bone itself is not, as Mr. Bell boldly asserts, equally concerned and active in the consolidation of fractures, as the membranes." *

* Mr. Bransby Cooper, of London, has recently undertaken a series of experiments, to determine with accuracy the phenomena which occur in the reparation of fractured bones. This is the most recent attempt of the kind, and is therefore worthy of notice. The conclusions which he draws from his inquiries are nearly as follow:—

"The first effect of the fracture is extravasation of blood between the cancelli, and into the surrounding parts; by this, when the blood coagulates, the limb is stiffened, and farther bleeding prevented. There is little farther change for the first twenty-four hours. On the third day the limb is rendered still more rigid by the effusion of lymph, the product of inflammation, between the bones, and amongst the surrounding muscles. From this period the effusion, which is at first gelatinous, gradually thickens, forming a distinct tumor around the fracture, limiting motion, and preventing the muscles being irritated by irregular ends of the bone. Mr. Key is of opinion that this coagulum becomes organized, and assists in the reparation.

"About the sixth day, the effused matter has the appearance, firmness, and elasticity of cartilage, and by its contraction tends to bring the hitherto separated ends of the bones, even though overlapping, parallel and in contact with each other. At the broken part, the periosteum is absorbed; but elsewhere it is thickened and more loosely connected with the bone than with the textures around. The denuded part of the bone becomes softened and more vascular. The first deposit of bony matter takes place on the surface of the old bone;" and from this Mr. Cooper infers, that the osseous system alone is in such cases the source of the bony deposit. He supposes that "the surrounding textures so far assist in the reparation of a fractured bone

The view here taken of the structure, properties, and functions of the periosteum, as also of its connexions with neighboring parts, particularly with the bones, prepares the way for a clearer and more satis-

as to induce approximation, limit motion, and diminish the irritability and contraction of the muscle; whilst the osseous system itself deposits the earthy matter essential to hardness, the grand characteristic of bone." Mr. Cooper finds an argument in favor of this view in the fact that bones little organized, such as the cranium or neck of the femur, are badly able to work out their own reparation.

"The only two points of novelty," says the Reviewer of Mr. C., "which Mr. Cooper's experiments would appear to suggest, are,—the power of the callus to replace the deranged bones, and the secretion of the new osseous matter by the vessels of the original bone, exclusively."—*B. & F. Medical Review*, No. 8, page 367.

The reader of my essay on Periostitis will see that the use assigned to the callus or ferrule surrounding the fractured ends of bone is the same that Mr. Cooper has mentioned, and in respect to the other point I leave it with the reader to say which of us is right, judging from the experiments and reasoning contained in this essay—Mr. Cooper, who refers the bony deposit that reunites fractures to the bony structure exclusively, or myself, in referring it chiefly to the periosteum and medullary membrane.

I am so well satisfied with the views of Baron Dupuytren on the subject of "Formation of Callus, and the means of remedying it when vicious or deformed," that, although advanced by him in his lectures in 1833, which was some three or four years prior to the experiments performed by Mr. Bransby Cooper, I deem them worthy of insertion. It will be seen that these views of M. Dupuytren accord with the ones I have advanced in this Dissertation, published in 1827.

"There is, perhaps, no subject in pathological anatomy, which has more exercised the sagacity of observers, and the imagination of those who establish hypotheses without requiring either observation or experience, than the theory of the formation of callus. In recent times, two opinions have especially prevailed—namely, those of Duhamel and Bordenave. The first attributed the consolidation of fractures to the swelling of the periosteum and medullary membrane, to their extension from one fragment to the other, and to their subsequent reunion and ossification. He admitted that this reunion took place sometimes by means of a single external clasp, sometimes by a

factory examination of its diseases. We have seen, that, like the other textures, it possesses its own peculiar degree and modification of the vital properties; that, in respect to the degree of their development and

double one—one of which enveloped the periphery of the fragment, while the other entered the medullary canal, where it formed a kind of mortise of greater or lesser length. Bordenave established other principles. He admits that the reunion and consolidation of fractures takes place by the same mechanism as the reunion and cicatrization of wounds and soft parts. To this conclusion he was doubtless led by what takes place when the fractured surfaces are exposed to the air. He believed that he perceived cellular and vascular granulations between the fragments of the fractured bones. According to him, these granulations, being approximated, become, subsequently, solidified by the accumulation of calcareous phosphates in their interior. These two doctrines, more or less modified, were adopted up to the time when I undertook, in 1808, to verify the ideas of Bichat and Bordenave. But I was astonished to find nothing to justify them. I multiplied my researches, and was led by my numerous experiments to establish a theory partly founded on that of Duhamel, and which I have since taught in my courses of pathological anatomy.

"If we examine the parts injured in fracture, from the first to the tenth day, we find an effusion of blood about and among the fragments, and even in the medullary canal. This ecchymosis may extend to very distant parts. Considerable inflammation and engorgement take place. The fleshy fibres are confounded with the inflamed cellular tissue, and shortly cannot be distinguished from the other parts. The periosteum becomes red, then pale; it swells, then softens, and discharges between it and the bony parts a reddish serous-like fluid. The fibrous net-work of the parietes disappears. The medullary tissue itself swells, inflames, and gradually effaces the canal in the centre of the bones. The marrow becomes fleshy to a certain degree, and unites with that of the opposite side. If we examine what takes place in the fragments, we see the clot which separates them reabsorbed in a few days, and replaced by a gelatine-form liquid. From the fourth to the sixth day the surfaces of the fracture are covered with a reddish, downy substance, which, however, is not invariably present. From the tenth to the twenty-fifth day the swelling of the soft parts becomes more solid, its adhesion to the intermediate substance between the fragments every day more intimate, the muscles, too, resume their aspect and functions. The tumor, which I have named the 'callus tumor,'

activity, it holds in common with the other fibrous textures, an intermediate rank between the softer and more vascular textures, and the hard osseous substance. This consideration leads to a supposition

diminishes in extent, and parts from the surrounding tissues. Its structure is homogeneous, like fibro-cartilage, and with difficulty divided. When detached, it is seen to be formed by fibres parallel with the axis of the fractured bone. The medullary membrane, swollen and transformed into a fibro-cartilaginous tissue, narrows, progressively, the central cavity of the bone, and ends by entirely obliterating it. The inner mortise resulting from these organic elaborations, mingles, on a level with the fracture, with the substance intermediate to the fragments.

"As we advance in the examination of the formation of callus, we observe other peculiarities, which may last till the fortieth, or even the sixtieth day. In weak subjects, the formation is only completed in three months. The lardaceous and fibrous mass which constitutes the 'callus tumor,' and which completely envelopes the fractured pieces, becomes by degrees cartilaginous, and rather bony. About this time the fragments are sunk into the centre of a solid clasp, which adheres all round, and which is externally covered by a thick periosteum, united with that ensheathing the sound bones. No external traces of the solution of continuity now remain. The cellular tissue is still stiff and condensed. The soft substance between the fragments hardens and adheres to them more firmly, although it is still far from effecting a perfect union. The central mortise continues to extend itself towards the extremities, augments rapidly in consistence, and soon forms a very solid osseous cylinder. At this period the bandages are generally removed. But this callus is not destined to remain, for which reason I have termed it the 'temporary callus.'

"From the third to the fifth or even sixth month, the 'callus tumor,' and central mortise become more compact. The intermediate substance is ossified, differing only in color from ordinary bone. This transformation I have called the 'definitive callus.' In the last period of the change, the central mortise is rarefied, cells appear in its interior, and it changes into a reticular tissue, which itself soon disappears, leaving the canal completely free. At first, a medullary membrane lines the cells, and after the reopening of the canal, it becomes continuous with its lining membrane, and also secretes a marrow. The external portion of the callus also disappears at length. One may readily understand that the various dispositions of fractures, occasion

which experience confirms, that its susceptibility to inflammatory action is of a corresponding intermediate grade; all the phenomena of inflammation being developed with a rapidity and in a degree proportioned to that of the vital energy which this membrane, compared with other textures, possesses. This position is, however, true in respect only to simple and local inflammation; for, when the inflammation is of a specific kind, take the venereal for an example, the susceptibility of parts is not proportioned to the degree of vital activity which they possess. There is a tendency of the disease to particular parts rather than to others, to the periosteum and bone rather than to the viscera of the large cavities, as we shall have occasion to remark more particularly when treating of venereal inflammations.

If we refer to elementary treatises on simple inflammations of the common cellular substance, they will be found to be arranged by many writers according to the violence of their symptoms and modes of termina-

slight varieties in that of the callus. Thus, when two fractured bones mount on each other, the interior clasp does not exist. The same takes place when there is no medullary cavity.

"To sum up;—the reunion of bones in ordinary fractures offers the following phenomena:—1st. Effusion of blood, and a viscous and glutinous fluid between the fragments. 2d. The formation of an ecchymosis in the surrounding tissues. 3d. The formation of a cartilaginous bony external clasp, and the development, internally, of a mortise formed by the tumefied medullary membrane, which undergoes the same changes. 4th. Ossification of the intermediate substance between the fragments. 5th. Diminution of the 'callus tumor,' reëstablishment of the medullary canal, and return of all the parts to their natural state. We thus see that the period of forty days, allowed by many surgeons for the consolidation of fractures, is far from being sufficient, and especially in oblique fractures, and in those where the extremities of the bones overlap each other." *Leçons Orales*, 1833.

tion. It may not be amiss to consider periostosis under the same heads of division, as the analogies and points of difference in the two kinds will elucidate their character, and facilitate our investigations. The terminations of common inflammation are in 1. Resolution; 2. Ulceration; 3. Suppuration; 4. Gangrene; 5. Adhesion; and 6. In the growth of new parts; and the processes which lead to these terminations are too well known to require a description.

Periosteal inflammation, as will hereafter be shown, may terminate according to the first, second, fourth, fifth, and sixth mode. It rarely if ever ends in suppuration; why it is so, says Bichat, I know not. Inflammations of the cartilaginous systems are also remarkable, in that they rarely or never terminate by suppuration. Formerly it was believed, that ulceration and suppuration were always coexistent; subsequently, it was ascertained that the mucous membranes, particularly those of the lungs, might suppurate without becoming ulcerated; since which, a purulent expectoration has ceased to be regarded as a sure indication of ulcers in the lungs. Still later, it has been ascertained, on the other hand, that ulceration may exist in some parts, as in the articular cartilages* and periosteum, without producing pus.

* "The ulceration of soft, vital parts, is usually," says Brodie, "so far as I know, always attended with a secretion of pus; but it is otherwise with the articular cartilages, in which suppuration seldom takes place, while the ulcer is small, and after the disease proceeds so far as to cause caries of the bones to a considerable extent, without matter being formed on the joint. This circumstance, he adds, is worthy of notice; for it has long been established that suppuration may take place without ulceration; and it appears, that, in this instance, ulceration may take place without suppuration."

But, though inflammation fails of producing suppuration in the fibrous texture, it produces matter in place of it, that seems to be peculiar to this system. This is a gummy, glairy mucus, sometimes appearing in the form of ganglions on the tendons, sometimes round the capsular ligaments after chronic rheumatism, particularly over the olecranon, and often in the periosteum, in the form of small prominent tumors, in secondary venereal affections. These tumors have long attracted notice, and, on account of their contents, have in France received the name of gommè.

Inflammations of the periosteum must, however, be regarded as of minor importance in respect to their effects on the membrane itself. It is the bone with which it is so intimately connected by situation and attachment, and to which it serves as a parenchyma of nutrition, that claims our chief attention in all diseases of this membrane. Thus, ulceration, if extensive, or long continued, must extend itself from the periosteum to the bone, inducing caries or exfoliation; and, in wounds of this membrane, we are alarmed chiefly for the safety of the bone, and direct our attention in the treatment to its preservation. Even an exaltation of its functional action, as in the exuberant secretion of osseous matter in the form of tumor or node, effects a greater ultimate change in the bone than in itself. In short, the periosteum can hardly undergo any material change from disease, without affecting a still greater and more serious change in the bone.

These morbid changes, produced in the bone by periosteal inflammation, will be varied materially in

their character by the nature, the degree of violence, and the extent of the inflammation. Thus, if the inflammation be circumscribed and of a chronic character, and affect the outer layer only of its fibres, and of so moderate grade as not to interrupt its functions in relation to the bone by changing or destroying its nourishing vessels, there will be produced that peculiar secretion of gummy matter before mentioned, that belongs to the fibrous texture. I do not know that inflammation of this membrane from local causes, can be continued a sufficient length of time of so uniform a grade as to produce this deposition of matter. Chronic rheumatism in the capsular ligaments often causes it; but I know of one kind only, the syphilitic, that causes the fibres to secrete this kind of matter.

Again, if the whole thickness of the periosteum or of its circulating vessels be affected with a low degree of inflammation, which, instead of abridging its healthy function, shall exalt it, causing an exuberant deposition of osseous matter, it will produce a growth of new substance on the bone, in the form of nodes and exostoses. From the manner in which ossification commences, first by a thickening of the membrane, then a deposition of lymph, which becomes cartilaginous, forming a nidus for the deposition of bony matter, there are periods of time when such tumors might with propriety be termed cartilaginous. When, however, such tumors are perfectly organized and matured, they are even harder in their textures than the bones on which they rest.

Another instance where inflammation of the periosteum is attended, like the last mentioned, with an in-

crease of its functional office, and which serves a valuable purpose in the animal economy, is that which takes place in the formation of callus, and in the deposition of new bone in necrosis; subjects, that have already occupied so much of our attention.

Lastly, inflammation may run so high in the periosteum as to destroy it by ulceration or sphacelus; and here, as in the other grades of periostitis, the bone is the more important organ implicated in the affection.

With these remarks on the nature and effects of periosteal, compared with other inflammations, and on their effects upon the bone, it is proper to observe, that an important distinction should be made between those cases which are constitutional, or originate in some internal disorder, and require constitutional remedies, and those which are purely local, and require to be treated accordingly; in other words, between those that are *symptomatic* and those which are *idiopathic*. Another division of periostites founded not so much on their extent, tendency, and mode of termination, is into *acute* and *chronic*. This division of periostites is of early date, and is probably the best that can be made. It is best, because it accords with the usual divisions of other inflammations with which we are more familiar; it is best, because it lays the foundation for a more correct prognosis than any other; and best, on the present occasion, as it accords with the question proposed for the dissertation. Availing myself of both divisions, I shall divide periostites into *constitutional* and *local*, and subdivide each of these classes into *acute* and *chronic*.

Under constitutional periostitis may be enumerated

the following kinds:—Rheumatic, arthritic, scrofulous, scorbutic, cancerous, and venereal. Of these, the last only will receive particular notice. In taking leave of the others, it may be briefly remarked of them, that they depend on an internal cause, which may in most cases be determined by the previous state of the constitution; that the rheumatic kind is merely an extension of the inflammation from the other fibrous textures, particularly from the capsular ligament to the periosteum, and produces a circumscribed thickening of the membrane; that gout will, in some rare cases, after producing chalky concretions about the capsular ligaments of the extreme joints, affect also the neighboring periosteum, and produce a deposition of similar matter between it and the bone; and that scorbutic and scrofulous periostites are of rare occurrence, and are to be met with in such cases only as are strongly marked with a previous constitutional affection. Lastly, it may be remarked, that soft cancer or fungus hæmatodes, which is considered by Sir Astley Cooper and M. Beclard to be a fungous, and by others a lymphatic tumor of the periosteum, though often excited by some injury, are believed to be, in all cases, preceded by a diseased state of the constitution, and that most of these constitutional periostites may vary from acute to chronic, and vice versa, during the course of their progress.

We now proceed to the consideration of the last mentioned inflammation of the periosteum of a constitutional kind, the venereal, which occurs more frequently than all others. It is the consequence of a neglected or ill-treated syphilis, and makes its appear-

ance only after the usual symptoms of syphilis have existed for a great length of time. The time, however, varies according to the situation and circumstances of the patient. Inflammation of the periosteum has been known to show itself within four weeks after the first appearance of chancre ; at others, it has not appeared till after a lapse of years, but ordinarily it shows itself between three and twelve months. It is the consequence of a general, deep-rooted venereal taint of the system, aided, in some instances, by misuse of mercury and by exposure to cold. The disease affects the periosteum and bones at a late period of the disease, partly because of the slower tendency of these textures to become inflamed than exists in those parts in which the affection first shows itself. The forwardness of this membrane or of the other textures to participate in the venereal disease, is, however, by no means proportioned, as we have already remarked, to the degree of vitality it possesses ; for, as Mr. Hunter observes, "as far as our knowledge extends, certain parts cannot be affected at all. The brain, heart, stomach, liver, and several other organs, have never been known to be attacked by syphilis." "The first order of parts, or those which become affected in the early stage of the lues venerea, after the genitals have been diseased, are the skin, tonsils, nose, throat, inside of the mouth, and sometimes the tongue." "The second order of parts, or those which are affected at a later period, are the periosteum, fascia, and bones."

These tumors, we have observed, are occasioned by syphilis with the misuse of mercury. This may be by too liberal an exhibition, or by even a moderate

quantity of the medicine, without due regard being paid to regimen. According to the most extensive observations that have been made of late, it would appear that where mercury is not employed in the cure of the venereal disease, periostitis rarely occurs. In the great number of cases treated without mercury by Dr. Hennen, not a case was seen, in which the bones of the nose were affected: some cases of periostitis, and of pains and swelling of the bones of the cranium and extremities were met with; but, except in two, he never remarked any nodes which could be regarded as *unequivocally syphilitic*. On the whole, he adds, "it appears tolerably certain that mercury, especially when employed unmercifully, and even when employed with moderation, and the patient exposes himself to dampness and cold, tends to promote the frequency of nodes as a sequel of the venereal disease." But then, as the long and abundant use of mercury does not produce periostitis after other complaints, and seeing that chancres treated altogether without mercury rarely lead to nodes, it would seem as if these swellings are the product of the combined operation of syphilis and mercury together. Be this as it may, no one is able to determine by inspection, when any case presents itself, whether it partake most of the venereal or of the mercurial character.

A doubt has been expressed by some eminent surgeons, among whom are Mr. B. Bell and M. Monfoncelon, whether inflammations and swellings of the periosteum ever proceed from an internal or constitutional cause; that is, whether all such cases of swelling as have been supposed to be in this membrane,

may not be referred to a disease of the bone. "That the periosteum may become inflamed," says Monfoncelon, "there can be no doubt; but it may well be doubted, whether those hard tumors resulting from syphilis originate in the periosteum." To prove this, he assumes the point as granted, that nodes originate from the bone; and then, on this false basis attempts to show, that all other periosteal tumors must, from their analogy to bony tumors, arise from the same source. "They have," says he, "identity of seat, that is, on the osseous tissue, as venereal exostosis; identity of cause, viz. syphilis; the same local symptoms; for, like the reputed periostoses, so venereal exostoses are preceded by pains of a peculiar character; the tumors in all cases are hard, circumscribed, and painful, when pressed."

In reply to this it may be remarked, that the proofs here adduced, viz. identity of seat, cause, and local symptoms, are as well suited to establish a belief in the existence of periostitis, as to refute it; they go as far to prove that exostosis exists as a consequence only of periostitis, as to prove what the author has attempted, that the bone in all cases of venereal nodes is the part primarily affected; and, although it is not positively certain that nodes originate in all cases in the periosteum, yet its greater activity and susceptibility to inflammation, qualifies it for earlier participation in disease; to which it may be added, that in a great proportion of cases, such equivocal tumors are more readily resolved than bony tumors can be, judging from our experience in well marked cases of the latter kind. We may, therefore, doubt of the existence

of venereal exostosis, except as a consequence of previous periostitis—and this doubt is strengthened by the concurrent opinion of the best physiologists of the present day.

"Some writers," says a distinguished author, "have divided venereal exostosis into *true*, when the swelling is owing to an increase of the substance of the bone, and *false*, when the tumor arises from a thickening and inflammation of the periosteum. But the hardness of periostitis is often as great as if the bone itself were affected; hence these tumors have been, and are still, often mistaken for real complaints of the bones, which are much less frequent than is commonly imagined. Dissections have lately shown that these tumors especially, on their first appearance, are generally in the periosteum and not in the bone. Sometimes, and especially when they have been long neglected, or ill treated, the bone itself becomes affected with a real *exostosis*." The same author remarks, that he had seen what he took to be a "voluminous exostosis from syphilitic origin, occupying all the lower part of the humerus, and after having for a long time resisted scientific treatment, disappearing quickly and completely on the occurrence of other syphilitic affections in the fauces;" and, in another place he lays it down as a general rule, that "exostoses are never resolved, and that the examples of this mode of termination cited by authors are cases of periostitis, the nature of which is different, though its appearance is very similar." Beclard observes, "there are tumors that seem to be deposited, as it were, on the surface of the bone, so that it is perfectly sound below; such are

most exostoses. This affection depends upon an inflammation of the periosteum, in consequence of which this membrane swells and secretes, from its internal face, a matter which hardens and becomes confounded with the texture of the bone; thus a sort of periostitis precedes the osseous tumor. This is more or less voluminous, according to the extent of the inflammation. If this be circumscribed, there results from it what are called *nodes*. These tumors are at first very distinct from the bone; afterwards maceration still detaches them from the bone, and they are seen holding to the periosteum, and it is not till a long time has elapsed, that they appear to be continued from the osseous texture; it may then be seen by the microscope, that their vessels have not the same arrangement as those of the rest of the bone." It may be added in conclusion, that almost every anatomical museum contains skulls having nodes, which are harder than the bones on which they rest, and that, in the early stages of these, there was no observable difference between them and those that have terminated by metastasis or resolution. Unless, then, we hold that tumors of bone can be readily resolved, which is somewhat doubtful, we are authorized in believing that venereal exostoses and nodes, originate in most, if not all cases, in an inflammation of the periosteum.

Venereal periostitis is generally seated on those parts of the osseous system that are superficial and exposed. Commonly it appears under the scalp, over the os frontis and ossa temporum; sometimes upon the outer surface of the sternum, on the side of the radius and ulna, and often on the inner surface of the

tibia. The greater tendency of the disease to these parts seems to be founded on the exposedness of their situation to the influence of external exciting causes; to contusions, and to changes of atmospheric temperature, both of which are often referred to by the patient, as the cause. And it is remarked by persons experienced in the diseases of seamen, that such tumors appear much oftener on ship-board, where cold and dampness prevail, than on land, and are earlier in coming forward, in proportion to the degree of exposure. The exposed situation of the bones of the nose, accounts also for their being the seat of secondary venereal affections.

Venereal inflammation of the periosteum is preceded by constant pain, more or less acute, and which is particularly severe in the night. A swelling then takes place; at first it is moderate, is more or less tender to the touch, and is circumscribed in its limits. Its circumference is insensibly confounded with the bone, on which it rests. The tumor adheres to the bone, is immovable, and appears to grow up from it; and, until the disease is somewhat advanced, the most experienced practitioner is unable to determine by touch, whether it exists in the bone or periosteum. As the disease however, makes progress, its peculiar character is developed, and the nature of the tumor is then found to vary, according to the extent and violence of the inflammation.

Periosteal tumors in their advanced stage, will be found to consist of three kinds:—The *first* is a tumor, which, to the touch, appears to arise from the bone, and acquires the volume of a nut or small egg; at first

hard, firm, and shining, after an indefinite length of time it softens in its centre, where matter collects. The skin then becomes thin, and when opened or spontaneously discharged, the matter is transparent and gummy, like a solution of gum arabic; hence the French name gommè. Sometimes a whitened or grumous lymphatic matter is discharged, of the consistence of paste or soft cheese. Cirillo, Cullerier, and Astruc, say, that this kind succeeds to buboes that have suppurated badly, after painful ulcers of the throat, pustules on the skin, and more particularly in subjects that are debilitated by the abuse of mercury; but that they may be the consequence of any species of primitive symptoms that have been neglected or ill-treated. This affection, I believe, is seated in the outer layer of the periosteum only, for the following reasons:—Because the greater length of its superficial fibres, as stated by Bichat, will allow of their distention by matter lodged between them and the inner layer; because the vessels destined to furnish calcareous matter to the surface of the bone, are not affected by this inflammation as they are when the whole thickness of the periosteum is alike moderately inflamed, as in the formation of callus, and exostosis, and as they were in the experiments on rabbits, where osseous matter was deposited on the surface of the metallic ferrule; and lastly, because in opening tumors of this description, the bone is found not entirely denuded, although the outer surface of the periosteum has evidently participated in the disease. This tumor I shall call *gummous*.

The *second* kind of tumor may, from its nature, be

termed cartilaginous or osseous, according as it is recent or of long standing. As it is resolvable, probably, in its early stage only, and more entitled therefore to medical attention at this period, I shall use the term *cartilaginous*, which is expressive of this stage. It presents nearly the same appearances as the gummous kind, is attended with considerable pain, is firm and hard, as if proceeding from the bone, and is slow in its progress. In a few cases, the tumor continues stationary for some time, and then diminishes a little, or it may entirely disappear. This termination by resolution rarely takes place spontaneously, unless by metastasis, and then the venereal affection is apt to be translated to the throat; most commonly, after the tumor has acquired considerable magnitude, it becomes indolent and harder, and continues in this state for life.

There is a *third* kind of venereal periostitis, which, from its nature and tendency, I shall call *necrotic*. It differs from the gummous kind, in that it extends through the periosteum, oftentimes affecting the surface of the bone with superficial necrosis, and from both the gummous and cartilaginous kind, in that the inflammation is of a graver character, is more rapidly developed, is attended with great pain, especially in the beginning, and is very tender to the touch. The integuments are more highly and extensively inflamed. It differs also in the nature of its discharge when it breaks through the skin, being a dark fetid kind of matter, and the bottom of the abscess is of a dull yellow color. Soon after it opens, a greyish decayed substance is discharged, which proves to be the dead

periosteum, and the bone is now left denuded, or is covered with red granulations.

I am aware that this kind of diseased periosteum may be considered, and indeed by some has been pronounced, a necrosis in its origin, and that the inflammation of the periosteum is a secondary affection. Admitting, however, that there is as much in the history and appearance of the disease to support this opinion, as the one I have advanced, of its being of periosteal origin, yet, considering that the periosteum takes an inflammatory action sooner than bone; that it is here destroyed and discharged with the matter soon after the tumor is opened, and is not so destroyed and discharged in those cases of artificial necrosis produced by a slip of lead passed round the bone inside of the periosteum, where this membrane remains entire and deposits new bone on the outside of the lead; seeing too, that such tumors in their incipient state are oftentimes speedily resolved by a mercurial course with antiphlogistic treatment, which could hardly be supposed to arrest the progress of a real necrosis; "for," as Richrand observes, "a necrosis *begins* as it were with death of the bone;" these considerations together, must weigh in favor of the opinion, that superficial necrosis of venereal origin is in all cases the consequence of an acute inflammation of the periosteum, that kills the surface of the bone by the previous destruction of its nourishing vessels, in concurrence with the disordered action communicated from the inflamed membrane. Should it be urged, that, because in deep-seated necrosis the periosteum remains quite unaffected, the bone must therefore

be the primary seat of the disease, it may be said in reply, that, in this case, the medullary membrane which serves as a periosteum to the central part of the bone, supplying it with nourishment, holds the same relation to deep-seated necrosis as the periosteum does to the superficial kind.

There are, then, three kinds of venereal periostitis, differing from each other chiefly in their seat and degree of inflammation. The first is indolent in its character, and affects only the outer surface of the membrane, and from the nature of its contents, may be called *gummous periostitis.* The *second* is a low degree of inflammation which affects the whole thickness of the membrane, and results in exostosis. Under this grade of inflammation may be ranked that which exists in the formation of callus and of new bone. The tumor being in the first instance cartilaginous, in which osseous matter is deposited, and this being the stage in which it may be dispersed, and is, therefore, as before observed, the most interesting to the surgeon, I call it *cartilaginous periostitis.* The *third* is a high degree of inflammation of the whole thickness of the periosteum, which ends in the destruction of the membrane and contiguous layer of bone ; this I call *necrotic periostitis.*

In subdividing these kinds of constitutional periostitis according to the question proposed for this dissertation, the two first, or gummous and cartilaginous periostites, may be pronounced *chronic* in their character, differing from each other chiefly in their seat. The third, or necrotic kind, may, on the other hand, be considered an *acute* inflammation of the periosteum,

so violent, that, if not subdued, it ends in gangrene. The degree of inflammation found to exist in any case, is of itself sufficient ground for determining to which of the two classes such case belongs.

Venereal periostosis of either kind, may be distinguished from other constitutional affections of this membrane, by the previous existence of syphilis, and exemption from scrofula and scurvy, and such other constitutional diseases as affect the periosteum; by the greater pain attending such venereal swellings from their first appearance, than exists in swellings of this membrane from other causes, and by its exacerbations in the night; by their situation, which is on the surface of superficial compact bones; the other affections, and caries in particular, preferring the cellular part of bones, as their heads and the bodies of the vertebræ.

The prognosis, in such affections, may be regulated by their difference of character. The gummous kind will yield to anti-venereal remedies, and entirely disappear. The cartilaginous kind will end in exostitis, if not arrested at an early period by a similar course of treatment. Cases of the necrotic kind, if not arrested at an early period by anti-venereal and antiphlogistic remedies, will, notwithstanding their subsequent use, end in necrosis.

When syphilis, in concurrence with the causes we have mentioned, has extended to the periosteum, it shows the disease to be far advanced, and to have taken deep root in the system. It is often accompanied with other symptoms, as various cutaneous eruptions and affections of the throat, and the whole

constitution is more or less impaired. The indications of cure are so fully laid down in treatises on the venereal disease, that very little can here be added. Mercurial remedies are chiefly to be relied on, and may be administered internally, or applied by frictions, or what is better, the employment of both methods simultaneously, it being important to make a general and sensible impression on the system as soon as possible. The form of medicine best suited in such cases for exhibition is found to be muriate of mercury, given in some convenient vehicle, and in such doses as the stomach can bear. Its peculiar advantage over other forms of mercury, probably, consists in its acting sooner on the whole system, and its greater tendency to affect the extreme vessels, as is evinced by its efficacy in cutaneous diseases. Although the army surgeons of England have strenuously maintained, of late, that mercury is not necessary for the cure of early stages of syphilis, and that its incautious use produces most of the inflammations of the periosteum of which we are now speaking, they still acknowledge its efficacy in the cure of them, and depend on nothing so much as on moderate doses of the medicine combined with other remedies, particularly sudorifics. The free use of the medicine here recommended is to be continued so long only as may be necessary to make a sensible impression on the system, to be manifested in the breath, and by a slight uneasiness in the gums. Beyond this point most modern practitioners agree, that its use would be injurious, and the object in *hastening* a mild mercurial action at the onset is, to arrest the progress of the local affection as soon as practicable.

After the constitution is slightly impregnated, it will be necessary to preserve it in this state for a time, till the periostosis begins to yield; and should this not take place in two or three weeks, there will, after this period, be as much to apprehend from a further continuance of the remedy in a system already somewhat impaired, as from the disease. "In the great hospitals in Europe," says Mr. Cooper, "long protracted mercurial courses for the cure of such swellings, are totally relinquished."

Auxiliary constitutional remedies should be employed, both during and subsequent to the mercurial course, as the decoction of the woods, guiacum, &c.; opium may be employed with advantage to allay pain and irritation. A class of medicines, termed alteratives, as arsenic, antimonials, and the blue pill, have been advantageously employed in conjunction with sudorifics, after the mercurial remedies are laid aside.*

When mercurials and local applications have been continued two or three weeks, without producing any sensible diminution of the tumor, it will in some cases, particularly those of the gummous kind, seem to aggravate the disease. Whether this be attributable to disorder of the constitution, induced by the medicine which disturbs healthy action in the part; or whether the disease has assumed a mercurial in exchange for a venereal character, as Mathias would maintain, I am unable to determine. Be this as it may, such tumors

* Dr. Williams, of St. Thomas, has found great benefit in the treatment of periostitis from Hydriodate of potass given internally, and the remedy has received high commendation from others.

Dose from five to twenty grains, three times a day.

have improved in their aspect, by dropping the mercury and adopting such a course of medicine, aided by such diet and regimen as will invigorate the system and improve the health generally.

Local treatment should vary according as the inflammation is acute or chronic. In the former, or necrotic kind, two things are indicated; to reduce inflammation and to allay pain. The first should be attempted by the free application of leeches and saturnine lotions. Pain, which is more severe in the night, may in some degree be mitigated by the application of laudanum and anodyne plasters, such as extract of poppies and of cicuta, or by anodyne balsam. Blisters have been extolled by some, and are used in St. Bartholomew's hospital; but in the highly inflammatory kind their application interferes with the use of the above named remedies, which are more strongly indicated.

In *chronic venereal periostitis* we are to expect more pain and inflammation than is common to exostosis of the idiopathic or local kind; still, however, when compared with the very grave kind that terminates in venereal necrosis, or even in idiopathic necrosis, it may with propriety be termed chronic and regarded as such in the mode of treatment that is to be adopted. Topical bleeding will rarely be found necessary. Anodynes at night, in combination with diaphoretics, with copious draughts of the decoction of sarsaparilla or mezereon or lignumvitæ, or the three articles combined, as in the "*decoction of the woods*," are, in concurrence with a mercurial course, chiefly to be relied on. The topical applications avail but little. The French are particularly partial to the *emplâtre de vigo cum mercurio*.

From *constitutional* or *symptomatic periostitis* requiring constitutional remedies, we turn to the other class which comprises such cases as are idiopathic or of local origin, and require to be treated accordingly. These, like the others, are best divided into *acute* and *chronic*, on account of the difference in the nature of their termination, depending, as this difference does, on the degree of inflammation, and because such a distinction leads to a more correct mode of treatment.

The causes are of two kinds; *first*, the existence of a defect in the periosteum itself, occasioned by some previous disease that has impaired the general health, and from which the system seems to relieve itself by concentrating the derangement in a particular part. A few cases have come within my limited observation, and more have probably been witnessed by experienced practitioners, where periostites have occurred as a sequel of typhoid fever, and which have from this fact been termed *fever-sores*. Another instance of this kind of inflammation, is that of paronychia gravissima, or what is vulgarly termed a *felon*, which often ends in necrosis or caries of the bones of the fingers. Sarcomatous tumors of this membrane, termed by some writers "*lymphatic tumors of the periosteum*," to which some constitutions have a remarkable tendency, are, perhaps, entitled to a place under this head, though we have enumerated them under the constitutional kind.

The other causes of acute inflammation of the periosteum, and which also endanger the life of the bone on which it rests, are wounds, contusions, comminute and compound fractures, acrid substances, caustics, and

extreme degrees of heat and cold. In these cases the membrane may be at once destroyed by the violence of the wound, or by excessive heat or cold, without the intervention of inflammation; or the inflammation consequent to the injury may cause a sphacelation of the membrane. It was formerly supposed, that purulent matter collected near a bone would, by remaining there, become acrimonious, and in time corrode the periosteum and injure the bone; hence it became a rule to open such abscesses as soon as their existence was discovered. But it is now believed, where the constitution is sound, that if an abscess be formed over a bone not originally diseased or hurt by the causes that produced the abscess, nor the periosteum injured by exposure to the air or by escharotics, the pus will prove harmless, occasioning merely a thickening of the membrane, as it does of the peritoneum when lodged against it. The admission of air, in such a case, through the sinus to the periosteum, may, however, stimulate its vessels and inflame the membrane; or, as Monfoncelon observes, it may change the pus from a bland, unctuous, inodorous fluid, to one of an acrimonious kind, that will inflame this membrane, if not destroy it.

As acute inflammation of the periosteum, by whatever cause induced, endangers the life of the contiguous bone, by destroying its nourishing vessels, so, on the other hand, a moderate chronic inflammation of it, will exalt its secerning function, and may cause an exuberant deposition of bony matter, in the form of exostosis. The attention bestowed on such tumors caused by syphilis, renders it unnecessary to dwell long on the nature of exostoses of the idiopathic kind.

These tumors, like those of syphilitic origin, have usually been considered as growing out of the bone like a tumefaction. My opportunities of examining such tumors have been very limited, a circumstance, however, of less regret to me, since a most valuable account of them has been given to the profession, by Sir Astley Cooper. Although his *Essays* are in the hands of every practitioner, I am induced by the great accuracy of his observations, and by their direct application to the present subject of inquiry, to give an extract from them, which will show that these tumors, like the syphilitic, originate in an inflammation of the periosteum, and are cartilaginous in their early stage.

Sir Astley says, "I have examined exostosis in the early part of the complaint, in which ossific matter had not yet been deposited, but in which, from dissection in other cases, I know that such a deposition would in future have occurred.

"Exostosis has two different seats; it is either periosteal or medullary. By *periosteal* exostosis, I mean a deposition seated between the external surface of the bone and internal surface of the periosteum, adhering with firmness to both surfaces; and by the *medullary* is to be understood a formation of a similar kind, originating in the medullary membrane and cancellated structure of the bone.

"With regard to its nature, exostosis is of two kinds, either *cartilaginous* or *fungous*. By the cartilaginous is intended to be expressed that species which is preceded by the formation of a cartilage which forms the *nidus* for the ossific deposit: and by *fungous*, a disease

similar to that which Mr. Hey has denominated fungus hæmatodes, but somewhat modified by the structure of the part in which it originates." "The parts most liable to this affection," he says, "are the os femoris, tibia, and fibula, next the bones of the face, and particularly about the alveolar processes, the os frontis, and often the bones of the fingers."

After dwelling on the fungous kind which originates in the medullary membrane, he treats of the cartilaginous exostosis of the medullary membrane, which, he says, differs greatly in appearance from the former; he then takes up the subject of *periosteal exostosis.* "This disease," says Sir Astley, "like the preceding, is both of a fungous and cartilaginous kind. The former of these scarcely differs in its symptoms from the fungous exostosis of the medullary membrane, except that the general swelling of the limb is less, and the particular tumor is more prominent: but there is the same want of sensibility in the commencement, with some pain afterwards; the skin remains free from discoloration, and has a similar tuberculated appearance. Ulceration, bleeding, and sloughing, with great discharge ensue, and occasion the destruction of life, if some operation be not performed."

This disease is attributed to accident; but any irritation upon a bone, in an unhealthy constitution, will produce it. He concludes this interesting account of fungous periostitis, with a few remarks on its treatment, and then takes up the subject "*Of Cartilaginous Exostosis between the Periosteum and the Bone.*"

"This is a very different affection to the preceding, and more deserving the attention of the surgeon, since

it admits of relief by operation, though sometimes with the loss of the affected limb. It originates in the inflammation of the periosteum and of the corresponding part of the bone; and a deposition of cartilage, of very firm texture, and similar to that which forms the nidus of bone in the young subject, adheres to both these surfaces. The periosteum adheres to the external surface of the swelling, and the swelling itself is attached still more strongly to the surface of the bone. Within this cartilage a bony matter is deposited, which continues afterwards to be secreted as the cartilage increases in bulk; for it appears, that, between the periosteum and bony mass, cartilage is constantly secreted, which constitutes the exterior surface of the tumor. Thus, on dissection we discover, 1st. the periosteum thicker than natural; 2d. the cartilage immediately below the periosteum; and 3d. ossific matter deposited within the cartilage, extending from the shell of the bone nearly to the internal surface of the periosteum, still leaving on the surface of the swelling a thin portion of cartilage unossified. When the accretion of these swellings ceases, and the disease has been of long standing, they are found to consist, on their exterior surface, of a shell of osseous matter, similar to that of the original bone of the same cancellated structure, and communicating with the original cancelli of the bone. Consequently, when an exostosis has formed in the manner here described, the shell of the original bone becomes absorbed, and cancelli are deposited in its place. In the mean time, the outer surface of the exostosis acquires a shell resembling that of the bone itself. When the exostosis

has been steeped in acid, and by this means deprived of its phosphate of lime, the cartilaginous structure remains of the same form and magnitude as the diseased deposit; and, as far as I have been able to discover, it is effused precisely in the same manner as healthy bone.

"For the most part these diseases are attended with very little pain, and, especially at their commencement, are but little complained of: when, however, they have acquired some considerable bulk, they do not fail to occasion painful sensations by their pressure upon the surrounding parts."

The most frequent seat of the periosteal exostosis is upon the inner side of the os femoris, just above the internal condyle, and in the direction of the insertion of the triceps muscles. Occasionally it appears on the tibia, immediately under the insertion of the sartorius and gracilis muscles, and sometimes at the insertion of the deltoid muscle in the os humeri.

"With respect to the cause of the periosteal exostosis, which has but a small base, and which follows the course of the ligaments or tendons, as that in the direction of the triceps femoris and gracilis, I am of opinion that it arises from exertions disproportionate to the strength of the patient. The tendons, which are fixed in the bone, becoming sprained by over-exertion, inflammation is excited in them, which is thence communicated to the periosteum and bone, and a deposition is consequently produced in the direction of the tendons sprained and inflamed, upon which the weight of the body is more particularly thrown. We see also in horses, that the disease denominated *splent*

is produced by sprains of the ligaments. This disease is exostosis. The same effect is also produced in the human subject by a sprain of the ligament, which connects the fibula with the tibia." Blows also occasionally produce this disease. "I have seen," says Sir Astley, "an enlargement of the tubercle of the tibia, produced by a fall on the knee, continue for many years." Pressure is also sometimes a cause of exostosis, as from long continued bandaging over a bone.

Nature, in her wise and beneficent provisions for the reparation of injuries done to the human system, offers no instance more entitled to admiration than that which is exhibited in the formation of callus after a fracture, and in the deposition of new bone round a dead one. The inflammation concerned in these processes has already occupied a due share of attention, when speaking of the functions of the periosteum.

PATHOLOGICAL REMARKS.

In consequence of severe local injury, we have already seen that the periosteum may at once be deprived of vitality, as by intense heat and cold, and by caustic; by extensive separation of it from the bone, or by long exposure to the air, the effect of which is, to dry up the few vessels that belong to it; and the consequence of such injury must always be death and exfoliation of the contiguous bone. The same thing will be likely to follow when the inflammation is acute, when the patient is old, or has a bad constitution, and, more especially, if, as formerly,

irritating dressings are applied to the denuded periosteum, or foreign substances, as lint, be interposed between it and the bone. The effects of a wound of the membrane will be varied by the kind of instrument with which it is inflicted, and by the manner in which it is applied. Thus, a contunding instrument presses the periosteum against the bone, tears and breaks the communicating vessels, contuses the bone, sometimes breaking it, and always impairing its healthy action in the part injured. A cutting instrument may, on the other hand, merely incise the periosteum, or, gliding over the surface of the bone, may separate the periosteum extensively, and yet leave the bone uninjured. Or, even if a portion of the bone be shaved off, by the oblique direction given to the cutting instrument, granulations may spring up from the bone to fill the chasm, which will unite and cicatrize with the replaced integuments. So also, when the detached periosteum is of little extent, the patient young and healthy, and the treatment calculated to prevent inflammation, hopes may be entertained that no part of the healthy, bone will die; granulations may soon arise from its surface and cicatrize with the surrounding integuments.

The consequence of violent and long continued inflammation of the periosteum, we have seen, is necrosis; when circumscribed in extent, the necrosis will be superficial, but where acute periostosis is extensive, the medullary membrane participates in the affection, and this will be likely to destroy the whole intervening bony substance; and here, the entire work of forming a new bone is done chiefly by the periosteum.

If the acute inflammation be on the cranium, it will extend through to the dura mater, and, from the afflux of humors it will occasion, may, by compressing the brain, endanger life. Richerand attributes the secondary inflammation to a direct communication of it through the blood vessels. Hunter explains it on the principle of contiguous sympathy. But, whichever theory we adopt in this case, I think it is safe to subscribe to the opinion of Bichat, in referring the occasionally wide extension of periosteal inflammation from a mere puncture to the agency of sympathy; and this fact shows the importance of attending to the state of the constitution, as well in forming a prognosis as in managing the treatment.

TREATMENT.

The existence and extent of an injury of the periosteum are to be ascertained by the form of the wounding instrument, and the manner in which it was applied; by exploring it with a probe or sound, and, on the information thus obtained, the prognosis and mode of treatment should be predicated. It is hardly necessary to add, after what has been said, that foreign substances are to be removed, the integuments carefully reapplied, air excluded from the wound, and soothing and emollient applications employed, instead of spirits and stimulating balsams, as was the practice formerly. The digestive organs are to be regulated and constitutional excitement prevented by attention to diet and regimen, and by depletion, should the symptoms require it.

Where acute inflammation settles upon the periosteum, in consequence of a disordered state of the constitution induced by fever as before mentioned, vesication over the part has proved beneficial by diminishing the evil, and sometimes has entirely obviated it. We observed that the local affection is thought to be a concentration of the general derangement of the constitution. Perhaps the reason why such strong artificial irritation arrests the progress of the disease, is, that it answers the same valuable purpose to the constitution, that the concentrated local affection does. This suggests an important consideration in all cases which we believe to be produced for constitutional relief, whether we cannot substitute operations for those of nature, which shall answer equally well for the purposes of the system.

When acute inflammation attacks the periosteum at the end of the fingers, there is not so much reason for referring it to derangement of the constitution; it is often attributable to some local injury done to the part, perhaps a long time previous to the accession of the inflammation, which has left the membrane weakened and susceptible of disease. Here the disease is rendered more severe by the unyielding structure of the integuments, and also by the plentiful supply of nerves constituting the sense of touch. To give relief from the intense suffering of the patient, occasioned by the strong pressure exercised upon the part, by tumefaction and by matter deposited from the inflamed membrane, it has been deemed good practice to lay the part open to the bone, since the admission of air to the bone is not followed with such

serious consequences here, as it is where a large bone is implicated in the disease.

"Periosteal exostosis," says Sir Astley Cooper, admits of remedy, from internal medicine, from external applications, and when considerably advanced, from surgical operations; but," he adds, "that his experience does not furnish him with an example from medical treatment, *except in the very commencement of the disease.* The common alterative plan of small doses of mercury, with decoction of sarsaparilla, combined with stimulating plasters, as the *emplastrum ammoniaci cum hydrargyro*, with the view of promoting absorption of that which has been effused, by its stimulating qualities and by its pressure, are the means which are generally adopted." Mr. Abernethy advised, in constitutions that tended to the formation of osseous tumors, the use of muriatic and acetic acids, but they failed of producing any apparent effect.

ENEURESIS IRRITATA.

DISSERTATION.

ON THE DISEASE CALLED AN IRRITABLE STATE OF THE URINARY BLADDER; ITS CAUSES AND TREATMENT.

In composing a dissertation on a subject proposed in few words, expressed in a general and indefinite manner, and where, as in the present case, circumstances preclude the privilege of knowing the purposes and wishes of those who propose it, and who are to decide on its merits, a great difficulty is experienced, in settling on the limits of the work, as well as in selecting the materials that are to compose it. This difficulty is increased in the present case, by want of information respecting the exact meaning intended to be attached to the term Irritable State of the Urinary Bladder. I find no disease bearing this name in any system of nosology, ancient or modern, and with the exception of what is contained in some comparatively recent treatises by Rollo, Wilson, Foote and Bingham, where the symptoms of irritable bladder are made a subject of separate investigation, I am ignorant of any authority we possess for conferring on this term the

dignity and privileges of a separate place in nosological arrangement; or of any important advantages gained by considering all cases of an irritable state of the bladder under one general head, in preference to regarding it, as in point of fact it in most cases is, merely a symptom of disease previously existing in some other organ, to the cure of which our attention should be chiefly directed, rather than to any primary affection of the bladder. It is true the bladder may be affected with an idiopathic irritability, or with inflammation requiring our undivided attention to the organ itself, as much so as the stomach, or the head, and we have terms expressive of inflammation of these organs, in Cystitis, Phrenitis and Gastritis; and perhaps an idiopathic, excitable or irritable state of either of the organs mentioned, is worthy of a name and place in the catalogue with other diseases; but since it has been withheld from such affections of the stomach and head, I see no good reason for showing such partiality to the bladder. But admitting the term to be correctly and advantageously employed in respect to idiopathic irritability of the bladder, inasmuch as it expresses our meaning more definitely than the term *Incontinence* of urine, employed prior to the time of Sauvages, and Eneuresis, used since his day, which include two nearly opposite diseases, a morbidly excitable and a paralyzed bladder, there still remain objections to using the term irritable state of the bladder when the affection depends altogether on diseases in other organs. We have no treatises on an irritable state of the stomach, intended to include that which exists in pregnancy, or from inflamed kidney, or

strangulated hernia, and why then employ irritable state of the bladder to express that which results from disease of the kidneys, or of the prostate gland, when this irritability is merely sympathetic,—is reckoned too among the symptoms of such primary affection, and requires but little attention in the course of treatment. It would accord better then with these reflections, and be in strict conformity with the state of the question here proposed, to limit our investigations to the cause and treatment of an irritable state of the urinary bladder of the idiopathic or local kind. An objection, however, immediately presents itself to this course, in the paucity of materials of any interest that can be drawn together for a dissertation, and this consideration, together with the difficulty in some cases of drawing a line of distinction between idiopathic and sympathetic irritability, and the fact that Howship, Foote, Bingham, and others, have included under this head, almost every variety of irritable bladder, from whatever cause, induces me to adopt the same course, premising, however, that the nosological term most applicable, as covering more of the ground occupied by this dissertation than any other, is *Eneuresis Irritata.*

The attention will first be drawn to the structure, properties and functions of the organ. The bladder is a species of musculo-membranous sac, situated without the peritoneum at the anterior and middle part of the cavity of the pelvis,—behind the pubis,—before the rectum in man, and the uterus in woman,—below the mass of intestines, and above the lower part of the rectum. The sac presents different re-

gions, the superior of which is called the fundus of the bladder; the middle part, which is a little larger, is called the body of this organ; the lower part, still larger, is called the lower fundus, and extends backwards; and, lastly, the fourth region, or neck of the bladder, which stretches forward.

Of the two surfaces which the bladder presents, the internal is most worthy of examination. There are to be seen, 1st, wrinkles running in various directions, and more or less multiplied according to the state of contractedness of the organ;—2d, a velvet-like surface, resembling what is seen in the stomach and intestines;—3d, sometimes eminences formed by the prominency of some of the fibres of the mucous coat, between which there are depressions, where are sometimes found calculous secretions, and hence they have been termed stony cysts;—4th, three openings, one in front, which leads through the urethra; the two others, situated posteriorly, constituting the entrance of the ureters. These three openings form the angles of a triangular surface, called by the French *trigone vesical*, which is without membranous wrinkles, and is endowed with extreme sensibility, as is evinced by the acute pains felt when a calculus or stone comes into contact with it. The whole of the surface near the neck of the bladder, is, however, possessed of greater sensibility than the superior fundus.

The peritoneum covers its superior, posterior, and lateral portions, and being reflected off to the walls of the pelvis, leaves uncovered the front, the lower, and a small portion of the back part. It is by these uncovered regions we are able to perforate the bladder

without penetrating the cavity of the abdomen. It is by a lax cellular structure that this membrane adheres to the subjacent or muscular coat, and this cellular tunic covers the whole bladder, and by some anatomists has been enumerated as one of its coats. The muscular membrane, destined to contract and sustain the bladder, is situated within the peritoneal coat, and extends over the whole organ,—is of unequal thickness in different portions of its extent,—is very thin in front, behind and on the sides,—is more developed towards the neck, and especially between the vesiculæ seminales. Its fibres are whitish, flattened, and run in various directions, sometimes interlacing and combining, constituting fleshy columns. Low down in the fore part of the bladder, the muscular fibres collect into a sort of tendon, which stretches off to the pubis, and this in the contractions of the organ causes it to be drawn forward towards the back of the bone. A few fibres extend to the dense, white elastic substance, constituting the chief thickness of the neck of the bladder, and which is not covered by a particular muscle of the sphincter kind, as some anatomists have maintained.*

* Mr. Bell says, "the true sphincter of the neck of the bladder has hitherto escaped notice; it has been looked for on the outside of the prostate gland, and then the compressor prostatæ, the levator urethræ, and the levator ani have been considered as sphincters, and so indeed they are, inasmuch as during their action the urine cannot be expelled along the urethra; but the true and appropriate sphincter of the bladder lies under the base of the prostate gland, and immediately surrounding the beginning of the urethra." In another place, vol. 1, p. 231, he says, "the sphincter vesicæ is not easily distinguished from the detrusor urinæ, being the fibres of it, only thicker and stronger at the lower and narrower part of the bladder." It is the opinion of French

The inner coat is called the mucous, between which and the muscular coat, there is a white dense coat, very elastic, formed of cellular structure, but destitute of fat. It is penetrated by numerous blood vessels and nerves, which intimately connect the mucous membrane with the muscular fibres. In this structure are situated the mucous glands whose secretory ducts perforate and open on the inner surface of the mucous membrane. It is from this texture, more compact than the rest of the cellular system generally, that the mucous membrane derives its support. It is called by some the cellular coat, by others the submucous.

The mucous coat, named from the fluid spread over its surface, lines the urinary channels throughout their whole extent, from the glands penis through the urethra, the bladder, ureters, the pelvis of the kidneys, the infundibuli, the papillæ and the capillary tubes which open on their summit. In the ordinary contractions of the bladder this membrane undergoes but a slight diminution of surface; it contracts scarcely at all, but folds within. Its inner surface is in contact with bodies heterogeneous to the living structure, and hence may be regarded as the limit and barrier placed between it and the bodies that are foreign to it; defending it from the injurious impression of these bodies, as the skin does the surface of the body, and experiencing no other change in itself, than an increase of secretion which is in no degree dangerous. The

anatomists generally that there is no such muscle as the sphincter vesicæ, though they admit that the levators of the urethra and anus perform the office of a sphincter, aided by the natural contractility of the urethra.

inner surface is covered with numerous papillæ, too small to be seen by the naked eye. Contiguous to its outer surface are the innumerable small glands above mentioned, imperceptible in their natural state, but which become visible when this tunic is affected with catarrh, and which filtrate the mucous liquor destined to protect the bladder from a too strong impression from the urine. Every considerable excitement of the mucous surface produces a remarkable increase of action of its secretory glands, not by coming in contact with the glands, for these are always under the membrane, and consequently separated by it from irritating bodies, but by irritating the extremity of the excretory ducts. Mr. C. Bell denies the existence of the mucous glands, and says that the mucus is probably a general discharge from the surface. Bichat, on the contrary, remarks, that though it is true they are less apparent in the œsophagus and intestines, yet the mucus that moistens them clearly demonstrates their existence, for the identity of secreted fluids supposes in fact, identity of the secreting organs. It appears that when these glands are hidden from our view, nature compensates for their delicacy, by their number.

The blood of the bladder comes in tortuous vessels and without uniformity from the hypogastric, umbilical, ischiatic, and middle hæmorrhoidal arteries, the largest of which are seen about the neck of the organ. Its veins are large and more numerous, and return the blood into the hypogastric plexus. The lymphatics are numerous, and lead to the hypogastric glands. The nerves come from the hypogastric and sciatic

plexuses, which are made up from the cerebral and ganglionary systems, the latter of which predominate.

In respect to its properties, the mucous coat of the bladder possesses *animal sensibility*, which exists, however in relation to the contact of substances to which it is not accustomed, as foreign bodies introduced into the organ, and stone, gravel, acrid urine, or other irritating substances formed within the body. Inflammation, however, raises its sensibility, and renders the contact even of healthy urine both sensible and painful, and this too, whether the inflammation be of local or of sympathetic origin. Its *organic sensibility* is strongly marked, and is the spring to most of its actions, both in health and disease. It possesses an *animal* or voluntary *contractility* and very little *organic contractility*, as is evident from the wrinkles it exhibits, when suddenly emptied. Its sympathies are numerous and extensive, and may with propriety be divided, according to the plan of Mr. Hunter, into continuous, contiguous, and remote. It sympathizes more readily with organs that are lined by a continuity of its texture, as the kidneys, ureters and urethra; in diseases of neighboring organs it also often participates, and it holds an intimate reciprocal influence with the skin.

Among the most remarkable properties of the muscular coat, are, its sudden and extensive *extensibility* and *contractility*. Artificially distended the bladder becomes immediately of a size treble that which is natural and ordinary. If it sometimes resists, it is no proof of its wanting extensibility; it is because the fluid injected irritates it and makes it contract. To

use the words of Bichat, "the organic contractility in exercise in this case, prevents the development of extensibility, but when urine distends the bladder from suppression, we see it rise from its contracted and concealed state behind the pubis, sometimes even above the umbilicus,—on the other hand its contractility will, in an instant, compress the full distended bladder to the smallest size. This contractility resides in its muscular coat. To this coat, which is destitute of an antagonist muscle, is opposed the urine, which collects and distends it till its quantity or quality stimulates the organ into action.

There are, according to Bichat, three kinds of contractility concerned in the motions of the bladder:—1. Animal; 2. Organic; 3. Textural. The first resides chiefly in the voluntary muscles, the diaphragm and those surrounding the abdomen, and perhaps in some degree the bladder itself; for, though the organ is not classed among those of animal life, and submitted to the will, yet it is more allied to them in this respect than the heart and stomach; "for," says Bichat, "we know that falls on the sacrum, from which arise a shock of the inferior part of the spinal marrow, produce retention of urine,—that they strike as it were this organ with the same paralysis as the inferior extremities, which then also cease to move. Yet as the bladder is very powerfully assisted in its functions by the abdominal muscles which surround it, the immobility of these muscles contributes much to the inability to evacuate the urine." It is, however, the second kind, or organic contractility, that predominates in the contractions of the bladder, which derives its influence

from the nerves of organic life, from the ganglions of the great sympathetic. The third kind, or *contractility* of *texture*, or tonicity, which prevails alike in the organs of both animal and organic life, has little or no agency in expelling the urine, but after the other two contractile powers have expelled it, the contractility of texture closes the organ. The urine then is retained in, or expelled from the bladder, in the following manner: gradually collecting, it distends the organ without exciting into action the sensible organic contractility; the muscular coat yielding to the urine in this case as a set of voluntary muscles does while its antagonist ones are in action, until the urine has, by its increased quantity, become an irritant sufficiently powerful to excite the organic contractility. The strength of this alone, is, however, unable ordinarily to overcome the resistance of the neck of the bladder, which is closed by the contractility of texture, and must be overcome by some force communicated to the urine. To accomplish this, there is a slight voluntary effort made by the diaphragm and abdominal muscles, sufficient to force open the neck of the bladder; after which, there is no need of continuing the effort, the organ itself being able to finish the expulsion. When, however, the urine is in great quantity, and has by long retention acquired the deep color which indicates a concentration of its principles, then the irritation it produces on the bladder, brings powerfully into action the sensible organic contractility, and the contents are expelled, voluntary efforts to the contrary notwithstanding.

It is to be observed, however, that the action is not

immediate. There is, between the stimulus and muscular coat, something intermediate; the mucous surface, which feels the irritation, and its impression is extended to the muscular coat, through the intervening cellular texture. When the mucous coat that receives the impression is diseased, the contractility is uniformly altered; the same stimulus produces slow or quick contractions, according as the affection diminishes or raises the sensibility of this intermediate organ; even slight inflammation may produce very frequent discharges of urine.*

A desire to void urine varies in its frequency, from a variety of circumstances, some of which refer to the state of the organ, others to the nature and qualities of the urine. Among those of the former may be mentioned age, sex, temperament and habit. In infancy, the muscular coat responds with great quickness to the stimulus of the urine. Children often discharge it in sleep,—this susceptibility of the organ is, however, gradually diminished by age and growth, and in old age there is a defect of an opposite character, —a want of excitability in the organ, and a consequent retention. In females, the irritability of the organ is ordinarily greater than in males. An irritable temperament has some influence on the organ, and season

* The muscular coat of the bladder possesses very little animal sensibility. "Remove," says Bichat, "the peritoneum behind the bladder of a living dog, and irritate the subjacent layer, the animal gives but few marks of pain." He mentions an uneasiness, or feeling of slight distress, experienced by persons whose bladder is kept permanently empty, as by an open sound in the urethra, which transmits urine as fast as it oozes from the ureters; this unpleasant sensation he attributes to the stimulus of inanition.

still more. All vesical diseases vary, in summer and winter, and are always exasperated by easterly winds. Habit, too, is worthy of attention, as will hereafter be shown. The inflammation of the organ has already been adverted to.

In regard to the nature of the urine, its influence on the irritability of the bladder will be varied, according to its degree of strength or acrimony. Such are sometimes its stimulating properties, that the bladder expels it as fast as it collects. Its quantity is influenced by the suddenness of its accumulation.

Of all the animal fluids, the urine is most variable in its physical and chemical qualities. Not only its materials appear mixed in different proportions, but there are frequent differences in respect to their number. Ordinarily there are three kinds of urine, varying in physical and chemical qualities, according to the time it has been retained. 1. The urine of *drink* is rendered almost immediately after a great quantity of liquid has been received into the stomach; it is but slightly animalized, its odor is feeble, its color lighter than staw. It is almost entirely aqueous, and possesses sometimes a part of the qualities of the drink that has been taken. Certain medicinal substances, called diuretics, have a specific action on the kidneys in augmenting the secretion. Charged with a very small quantity of the salts and other materials constituting the true urine, that of drink is an unfaithful representation of this liquid, and therefore is not selected by the chemist for analysis. Experiments thus made, serve to determine wherein the urine of drink differs from that which is secreted during the

course of a typhus fever. In relation to their physical properties, their difference is very small. 2. The urine of *chyle* possesses much more of the constituent principles than the above,—its odor and color are more strongly marked:—the kidneys have received blood charged with chyle, and elaborate a more perfect urine, partaking very often of the nature of alimentary substances. 3. That of the *blood*, possesses all the characteristic principles of urine, whether physical or chemical, in the highest degree, and is therefore generally selected by chemists for analysis.

Such are the appearances of urine in a state of health; but this excretion is singularly modified by disease; and the changes to which it is liable, have attracted the attention of physicians in all ages, because they serve in some measure to indicate the state of the patient, and the progress of the disease under which he labors. "The following," says Thomson, "are the most remarkable of these changes that have been observed.

"1. In *inflammatory* diseases the urine is of a red color, and peculiarly acrid; it deposits no sediment on standing, but with corrosive sublimate it yields a copious precipitate.

"2. During *jaundice* the urine has an orange-yellow color, and communicates the same tint to linen. Muriatic acid renders this urine green, and thus detects the presence of a little bile.

"3. About the end of *inflammatory* diseases, the urine becomes abundant, and deposits a copious pink colored sediment, composed of rosacic acid, a little phosphate of lime, and uric acid.

"4. During *hysterical* paroxysms, the urine usually flows abundantly. It is limpid and colorless, containing much salt, but scarcely any urea, or gelatine.

"5. Mr. Berthollet observed, that the urine of gouty persons, contains usually much less phosphoric acid than healthy urine. But during a gouty paroxysm, it contains much more phosphoric acid than usual; though not more than constantly exists in healthy urine.

"6. In general *dropsy*, the urine is loaded with albumen, and becomes milky, or even coagulates when heated, or at least when acids are mixed with it. In dropsy from diseased liver, no albumen is present; the urine is scanty, high colored, and deposits the pink colored sediment. In certain cases, females have been observed to pass urine which had the appearance of milk, and which, on examination, proved to differ from common urine, in containing a notable proportion of the curdy part of milk.

"7. In *dyspepsia*, the urine always yields a copious precipitate with tan, and putrefies rapidly.

"8. The urine of *rickety* patients, is said to be loaded with phosphate of lime, or, according to others, with oxalate of lime.

"9. Mr. Rose has ascertained that in chronic hepatitis, the urine is destitute of urea. This fact is confirmed by the experiments of Dr. Henry.

"10. In *diabetes* the urine is sweet-tasted, and often loaded with saccharine matter. Twenty-nine ounces of sugar, according to Cruikshank, have been voided in the urine of a diabetic patient, in a single day."

The view taken of the organization, properties and functions of the bladder, and of the qualities of the urine, prepares the way for a more intelligible examination of the disease called an irritable state of it. We have seen that on its muscular tunic depends its most essential property, organic contractility; that in a healthy state, the contractility of the neck of the bladder, residing in its dense and fibrous structure, predominates over the detrusive power of the muscular coat, insomuch that the latter requires the coöperation of voluntary muscles with its own, to overcome the resistance; that when this is once accomplished, and a few drops of urine have entered the neck of the bladder, the organ is able, by its own contractility, to complete the expulsion. From this it may be inferred, that a derangement in the relative strength of the detrusive power of the organ, and of the constringing power of its neck, must be attended with a manifest derangement in the functions of the organ. Thus, if loss of power, on the one hand, exist in the organic contractility, as a palsy from injuries done to the spine, or otherwise, the bladder is no longer able to expel the urine; the force of the voluntary muscles alone, being insufficient for compressing the whole surface of its parietes; this must necessarily cause an accumulation, until the pressure of the surrounding parts, aided by the bladder's own tonicity, overpowers the resistance in the neck, when its distension will be taken off, in a slight degree, by a slow dribbling from the urethra, which may continue until the resistance of the neck and urethra is exactly balanced by the expelling power above mentioned. "Sometimes the urine even

dribbles away incessantly, as is found to happen when the action of the bladder is entirely destroyed; for being then constantly full, it can hold no more of the urine descending to it through the ureters, unless as much be voided by the urethra as is received, and as unremittingly as the addition from the kidneys continues to be made." On the other hand, if the contractility of the neck of the bladder is impaired by palsy, wound, or other cause, and the detrusive power of the muscular coat remains, the same effect will be produced as respects incontinency, with this difference, however, in respect to the state of the bladder, that in the former case it will be constantly full, but in the latter case constantly empty.

When the difficulty consists in loss of power in the detrusor urinæ, the disease has been termed *retention of urine*, whilst that which depends on loss of contractility in the neck, has been named *incontinence of urine;* neither of which diseases properly belong to the present subject of investigation. It is a state of the organ opposite to both the above mentioned, that claims our attention,—an irritable state of it, in which the urine excites its contractility more readily than in health.

An irritable state of the urinary bladder varies essentially in its character, and in the indications of cure, according to the nature of the cause, and the circumstances of the patient. In these respects cases may conveniently be divided into two kinds:—1st, those depending on debility, general or local, or sympathetic; and, 2d, those depending on undue excitement, either local or sympathetic. These will now

be considered, separately. The simplest form is that which prevails in children, where the organ is excited into action, without the aid of volition, more frequently in the night. In the day time, the patient is inclined to discharge the urine more frequently than other children, and is sometimes unable to resist the urgency of the call till in readiness to obey it. According to J. L. Petit, there are three kinds of infants, "qui pissent au lit involuntairement: ceux qui sont paresseux de se lever pour uriner aux premiers avertissemens; ceux qui dorment si profondément que la sensation qui accompagne l'envie d'uriner n'est point assez forte pour les eveiller, en sorte que la vessie, qui est naturellement trés-irritable dans les enfans, se contracte avec assez de force pour surmonter la résistance de son col, sans que la volonté ait aucune part à cette contraction, et que l'ame en soit avertie; la troisième espèce est celle des enfans qui rêvent pisser dans un pot de chambre, contre un mur, &c.; ils sentent qu'ils ont besoin d'uriner et qu'ils pissent effectivement; ceux-la ne sont pas en grand nombre, ou du moins il ne leur arrive pas souvent de faire de pareils rêves."

That this form of the disease depends on debility, is proved by the fact, that children are almost the only subjects of it, and are in most cases cured by the development of strength in the organ, at the age of puberty, growing out of its connexion with the genital organs, which experience such an accession of vigor at this period. "Lorsqu'ils sont débarrassés de cette incommodité, le rire, les secousses de la toux, provoquent tres-souvent encore l'incontinence quoique la sensation du besoin d'uriner soit aussi developpée

chez eux que chez d'autres. Quoiqu'il en soit, au reste, de la théorie de l'incontinence, les enfans affectés de cette maladie sont, en general, doués d'un tempérament lymphatique; ils ont ordinairement le tissu cellulaire assez chargé de graisse, les cheveux blonds, le teint coloré, l'iris dilaté; on voit parmi eux beaucoup de scrofuleux, de rachitiques, de teigneux, et on ne peut se dissimuler que comme ils sont plus ou moins faibles, ils sont en general disposés aux maladies du systeme lymphatique, quand ils sont d'ailleurs mal nourris et mal vêtus."—To which it may be added, that the occasional exciting causes, as will hereafter appear, are of a debilitating character.

A question here suggests itself,—If, as we believe the contractility of the whole bladder is wanting in strength, in the neck as well as in the body, (the debilitating cause being supposed to act generally), and if the neck of the bladder, though weak on the whole, yet possesses strength of contractility proportionate to that of the bladder, as in health, why does it fail to counteract the expulsive power of the bladder as effectually in this case as it does in a state of health, and by a similar preponderance of power prevent incontinency? The explanation of the phenomenon appears to me to be this: There is a consent of action, in the retention and evacuation of urine, between the neck of the bladder, the bladder itself, and the muscles of the abdomen. In a state of health the abdominal muscles, as before remarked, commence the expulsion, by forcing open the neck of the bladder; the urine stimulates the sensitive coat of the urethra, which has been bathed for some hours in a bland mu-

cus, and this excitement brings on a contraction of the muscular coat to complete the process. Now in a debilitated state of the whole organ, less aid is required in the incipient stage of the process from the voluntary muscles, and may not even the contractility of texture, or elastic pressure of these muscles, be sufficient to overcome the contraction of the neck, without any voluntary exertion, or even consciousness ?* The supposition is strengthened by many circumstances. Distending the abdomen immediately before going to bed causes such persons to wet their beds;—pursuing an opposite course, prevents the evil. Children whose bellies are habitually tumid and hard, are more subject to this weakness than others. The most valuable remedies are such as strengthen the neck of the bladder, enabling it to resist the common elastic pressure of the abdomen.

Immediately after birth infants pass most of their drinks by the kidneys; very little goes off by the skin. The bladder then contracts itself very often, the urine is scarcely colored, and there is very little difference between that of day and of night, there being no time for absorption in the bladder. "Infants," says Dr. Guersent,† "are in this respect like individu-

* The urine occupies and fills the bladder without occasioning contractions; but if by excess of its plenitude, or by compression of the muscles of the lower part of the belly, a small quantity of this liquid happens to be forced into the orifice of the canal of the urethra, the parietes of which are habitually in contact, the whole of the body of the bladder enters into contraction, and the organ is completely emptied. —*Dict. des Sciences Medicales*, Article *Irritabilité*.

† Of the Hospice des Enfans.

als having no bladder, whose ureters discharge into a sort of cloaca placed within the pubis. Such persons pass enormous quantities of urine, sometimes four or five pounds in twenty-four hours." But after a few months the neck of the bladder acquires strength, and retains the urine longer; absorption of some of the aqueous parts takes place, rendering the urine more saline and stimulating to the organ, and serves to subdue the irritability of it till, after a time, the subject is obliged to call in the aid of the abdominal muscles in expelling it. The faculty of retaining the urine is usually developed between the first year and the termination of the first dentition, and if after this period the child appears insensible of the discharge, there is reason to apprehend a habit of incontinency.

The period of life most subject to this, is between the first and second dentition; the next is between the latter period of puberty; it is, comparatively speaking, very rare in adults. Boys are more subject to it than girls; the same holds true after that period, "ce qui dépend, peut-etre, de ce que les jouissances étant en général plus précoces parmi les jeunes gens, que parmi les jeunes demoiselles, l'excitation des organes genitaux se communique aux organes destinés à la déjection des urines."

Where an irritable state of the bladder exists in children, the quantity of urine discharged varies from causes that are generally assignable. All the means which excite or strengthen their constitutions diminish its quantity, and those which on the contrary relax, cause an abundant increase of it, and augment the disposition to incontinency. When such patients are

attacked with fever, the urine becomes high colored, more stimulating, and is retained perfectly well both day and night; but after the fever has subsided, the debility and incontinence return. Every debilitating cause sensibly augments its quantity, more especially the juices of fruits and a watery diet, and moist weather, and night time. "I have known children," says Guersent, of the Hospice des Enfans, "from six to nine years of age, make from six to eight ounces during the day, and thirty or forty during the night, and though they were taken up seven or eight times during the night, they are found bathed in urine in the morning." But this disproportion depends somewhat on the relative activity of the cutaneous and renal system.

An irritable state of the bladder of the above kind, depending on debility, disappears, as before observed, at the age of puberty, and will sometimes yield to treatment, hereafter to be mentioned, at an earlier period. But there is another kind, of rarer occurrence, sometimes met with in adults, which is accompanied by general debility, and is preceded by defect or derangement in some other organ, and which affects the bladder by sympathy. The organs most likely to suffer and to produce the disease in question, are the skin and stomach. Dwelling in low and humid places, and suddenly checked perspiration, have been known to produce the former kind. Of the other kind, dyspepsia is the most frequent cause,—close study, a sedentary habit, a fretful and anxious state of mind. A clergyman, says Mr. Foote, was long afflicted with an irritable state of the bladder, which he attributed to

the pendency of a vexatious and dreaded lawsuit. Bingham has referred to several cases brought on by dyspepsia, occasioned by errors and excess in diet, and in the use of ardent spirit.

The debilitating passions of fear and dread have a direct tendency to excite the contractility of the bladder. Scholars, while waiting their turn to speak at public exhibitions, are incommoded with an incessant desire to make water. Throwing a hound into a sheep-fold, will cause the whole flock to evacuate their bladders, as soon as the first shock has subsided, so that they can take a convenient posture for the purpose. The effect of fear on timid soldiers in battle is proverbial. The force of *habit* is worthy of attention, in respect to its influence on the retentive power of the bladder. Voiding the urine on particular occasions, is apt to excite a desire to do it on similar ones, even when the quantity collected is very small, as in dismounting from a carriage or horse.* This principle of association, or (to use the more recent and appropriate term of Dr. Brown) suggestion, is affected by peculiar sounds through the nerves of relation,—as that of a cascade, of the streaming of water from a house into a vessel placed near one's bedroom, of another person voiding his urine often within hearing, which every person has felt the influence of upon his own inclination. These causes would be scarcely worthy of a passing notice, but for their effect when often repeated, in contracting the size of the bladder, and thus rendering it irritable to the stimulus of distension.

* The practice of doing this is so common, that we are struck with the appositeness of Butler's description of the situation of Hudibras, at the door of the conjurer, while Watchum is pumping his squire !

Another cause of an irritable state of the bladder is the stimulus, if so it may be called, of inanition. It is that which Bichat refers to while on the subject of caloric, the privation of which is oftentimes an active stimulant. "Apply a stimulus to a muscle, it contracts; but at the end of some time the motion ceases, though the contact continues: remove the stimulant, the motion frequently returns in an instant." A catheter worn for a great length of time, causes an irritable state of the bladder when it is withdrawn and the urine is suffered to collect and distend it.

An irritable state of the bladder is rarely confounded with other diseases, if we except incontinence of urine occasioned by paralysis, and here the previous circumstances of the patient, the state of his general health, and of the spinal nerves, must decide its character. Between the kind depending on debility, and that which is attributable to inflammation, hereafter to be described, an important distinction is to be made, both as regards prognosis and treatment. The kind depending on debility is met with most frequently in children, between the first and second dentition. In almost all cases, if not cured before puberty, it terminates at that period. When this is not the case, the disease becomes more serious in its nature, and threatens to be incurable. There is in this kind an absence of inflammatory symptoms, and what is particularly to be noticed, there is no mucous discharge.

In most cases the habit of wetting the clothes or bed, in children, cures itself, as they grow up and acquire strength. If indolence is the cause, gentle chastisements may be used; most writers, however,

speak of the habit as a real infirmity, and enjoin caution in inflicting punishment—obviating exciting causes, as distension of the stomach with liquids, shortly before bedtime, and taking up such children often during the night. The remedies are such as invigorate the whole system, and give tone to the neck of the bladder. A cold hip-bath, and, when the season will permit, submersion or showering in cold water, will be one of the most effectual remedies. Tonic medicines, particularly the metallic oxides, port wine, Peruvian bark, gentian, and the like may be combined with a liberal allowance of animal food. Peruvian bark in powder, combined with black oxide of iron, in doses of from one to three grains, or in such quantities as to excite an action of the bowels, will cause an immediate diminution of urine, and give its watery color a more healthy shade, and effectually stop the disease for a time. Bingham speaks favorably of calomel in alterative doses.

When the disease is light, it will often yield to strong impressions on the imagination, as thinking of disgusting medicines. A well known remedy with common people, both in this country and Scotland has been a dried fieldmouse, pulverized and mixed with molasses. I believe that here a dread and disgust of the medicine keeps the patient from falling into profound sleep, and from insensibility to the state of the bladder. A dread of chastisement may act in the same manner.

In the Hospice des Enfans in Paris, every tonic application on the loins, pubis and perineum, says Guersent, with the exception of cold water, has failed of producing any sensible effect. "Even cantharides, so much extolled, has almost always failed. A blister

applied over the sacrum has rarely done much good. Generally, this and other applications of the tincture of cantharides have produced no sensible effect on the disease.* The tincture of cantharides, taken internally, has proved beneficial as a tonic. I have given it to children from six to nine years old, to the amount of a drachm in a day, without producing any heat in passing the urine; which proves, that in infants affected with incontinence of urine, the bladder is quite insensible to the irritation produced by cantharides." The same author speaks in high praise of nux vomica, in extract or in powder.

M. Mondière, of Germany, has employed the extract of nux vomica in cases of nocturnal incontinence of urine, with very beneficial effects. The case in which its efficacy was most strongly shown is that of a young woman, aged twenty-eight, who, from the age of six years, had constantly voided her urine involuntarily during the night. The use of twelve of the following pills put an end to the incontinence. They were continued until twenty four grains of the extract had been taken, and during the year following this treatment, there was no return of the disease. Other successful cases are mentioned.

℞ Extracti nucis vomicæ gr. viij.
Ferri Protoxidi gr. j.
Fiant pil. xxiv.

Electricity has produced temporary benefit in children, particularly those of a scrofulous habit. Doubtless the benefit would be greater, in obstinate cases,

* Dr. Samuel Lair, of London, has recently succeeded in curing three cases of incontinence by introducing the tincture with a catheter to the neck of the bladder.

if light shocks were transmitted by a sound passed into the bladder. But whatever may be the means employed, relief from the evil will be slight and temporary if nature, in turn, fails to develope the vital forces of the system, and particularly of the organ concerned. It is therefore of the first importance to confine such children to that kind of diet and regimen which will be most likely to improve their general health, feeding them with roasted, broiled and smoked meats, allowing strengthening drinks, and withholding broths, porridges and diluting beverages, particularly on going to bed. In a word, they should be well fed, clothed and exercised.

When the disease is protracted till after the age of puberty, there is great danger of its becoming incurable. Medicines, if resorted to, should therefore be used more vigorously and perseveringly. The nux vomica is worthy of a more thorough trial. In one such case I have found tartar emetic ointment, applied to the sacrum, prove beneficial. Cold sea-bathing should be persevered in for a great length of time. Marriage has proved effectual in a female, says Guersent, after other means had proved unavailing.

When these remedies and the like fail, we must content ourselves with the use of palliative means, as instruments calculated either to compress the urethra, and intercept the passage of urine, or to receive the urine as fast as it is voided. "The first of these plans is more difficult to accomplish in women than men; but it may be executed by means of an elastic hoop, which goes round the pelvis, and from the middle of which, in front, a curved elastic piece of steel de-

scends, and terminates in a small compress, which is contrived to cover accurately the meatus urinarius." *

Where an irritable state of the bladder proceeds from dyspepsia, the remedies indicated for the primary affection are chiefly to be relied upon. Bingham lays great stress upon attention to diet and regimen, and an alterative and purgative plan of treatment, and cites several interesting cases in support of his opinion.

In these, as well as most other cases of a chronic character, there generally exists a diminution of the capacity of the bladder. The treatment successfully adopted by Mr. Foote for this evil, was injecting a decoction of mallows or flaxseed, twice a day through a catheter, letting the instrument remain in most of the time, and the injection for the space of about fifteen minutes. By a perseverance in this course, Mr. Foote says he has been able to distend a bladder that had contained, for a great length of time, not more than half a gill at once, and that with pain, until it could retain twelve ounces.†

From an irritable state of the bladder depending on debility, we now turn to the other kind mentioned, arising from inflammation of the mucous coat. That it depends on inflammation, and consequent augmentation of its organic and animal sensibility, seems proved, not only by the obvious effects of its assignable causes, but also by the appearance, in most cases, of great quantities of mucus mixed with the urine. "If there be a discharge of mucus in unna-

* Œuvres Chir. de Desault, par Bichat. T. 3.

† "On curing Diseases of the Urethra and Bladder, by Jesse Foote."

tural quantity, there must be increased vascular action, because as all secretions are formed from the blood, the quantity of them must in some degree be proportioned to the quantity of this fluid which circulates in the part from whence the secretion takes place." * An inflamed state of the organ has been less spoken of by those who have described post-mortem appearances than we should expect, on the presumption that inflammation in all such cases existed; but the reason of it I believe is, that there is an oversight of the natural paleness of the organ compared with what exists in other cavities lined with a mucous membrane. "I ought to observe," says Bichat, to those who open dead bodies, that they should never lose sight of the original tinge of the portion of the mucous system they examine, since each of the divisions of this system exhibits in its shades remarkable differences. If the membrane of the bladder is found as red as that of the stomach in its *natural* state, then pronounce that there had been inflammation. There is a scale of color for the mucous system; it is then essential to have an accurate knowledge of this scale, a type to which to refer the inflammatory state in the examination of dead bodies. We have before remarked that inflammation in the mucous membrane of the bladder, however slight, augments its sensibility, and through this the contractility of the muscular coat, and thus occasions frequent discharges from the organ, and this, too, whether the neck participates in the inflammation, or retains only its ordinary share of contractility. When, however, the inflammation is violent, and in-

* Renauldin. Dict. des Sciences Medicales.

volves the muscular coat, the organ is equally indisposed to contract or dilate, it therefore remains in a state of equipoise; a certain portion of urine will consequently be retained, and when its quantity is increased, and puts the muscular fibres on the stretch, the organ will relieve itself by expelling a part.

An irritable state of the bladder from inflammation may, like that which depends on debility of the organ, be divided according to its cause into two kinds, local and sympathetic. The local causes are too long a voluntary retention of the urine, as often happens in riding a great distance in a carriage, on our being closely impacted in large assemblies or public courts, or so strongly chained by the interest or eloquence of a subject discussed in such a place, that we cannot consent to retire so soon as we ought. The irritation of distension long endured may cause a spasmodic constriction of the neck of the bladder,—this often happens in those whose urethra has suffered much from previous gonorrhœal inflammation,—and the urine will at length, by the stimulus of distension, and by its increased acrimony, from absorption of its aqueous part, excite inflammation, and an irritable state of the bladder. Violent blows on the region of the bladder; riding rudely on horseback, or with too elevated a pummel to the saddle; compression in labor; the presence of foreign substances introduced, as a sound or bougie, or from gun-shot wounds; or needles passing from the stomach; irritating injections; calculi in the form of stone, gravel,* or sand; acrid urine from

* The most frequent cause, says Howship, is a disposition to deposit gravel in the urine.

cantharides taken or absorbed by the skin; the use of substances possessing aphrodisiac powers; excessive venery; acrid diuretics, as balsams, and turpentine; the latter may be inhaled into the circulation through the lungs, in a newly painted room, as has been proved by examining the urine of persons after such exposure. A dissecting room, where much turpentine is used in making preparations, I have known produce an irresistible desire to void urine in some persons, every time they entered it. Lastly, acute and chronic catarrh of the bladder, from whatever cause, and ulcers and cancers, diseased mucus, blood, or other fluid, to which the bladder is not accustomed. "The urine," says Haller, "is the least uneasy stimulus of the bladder; water injected is more so; and mucus, blood, or other fluid, except healthy urine, causes more or less irritation." This is true, however, only when the bladder is in a healthy state: when its vital properties are changed, as by inflammation, the qualities of the urine in relation to them are no longer the same,—it becomes a morbid stimulus; while pure water or mucilaginous solutions will, under such circumstances, have the effect to soothe and allay irritation.

Among the sympathetic causes, may be mentioned those acting on other organs, and propagated to its mucous membrane by continuity of texture; as renal irritation or inflammation, from whatever cause,—urethral, from stricture and virulent gonorrhœa, which is the most frequent cause of an irritable state of the bladder. This tendency of the bladder to participate in diseases of the continuous mucous coat, lining the

whole length of the urinary channels, seems to depend, first, on the peculiar and identical degree of sensibility and irritability assigned to this one and the same structure throughout its whole extent; and, secondly, on the sympathy always found to exist between parts engaged in the same function. On this account it is advisable, in all cases of irritable bladder suspected to proceed from sympathetic inflammation, to have an eye first to the several parts of the urinary passages lined by the mucous membrane; next to this the contiguous organs should be looked to; as the prostate gland, the uterus and vagina, the rectum and anus, and the spinal marrow;*—also remote organs, as the skin,—which holds an intimate sympathy with the bladder, as is evinced sometimes by the effect on the latter of suddenly repelled cutaneous diseases. I have seen two cases of inveterate psora cured suddenly, that were followed by a long continued irritability of the bladder. In one of them, a child, nine years old, the disease assumed the character of irritability from weakness, and was prolonged until the time of puberty. The affection may proceed from the sudden suppression of accustomed evacuations, as of perspiration, of hæmorrhoids, and of the catamenia. A reviewer of Bingham's book concludes by saying, "one affection of the bladder he has not noticed, and we know of no one who has particularly described or even alluded to it. It is a very distressing affection of the

* I could relate three cases that were connected with spinal irritation, and which yielded entirely to remedies, applied over the lumbar vertebræ, such as cupping, issues and tartar emetic ointment, with the free use of carbonate of iron.

bladder, produced by sudden check of the catamenia. It has been mistaken for and described as some affection of the uterus; it is, however, seated in the bladder."

The most prominent symptoms of irritable bladder are, frequent inclinations to void the urine; a sense of uneasiness, sometimes of heat, in the bladder, and a tenderness to pressure; pain; in some cases urgent tenesmus and straining, which are most severe in discharging the last drops. The turgid vessels near the neck sometimes give way and cause a discharge of blood. A mucous discharge is very common, and is a diagnostic symptom, in most cases, between inflammatory irritability and that which depends on debility. This symptom is worthy of more attention in respect to the different states of the mucus, and therefore justifies the following extract from Bingham. "Mucus from the bladder is met with of four different kinds, or in four different states. Sometimes it appears much like jelly, adhering all round the inside of the vessel into which it is voided; and in one instance of this which I have seen, the mucus had a slight greenish hue, but in other cases it has been perfectly free from color. Sometimes the mucus resembles pus so nearly, as to make it difficult to discriminate between them. A third kind is glairy mucus, so thick and tenacious that the end of a stick entangled in it, will elevate the whole in the form of a thick rope. The fourth only differs from the latter in containing a quantity of earthy matter, which is sometimes so fine and white as to have been compared to hair powder; but I have seen it in rough particles about the size of mustard seeds, and one or two pieces have been nearly

as large as a grain of wheat: in this state it looked very much like old mortar. The best way to determine whether there be a morbid secretion of mucus from the bladder, is to observe the urine immediately after it is voided, whilst it remains warm, for when cold it often throws down a sediment which may be mistaken for mucus. If none but cold urine can be obtained, it should be heated to the temperature of the internal parts of the body, before observation be made on it. If mucus appear under these circumstances it will be more satisfactory, but if the urine be perfectly clear, we are not thence to feel assured that it contains no vesical mucus, because I have seen urine that was both clear at the time of voiding it, and after standing to grow cold, from which a deal of mucus separated and clung to the side of the pot so firmly, as to allow the urine to be poured away from it. Pus, I believe, may be distinguished from mucus by observing how it mixes with the urine. Pus seems to me both to blend more readily with the urine when they are stirred together, and to separate more completely than mucus does. To the best of my recollection, in every instance where I have had no doubt of pus coming away with the urine, the latter has always retained a milky or rather whey-like appearance. Sometimes the best mode of discriminating between the two, is to let the urine stand perfectly undisturbed for some hours in a cold place. Thus I have known a discharge from the bladder,—which, when first voided, was so much like pus that I could not determine its nature, but which I was inclined to think pus,—after standing a few hours, assume so consistent a form, as

to leave no doubt of its being mucus. The smell of vesical mucus will also often distinguish it.

From the secretion of the prostate it may be distinguished by not having the peculiar mawkish smell of the latter,—from its containing earthy particles,—from its rapidly becoming putrid and discharging much ammonia, and from its being discharged only with the urine; whereas the prostatic secretion, when formed in an unusual quantity, generally escapes externally along the urethra, as rapidly as it is forced out from the prostate.

"Mucus that is discharged along with the urine, very possibly may come from the kidneys; but when this happens, it seldom appears in considerable quantity, unless it bear a great resemblance to pus. Precisely the same kind of mucus may be secreted by the bladder; therefore a correct discrimination may sometimes be difficult,—we must be guided chiefly by other symptoms. If there be indications of disease in the renal glands more violent than the symptoms of disease in the bladder, and if they existed before those of the bladder, then we may be allowed to suppose that the mucus comes from the kidneys; but if the bladder was known to be diseased before the kidneys, then we may suppose the symptoms of disease in the latter to be sympathetic, and may conclude the mucus comes from the bladder.

The prognosis must be regulated by the degree of violence in the inflammation; threatening on the one hand gangrene and high symptomatic fever, or promising on the other a resolution, and leaving no permanent organic lesion;—by the extent and duration of

functional interruption,—by the nature and magnitude of the sympathetic affection, threatening exhaustion from excessive discharge of mucus and from constitutional irritation.

When the disease is of local origin, some general remedies are applicable, which must, however, be varied according to the intensity of the symptoms and the circumstances of the patient. The first indication that ought to engage the attention, is, to calm the irritation of the organ and subdue inflammatory symptoms. If the symptoms are violent, bloodletting should be employed,—the more suddenly the abstraction is made the better. On this account it may be advisable, in cases of great intensity of suffering, to bleed from both arms at once. The body may be immersed in the warm bath, and where this is impracticable, the hypogastric region should be bathed with emollient fomentations. Mucilaginous drinks should be administered freely, as linseed tea, and injections of the same per anum, adding to a pint from two to four drachms of the tincture of opium, according to the degree of suffering of the patient.*

If urine has accumulated in the bladder and the inflamed state of the neck opposes its discharge, the introduction of a catheter may become indispensable;

* In many cases of obstruction, when the bladder is very full, the injection of water into the urethra may force open the passage inwardly and give passage to the urine. In cases of old men this promises relief. In such the stricture is membranous and acts as a valve in preventing the flow of urine. It may also serve to push back into the bladder a calculus lodged in the passage. A flexible tube should be introduced as far as the stricture and a gum elastic bottle used. *Johnson's Journal*, 1826. p. 284.

but this operation must be performed with great care and delicacy, as the bare contact of the instrument is calculated to augment the irritation of the mucous membrane. After having given vent to the urine, it will be advisable to press gently through the catheter into the bladder a mucilaginous injection of flaxseed tea or a solution of gum arabic, to an ounce of which may be added twenty or thirty drops of laudanum. This should be retained for some minutes, when a part of it only should be allowed to flow out at a time, the other part remaining to attenuate the acrimony of the urine, until more is thrown in. When the symptoms are moderate and the neck of the bladder is not closed, mucilage, of the temperature of the part, may be injected by a urethral syringe, in successive charges, till a portion of it reaches the bladder. Some irritation will be created at first by the contact of a fluid to which the part has not been accustomed, and by its retrograde distension of the passage, on account of which simple mucilage alone should at first be tried, but after a small quantity of this has reached the bladder, I have found the addition of the tincture of opium, in proportion of a teaspoonful to an ounce of the injection, produce the most happy effect. Some effort will be required at first on the part of the patient to retain it, and it should be administered to him while in a horizontal posture, in a warm bath, or covered in bed. In almost all cases where inflammation runs high, is attended with violent straining, tenesmus, and other distressing symptoms, the above will be serviceable in mitigating the suffering. Finally, should catheterism become absolutely impracticable,

under the depleting, relaxing, and soothing treatment above mentioned, it may become necessary to puncture the bladder with a trocar. The French surgeons generally prefer doing this over the pubis, and the English through the rectum. When the organ is much distended it is easy to penetrate it either way, without endangering the peritoneum.

The following case, in which the bladder was punctured, came under my own observation, and seems worthy of insertion. F. J. had a stricture of the urethra, of long standing, and which finally increased so as to be impervious to bougies or catheters. His bladder being greatly distended and no relief afforded by medical treatment, it became necessary to puncture it, which was accordingly done through the rectum by the common curved trocar, and the canula was confined in the usual manner with tapes passing up behind and before to a belt. It was intended to be left in a day or two until adhesion should take place. The time required for this Sir E. Home thinks is thirty-seven hours, after which the canula may be withdrawn. Being at the time a student with Dr. Warren, who had charge of the patient, I was stationed to watch with him, with orders to prevent, if possible, the disturbance of the canula. On the following night, however, it was forced out by a dejection from the bowels, and great fears were felt by the operator, Dr. J. C. Warren, that the cure was defeated. It however proved otherwise. An opening continued between the bladder and rectum, through which the patient passed his urine for one or two years till his death, it being found impracticable to overcome the stricture in the urethra.

Another case has recently come to my knowledge in which the operation was performed over the pubis, which I refer to on account of the instruments used. They were a bistory and female catheter. An opening was made by the former and the catheter was introduced by the side of it, and suffered to remain for many days, when an incision was made in the urethra over the stricture and the obstruction removed, so as to admit of the passage of a catheter into the bladder, where it was suffered to remain till the first opening was closed and the incision in the urethra healed.

When the inflammatory symptoms are subdued, it will be advisable to desist from the emollient course, lest the disease should assume a chronic character. On this account it is advisable, in the decline of the disease, to change the rigid antiphlogistic treatment for one that is more invigorating, to administer drinks moderately astringent and tonic, to take solid food and wine, to exercise moderately, and to avoid all predisposing and exciting causes.

But oftentimes all these means fail, and the disease is converted into a chronic irritability of the bladder, a disease which is more frequently seen than the acute kind, for besides being many times the consequence of it, this often begins in a slow and insensible manner. Though the causes are the same as of the acute kind, it is observed to proceed more frequently from stone and gravel, or from other unnatural bodies in the bladder,—the presence of a sound for a long time, or of bougies introduced too far into the cavity of the organ. It is also apt to be the consequence of a cutaneous eruption, suddenly repelled, and to attend

aged persons affected with rheumatism, gout, and nephritic irritation, a disease of the prostate, and to follow multiplied attacks of gonorrhœa, neglected or ill treated, excessive venery, and the abuse of spirituous liquors, particularly of gin; and to accompany diabetes.

When chronic inflammation and irritability succeed to the acute, there is a mucous discharge long after the inflammatory symptoms have subsided. If, on the contrary, the disease has not been preceded by acute symptoms, it is often accompanied with pains in the bladder and in the extremity of the urethra, before and during the discharge of urine; and this fluid, as it cools, deposits mucus, the quantity of which is gradually augmented, and which varies in character according to the nature of the cause, as before stated.

The loss of this mucus when considerable, as well as the accompanying irritation, induces emaciation; and though one may live many years with such a disease, a cure ought to be attempted. To the general directions already given, may be added some of individual application to particular cases, whether local or sympathetic. The diagnostic symptoms of each case are to be particularly noticed; some of which I shall briefly mention. 1. If caused by *stone*, the pain in making water is severe and greatest while forcing out the last drops, because the contraction of the bladder presses the stone to the neck. Often there is a dull pain in the region of the bladder, with acute suffering in the glans penis. The pain is greatly increased by riding; there is a large quantity of mucus, and occasionally some blood in the urine. There is

some difficulty in retaining the urine; frequently when the urine is flowing in full stream, it stops suddenly, without a cessation of the stimulus to evacuation. "This happens," says Sir Charles Bell, "from the stone falling on the urethra. If the patient be placed on his hands and knees while making water, and this sudden stoppage occurs, it is a particularly strong indication of stone, especially if the urine flows on changing to the more recumbent posture." No cure can be effected without an operation, which it would be foreign to my purpose to describe. 2. *Renal calculi* in the bladder occasion an irritable state of it, a discharge of mucus, and uneasiness in the loins. When in the form of *sand* the pain is slight, whilst *gravel* occasions great previous suffering in the kidney and ureters. The sand is either white or red, and according as the former or latter color prevails, the sand is of an acid or an alkaline nature. This it is important to remember, as the remedies in the two cases must be different and opposite. When the urine deposits white sand, says Latham, acids should be administered, as the muriatic, sulphuric, citric and carbonic; but when these are long continued, they cause the very evil they were intended to remove; the sediment becomes copious, and of a red color. Reversing the treatment, and exhibiting alkalies, as magnesia and soda, changes them again to a white color. But by employing the two classes of medicines alternately, a balance between the evils will be preserved, until, by the aid of tonics and astringents, the cause, with the irritability it occasioned, are removed and health is restored. Both remedies must, however,

be watched, in order to keep between the two extremes.

In these, or other like cases of irritable bladder depending on the presence of irritating substances, the coats of the organ are liable to a permanent contraction. "An irritation of the bladder, existing for a great length of time, especially that which is produced by the presence of a calculus, or of lithic sand, or by any other of the common causes of inflammation, will produce a shrinking of the organ from its natural size." Mr. Foote ascertained that in these, as well as in the cases depending on debility, the organ may be easily restored to its natural size by mucilaginous injections, which, besides distending the organ, and thus obviating one cause of irritability, have also the happy effect to wash away the sand from the coats of the bladder, when present, more effectually than would be done by the urine alone.

Another cause of local irritation is diseased urine. Though it would seem more proper to refer an irritable state of the bladder from morbid urine to a disease of the kidney secreting it, rather than to the secretion itself, still the latter must have some effect in aggravating the disease. I shall barely refer here to diabetes mellitus, in which the urine, by its stimulating qualities, keeps up a constant irritability of the bladder. It would be wasting time to discuss the nature of this malady, for whether it be seated in the stomach or some of the chylifacient viscera, as maintained by Rollo,—or caused by dyscracy or intemperament of the blood from defect in the assimilating functions, as stated by Willis and Sydenham,—or as Charles Dar-

win maintained, by a retrograde motion of the lacteals from the thoracic duct into the lacteals of the kidneys, or by a morbid condition of the kidneys, as maintained by Galen, Ruysch, Prout, Cruikshank, Dupuytren and Thenard, there is still a general agreement in respect to the best mode of treatment; and with a restoration of healthy urine, in this disease, or from any other cause, the irritability will of course subside.

The other diseases of the mucous membrane, in its continuations, are seated in the kidneys and urethra. Among the latter may be mentioned gonorrhœa virulenta, which often extends along the mucous lining of the urethra, producing a very irritable state of the bladder. The remedies in such cases are the same as those described under acute inflammation of this organ. Bingham recommends the injection of warm oil, where there is a spasmodic stricture from the above cause, and attributes its good effects in part to mechanical distension; and compares it, in this respect, to the *partial* introduction of a large bougie, which has, in many cases, proved more effectual in giving passage to the urine than a small one, though introduced only two or three inches.

When the disease proceeds from inflammation in the kidneys, there is pain in the renal region; frequent micturition; vomiting; numbness of the thigh on the affected side, and retraction of the testicle. "The skin is usually hot and dry, the body costive, and motion, or even an erect position, is accompanied by considerable uneasiness." When the disease is violent the urine is discharged in small quantity, and of a pale hue; and hence if the urine becomes high colored, be

secreted in a larger proportion, and be at length thick and mixed with mucus, a gradual relief may be expected to follow, and the cure will be effected by a copious flow. Sometimes the desire to make water is very distressing and incessant, and the bladder may become so irritable, that whether it be moderately distended with urine, or empty and contracted, the pain is equally great. It is unnecessary to add, that here the attention must be directed to the primary disease, and with the removal of this will cease the sympathetic irritability of the bladder.

The last remark applies also to sympathetic irritability proceeding from affections of contiguous organs, of which our limits will permit of only a cursory notice. The signs denoting an irritation in the prostate, accompanying an irritable bladder, are, "a sense of heat and fulness; a dull, aching pain in the perineum, with occasional aching pain in front of the pubis, as though this latter part were pressed externally by some hard substance. In some instances, the finger in the rectum will discover the prostate to be enlarged; and if the gland be pressed, it sometimes causes pain in front of the pubis; but it must be remembered, that considerable irritation may prevail in the gland, without any enlargement of it. Should the prostate, however, be enlarged, then very probably there will be also a partial retention of urine, which may be the only cause of the bladder's being irritable. This can only be known by introducing the catheter, after the patient has used all his endeavors to expel his urine. Disease in the prostate operates directly, and indirectly, to produce irritability of the bladder. The

direct effect takes place when irritation is propagated, or continued from the prostate to the bladder; and the indirect effect occurs when some enlargement of the prostate merely prevents the complete evacuation of the urine, in which case the bladder grows irritable in consequence of the perpetual stimulus of the retained urine. This should be carefully borne in mind, because the treatment of these cases ought to vary according to the immediate cause of the vesical irritation. If the bladder suffers from partial retention of urine, this must be remedied by the introduction of the catheter, as often as necessary." In cases of diseased prostate, Mr. Bingham considers it of the first importance to regulate the digestive organs by diet and medicine; and when this is done the sympathetic affection will generally subside.* His directions in regard to the use of the catheter are excellent, and, if attended to, will enable one to understand the nature of the obstruction opposed to the passage of urine by the prostate;—that is, whether it be the middle or the lateral lobes that are enlarged.*

* "When an instrument will pass to and fro freely, for the distance of eight, eight and a half, or nine inches along the urethra, the retention will then generally be owing to the valvular projection of the middle lobe of the prostate, over the internal orifice of the canal; but if, when the instrument has entered about seven inches and a half, it be impossible or difficult to urge it further, and when it has passed further, it be found equally difficult to withdraw,—and if it be a bougie that has been used, and its point appears flattened at the sides, then there will be reason to conclude that the lateral lobes of the gland press firmly against each other, and so obstruct the flow of urine. This latter kind of obstruction usually comes on in consequence of inflammation of the prostate, and is indicated also by a great sense of weight, heat, and fulness, and perhaps aching pain in the perineum and about the pubis. Very often, both these kinds of obstruction exist

Derangement in the functions of the uterus, as obstructed catamenia and hysteritis, may cause an irritable state of the bladder; but as the primary affection in this case, as well as the remedies, are generelly understood, nothing further need be added. Ulcerations of the colon and rectum are mentioned by Bingham, and several interesting cases are given which were successfully treated by mild purgatives, with strictest attention to diet, followed by mild tonics.

When the disease succeeds to a suddenly repelled cutaneous eruption, more benefit is to be expected from blisters than when it proceeds from other causes. Persons who are subject to returns of an irritable state of the bladder, from suddenly checked perspiration, have been benefited by perseverance in the use of the shower-bath.

at the same time; for as that which results from the pressure of the lateral lobes against each other may be brought on at any time by a sufficient degree of inflammation, so it is apt to take place when the valvular projection of the middle lobe exists already. Inflammation may indeed be the cause of the valvular obstruction; for, although the middle lobe of the prostate be morbidly enlarged, it may not be sufficiently so to obstruct the urine; but if it becomes inflamed, then the increase in size that necessarily follows, makes it shut up the urethra completely."—*Bingham.*

CUTANEOUS DISEASES.

DISSERTATION.

ON THE CONNEXION BETWEEN CUTANEOUS DISEASES WHICH ARE NOT CONTAGIOUS, AND THE INTERNAL ORGANS.

The laws of vitality that preside over organized bodies, preserve a mutual dependence and a reciprocal influence between their several component parts. The more perfect and complicated the organization is, the more numerous are its ties of connexion and relation. Not only the several organs are thus held in mutual dependence, but each tissue is so modified in its relations by other tissues, that the exercise of any one of them, whether healthy or morbid, is felt and responded to by all the others.

This consent of action between parts is clearly displayed in the organs designed to aid in replenishing and nourishing the human body. The brain, through the medium of the first pair of nerves, takes cognizance of savory food proper for nourishment;—the salivary glands pour out a fluid to moisten it, which is increased when the substance is introduced into the mouth, and still more when the jaws are put in motion to masti-

cate it. The complicated mechanism of deglutition acts,—the exhalant arteries of the stomach are excited by its presence within that organ;—the whole sanguiniferous system receives the impression, and the blood retires upon the central organs. These central organs, and especially the chylopoietic viscera, are excited into action, and transmit the nutriment they have prepared to the surface and elsewhere, replenishing and invigorating every organ, each participating in the process, and each deriving benefits in return.

But if healthy actions are thus mutually extended from part to part, so also are morbid ones. If the process just mentioned be interrupted in any part of it, disorder pervades the whole. If with the savory substances, crudities are swallowed, the stomach is oppressed, chymification is imperfectly performed, which leads to imperfect chylification, and this to imperfect sanguification, and this to imperfect assimilation. If the mesenteric glands be tumefied, and the lacteals thereby obstructed, the circulating fluid is diminished, and debility and marasmus ensue. Or even if blood be drawn while the stomach is distended with wholesome food, the digestive process is interrupted, and faintness, nausea, and perhaps vomiting, are produced. Each part is so catenated in its office with the others, that disorder or interruption in any one link, is extended to the whole chain.

Pathology, therefore, as well as physiology, demonstrates the mutual dependence and reciprocal influence of different parts of the body. This, however, is more observable in respect to some organs than others. Between the stomach and head, the uterus and mam-

mæ, the throat and testes, it is particularly remarkable. The same remark applies to particular textures or parts of organs. Inflammation of one tunica conjunctiva extends to the other,—of the fibrous texture of one joint to that of others,—of one part of the mucous membrane to other parts of it,—of the skin to the mucous membrane, and of this membrane to the skin. This consent of action between certain organs and certain textures, whether healthy or morbid, is termed *sympathy*, the nature of which will now be imperfectly investigated.

By sympathy, then, two organs are so united that an affection of one of them extends to the other. The point or organ primarily affected, may be termed the radiating centre of sympathy; the part secondarily affected may be termed the seat of it. All the organs may become radiating points of sympathy. Severe inflammation of any tissue may affect the heart, the lungs, the gastric system, or the brain and nerves. In general, the more a viscus or organ is endowed with life, the more its relations with other organs are multiplied and immediate. Diseases of the brain, of the lungs, and of the liver, spread derangement throughout the system. But of the simple textures, the mucous membranes, particularly that of the stomach, seem entitled to the first rank as radiating and receiving centres of morbid sympathies.

Morbid impressions are, however, oftentimes less sensibly manifested in the radiating organ, than in the sympathizing one. Whether this be attributable to greater natural susceptibility in the latter, or to the fact that it has been less exposed to the action of ex-

ternal agents, and is therefore less habituated to their impression, certain it is that it often experiences more decided and permanent changes immediately after the primary impression has been made. Thus cold, acting upon the skin, may produce only a slight and transient change on the state of the part, while the organ that sympathizes with it, as the mucous membrane of the throat and air-passages, or intestinal canal or bladder, may be affected with severe inflammation.

The radiating centre of sympathy is ordinarily single, but the receiving ones may be numerous. The irritation of the gums caused by teething, may derange the stomach and produce indigestion. The imperfect chyme may then irritate the intestines,—this may extend to the skin and produce cutaneous eruptions, or to the brain and cause convulsions or effusions. When the mucous membrane of the lungs is highly inflamed, in consequence of cold applied to the skin, this may extend its influence to the presiding organs of the body, to the brain or the heart and arterial system, and thus affect every part.

It would gratify curiosity, and in some instances lead to more correct indications of cure, could we determine the means by which sympathies are propagated from tissue to tissue, and how remote organs participate in each other's diseases;—how the abstraction of heat from the soles of the feet causes quinsey, or cold drink during free perspiration causes pleurisy;—what tissue has transmitted the irritation of the mucous membrane of the stomach to the pleura, whether it be one or many agents that are employed,

varying according to the nature of the radiating centre. These questions, which have ever occupied the attention of physiologists, are as yet unsettled, though many ingenious and plausible theories have from time to time been advanced. The membranes, the cellular texture, the blood vessels, the nerves,—each singly or in concurrence with the brain,—each singly or in concurrence with the blood vessels, has at different times been represented as the agent of sympathies.

When physiology was imperfectly understood, all the membranes were supposed to be derived from the brain, and it was during the prevalence of this error that Baglivi referred to them the chief agency of sympathy. Although each membrane may propagate its inflammations in itself, by continuity of texture, or to other corresponding ones, by reason of similarity of structure and function, and from its consequently corresponding development of vitality, yet a great proportion of the phenomena of sympathy are admitted to be inexplicable upon such a connexion.

Bordeu referred sympathy to oscillatory movements, propagated along the cellular tissue, and cites as proof the fact, that many cases of abscess are translated from part to part in this substance; but this doctrine is now abandoned.

Those who have represented the vascular system as the agent of sympathies, explain some instances by the anastamosis of blood vessels, especially of the arteries; but the connexion between the uterus and mammæ, and the parotids and mammæ, by sympathy, as also the vicarious hemorrhages that sometimes occur in organs remote from the primary affection, cannot be thus explained.

But it is the nerves in an especial manner that, from the nature of their office, and their general distribution through the system, have been charged with being the agents of sympathies. They alone impart sensibility and contractility,—their filaments penetrating all the organs and tissues, accompanying the vessels to their ultimate divisions, and forming frequent connexions with them. Moreover, a great proportion of the phenomena of sympathy are known and acknowledged to depend on their instrumentality.

Some objections have, however, been made to this opinion of the sympathetic agency of the nerves in all cases, a few of which it may be proper to notice. "A nervous trunk distributes its filaments to many organs, of which, one alone happens to be the seat of sympathetic phenomena;—why is it that all the branches are not irritated?" If the organs are connected by nerves, why is it that two organs, remote from each other, are brought into sympathetic action, and not the intermediate ones? "Whytt attached great importance to what he considered an established anatomical truth, viz., that each filament has two extremities, one in the brain, the other in the organ to which it is distributed; and that it has no communication in its passage with the other filaments accompanying it, but is separated from them throughout its track."

In reply to these objections, it should be observed, that since they were offered, anatomy and physiology, as well as pathology, have made astonishing progress generally, but especially in relation to the distribution and connexions of the nerves, and that every new step has been attended with some new demonstrations

of the nature of sympathies, as connected with nervous communication. Mr. Hunter made some discoveries, and Mr. Charles Bell has been particularly successful in disentangling the complexities of the nervous system, and in drawing out many threads that before seemed inextricable, and has shown that many sympathetic phenomena, which before his time were termed remote, are unquestionably owing to direct nervous communications. The French physiologists have likewise been diligent and successful in the same pursuit. M. Broussais has demonstrated, to his own satisfaction at least, that all sympathies depend on the sympathetic nerve, diffused throughout the system, and communicating every where by ganglions with the sensorial nerves. His views, as given by Merat, in the Dictionary of Medical Sciences, p. 551 and 2, are worthy of being transcribed.

"On sait, surtout depuis les écrits de ce médecin, que les organes d'espèce différente qui constituent par leur ensemble le système nerveux, ont entre eux des rapports fréquens et intimes; que chaque sensation extérieure est transmise au cerveau par les nerfs qui partent de ce siège principal de la puissance nerveuse et de la moelle épinière, parvient dans les nerfs des ganglions et les suit jusque dans les tissus où ils se terminent; que le nerf trisplanchnique fait connaître à la masse encéphalique les impressions diverses reçues par les viscères; qu'ainsi le cerveau correspond avec les viscères, et que les deux ordres de nerfs s'influencent réciproquement. Le nerf trisplanchnique, placé le long de la colonne épinière de l'un et de l'autre côté, a spécialement les viscères sous sa dépendance;

il envoie de nombreux filets dans leurs tissus; il accompagne les vaisseux sanguins dans tous les organes. Ses ganglions sont, aux yeux de M. Broussais, autant de points de convergence; c'est là qu'aboutissent les mouvemens ou impressions qui parcourent les cordons nerveux; c'est par eux que les viscères sont associés les uns aux autres dans leurs actions organiques. Une particularité qu'il importe de signaler, c'est le nombre infini des anastomoses ou communications qui existent entre le nerf trisplanchnique et les nerfs qui appertiennent au cerveau et à la moelle épinière. M. Broussais pense et démontre que les nerfs des ganglions n'ont pas été créés uniquement pour modifier les sensations qui, du cerveau, parviennent dans les viscères, ou qui des viscères sont réfléchies au cerveau ou pour faire exécuter directement des mouvemens voluntaires; mais que c'est bien plutôt pour déterminer des mouvemens indirects par l'influence réciproque des deux ordres de nerfs. Le nerf trisplanchnique commande les contractions des muscles des viscères; il les rend indépendantes de l'influence du cerveau; il est l'intermédiaire obligé des mouvemens musculaires qui ont lieu dans les viscères, lorsque ceux-ci ont reçu du *sensorium commune* une impression reçue par les sens externes; il a pour destination spéciale d'établir des relations entre les viscères et le centre sensitif; tandis que l'appareil cérébral a la double fonction de correspondre d'une part avec lui, de l'autre avec les objets extérieurs. Le cerveau agit sur les viscères par le moyen du nerf trisplanchnique; le nerf trisplanchnique agit sur les muscles des mouvemens voluntaires avec le concours du cerveau.

"Tous les organes, tous les tissus, sont liés par les nerfs, sont animés par eux; une harmonie admirable les unit; ils peuvent tous s'influencer réciproquement; ils se prêtent de mutuels secours; ils souffrent tous plus ou moins d'une maladie qui n'affecte que l'un d'eux: en est-il qui soient privés des nerfs? L'induction et des travaux anatomiques, qui paraissent exacts, ne permettent plus de le croire. Cette association de toutes les parties de l'economie animale déjà évidente, dans l'état de santé, l'est bien davantage dans celui de maladie; alors elle se déclare par les phénomènes sympathiques qui en sont l'expression la plus forte."

"Il est impossible de concevoir (says Merat, p. 599) l'exercise d'aucune fonction sans l'intervention des nerfs, surtout les sympathies; tout porte à croire, dans les idées reçues aujourd'hui, qu'ils sont les agens exclusifs de ces phénomènes singuliers, et que le centre sensitif n'est point étranger à leur exercise. Nous n'affirmons rien, car on manque de données positives pour décider la question; on ne la juge que par des probabilités bien imposantes, il est vrai, mais qui n'équivalent pas à la certitude."

Another theory advanced before the time of Broussais, is that of Bichat, which refers all sympathies to the vital properties. After adverting to the attempts made to explain them by continuity and mediation of cellular tissue, by that of the membranes, by the circulating system, and by anastomosis of nerves, with or without affection of the brain, and showing the fallacy of each hypothesis, he concludes that it is improper to consider sympathies in a general manner as subordinate to any single texture and chain of

actions, and that, in order to determine their cause, they should be divided in the manner he has done the vital properties. "We know," says Bichat, "the innumerable phenomena which arise from the disappearance of herpes, the itch, &c., imprudently produced; in all these cases it does not appear that morbific matter is carried to the other organs, though I do not pretend that this never happens. It is the vital forces of these which are raised, and which then occasion different accidents: now as these forces vary in each system, those accidents will be essentially different;—thus, the same morbific cause disappearing from the skin, will produce vomiting, if thrown upon the stomach, in which the sensible organic contractility predominates,—pains, if it goes to the nerves, which are especially characterized by animal sensibility,—derangement of sight, hearing and smell, if it affects the various nerves of these senses,—hemorrhage, catarrhs, phthisis, tubercles, inflammations, &c., if it attack the mucous surfaces, the lungs, the serous membranes, &c., in all which, the organic sensibility is much raised. Now if the same morbific matter carried upon these different organs produced these accidents, they ought to be uniform. Do not their variety, and especially the constant analogy which they have with the predominant vital forces of the organs in which they appear, prove that they depend upon the state of their vitality at the time in each?" A few remarks in favor of this theory, will follow the brief notice we have to give of one other hypothesis, which is founded on the humoral pathology.

From the earliest ages of medicine, cutaneous

diseases have been referred to peccant humors, which nature has successfully expelled from the more central parts of the body through the circulation to the capillary vessels upon the surface of the body. Many internal disorders were attributed to their retention or their repulsion, inwardly, from the surface. M. Corvisart attributed to this cause scirrhous and glandular tumors, and he asks to what other kind of cause can be attributed the development of a number of organic diseases of the heart, the erosion of the interior surface of the viscera, of the coats of the blood vessels, the singular spots of the internal membranes, and of the lining tunic of the intestines and their erosions during fevers,—whether the humor be psoric, herpetic, or venerien? The same opinion was entertained by Sydenham; and indeed this remnant of the humoral pathology has had more or less advocates in all ages; it forms the basis, in some measure, of Mr. Dendy's recent valuable work "On the Cutaneous Diseases incidental to Childhood," and it is so incorporated in our mode of thinking and expressing ourselves upon such diseases, that almost every practitioner, however averse to the humoral pathology, and inclined to the doctrines of solidists or vitalists, is in the habit of expressing himself after the manner of the humoralists. It would be out of place to review the endless disputes of the two classes of theorists; yet, in reference to cutaneous diseases, it may not be amiss to glance at the doctrines of each by way of comparison.

The phenomena of this class of diseases are more satisfactorily explained upon the theory of Bichat than upon that of the humoralists. It accounts better for

their reciprocal influence with diseases of the internal organs, and also for the modus operandi of counter-stimulants applied to the skin and gastric viscera. The intimate sympathy subsisting between the skin and mucous membrane, is founded, according to Bichat, upon the similarity of structure and functions of these tissues, as secreting and absorbing organs, and the corresponding degree of vitality with which they are endowed. Being by these circumstances more in relation with each other, morbid impressions received by one, are more readily extended to the other than to parts which are in these respects dissimilar. So, also, when the exciting cause is removed from the radiating centre, the sympathizing organ is relieved simultaneously. Again, when the skin is affected with a local disease, as scabies, the gastric organs, by the gradual manner of its accession, become accustomed to its stimulus, and are not roused into morbid sympathetic action; but when the eruption is too hastily cured, the sudden removal of such a stimulus, to which the gastric organs have from sympathy been long accustomed, produces an impression of faintness and a sinking sensation in the region of the stomach. Now that these are not owing to a repercussion of the eruption upon the internal organs, as the humoralists would maintain, but merely the abstraction of a stimulus, is proved by the fact that the sudden removal of lice from the skin has produced corresponding symptoms upon the internal organs.*

* "Dr. Fay, while a resident practitioner in Boston, was called to two African children, who were covered over their whole bodies with

The sympathies manifested during the action of medicines called counter-stimulants, on the mucous membrane of the stomach and intestines, or upon the skin, are better understood upon the theory of Bichat. Medicines are rarely applied upon the diseased part, but to organs which sustain relations with it. We give purgatives in apoplexy, emetics for headaches, the croup, and other species of angina;—we apply blisters in ophthalmia and pleurisy and rheumatism, and moxa and issues in diseases of the hip-joint, and in psoas-abscess. Now neither of the foregoing doctrines explain the effects of these remedies, nor do they furnish such useful guides generally, in practice, as the theory of Bichat.

Compared with that of Broussais, which refers all sympathies to nervous communications by the ganglionary system, it elucidates the varied character of cutaneous diseases more clearly, and accounts for some phenomena which, by that theory, are inexplicable. Thus, the fact that diseases of certain tissues are radiated by sympathy to tissues possessing corresponding degrees of vitality remotely situated, as from the skin to the mucous membrane, and vice versa, is a legitimate inference from Bichat's theory; while that of Broussais would, a priori, lead to the different conclusion that intermediate parts would, in most instances, be soonest affected. The fact also before adverted to,

body lice. He ordered them to be immediately washed all over with warm soap-suds, with a view to the destruction of the vermin. The *sudden* removal of the irritation by the *sudden* destruction of the vermin, additional to the *warmth* of the water, suddenly checked the motions of life, and the children dropped down and expired immediately." (Shattuck's Prize Dissertation, p. 117).

that cutaneous diseases, imprudently repelled, vary in respect to their effects according to the debility and consequent susceptibility of the sympathizing tissue or organ, is better understood on Bichat's theory, by which there is supposed to be an aberration of the vital forces from the usual state of them in the sympathizing organ, which brings it more in relation with the organ primarily affected than other organs are, and consequently into sympathetic action. For example, the sudden repulsion of a cutaneous disease ordinarily produces derangement of the stomach, or of the mucous membrane of the lungs, for reasons just stated; but if the bladder has, from previous or present disease, been brought more in relation with the skin, this may, in the form of vesical catarrh, assume the disease when driven from the skin, and the stomach and lungs thereby escape.* The muscles, which ordinarily have but little morbid sympathy with the stomach, may, from debility, become the seat of the sympathetic affection, in the form of chorea, from suddenly repelled cutaneous diseases, and the stomach, lungs and bladder escape.† Now the distribution of the nerves being the same in disease as in health, we should hardly

* "Tous les points de l'economie (says Piorry, an eminent French physiologist,) peuvent être modifiés à la fois par une cause agissant sur l'un d'eux, et cette modification peut ne pas produire d'effet apercevable sur le plus grand nombre d'entre elles, tandis que dans le tissu de la partie dont le mode de sentir sera plus en rapport avec l'impression communiqué il pourra se manifester une alteration plus ou moins profonde."

† It is worthy of remark, that we generally meet with chorea, in patients wanting muscular tone,—in young females who have not enjoyed sufficient exercise in the open air.

expect this variableness in the seat and nature of the sympathetic affection, if they are the sole medium of sympathy, while, by referring the phenomena to the aberration of the vital forces in the affected organ, we should give a more satisfactory explanation.

But, after all, it is not too much to expect, judging from the progress made, within a few years, in ascertaining the distribution and varied appropriation of the nerves and the sympathies that are now known to depend on them, that future investigations will farther elucidate the subject of sympathy, and establish it upon the basis of nervous communication. But, in the present state of our knowledge, it seems preferable to regard morbid sympathies in the manner pointed out by Bichat. He maintains that there are four kinds, depending on animal sensibility and animal contractility, and on organic sensibility and contractility, but that the causes of the two latter, or the organic kind, which are the ones concerned in diseases of the skin, are absolutely unknown, "et un voile epais recouvre les agens des communications qui lient dans ce cas l'organe d'où part l'influence sympathique à celui qui la reçoit."

When the skin or an internal organ radiates its diseases from one to the other by sympathy, it may do this partially or entirely;—there may exist an equal and simultaneous participation in both organs, or there may be an entire transfer of it from one to the other by what is termed *metastasis*. On this fact is founded a distinction of some importance to be observed in practice, and which conveniently divides sympathetic diseases of the skin, of a non-contagious character,

into two classes, viz., *symptomatic* and *metastatic:* the former including those which co-exist with an internal disease, as the eruptions produced by teething, which come and go with the irritated and inflamed gum, and those caused by gastric irritation, &c.; the latter including those that are occasioned by an entire transfer of internal disease to the skin, as critical abscesses in the form of carbuncle, furunculus, cutaneous ulcers, some cases of herpetic eruption, &c. &c. The same distinction applies to diseases transferred from the skin to the internal organs. These may take place partially, or their severity upon the skin may be such as to produce fever, and in both cases the internal disorder may be termed symptomatic; or, the whole disease may be transferred, as when erysipelas or other severe cutaneous disease is suddenly and entirely repelled, and an internal organ becomes diseased; this affection may be termed *metastatic.*

It is not to be understood, even upon the theory of the humoral pathology, that the sympathetic disease is the same in character as the primary one. The difference in organic structure, as well as in function and properties, between the internal and external organs, prevent such a conformity and similarity in their respective diseases. The true skin is every where covered with a cuticle, under which morbid lymph and other fluids collect in vesicles, larger or smaller, and constitute a great proportion of cutaneous diseases; but upon the serous membranes no such cuticle exists, consequently no such vesicles can form,—the degree of inflammation which would produce eruptions upon the skin, would here produce an increased

effusion of serum, or perhaps of coagulable lymph. M. Alibert has fallen into an error on this subject, when he concludes that three cases of ascites, which occurred soon after an hastily cured eruption, could not have been caused by metastasis, merely because the peritoneum exhibited nothing of the eruption. He should have recollected that the structure of the serous membranes would admit of no such eruption, but that, in place of it, an increased effusion of lymph, constituting dropsy, was the very effect he should have expected from such a metastasis. The mucous membrane (with the exception of aphthæ) rarely exhibits cutaneous eruptions under its epithelium.

Internal sympathetic diseases from repelled cutaneous affections, vary exceedingly in their character, according to the texture and functions of the part affected, and to the relations it sustains with other parts. Those organs that are covered with the mucous and serous membranes are affected with phlegmasiæ; the cellular texture with abscess; the glandular with tumefaction and suppuration; the muscular with spasmodic affections; the nervous with palsy, epilepsy, mania, &c. It would be a difficult task to enumerate all the individual diseases that metastasis from the skin may occasion. Of the acute kind it may be said that they take place in almost every texture and organ of the body, and the technical names of them are in most instances derived from the organ affected. Of the chronic kind may be mentioned most of those which were acute in their commencement, but have, by neglect or ill treatment, been prolonged till they have become chronic, and perhaps essentially changed

in their nature. It would be useless to cite authorities to support the opinion that internal affections are caused by sympathy of the organs where they are seated with the skin, since numerous cases are stated by almost every systematic writer on cutaneous diseases, and they are to be found interspersed throughout almost every work on pathology and therapeutics.

A few cases that have occurred within my own observation serve to illustrate the foregoing positions, and may be worthy of a brief recital.—Mr. W. B. suffered severely, during several successive winters, with an impetiginous eruption of the face and hands, and sometimes covering the arms. It was in the form of a humid tetter, and attended with severe itching and irritating discharge, and partially disappeared and returned with great severity every few days. A partial removal of the affection was invariably followed with pain and sense of tightness in the head. A chronic catarrh commenced early the present winter, which has continued unabated during five months, in which time he has had no cutaneous disease, and expresses himself as satisfied with the compromise.

Cases of erysipelas suddenly repelled, affecting the brain, are well known to the profession. This is most likely to happen when repelled from the face. When repelled from the lower extremities, it is said to tend more to the peritoneum; and one or two cases are on record where it has passed from one to the other several times successively. I shall mention only one case of metastatic erysipelas.—Mrs. L., an aged lady, of apoplectic make, was suddenly attacked with se-

vere pain in the head, which soon induced lethargy. I was called, and treated the case as apoplectic, by venesection, cathartics and blisters,—shaved and blistered the head, and opened the temporal artery. She remained comatose three or four days, when her nurse informed me of an eruption upon the abdomen. On examination, I discovered it to be erysipelas, extending from ileum to ileum, and to the pubis. It increased a little until she gradually sunk into fatal apoplexy, about the eighth day from the first indisposition, and fourth from the appearance of the erysipelas. A circumstance worthy of notice in this case, was the first appearance of disease in the head, and subsequently upon the surface,—showing that it may be radiated either way, though more generally its metastasis is inward *from* the skin. It is probable that nature here attempted a metastasis outward; but because of the vital importance of the organ attacked and oppressed, the salutary efforts of the system to this effect were interrupted, and the prophylactic process failed.

The repulsion of acnè, or pimples upon the face, by cosmetics, has been decried as fraught with danger.—Miss H., aged about eighteen years, was advised by an irregular practitioner to apply a repellant lotion for a pimpled face, which soon disappeared, but was followed by a numbness in the fingers of the left hand, which extended in a few weeks to the shoulder and to the lower extremity, attended with spasmodic contractions of the limbs. Blisters on the back of the neck, with a mild mercurial course, produced some abatement of the symptoms. But they soon returned

with increased violence, and affected the other side with the same symptoms, and finally ended in palsy and fatal convulsions, about six months after the repulsion of the cutaneous eruption. We cannot speak decidedly in such cases of the pathological state of the parts, but it is probable that the brain and spinal marrow were thrown into disorder by a compression of their investments. In children, the sudden removal of cutaneous diseases has caused epilepsy and hydrocephalus.

We have said that the muscular texture may, from previous debility or other causes, be brought more into relation with the skin than the deeper seated organs, and become the seat of metastasis in the form of chorea. Darwin relates three cases of chorea, caused by a hasty removal of long protracted psora, which were immediately cured by re-inoculation. The same cause has in other cases produced phrensy and hepatitis. I have met with one case of prurigo in a young female, the sudden removal of which caused an extremely obstinate chorea.

M. Corvisart attributes many cases of structural diseases of the heart to metastasic affections from the skin. Otitis and abscess under the ears, often follow the sudden suppression of cutaneous eruptions from the scalp. Ophthalmia, too, will oftentimes alternate with cutaneous diseases. I say *alternate;* and probably this term is more appropriate than *transfer*, *repulsion* and *translation*, from part to part, which I have used in obedience to custom, although derived from the humoral pathology, which I have found so much fault with, as explanatory of the phenomena of cutaneous diseases.

We have confined our attention to organic or visible diseases of the skin, as influencing the internal organs. There are, however, functional diseases of like tendency, one of which is habitual sweating, oftentimes of a part only, as of the hands and feet, the head or breast, and which, if suddenly arrested, may occasion great internal disorder. Several cases are recorded in Vol. 33 of Dict. des Sciences Medicales, article Metastasis, of various internal disorders thus occasioned, some of which proved fatal.

When diseases of the skin are symptomatic of internal derangement, they vary less in their character than those of the internal organs when sympathetically affected. This is what might be expected from the circumstance that the seat of disease, in the one case, varies exceedingly in structure and function, and, in the other, is confined to a part nearly similar in structure and function throughout. Still, however, the same exciting cause acting upon an internal organ, will produce various symptomatic diseases in different individuals. "Thus, certain substances which suddenly derange the organs of digestion, sometimes produce urticaria, sometimes roseola, and sometimes even psoriasis and lepra; yet each of these shall retain its specific character, and follow its peculiar course."

Sympathetic diseases of the skin vary somewhat in their nature and appearance, according to the organ primarily affected. There are certain eruptions peculiar to gastric irritation, as rashes, red gum, and the stone-pock of habitual inebriates; others to hepatic derangement, as rosy-drop of drunkards;—some, as furunculus, anthrax, and constitutional periostitis, and

some cutaneous ulcers, seem to depend on constitutional derangement, and to be a concentration of general derangement upon a part less essential to life.

The tendency to alternation of their diseases, between the skin and *particular* internal organs, rather than others, is sometimes owing to habit. When such alternations have once taken place, they are more likely to recur again in the same parts. "C'est une chose vraiment singulière, et que l'observation a depuis long temps confirmée, que cette tendance des métastases à s'opérer sur des parties où elles ont déjà existé, et plus elles s'y sont opérées de fois, plus elles s'y renouvelleront avec facilité. Cette seule cause suffit même quelquefois pour les y déterminer, lorsque aucune autre ne paraît les avoir provoquées. Il n'est pas même nécessaire que cette circonstance ait lieu récemment; la tendance existera dans un temps assez éloigné; car la nature n'oublie rien."

Every practitioner must have observed that sympathetic diseases have a great tendency to establish themselves upon an organ that is in a state of debility, from whatever cause. Such organ seems intimately connected with all others, and ready to assume all their diseases. "Si quæ pars ante morbum laborârit, ibi morbi sedes erit," says Hippocrates. It is thus that a settled weakness of the lungs or of the stomach places those organs more in relation with morbid impressions made on any other organs, and more ready to assume or participate in their diseases.

In respect to the seat of those cutaneous diseases that tend to metastasis, it is worthy of remark, that this varies in some degree in different ages. We

know that different parts of the system vary in respect to their development and degree of vitality in different ages, and wherever this predominates most, there is, in consequence of it, a greater susceptibility to morbid action. This remark was made by Hippocrates, and is confirmed by pathological observations. In infants, the head is the seat of this excess of vitality, and in them it is the seat of metastatic affections, as scald head, crusta lactea, &c. "Les depôts sur cette partie sont très-fréquens alors, parceque, outre la facilité qu'ont les causes inflammatoires à s'y établir, elles ont une marche extrêmement rapide, en raison même de l'énergie vitale ordinaire à cet age. Les éruptions de elle nature qui affectent les enfans en sont une preuve ;—* *—aussi sont elles le plus ordinairement salutaires, et doit-on les respecter, leur repercussion étant le plus ordinairement suivé des symptômes les plus fâcheux. Les systèmes glanduleux et cellulaire de cette partie, jouissent aussi de la plus grande activité, et c'est ce qui rend raison de l'innombrable quantité de petits dépôts qui se forment dans les glandes maxillaires autour des oreilles," &c. After the first years of infancy, the excess of vitality about the head is comparatively lessened, and the metastatic affections are diminished. In succeeding years, the lungs and larynx are enlarged and invigorated by exercise, and, during youth, are more subject to metastatic affections. It is not improbable that the frequent appearance of croup is attributable to this greater susceptibility to metastatic affections. The superior degree of vitality and of vascular action of the face, accounts for the fact of its being so often the seat of eruptions, as acnè and

erysipelas. The capillary circulation is there greater and freer, and is constantly excited by changes of temperature, and by the emotions and passions.*

The diagnosis of sympathetic cutaneous diseases, and of those internal diseases that result from sympathy with the skin, is not always easy to establish. This is more difficult in the former than in the latter kind. Hence it is that the cause of many cutaneous affections is involved in obscurity; some attributing them to sympathy, and others to local causes, while the internal alternation or assumption of the external disease is soon known by the magnitude of the evil it produces. Even the repulsion of acnè, or pimples of the face, produces very sensible derangement in the central organs, as heat and uneasiness about the præcordia, and sometimes more formidable complaints upon the nervous system. The case of Miss H., which terminated fatally, is nōt the only one of the kind that has occurred. The fact of the sudden disappearance of a cutaneous disease being followed by internal derangement, is sufficient, in most cases, to establish the relation of cause and effect between the external and internal disorder. Sometimes, however, the internal disorder, from the comparatively low degree of vital activity of the part it occupies, is a long time in making its appearance,—as where syphilitic

* "I will add another essential observation in respect to the facial capillary system; it is, that it appears that its tendency to receive blood, disposes it to become the more frequent seat of many affections. We know, 1st, that erysipelas is much more frequent in this than in the other parts; 2d, that the variolous pustules are remarkably conspicuous here; 3d, that many eruptions are more abundant here than elsewhere."—*Bichat, page* 273, *Vol. III.*

eruptions are suddenly suppressed, and the periosteum and bone alternate and assume the disease. Metastatic abscesses, as anthrax and fistula and benign buboes, are slow in forming. But where vital organs, or the serous or mucous membranes, alternate with the skin, the indications of it are more immediate.

In what cases is it unsafe to attempt the cure of cutaneous diseases by local treatment alone? This is an important question to decide, but is rendered difficult and perplexing by circumstances of difference in constitutions, founded on age, peculiarity of temperament, hereditary predisposition, and idiosyncracy. Generally speaking, however, it may be said, that in all cutaneous diseases of a sympathetic character, whether they be symptomatic or metastatic,—as those that proceed from teething of children, from gastric irritation produced by crudities, from acrimony or from worms in the stomach and bowels,—our treatment should be directed to the organ primarily affected, and to the removal of the local cause. Under this head may be included all acute diseases that are not contagious, and for which there is no assignable cause, and chronic cutaneous diseases that have been preceded by or are attended with internal disease. This would comprise,—

1. Infantile eruptions, as strophulus or red gum, (or gown), and tooth rash, &c., which proceed from dentition or gastric irritation, before mentioned.

2. Prurigo, a severe itching, and colorless pimples, often preceded by sickness of the stomach, gastrodynia and headache, and which occur after the first years.

3. Crusta lactea, occurring on the head and face during lactation, and oftentimes caused by deteriorated milk.

4. Follicular tumors, caused by an obstruction of the sebaceous glands, sometimes from neglect of cleanliness, but more commonly by "some derangement in the digestive organs." They include—*a*, crinones, or grubs, where the sebaceous matter "is retained, from a deficiency of action in the follicular vessel,"—the back of a sucking infant being sometimes thickly studded with them in the form of whitish elevations;—*b*, follicular wart, "usually situated on the cheeks, temples or forehead, and occurring in children from two to six years of age," and "are disposed to suppurate from errors in diet;—*c*, acnè simplex and acnè punctata, which are slight circular elevations of the cuticle, termed by some authors vari,—appearing singly or in clusters, and sometimes surrounded by a dusky discoloration,"—sometimes, but not always, depending on gastric irritation, and occurring mostly towards the age of puberty, particularly in females: the common appellation is pimpled face;—*d*, sycosis capillitii, "which consists in an obstruction of the follicles on the hairy scalp in children."

5. Phlegmonous tumors of various kinds, which, with the exception of those produced by local causes, "are real indications, in most instances, of an internal or constitutional disturbance, from which the system has attempted to relieve itself by topical concentration.

6. Urticaria, or rash, caused by crudities or irritating food, oftentimes by fish, sometimes by indigestion from teething,—occurring, however, at any age, and in adults from cold drinks, when heated.

7. Impetigo, a pustular or humid tetter, which, though pathologists disagree about its symptomatic character, is found, according to Dendy, to require internal remedies.

8. Herpes or shingles, and vesicular ringworm, often, but not always, referrible to derangement of the stomach or other alimentary viscera, and always most successfully treated by gentle laxatives.

The above are considered, by Dendy and Plumbe, and most other writers, as symptomatic of disorder in the alimentary viscera. Another class of Dendy comprises those that are connected with a deranged state of the chylopoietic viscera, and are usually marked by debility. These consist of,—

1. Aphthæ, an affection confined mostly to the mucous membrane of the mouth and alimentary canal—sometimes to the cheeks.

2. Rupia and ecthyma, consisting of vesicles and pustules, and both terminating in circular, imbedded incrustations, and "occurring in infants during the period of lactation, from deficiency of nutrition, or unhealthy qualities in the milk,"—sometimes produced by obstruction or obliteration of the lacteal glands.

3. Purpurea, "consisting of small red points, termed *stigmata*, or small purple spots or petechiæ formed by the coalescence of the stigma, sometimes of ecchymoses, or vibices." It includes two kinds, simplex and hæmorrhagica, and may proceed from imperfect assimilation of food.

4. Pemphigus, a vesicular eruption attended with great prostration of strength. Its pathology not well understood.

5. Icthyosis, or fish skin disease, "a peculiar deposition of diseased cuticle." "In the treatment of which," says Dendy, "we should always administer internal remedies."

6. Cloasma, a symptomatic discoloration of the skin, resembling sun spots, "frequently," says Dr. Hall, "the effect of a loaded condition and impaired function of the alimentary canal," and of protracted hepatic derangement.

7. Nomè, a gangrenous erosion or ulceration, or a spreading canker of the mouth, not a common disease, occurring "in weakly children who have been deficiently fed, and who have been previously reduced by disease."

8. Œdema cellularis, or skin bound.

There is a third class of diseases usually symptomatic, but arising also from extraneous excitement; depending probably on peculiar idiosyncrasy.

1. Roseola, or rose rash, "an efflorescence, of a rose or light crimson color, symptomatic of derangement of the visceral functions or of dentition."

2. Erythema, a diffused redness of the skin. "It is commonly evanescent when arising from derangement in the primæ viæ, appearing at irregular intervals."

3. Eczema, an eruption of small pearl-colored or brownish vesicles. "In some children internal irritation will frequently produce it." But the most common cause is draughts of cold water, or acid or subacrid fruits, if swallowed in the heat of summer. The disease is then termed surfeit.

4. Pityriasis, consisting of progressive laminæ of thin scales, which exfoliate, called dandriff.

5. Psoriasis, or scaly tetter, resembling lepra, but attended with more vascular action, often hereditary, and requiring that "the bowels be kept open" during the treatment.

6. Porrigo, or scald head, and ringworm of the scalp, scarcely at all depending on internal disease.

7. Paronychia, various kinds of felon and whitlow; though sometimes of constitutional origin, scarcely ever requiring internal remedies.

8. Lepra, leprosy, of various names according to the part affected, rarely requiring internal medicines.

9. Erysipelas, sometimes proceeding from gastric irritation, but depending more on peculiarity of constitution. In either case, if extensive, it is unsafe to attempt the cure by local applications.

10. Miliare, an eruption of minute pearl-colored vesicles, is of rare occurrence.

11. Pompholyx, consisting of bullæ or blisters, sometimes appearing during teething, and sometimes occasioned by swallowing cold water in the heat of summer.

To the foregoing cutaneous diseases, most of which are generally sympathetic, and which occur, most of them, in adults, may be added some others which are peculiar to adults.

1. Lichen, an extensive eruption of papulæ, connected with internal disorder, usually terminating in scurf, recurrent, consisting of seven species, most of them characterized by heat and itching.

2. Sycosis, or mentagra, which bears a near re-

semblance to Ecthyma, but is chiefly confined to the roots of the hair, on the chin and side of the face. It has recently appeared so frequently in New England among stage drivers and others, and is so limited to the parts just mentioned, as to give rise to the belief that it is contagious, and is communicated from person to person by a barber's brush or razor, and has acquired the name of Jackson Itch. It is composed of many successive eruptions, and may prove troublesome for many months and even years.

3. Ionthus, or stone pock, peculiar to inebriates, and produced by sympathy of the skin with a torpid state of the stomach.

4. Ionthus corymbifer, or rosy drop, or rum blossom, produced by sympathy of the excernents of the skin with the liver.

5. Chronic ulcers of the lower extremities.

6. Anthrax.

Although most of the foregoing sympathetic diseases may be termed symptomatic on their first appearance, coexisting as they do with an internal affection, yet many of them, even while recent, may with advantage be separated from the list and termed metastatic, because they are a concentration of the whole internal disease upon the skin. Of this description are those cutaneous eruptions that occur on the crisis of fever, and other severe constitutional diseases, tinea capitis, and other chronic eruptions of childhood, and all those which are attended with entire relief to all the internal organs,—erysipelas when preceded by constitutional derangement,—rose-drop

and anthrax. To these should be added those chronic eruptions and ulcers of adults, whether constitutional or local; for if they are of long standing they are associated with the animal economy, and their sudden removal would produce metastatic affections upon some internal organs. Psoriasis and lepra, that are hereditary, or of very long standing, although attributable to no internal disorder, will be apt to produce one, whenever a successful attempt is made to remove them suddenly. Even habitual sweats cannot, as before remarked, be suddenly arrested with impunity. In short, all chronic cutaneous diseases that are local in their commencement, may prove metastatic in their effects if suddenly removed.

I have said that the division of sympathetic cutaneous diseases into symptomatic and metastatic, is of some importance in their treatment. In those termed *symptomatic*, we are to attend to the state of the organ whose disease caused, and continues to prolong, the cutaneous affection. When that is removed, the symptomatic disease of the skin, if recent, soon disappears, and a hasty repression of the latter, without regard to the primary affection, may be followed by an aggravation of it, or by metastasis of the cutaneous affection to some other more important organ. Thus, erysipelas upon the face, excited as it in many instances is by gastric irritation, may be repelled to the brain, and prove fatal. All those cutaneous affections of children caused by gastric irritation or by teething, will, if subjected to a repelling treatment

alone, either aggravate the primary affection, or produce a metastatic affection in some other organ.

But in respect to those cutaneous diseases that are *metastatic*, whether so in their origin, as in critical eruptions, abscesses, ulcers, glandular swellings, &c., or are likely to become so from their long, and consequently habitual influence upon the constitution, as long existing issues, chronic ulcers, carbuncles, rose drop, &c., they are salutary in their effects, are real prophylactics, and to be treated with respect proportioned to their age and magnitude,—are not to be attacked in front and driven in upon the central organs, but are to be approached through the medium of the circulation, or through other sympathies, by alteratives, countervailing irritations and artificial drains, by sudorifics, diluting drinks, chalybeate medicines, mineral tonics and strict attention to diet, conjoined with vapor bath and frequent ablutions; in short, by whatever will improve the state of all the functions. When these affections, or those chronic eruptions of local origin, that have by their age become associated with the animal economy, as long protracted itch, lepra vulgaris, &c. &c., are suddenly repelled by accident or injudicious treatment, and internal disorder ensues, a substitute is to be made in the form of blisters or issues, proportioned in magnitude to the first affection and to the danger it threatens within.

CANCER OF THE BREAST.

DISSERTATION.

"WHAT ARE THE DIAGNOSTIC MARKS OF CANCER OF THE BREAST; AND IS THIS DISEASE CURABLE?

The term *cancer*, derived from the Latin language, is synonymous with *carcinoma*, derived from the Greek, and originated in a fancied resemblance of certain tumors to the animal whose name they bear.

There is an evident propriety in specifying cancer of the breast in the question here proposed; for the disease, in its ravages upon this organ, extends to almost every variety of structure which can modify its character, is accessible to inspection and local treatment, and occurs more frequently than elsewhere.

Whether all the diseases at present included under the term cancer, should continue to receive that appellation, some might be inclined to doubt. They are so numerous and so different in aspect, that it is almost impossible to say any one thing that will apply to all without exception. They present tumors, ulcers, excavations, excrescences, indurations and *ramollissemens*. The tumors vary from the hardness of cartilage to the consistence of jelly; the ulcers furnish sometimes an

abundant suppuration, varying in color and consistence, —at other times they are dry, and some of them are covered with a hard grey crust, that reproduces itself as often as it is removed; sometimes they are surrounded with varicose veins, that bleed frequently, at others they are wanting; the excrescences present equally varied aspects, and the sufferings of the patient are of every grade.

But however varied cancerous affections are in the foregoing particulars, their progress and termination are nearly the same in all. They all tend to invade and destroy surrounding parts. Whatever be the nature of the texture in which they are located, they seem to feed upon it like a parasitic animal, growing and thriving upon another. This is so striking a characteristic of cancer, that in early times it was compared to a ferocious animal, which led some of the ancients to carry the idea so far as to attempt to feed it daily with fresh slices of viands, in hopes of thus satiating its voracious appetite. All the varieties of cancer, though they remain stationary for a time, will ultimately augment, every change in their state being invariably for the worse. Irritating substances, general or local, aggravate them alike, and if extirpated there is always danger that they will reappear. Finally, they alike tend to produce constitutional derangements of a similar nature—a sort of cancerous cachexy, marked by emaciation, hectic fever, and a peculiar tint of the skin.

If we turn our attention from the exterior survey of cancerous affections to their interior structure, they will be found to present a variety of appearance and

consistence. Multiplied dissections have, however, enabled pathologists to analyze and reduce cancerous substance to a certain number of diseased tissues, each having a structure peculiar to itself, and which always presents the same characters, in whatever part of the body they may be situated. These tissues are sometimes isolated, at others variously combined, two or three or even four of them being in the same tumor. Every cancer, with the exception of certain chancrous ulcers, which do not repose (in their early period at least) on a cancerous tissue, is constituted by the development and evolution of "two accidental tissues, that are different from any normal tissue," viz. the scirrhous and encephaloid—names derived from *skirros* (hard) and *encephalon-eidos* (brain-like). One or the other of these, and sometimes both together, are always found in cancerous tumors. There are other morbid tissues occasionally met with in such tumors, as the fibrous, the melanose, the tubercular, the cartilaginous, and the fibro-cartilaginous, one or more of them. But these latter do not of themselves constitute cancer, one or all of them; they may therefore be termed incidental tissues, whilst the scirrhous and encephaloid kind, from the invariable presence of one or both of them, may be termed essential tissues of cancer. These, therefore, are deserving of more particular notice.

The *encephaloid* matter of cancer may exist in three different forms—in cysts, in masses without cysts, or infiltrated into the substance of the organ. These forms are more distinct and observable in the crude or early stage, but in a subsequent stage, or that of

complete development, and before their *ramollissement*, they all assume a similar appearance. The encephaloid matter is then homogeneous, resembling the medullary substance of the brain, and presents, here and there, a slight rosy tint. Cut in thin slices, it is semi-transparent; but in masses, it is opaque. Its consistence is that of an infant brain a little softened.

The encephaloid matter is enclosed in cells, made up of a delicate tissue, resembling the pia mater—is, like it, very vascular; and the tunics of its vessels are so extremely tender, as to be easily ruptured, causing extravasation and accumulations of coagula. A new and curious fact stated by M. Bérard in the Repertoire Generale des Sciences Médicales, of February, 1834, is, that he has ascertained by experiment that these vessels are exclusively *arterial*. There are other and larger vessels surrounding the tumor, both arteries and veins, and the encephaloid matter often penetrates these veins and obstructs them.

But the encephaloid matter remains not long of the consistence now described—it tends constantly to mollify, until it finally resembles thick pus, but still retaining its color. In this stage, more than any other, the slender vessels are ruptured, and cause numerous extravasations of blood, which, instead of forming a coagulum, is blended with the puriform matter, giving it a reddish or brownish color, so that it resembles thick chocolate; excepting some portions of the tumor which remain exempt from bloody infiltration, and serve to show what was its former appearance.

The encephaloid tissue is more frequently met with in the uterus and testis, than in other organs; is also

found in cancer of the liver and stomach. It appears also in cancer of the breast, particularly when the disease recurs after an operation.

The other essential tissue of cancer, viz. *scirrhous*, when fully developed, consists generally of a firm, hard, rugged, incompressible and knobbed mass, the limits of which are not well defined. It grates under the knife like the substance of the uterus, presents a bluish or greyish white color, and when cut in thin slices is semi-transparent. At first glance it might be easily mistaken for a fibro-cartilaginous tumor; but a closer examination shows that it is composed of two distinct substances, the one fibrous, hard and organized, the other soft and inorganized. The former composes the chief part of the diseased mass, and consists of septa, which are opaque, of a paler color than the soft part, varying in their volume and direction, and forming unequal cavities or cells, which contain the soft part. The latter is of a bluish color, and of the consistence of softened glue or even of cream. "The fibrous structure seems to be the cellular or proper tissue of the part, in a state of induration and hypertrophy," whilst the softer portion contained in its meshes or cells, appears to be merely a morbid secretion, poured out by the vessels nourishing the organized fibrous tissue. In this view of it, the organized part results from an altered state of nutrition in the tumor, and the soft or inorganized portion, or accidental tissue, as the French term it, is the result of a morbid secretion. In all cases, the fibrous mass is both most conspicuous and abundant, and is condensed in its centre into a hard nucleus, whence seem

to radiate the numerons septa in every direction. In the centre of the nucleus there is often a little cyst containing a limpid fluid of very acrid nature. In some rare instances, portions of the scirrhous mass resemble cartilage, in parts of which osseous or calcareous depositions are occasionally found.

It is probable that several of the tumors, as the mammary and perhaps pancreatic, described by Mr. Abernethy, consist of varied proportions of the two essential tissues of cancer, modified by local irritation, temperament, &c. But such tumors, I may here remark, glide so insensibly into each other, and correspond so nearly in respect to their origin and progress, that little practical advantage results from his classification.

As the encephaloid tissue is more frequently met with in the uterus and other internal organs, so the scirrhous is most apt to predominate in external cancers, particularly in those of the breast—they are however often found united in cancerous tumors in all situations.

Cancerous tumors usually begin in a sound part, but in some rare instances, where a predisposition to the disease exists in the constitution, other tumors and ulcers degenerate into cancers. But more of this hereafter.

Thus far, the subject of cancer generally has been considered; but, as the female breast is its most frequent seat, many authors have taken cancer of this organ as a type for its general description, and the question proposed requires that our future remarks be confined to this locality of the disease.

The age most subject to cancer of the breast is from the fortieth to the fiftieth year. It very rarely appears before the age of twenty, sometimes between twenty and thirty, many times between thirty and forty, and rarely after the age of sixty. A table, drawn up by M. Recamier, will be given at the end of this treatise, which in respect to age, accords with the observations of all surgeons.

Persons most subject to the disease are antiquated maids, next, those mothers who have not suckled their children, and least so those who have borne children and nursed them with their own milk.

The disease may be divided into three stages. 1. *Indolent scirrhus;* 2. *Painful scirrhus*, sometimes called *occult* cancer; and 3. *Ulcerated or open cancer.* Indolent scirrhus, then, differing as it does in its whole aspect, from open cancer, is, nevertheless, the germ or first stage of that disease. Some have contended, however, that it is a more local disease, is more yielding to discutients, and instead of always progressing to cancer, has in some rare instances terminated in gangrene, and in many others has remained stationary through life. Now in respect to their ever being resolved, we are not able to speak with confidence, because we have not the best evidence of such cases being truly scirrhous, I mean examination with the knife. We can only judge from their external appearance. To ground such an opinion upon the vaunting reports of charlatans, would be to admit that "they are all resolvable when their own specifics are employed," and that failures are attributable to error on the part of the patient, or their delayed application.

But the number of cases of resolution, cited by eminent surgeons, is so extremely small, as not to be entitled to consideration as exceptions to the principle, that they are not resolvable by any known remedy (pressure excepted,) general or local—but more of this hereafter.

That scirrhus may remain stationary for life, is far more probable. Life may be short; the tumor may appear at a late period of it, when morbid action is feeble, and such tumors no doubt vary in their tendency to painful cancer from constitutional peculiarities; these therefore should not be received as exceptions to the general principle that scirrhus is incipient cancer.

RISE AND PROGRESS OF CANCER OF THE BREAST.

A woman in touching her breast feels a small induration, which is not natural, but which causes not the slightest inconvenience. Perhaps her attention has been first drawn to it, by a small stain upon her dress, opposite the orifice of the lactiferous tubes, which leads her to feel of the part. She can neither tell when the tumor commenced, nor assign any certain cause, though she may suspect some mechanical injury, as a blow against a chair or door, or the pressure of her dress. She may also refer it to an obstruction of the milk when nursing her last child. It remains indolent and insensible to pressure, and makes no impression upon her general health. The induration gradually increases in volume, and from being round, circumscribed, and rolling under the finger, its surface presents nodes and depressions, followed by adhesions

to the surrounding cellular membrane, and to the skin, giving to it the appearance of being quilted to the tumor. After a time of uncertain length, the patient begins to feel a twinging, pungent, or darting pain in the tumor, occurring more towards evening and in the night. Still, however, it gives no pain to handle the part and even press it. If the catamenia have not ceased, she will experience an aggravation of pain in the breast, about the time of their recurrence; at this period, also, the tumor grows faster than at any other, and any external violence produces a sudden enlargement. Thus far the tumor is characterized by extreme hardness, by great weight compared with its volume, by a knobby feel, and by insensibility to the touch. These characterize the scirrhous state.

The pungent pain is the ushering in of the second or occult cancerous state, in which the progress of the disease is more rapid, the tumor increasing in volume from the size of a small nut, when first discovered, to from two to three inches in diameter, but it soon attains nearly its maximum size, and remains somewhat stationary, notwithstanding all other symptoms, and particularly pain, have augmented. Adhesions are formed to the subjacent parts—and the skin over it begins to pucker and to assume a violet tinge. The nipple, by the drawing of its tubes, gradually retreats within the surface of the breast. The darting pain, which added to the above-mentioned signs of scirrhus is one of the best pathognomonic symptoms, now interrupts sleep, and the patient's general health begins to suffer; with emaciation, loss of appetite, and dryness of the skin, which presents a pale yellow tinge.

The axillary glands about this time become affected; but there is much uncertainty in respect to the time, for they often do not enlarge till after the second stage of cancer, and in some rare instances do not swell at all, although the cancer proves fatal. There is sometimes a solitary gland situated over the outer edge of the pectoral muscle, between the breast and axilla, and this, in such cases, is the first to enlarge. In a few instances, where the tumor is on the sternal side of the breast, the axillary glands escape, and those about the clavicle suffer. Finally, the part of the skin most affected over the tumor gives way, forming a fissure, from which oozes a colored serum—and this completes the second or occult cancerous stage.

When the *third* stage or *open* cancer has begun, the borders of the fissure first opened are gradually thickened, indurated, and everted, and wear a pale bluish color. The surface of the ulcer is soon covered with pale-red vegetations, which furnish an ichorous or sanious suppuration, more or less abundant, and often very fetid. Its peculiar odor serves as a diagnostic symptom. The surface of the sore feels hard, like the original tumor, and, like that, is wanting in sensibility to pressure, as the patient can wipe and handle it without experiencing the least pain. The lancinating pain, before spoken of, varies to an acute smarting, or burning, or insupportable itching, that nothing can calm. The hideous ulcer enlarges in every direction, consuming indiscriminately the adjacent substances, sparing neither veins nor arteries, and causing frequent hemorrhages, which, while they temporarily mitigate the patient's sufferings, hasten exhaustion of her

strength. Whilst one part of the sore is sloughing, another is projecting forth luxuriant vegetations, that stretch one after another over the borders of the ulcer, like the leaves of a double rose over its calyx.

The cancerous *cachexy* is now more strongly marked; the flesh is emaciated and flabby, and the arm swells; sometimes also the lower limb becomes œdematous. The patient is often tormented with a burning sensation behind the sternum, with severe cough and rheumatic pains; she loathes food; has obstinate costiveness alternated with colliquative diarrhœa, and finally sinks under hectic and torturing pains.

Such is the ordinary course of the disease when it proceeds unmolested to its natural termination, or is unsuccessfully treated. But the varieties it presents are innumerable, a few of which deserve notice. The scirrhus which precedes cancer is sometimes void of protuberances or inequalities, and presents a smooth surface like an encysted or fibrous tumor. Instead of being always single, it is in some cases composed of many tumors, united or separated. The adhesion to the skin and subjacent muscles alluded to, does not always take place until ulceration is about commencing. Its degree of hardness varies, and with this also the rapidity of its progress—the hardest kind being most indolent, and the first cancer is harder and slower in its progress, than one that returns after extirpation. Injuries and irritations, and disturbed menstruation, hasten its progress, but it sometimes takes a sudden start without any assignable cause. In aged people, however, they may continue nearly

stationary for many years. Hemorrhage is a common occurrence, but in some cases cancers will run their whole course and destroy the patient without loss of blood. The blood may issue from an opened vessel, or be exhaled from the surface of the ulcer, or from the interior of the morbid structure.

Cancer is so constantly fatal, that to speak of its *prognosis* when left to itself or impotently treated, is to speak of the different manners in which death occurs, when no other disease sets in to abridge life. The exceptions are, a few rare cases which happen in very advanced life, of scirrhus and even of ulcerated cancer, that advance so slowly as not to shorten the patient's days—or, what is more rare, gangrene may take place in a cancerous breast, as in other parts, and after the organ has sloughed out, the sore will cicatrize as if the organ had been extirpated with a knife. Here and there, too, we meet with detailed cases of the cicatrization of a cancerous ulcer, whilst the subjacent scirrhous mass remains undestroyed. If such cases are genuine cancer, they show that nature establishes no law in regard to disease, that she does not sometimes break. A multitude of accidents and complications may occur to hasten death, as pleurisy, hydrothorax, anasarca, or a putrid fever. Such being the case, a surgeon cannot be too circumspect in giving a prognosis.

Post-mortem appearances may be considered under the head of general and local. The former have already received some attention, under the head of pathology of cancerous diseases. At the termination of life, open cancer of the breast presents a mass of

vegetations and excavations, covered with a fetid putrescence, in which scarcely a vestige of organization remains. This is therefore a less interesting period for examination, than when the cancer is extirpated in any of its stages during life.

Indolent scirrhus, when extirpated, is ordinarily round or ovoid—presents a knobby surface, and adheres more or less to the surrounding parts by cellular tissue. It may occupy the place of the mammary gland, or any other part of the breast. Cutting it into slices shows it to be formed in part, or entirely, of a greyish or bluish white substance, slightly translucent, and varying in consistence from that of lard to that of cartilage. This is the true scirrhous tissue. In the same tumor may be seen masses or minute portions of substance, softer than the preceding, whitish, opaque, divided into unequal lobules, and surrounded in every part by blood vessels. This is the encephaloid tissue. To these two essential tissues are sometimes added others that are incidental, as cartilage, fibro-cartilage and melanose. In the midst of all, may be seen portions of the mammary gland—sometimes sound, although surrounded by degenerations, at others partly transformed into the scirrhous or encephaloid tissues.

Painful scirrhus or occult cancer, when extirpated, presents the same essential tissues, but softer. The scirrhous will be here and there penetrated by a whey or cream-like matter that may be pressed out in large drops, and the encephaloid may present some little effusion of blood. In some places it will be soft. It adheres to the skin, and perhaps to the subjacent

muscle; and the surface is more knobbed than in the indolent state.

Cancerous ulcer, when extirpated, evolves a less fetid odor, previous to its becoming putrid, than it did before extirpation; which shows that the peculiar fetor of cancer is an exhalation from the living surface. Below the surface, to the depth of a line or two, is a stratum of flesh of the same color as the ulcer. Cutting deeper, we discover the essential tissues of cancer, but more compounded with others, and they would not be readily recognised by one who has not studied them in their former states. The cancerous mass is no longer circumscribed to the breast, but extends to bone and muscle, and all other neighboring textures indiscriminately.

The *general* post-mortem appearances are, a yellow tinge of the skin, a soft and flabby state of the muscles, and a fragility of the bones. Some French writers, who have had great experience in this disease, contend that it produces no such effect upon the bones. Their opinions would however be corrected, by a visit to Guy's Hospital, where bones are preserved, that were fractured by merely a turning of the patients in bed, and two or three similar cases have occurred within my own observation. The lung under the cancer is inflamed, and adheres to the pleura-costalis, and some serum is found in the cavity of the chest, and small tubercles are discoverable in the pleura. The liver, especially if the cancer be on the right side, is tuberculous. The uterus almost always presents cancerous tubercles. The glands of the axilla, and sometimes those about the clavicle, are en-

larged and scirrhous. Sometimes the arm of the affected side is much swollen, and at others the whole side is in like manner affected.

The *cause* of cancer not being required in this treatise, and if it were, our knowledge of it, and especially of the *proximate cause*, amounting as it does to little or nothing, is a sufficient apology for saying but little about it. In respect to its *remote* and *exciting causes*, it may be stated, that the foundation of the disease is laid in a *cancerous diathesis*, that may evolve cancer spontaneously, though oftentimes its appearance is preceded by some slight injury or irritation of the part. This has induced some to pronounce it a local disease. But it is not probable that any local irritation can assume a cancerous character, where such a constitutional diathesis does not exist; and yet, it may serve as a nidus, in which the disease will appear sooner than it would spontaneously, or without any such point of attraction—and it is not improbable that the diathesis may exist in some persons through life, but in whom, from the absence of such local irritation, or because the diathesis is feeble, it may not be evolved. In this and some other respects it resembles scrofula—a disease known to be constitutional. It is said, in opposition to this, that extirpation of cancer oftentimes effects a permanent cure, and that therefore the disease must be local. The same may be said of the amputation of a scrofulous limb. Besides, let it be remembered that cancer of the breast is evolved, chiefly between the fortieth and fiftieth year of age;—in other words, about the period of menstrual cessation. Now the lapse of time necessary for the devel-

opment of cancer in the breast, after its first appearance, together with the time taken up in healing the wound made by extirpation, is, in many cases no doubt, sufficient to carry the patient through the most susceptible period; the system has had time to recover from the constitutional disturbance, and the breasts are no longer irritated by sympathy with the uterus. It is this cancerous diathesis that so frequently causes a return of the disease in the cicatrix, even after a second or third extirpation, or to evolve it in some other organ, and perhaps in diverse organs, remote from each other, simultaneously.

The connection between a disturbance of the uterus at the cessation of the menses, and a cancerous breast, is so strenuously maintained by Sir Charles Bell in a late lecture, that I feel justified in making an extract from it. "Nature has established a reciprocal action between the uterus and mammæ, and though widely apart, they are intimately united by sympathy. Every change in the ovarian circulation has an influence upon the mammæ, from the first period of puberty to the final period of change—menstruation, conception, quickening, delivery—all have this influence—they all communicate pain and turgescence of the mammæ. At the turn of life, the irregularity of menstruation produces a most decided influence on the mammæ. It is this which lays the foundation of cancer."

"As there is a coincidence in time, so is there a considerable resemblance in the nature of the disease which fixes upon the ovaria and mammæ; the difference is chiefly in their position, as internal or external parts. This is a very interesting inquiry, because it

embraces an extensive view of practice. The scirrhosity, I say, and hydatid tumors which infest the mammæ, and are the forerunners of so many distressing cases of ulcer and ill-conditioned sores, if they were seated in the ovaria, being internal, would smoulder, and partake of a chronic state, that would hardly interfere with the term of life."

The cancerous diathesis is no doubt oftentimes hereditary, as appears from the numerous instances where it has prevailed in particular families. This fact is now so generally understood, as to induce eminent surgeons to advise families, in which a case of cancerous breast appears, to guard the general health of females at the cancerous period of life.

Climate has some influence upon predisposition to cancer. Cold latitudes present cases more frequently, and of a more indomitable character, than tropical climates. The island of Madeira very rarely exhibits a case of it. [Johnson on cancer.]

It is to be regretted that a cancerous *diathesis* is not, like that of scrofula, manifested by some external signs. The disease occurs in every variety of constitution and temperament, and a tendency to it is not even suspected, till the scirrhous tumor appears. But it is not so when the disease has existed long enough to impair the constitution, and establish a cancerous *cachexy*. Here there is an evident depravation of the whole constitution, manifested by dejection of spirits, debility, emaciation, or yellowness, dryness, and waxen appearance, of the skin, and more or less general fever.

Depression of spirits and other debilitating causes are supposed to have some influence in predisposing

the system to cancer, but this is rather a matter of conjecture.

Contagion was formerly supposed by some to exist in cancer, and was referred to as a cause of it. But the experiments of Biett, Alibert, Dupuytren, Nooth, and Nesbit, upon animals, and by inoculation upon themselves, with the matter discharged from cancer, have decided that it is not contagious.

Has the virus or matter of cancer any specific quality or power of circulating itself, in the same individual, from one organ to another? Facts seem to support the negative. True, the axillary and clavicular glands sometimes become cancerous after the breast. I say sometimes, for it is generally admitted that such glands are often enlarged by sympathy, without being cancerous. But it is not necessary to suppose that even those which are really cancerous are made so by any absorption of matter. It is a well-known law of vital action, that irritation and inflammation, either simple or specific, existing in any tissue, are propagated along that tissue, even to a distance, rather than to others, although nearer, that have a different vital endowment and different functions to perform. Witness inflammations in the urethra, extending to the bladder and testes by the mucous membrane. In cancer, as in this case, it is not necessary to suppose the transmission of virus as a cause of the secondary affection. Moreover, in cancerous breast, the absorbent vessels themselves seem to become obstructed by the disease, and to appear like cords, which probably accounts for the difficulty, I might say impossibility, of lessening the absolute size of a truly scirrhous tumor by means of

discutients; and it also accounts for the exuberant granulations of cancerous ulcer, the balance between the arteries and lymphatics being destroyed. That it is not matter transmitted to the axillary glands, seems probable from the fact, that in a kindred disease, the medullary sarcoma, absorbent glands are affected in an opposite direction to that of their current of circulation. Another fact in point is, that matter of cancer inserted under the cuticle, will not produce cancer in the glands to which absorbents of the part lead. From these considerations it is much more likely that the axillary glands are affected by continuous sympathy with the breast, and that having once enlarged and become irritated, they afford a suitable nidus or point of attraction, in which the cancerous diathesis of the system is kindled into disease, as it had previously been in the breast.

WHAT ARE THE DIAGNOSTIC MARKS OF CANCER OF THE BREAST?

This is a question of the first moment, as a decision of it involves the propriety of a painful operation, upon the performance of which the preservation of life may depend.

The diagnostic marks of cancer may be divided into three classes—those relating, 1st, to the scirrhous stage; 2d, to the occult cancerous stage; and 3d, the open cancerous stage. The two first are of chief importance, since an open cancer, besides its obvious and unequivocal signs, is also distinguishable from other ulcers by its previous history; the only exceptions being a few rare cases where other ulcers assume the cancerous character. The two first stages of can-

cer are therefore chiefly entitled to consideration, and presenting as they do the form of tumors, it is other tumors only with which they can be confounded, and from which it is our object to distinguish them. Those tumors which simulate cancer are—

1. *Hard tumors of a cartilaginous, a fibrous, and fibro-cartilaginous structure.* These are noticed first, not from the frequency of their occurrence, especially in the breast, for they are very rare—but because they approach nearest in aspect to indolent scirrhus, so much so as to puzzle the most eminent surgeons to distinguish them. They are alike hard, indolent, and sometimes knobbed upon their surface, whilst to increase the difficulty, this last mark, though characteristic of true scirrhus, is not always present in it. Among the uncertain marks are the fact, that this tumor is not peculiar to the cancerous period of life, and that it is less adherent to the mammary gland than scirrhus. But the knife is the only sure test to which they can be subjected, and it affords some satisfaction to be able to assure the patient, after they have been unnecessarily extirpated, that she is in no danger of a relapse.

2. *Hydatid or Encysted Tumor.*—"This begins in a swelling which is unattended with pain, and which has the character rather of a chronic inflammation in a part of the breast, than as bearing a resemblance to a scirrhus; for it has neither its mobility, its hardness, nor its general circumscribed or distinct limits, but incorporates itself with the surrounding parts of the breast. The general health is unaltered, even when the swelling becomes of the most formidable magnitude.

"As it increases, a change in the nature of the swelling is produced; at first it was uniformly solid, but is afterward distinctly divided into a solid and fluid part; the latter fluctuating so as at once to inform the surgeon of the existence of a fluid. If this part be punctured, a liquid having the usual appearance of serum, is discharged; the cyst sinks, but soon becomes distended, and the swelling continues to grow. At length the tumor acquires an enormous magnitude, and some of the largest swellings of this organ are of the hydatid kind. The absorbent glands, in the most aggravated form of this disease, are unaffected. It is more frequent in advanced age than in youth. When removed by operation it does not return."

"This disease wants the following marks of scirrhus, viz. excessive hardness, mobility, its circumscribed limits, and its small and stationary size, and it is not peculiar to the cancerous period of life. If mistaken in its early stage for scirrhus, and extirpated, there is no reason for regret, since it does not yield to discutients, and tends to grow to such a size as ultimately to require removal."

3. *Simple induration.*—This is of more frequent occurrence than all others beside. The most common kind is produced by disturbed menstruation. Sir Charles Bell says that the number of young women, from the age of sixteen to thirty-five, who have presented themselves in the hospital with lumps in the breast, is fully equal to those who have presented themselves at a later period of life with carcinoma; and he adds, "we have to trace an influence of the same kind in both, namely, irregular uterine action."

This form of disease is described in Sir Astley Cooper's lectures under the name of "irritable tumor of the breast."

It is distinguishable from scirrho-cancer by its occurring early in life. The same tumor occurs however at the cessation of the menses, and then age is no test of its character. But it is distinguishable also from scirrhus by pain and sensibility to the touch, its redder color, its retaining more of its original structure, and being less indurated, also by the surrounding part being slightly inflamed—and lastly, by its yielding to depletion, general and local, to sedative applications, and to correction of the uterine derangement.

Under this class may also be included indurations from external violence, either sudden, as from a blow, or slight and often repeated, as pressure of the breast, and too often handling the organ. Also, indurations resulting from a suppurating acute inflammation.

4. *Herpetic tumor.*—This arises from an irritation communicated to the centre of the breast, by an herpetic eruption upon the skin, around the nipple. It is apt to give an itching pungent sensation, which might possibly be mistaken for that of incipient occult cancer. The tumor is however sufficiently distinguishable by its evident cause and by its transitory nature.

5. *Scrofulous swellings* sometimes, though very rarely, appear in early life, or before the thirtieth year. They are attended by general marks of scrofula, and they yield to anti-scrofulous treatment.

6. *Rheumatic* and *gouty* constitutions are sometimes

affected with tumors of the breast—but they are tender to the touch and painful, and exhibit other marks of acute inflammation.

Pancreatic tumor of Mr. Abernethy, the simple chronic tumor of Sir Astley Cooper. "This disease is not of a malignant nature, nor does it produce any dangerous consequences. It attacks the young and apparently healthy, seldom beginning after the age of thirty years, and usually appearing from the age of puberty to that period. It is very superficial, growing rather upon the surface of the breast than its interior. At first it feels like one of the mammary lobes enlarged; and then, as if several were combined in one swelling. As it increases, it becomes in some degree lost in the substance of the breast. It has not the hardness of the scirrhous tumor, and is not accompanied with the loss of health of fungoid tumor," next to be mentioned. "It is an extremly moveable tumor. It is generally unaccompanied with pain, either in the part, or shoulder, or arm. It grows very gradually and slowly." It is therefore distinguishable from scirrho-cancer by the youth of the patient, by its softness, its slow and gradual growths, it being more superficial, and wanting tubercles, &c. &c.

Fungoid or medullary tumor—or *Fungus hæmatodes.*—This disease has been also called soft cancer, and being equally fatal in its tendency, and requiring the same treatment as scirrho-cancer, it may be asked why it is here separated and classed among those tumors that we wish to distinguish from cancer of the breast. The answer is, because it differs in its early stage so much from scirrho-cancer, that its admission

among that class of tumors would throw our best diagnostic symptoms of scirrho-cancer into confusion, and embarrass the young surgeon unnecessarily. For this reason I have given it a separate place.

"It occurs at all ages—is not so hard as the true scirrhus, but has more the feeling of chronic inflammation at its early stages; and as it increases, it becomes softer, yields to the impression of the finger, but immediately again fills, as the pressure is removed. After a few months, the skin becomes livid, and a distinct fluctuation may be felt that is contained in a cyst. The veins of the surrounding skin become extremely enlarged and varicose, and the surface assumes an inflammatory appearance, of a darker color than common inflammation." The cyst next ulcerates and discharges a fluid resembling bile, which is extremely nauseous to the smell.

It may therefore be distinguished from scirrho-cancer by occurring at all ages, by being softer, by its gradual growth, by the enlarged veins surrounding it, by wanting the darting pains, puckering of the skin, retraction of the nipple, knobby feel, and enlarged absorbent glands, and lastly, by impaired health from the first attack.

The foregoing tumors include about all that can be mistaken for scirrho-cancer. I have purposely omitted milk tumors, and wens, and also hypertrophy of the breast, wishing to simplify, by reducing the number as much as possible, and believing the latter tumors cannot be mistaken for cancer.

I will now recapitulate the diagnostic marks of scirrho-cancer in connection with those of the fore-

going tumors, in such a manner as will enable the surgeon to distinguish the one from the others.

1. *Hardness.*—This will serve to distinguish scirrho-cancer from all of the other tumors, excepting the fibrous and cartilaginous, including the osseous, to which the last is sometimes converted, and excepting also some chronic indurations.

2. *Insensibility to pressure.*—This will serve to distinguish scirrhous from simple induration, and from herpetic, rheumatic, and arthritic tumors. The frequent appearance of simple induration, compared with that of all others excepting scirrhus, makes its diagnostic symptoms more interesting to the practitioner than those of any other kind.

3. *Weight, in proportion to its size.*—This mark will exclude all other tumors excepting the fibrous and cartilaginous kind.

4. *Knobbed surface.*—This in a few cases of scirrhus in their first appearance is wanting, whilst on the other hand it is sometimes present in fibrous and cartilaginous tumors, and yet it is one of the best marks of scirrho-cancer.

5. *Circumscribed and stationary size.*—This will exclude all, excepting the fibrous and cartilaginous kind, and some rare cases of simple induration and scrofula, especially if it has existed more than a year.

6. *Unyielding nature to discutients and to antiphlogistic treatment, local or general.*—This will exclude all chronic indurations and most other tumors excepting the fibrous and cartilaginous, and the fungoid and pancreatic tumors. It is a valuable diagnostic, because

it is brought to bear upon forty-nine fiftieths of the tumors that are not scirrho-cancerous.

7. *Darting or lancinating pains.*—These announce the approach of occult cancer, and exclude all other tumors, excepting perhaps the herpetic kind. It is a decisive diagnostic in almost all cases.

8. *Puckering of the skin* is equally decisive with the last mentioned.

9. *Drawing in of the nipple*, equally decisive of scirrho-cancer.

10. *Adhesions to surrounding parts*, to the skin, and to the muscles, whilst still void of sensibility to the touch. This excludes all the tumors simulating cancer, excepting the fungoid and pancreatic kinds, and perhaps the fibro-cartilaginous kind.

11. *Violet or bluish tint of the skin*, is decisive of cancer in all cases excepting the fungoid tumor.

12. *Swelling of the axillary or clavicular glands.*—This excludes all, excepting some rare cases of simple induration—but it does not always occur in cancer.

13. *Period of life.*—Cancer of the breast rarely appearing before the thirtieth or thirty-fifth year, mostly between the fortieth and fiftieth, and rarely after the sixtieth.

14. *Past history*, as respects exposure to the cause of other diseases that simulate cancer, and their effect at the time.

15. *Hereditary tendency* to the diseases that simulate cancer, or to cancer itself.

By thus comparing any suspicious tumor with

others that simulate scirrho-cancer, the surgeon may, by the process of exclusion, decide its character with some degree of certainty, if it be a scirrhus, and with absolute certainty if the symptoms of occult cancer are present.

For example, although no one nor two marks of scirrho-cancer of the breast are sufficient to decide its character in the indolent state, yet several of them united, "as hardness, knobbed surface, insensibility to pressure and of more than a year's standing, will prove it to be a scirrhus in ninety-nine cases out of a hundred." And if in addition to the above it has resisted the known remedies for the other species of tumor—has darting lancinating pains, and the skin over it is puckered and nipple drawn in, there can be no mistake in calling it a cancer.

Tumors and ulcers that are only simulative of cancer, may, as before stated, assume its real character, in constitutions that possess a diathesis or predisposition. The local disease seems to be a more combustible portion of the system, in which the cancerous flame is ignited sooner than elsewhere, and before it has arrived at that degree of intensity which would cause it to break out spontaneously in a sound part. Dr. Monroe was so impressed with this idea, and with his unsuccessful operations, that he at last advised extirpation in cases only where cancer was evolved by some local disease, believing that these were the only cases in which the operation would succeed.

Cancerous ulcer may be distinguished from others by its hard and luxuriant vegetations, its suppurative matter, which is never that of healthy pus, and always

evolves a peculiar odor—by its sloughings and excavations—by the eversion of its edges—by its affecting the absorbent glands—by its incurable nature—and by its past history. Among those that simulate it, are fistulous sores with hardened edges, and some phagedenic ulcers, that by appropriate local treatment, and improvement of the constitution, may be made to cicatrize.

IS CANCER OF THE BREAST CURABLE?

I begin this part of the dissertation by stating distinctly that no medicine has been hitherto discovered, either of general or local application, or both combined, that can disperse a scirrho-cancerous tumor, even in the incipient or scirrhous state, or that can correct and cure the cancerous habit, on which such tumor depends.

If this be true in respect to indolent scirrhus, as I shall make it appear, when considering the reputed antidotes and specifics that have been hitherto offered, the position is still more maintainable with respect to painful or occult cancer; for, besides the obstacles belonging to the previous state, there are the additional ones of augmented size, deeper rooted cancerous diathesis, and accelerated progress. So true is this, that it has become a maxim with all good surgeons, that the longer extirpation is delayed, other things being equal, the greater is the liability to a return of the disease. I know it has been said by the distinguished Mr. Pearson, seemingly in opposition to this, that "if the removal of the morbid part were equally complete in two patients, one of whom had been afflicted seven

months and the other seven years, he should esteem the latter patient in less danger of a relapse than the former." By this, however, he meant to imply, that the two cases show a difference in constitution and virulence of disease, by which its progress is more rapid and sure to a fatal termination in one than in the other, whether extirpated or not; and not, as some have inferred from his remarks, that delaying the operation in either case was advisable, as affording any security against a recurrence of the disease—for, seven years' delay would place almost any cancer beyond the reach of any surgeon's knife. But to return from this digression, not only those who regard the disease as depending on a cancerous diathesis, that tends to increase up to a certain period of life, consider delay in the use of the knife dangerous, but those also who regard the disease as local, for Sir Everard Home, who is a localist, states that the longer the operation is delayed, the more it contaminates the neighboring parts, and thereby defeats the operation, by lessening the chance of extirpating all that is affected. Be the disease, then, general or local, the tumor is unyielding, both in its indolent and painful state, to any known medicine, topical or constitutional. It is, however, proper that I should notice some of the most extolled remedies, with the view of showing their utter inefficacy:—and first, of external remedies.

Arsenical preparations.—These may be regarded as operating, not by dispersing, but by destroying, in a manner somewhat analogous to the knife, and more properly belong under the head of extirpation or abla-

tion. Under this class may be included all medicines that act in like manner, as caustics and actual cautery.

Ferruginous preparations.—Mr. Carmichael, of Dublin, held out encouragement to the profession that great benefit would result from their use; but the cases he detailed were probably not cancer; at any rate, there is no longer any value attached to them as anti-cancerous remedies, and they are used for cancer of the breast as sedative applications only, to palliate some of the painful symptoms of cancerous ulcer.

Mercurial preparations, particularly corrosive sublimate, were recommended by Andrew Wilson for cutaneous cancer, but his cases cited in proof of their efficacy were probably of a syphilitic character. All mercurial preparations to the surface of true scirrhus or cancer, are now considered injurious.

Alkaline and acid substances have been extolled at different periods, but their use is now rejected.

Vegetable and animal substances, of various kinds, have from time to time enjoyed a reputation as being anti-cancerous. Opium, cicuta, belladonna, digitalis, aconite, and other narcotics, have been serviceable as sedatives and palliatives in the painful state of cancer, but it is useless to add that neither of these, nor gastric juice, bullock's blood, nor slices of flesh, which have at times been considered as sure remedies, are, as such, entitled to any confidence.

Iodine, from its known effect upon some chronic glandular engorgements, was looked to with sanguine hopes of benefit, the more so as its discutient power, when long applied, had caused atrophy of the testis and mammary gland itself. Mr. Ullman, a German

physician, tried it in 1823, as he thought with decided benefit. M. Magendie, it is said, has used it with some success; but a great many others who have tried it report differently. It is easy to conceive, however, of its exciting fallacious hopes; for, as a powerful discutient, it might affect the inflamed cellular substance surrounding a cancerous tumor, and even the gland itself, and, by reducing these, appear to lessen the whole tumor. It may also have entirely dispersed some tumors that simulated cancer; but diligent inquiry and some observation of its effects, have satisfied me that it has no influence upon a real scirrhus.

In respect to internal medicines, many of the above-mentioned topical ones have been administered without benefit, excepting as palliatives. Among these, cicuta has enjoyed some reputation. Stork pronounced it an antidote to the disease. But De Haën assures us, that of a hundred and twenty patients who tried it, according to the directions of Stork, not one was cured. Alibert reports a similar result upon nearly an equal number under his care, and this accords with the reported experience of most others. It appears useful in facilitating the dispersion of some other tumors, and may render cancer less painful, perhaps less rapid in its progress; but never cures it. The same may be said of belladonna, of aconite, of lauro cerassus, and some other vegetables of a similar character.

Acetate of copper, white arsenic, arsenious acid, preparations of iron, muriate of barytes, have each by turns risen and fallen in reputation. But no one pretends, at the present day, that either of them is anti-cancerous.

Distilled water, as a sole article of subsistence for many days, under the impression that it would starve out a cancer, was tried and recommended by Pouteau of Lyons, and Lambe of London.

Repeated small bleedings, recommended by Valsalva and Fearon, were brought into notice probably by a trial of them in some indolent tumors that simulated cancer. At any rate, they are no longer in repute.*

I have purposely omitted a long list of specifics, as they have been termed, because they are unworthy of notice. As if no absurdity could be too gross in the selection of remedies, I will observe, that green lizards, swallowed fresh, have enjoyed high reputation for the cure of cancer. They were proclaimed as sure remedies, first, by a learned professor in Guatamala, and subsequently in Spain, Sicily and Germany, and have called forth treatises of high commendation, in each of those countries. The direction is, to cut off the head and tail, tear away the skin and entrails, and swallow them while palpitating. Strange as it may seem, two of the best treatises upon cancer that are to be found in the French language, were written by men who were so far influenced by the foregoing accounts as to try them upon patients. M. Bayle caused one patient to swallow four hundred of them in the space of two months. [Dict. des Sciences Médicales, Vol. 3d, p. 667.] The other gentleman, M. Cayol, whose treatise was published in 1832, saw one patient swallow fifty in fifteen days. Their re-

* For an account of the trial of some of the foregoing remedies, I am indebted to Dict. des Sciences Méd., Vol. 3.

ports state that they saw no good effect, "physiological or therapeutic."

But it is useless to pursue this subject further. The high authority upon which the foregoing remedies were recommended, is the only apology for selecting them from a long catalogue of absurd prescriptions that have enjoyed reputation. We could wish, for the honor of the profession, that so many deceptions practised upon suffering humanity could all be referred to an honest mistake in the diagnosis of cancer. But alas! every one must be constrained to believe, that "independently of this cause, the illusions of self-love, the desire of renown," or the promptings of avarice, "which speculate upon the dearest interests of humanity"—a detestable unfairness that trifles with the credulity of the afflicted, and withholds from the public a true statement of failures, are the cause of the impostures that have been practised, and which are the more reprehensible because they defer a resort to the only remedy that is entitled to confidence, until it is unavailable, and the patient's fate is sealed.

The foregoing facts justify the conclusion that no medicine, yet discovered, possesses the power of resolving or otherwise curing cancerous tumors, or of correcting the cancerous diathesis. Here, be it understood, that I do not include those medicines or other articles that kill the affected part, and which are often substituted for the knife; nor do I include mechanical pressure, which may produce atrophy or gangrene.

Are we to infer from past failure of success that the disease will always remain incurable by medicine?

By no means. Syphilis was at one time as litttle known in its nature, and as incurable, as cancer, yet its varied forms "now yield to a medicine that was introduced in a manner purely empirical or accidental." Iodine, if not a specific for scrofulous tumors, has conferred great benefit on those who are affected with them. Who knows but some medicine may yet be found equally efficient for correcting a cancerous diathesis, and which in concurrence with some new topical application, may resolve scirrho-cancerous tumors as effectually as we are now able to resolve venereal tumors of the periosteum, of equal or even greater hardness? The chief obstacle to experiments, and it is, I admit, one of magnitude, is the danger of consuming time, in which the only remedy at present known must be tried in order for its success. The only medicine that engages public attention at this time in Europe is creosote, which on account of its efficacy in some cases of cancerous uterus, is now undergoing experiments in France and England upon other cancers.*

Extirpation, then, with the knife, or the destruction of its living powers, and consequent separation of it from the subjacent sound and living parts, is the chief if not the only measure that promises to effect a cure. Strangulating the tumor with ligatures drawn through or round its base and tied, has been recommended, but this presents too many objections to

* Three years have elapsed since this Dissertation was first given to the public, in which time the virtues of Creosote have been fairly tried, but I regret to say with very little benefit. Some cancerous ulcers are perhaps slightly improved in their condition, but as a cure for cancer it is probably about equal to Iodine.

entitle it to further notice. To the use of actual cautery, objections are equally strong. Arsenical escharotics, the chief ones now used, are justly entitled to more confidence. Yet if we reflect duly upon the danger and uncertainty that attend their operation, they must in almost all cases give place to the knife; for who can determine the exact limits to which the caustic when applied may extend, or whether it may not leave some portion of the cancer untouched, or destroy the patient as a poison? An important direction in the use of the knife is, to examine the tumor after extirpation, in order to ascertain if some indurated portion may not have been left; but escharotics afford no such means of knowing whether we have made clean work. Another important direction in the use of the knife is, to heal the part immediately; if possible, by the first intention, in order to prevent its being a long protracted point of irritation, that will be likely to assume the cancerous action. The constant failure of Mr. Monroe and many others of his day, to prevent a return of cancer, is justly attributable to a neglect of this rule. And surely the same evil must ensue, where escharotics leave a large open ulcer.*

On the knife, then, surgeons have been taught by

* A "Cancer Doctor" named Pope, resided in Providence some years since, who enjoyed some reputation for curing cancers by escharotics which caused less pain than ordinary applications of the kind. A medical friend succeeded in obtaining his formula for preparing it, and allows me to insert it.

℞ Corrosive Sublimate 3iij.
Gum Opium, 3j.

Concentrated sulphuric acid, q. s. to give the mixture the consistence of tar.

A thin layer is laid over the part, which will destroy the skin, a

experience to rely, as their chief hope of success in the treatment of cancer of the breast. Fortunately the operation is not dangerous nor difficult, and the wound appears to heal kindly. It is probable that not one in five hundred die of the operation, and it is most usual for the wound to wear a healthy appearance for some time after. But alas! our fondly cherished hopes are often cut off by the recurrence of cancer, "either in the cicatrix, or in some other part of the body;" and it is commonly more rapid in its progress, than it was in the first instance. The cancerous vice seems to have acquired a new degree of virulence, to diffuse its influence throughout the system, suddenly evolving all the marks of an established *cancerous cachexy.*

To the patient, then, and to himself, the surgeon must hold up the following propositions.

1. That the extirpation of a scirrhous tumor, whether indolent or painful, large or small, recent or of long standing, is no positive security against its re-appearance, and that the same is true in respect to cancerous degenerations of other tumors and ulcers.

2. That the danger of a return is greatly increased when the disease has been of long standing, or of rapid progress in its development, or if ulcerated, and especially if it has affected the axillary glands, or adheres to the subjacent muscles.

thicker one will strike deeper. It is probable this might be applied with advantage in a circle to the circumference of a schirrous or other tumor so as to remove it, which would be less painful on the whole than to burn out the whole substance. I have never used it, but think it probable that the amount of pain from the escharotic ingredients is diminished by the opium, and were I obliged to use any such application, this would be my choice.

3. That there is but little hope of preventing a return, by operating after the constitution exhibits marks of cancerous cachexy.

It may be further remarked that a cancer which has broken out a second or even a third time, may yet be a fit subject for an operation. Some French surgeons have operated upon the same breast four times, and one of them a fifth time.

Relapses.—One cannot but feel surprized in reading the difference in the reports given by surgeons of the first eminence, in respect to the proportion of relapses that have occurred in their own practice. The elder Monroe said that of sixty persons operated upon for cancer, four only had not relapsed after two years. Scarpa had only seen three cases where the extirpation of cancer was not followed by a relapse. According to Boyer, four or five only out of one hundred were permanently cured by extirpation. Mr. Home describes seventeen cases of extirpated cancerous breast, five only of which proved successful. On the other hand, Mr. Hill, a surgeon of Dumfries, in Scotland, reports eighty-eight cases of extirpated cancer, six out of seven of which proved successful. Mr. Nooth says that not more than one in thirty of his patients experienced a relapse. Mr. Fearon's experience is nearly as favorable. Sir Astley Cooper estimates the failures of entire cure at three fourths.

Professor Benedict, of Breslau, states, that only thirteen out of ninety-eight, or two in fifteen, escaped a return of cancer in the breast, after amputation, and he thinks that some of those who did escape, were

not affected with a genuine cancer. Cancer of the lips is less likely to return after an operation.

In this country, so far as my inquiries have extended, the proportion of relapses is at least two thirds.*

Satisfied as we are that the above-named gentlemen in Europe are entitled to the highest respect as operators, it seems difficult to account for such various results. In respect to Dr. Monroe, however, it is stated in the Edinburgh Essays, Vol. 5, by a writer who had perused Dr. Monroe's MS. lectures, that "he recommended the operation too indiscriminately, and without prescribing the necessary limitations." It is well known, too, that in Dr. Monroe's day it was customary to heal the wound of an operation by the slow process of granulation. The same remark is no doubt applicable to the patients of Scarpa, in the early part of his professional career, and Boyer continued to stuff with lint the wounds made by the operation until the latter years of his life; whilst the British surgeons, very soon after the days of Monroe, changed their mode of dressing, by endeavoring to heal the wound as much as possible by the first intention. To this it should be added, that in Dr. Monroe's time it was erroneously supposed that, by keeping up a discharge from the breast, the return of the disease would be prevented, and with this view it was directed that when the sore was reduced to the size of the palm of the hand, it should be kept open for the remainder of life, and to apply occasionally common caustic and

* Three years since, I stated the proportion of final cures, after extirpation, at more than one half. Further inquiry and experience have diminished the proportion of cures.

black soap, in the form of an ointment, for the purpose of promoting a discharge. Now the doctrine we have maintained, that local irritation is apt to evolve cancer in those who are strongly affected with cancerous diathesis, (and who can be more so than those who have had cancer extirpated?), would lead to the conclusion that these different modes of treatment must be followed by results somewhat various.

Another circumstance of equal importance to the success of modern surgery, is, the practice of removing every portion of the cancer and something more—of examining the extirpated tumor to see that sound and healthy looking flesh appears throughout its cut surface, and to remove any suspicious portion that remains in the wound, which can assume the cancerous character. Nearly all modern authors counsel our making the incisions in an apparently healthy part, beyond the limits of the tumor—a direction less insisted upon formerly.

Can a relapse be prevented by any treatment, local or general? We have already shown, that no known specific against cancer exists in the Materia Medica, and the profession is therefore confined to the course of merely combating such diseases and derangements of the constitution as are supposed to favor a development of the cancerous vice. The foremost of these appears to be derangement of the uterine function, at or near the period of the cessation of the menses. The views before given of Sir Charles Bell, show its great importance, and the necessity of correcting every

deviation from health, by the means ordinarily recommended in such cases.

From an impression that peccant matter exists in the circulation, in cancerous constitutions, which might be drained off, issues have been prescribed from time immemorial; but the experiments of MM. Deschamps and Gurnier, upon an extensive scale, show satisfactorily that they can have no effect upon a cancerous diathesis, and that, applied to the part affected, they are worse than useless. As a general direction, we are to avoid every cause of constitutional irritation and derangement, to preserve a cheerful state of mind—in one word, to conform to the strict rules of hygiene.

In respect to local treatment, for the prevention of a relapse, it is now generally recommended to abstain from every application that can irritate the skin, to treat the cicatrix with the utmost tenderness, and to keep it constantly preserved from sudden changes of temperature, by some soft covering of the nature of down, "or a swan's skin. Sir Charles Bell, in accordance with this, and with his view of the intimate relation subsisting between diseased uterus and mammæ, directs that a cancerous breast should, as far as possible, be made an internal part, by such dressings" as will protect it from changes of temperature, give it a gentle support, and soothe the skin. This he prescribes for cancerous tumor, and it is equally applicable to the cicatrix, after its removal.

Finally, the foregoing pages authorize the conclusion, that our acquisitions on cancer, within the last half century, amount only to a more exact notion of

the tissues of cancer, obtained by a closer attention to pathological anatomy—to a more exact analysis, which has excluded tumors of another nature—to the rejection of unfounded hypotheses, and to a more certain diagnosis in some cases—but that very little has been added to the treatment.

TREATMENT OF CANCER BY COMPRESSION.

I will now notice a mode of treating cancer, which, although not essentially new, has recently obtained such favor in Paris, as to deserve attention—it is pressure of the tumor, with the view of producing atrophy. In 1829, M. Recamier published two volumes, entitled "Recherches sur le Traitement de Cancer par la Compression." The first volume presents a history of sixty-two cases of cancer of the breast, a summary of which is given in the following tables.

Table 1st.—Of 62 cases of cancer of the breast,
5 " were not treated.
11 " palliatives only.
45 " treated with hope of success.

Table 2d.—Of 45 cases treated with hope of success,
30 " were treated by compression alone.
4 " compression and cauterization.
5 " compression and extirpation.

Table 3d.—Of 30 cases treated by compression,
10 " cured.
4 " almost cured.
4 " less advanced in treatment.
6 " have less favorable chances.
4 " have obtained slight advantages.
2 " not any benefit.

Table 4th.—Of 4 cases treated by compression and cautery,
2 " cured.
1 " nearly cured.
1 " received temporary benefit.

Table 5th.—Of 5 cases treated by compression and extirpation,
3 " cured.
1 " relapsed.
1 " dead.

Table 6th.—Of 6 cases treated by compression, cautery and extirpation,
5 " cured.
1 " dead of another disease during treatment.

General summary.—45—curative treatment.
20—cured.
15—under treatment.
10—treatment failed. (Two of these ten died of other affections.)

Cause.—16 Blows.
39 No local violence.
5 Other cancerous persons in same family.
2 Blows, and suspected hereditary causes.

Age.—Less than 12 years, . . . 1
Between 20 and 30, . . . 3
" 30 and 40, . . . 15
" 40 and 50, . . . 22
" 50 and 60, . . . 16
" 60 and 70, . . . 4
" 70 and 80, . . . 1

Side affected.—25 Right side.
35 Left side.
2 Both sides.

Relapses after extirpation, . . . 11
" after Recamier's treatment, . 1

Complication of secondary engorgements.—In axillary region, ... 21
Sub-clavicular, ... 4
Super-clavicular, . . . 3

The treatment by compression was adopted by Sir Charles Bell, at the Middlesex Hospital, in London, probably in consequence of the statements of M. Recamier; but Sir Charles reported to the Medical Committee that it was not entitled to confidence. M. Recamier stated in reply, that if compression was unsuccessful at the Middlesex Hospital, it was because

it was not properly exercised, nor modified according to the stage of the disease. I have been at some pains to ascertain from Paris the manner that M. Recamier would prescribe, a summary of which is as follows. He employs layers or disks of agaric cut smoothly, and placed over the scirrhous tumor. These he retains on the part by bandages of flannel, without seams or selvages, rather more than two inches wide, and eight or nine yards long. He places a disk of agaric on each breast, and then several additional ones on the one affected with scirrhus, placing them so that the centre of pressure may fall on the most prominent part of the tumor. When this last is very prominent, the disk of agaric must be thick, and vice versa. The pressure of the bandage cannot be borne by some patients, unless it be very skilfully applied, and perfectly equal over the whole surface. "Elle doit être égale, douce, constante, générale, modifiée à mesure que l'affection locale se résout, et continuée après la résolution de l'engorgement—une compression inégale devient promptement douloureuse; l'appareil se relachant ou blessant après un certain temps, il est nécessaire qu'il soit renouvelé souvent, tous les jours s'il n'y a pas d'ulceration, et deux fois par jour s'il y en a."

M. Cayol, who was a professor in the Faculty of Medicine in Paris, in 1829, published a learned treatise on cancer in 1832, in one volume. To this is added an Appendix, entitled "Progress of Science with regard to Cancerous Diseases, &c." Here the author gives an account of Recamier's method of compression, and he declares it to be a conquest in thera-

peutics which should be placed by the side of lithotrity and the preparation of sulphate of quinine.

Such are the opinions of M. Recamier's method of treating cancer, but respecting which the foregoing dissertation suggests to the reader's mind two difficulties.

1. That its slow operation consumes the precious time in which extirpation offers its best chance of success.

2. That however skilfully applied to the female, even by M. Recamier himself, bandages will never press a cancerous diathesis out of her system.

MALARIA.

DISSERTATION

ON

MALARIA,

EXHIBITING

THE COMPARATIVE INFLUENCE OF ANIMAL AND VEGETABLE DECOMPOSITION AS A CAUSE OF FEVER.*

It is supposed, that one-sixth of the human species die of fever. As a majority of cases have seemed attributable to natural causes, unremitted attention has been given to their investigation. But notwithstanding the importance of the subject, and the weight of talent that has been employed, it involves important questions, that still remain undecided; among the most important of which, are those we have selected as the subject of the following pages.

In discussing these questions, our attention will be directed, *first*, to the effect of vegetable decomposition; *secondly*, to that of animal decomposition; *thirdly*, to the comparative influence of both as a cause of fever.

* The Boylston premium was not awarded to this Dissertation. It however is appended to the others, in consequence of its having received respectful commendation from the Boylston Committee, accompanied with a wish that it might be published, and its author's name made known. (See Boston Med. and Surgical Journal, Vol. III, No. 26.)

I. *The effect of vegetable decomposition on the human body.* The depopulation of particular regions—the destruction of armies quartered therein—and the greater prevalency of fevers at certain seasons than at others, gave rise to a particular examination of the soil, face of the country, and atmosphere, peculiar to those places. It was soon ascertained that fevers prevailed most in marshy, moist ground, wherein vegetables having grown, die and putrefy. This led to the belief, at an early period, of their being caused by putrefaction, and this belief has become so generally and firmly established, that a statement of it, at the present day, wears the air of a truism. It may, however, not be amiss on the present occasion, to re-examine the evidence on which such belief has been maintained.

1st. Is fever proportioned, in frequency and intensity, to the amount and rapidity of vegetable decomposition? The rapidity of this process is regulated by the degree of heat and moisture. Either of these agents, without the other, fails of producing it. If moisture be increased till it excludes air from the surface of vegetable matter, decomposition is suspended, and the same effect is produced, if heat be increased till moisture is dissipated; as also when the surrounding atmosphere is reduced to the freezing point. But when the temperature of this ascends from 32° Fahrenheit, the proper quantity of moisture being present, decomposition increases in direct ratio with it, till the degree of heat rises to 100°. Let us now inquire whether the frequency and intensity of fever prevails in countries where decomposing vegetables

abound in proportion to the degree of heat and moisture.

In respect to heat we may observe, that the ancients discovered, at an early period, that its prevalence coincided with that of fever. To this agency alone, they attributed the malignant fevers that wasted their armies, and depopulated many regions. They observed, too, that frost arrests, or mitigates all fevers, which they had ascribed to the influence of this cause; —that it stayed the progress of intermittent, bilious remittent, and yellow fevers;—that such fevers were unknown in the winter season of temperate climates, and that they commenced only in the summer, and declined in autumn. Later writers have observed, that within the tropics, no season is exempted from the occasional appearance of these fevers, and that in some parts they prevail through the year;—that winds from the north, even in summer, render them milder in all places;—that even the shade of trees moderates their violence, while this, on the other hand, is greatly augmented, when the trees are cut away, and the surface of the ground left exposed to the direct influence of the sun. Hence, the first settlers of a wilderness suffer less from fever, than those do who arrive immediately after forests are cleared, and before decaying substances are removed from the ground by cultivation. The severity and duration, too, as well as the frequency of fever, is influenced by the degree of heat. This is observable both in respect to different seasons, and to different latitudes, and also to different altitudes of the same place. In some latitudes, vernal intermittents are succeeded, as the season ad-

vances, by bilious remittents, corresponding in severity to the elevation of temperature; and when this is very high, and long-continued, they assume the malignant type. In the autumn again, they become milder, and are finally checked on the accession of frost. In respect to their duration, we find that in England, and in corresponding latitudes on the continent, fevers appear in August, and prevail through September, declining as the cold weather approaches. In the Netherlands, they appear in the latter end of July;—in the campagna of Italy, and in Spain, early in July; in Sardinia and Minorca, in June, and are prolonged till late in November; in Egypt, in May, and they prevail both earlier and later in Gambia, nearer the equator.

The same remarks apply to this country, making allowance in comparisons with Europe, for difference of temperatures in corresponding latitudes. The fevers we have mentioned are hardly known in Quebec; are rare and mild in New England, excepting in extremely hot seasons, when they produce yellow fever: its exemption from intermittents and remittents being ascribable to other causes than an appropriate degree of heat, and which will be noticed hereafter. Passing southward we find the frequency and severity of fevers increasing in Maryland and Virginia, still more in South Carolina and Georgia, and appearing earlier and later till we reach New Orleans, where fever of a malignant character prevails during a great part of every summer.

In respect to difference of altitude, heat, in conjunction with other causes to be noticed, acts with more effect on the low grounds of tropical climates, than on

elevated situations, where the temperature is cooler. Monks-hill in Augusta, says Dr. Ferguson, is quite exempt from yellow fever at the height of six hundred feet. On the Ridge, a sloping hill in India, three hundred feet above the marshes, the yellow fever of the marshes disappears, and the common remittent takes its place, while at the top of the Ridge, five hundred feet high, the troops are exempt from disease.*

The same remark applies to the fevers of Cuba. "Tivoli, less unhealthy by far than Rome, is three hundred feet above Rome. Sezza, exempt from diseases, is nine hundred feet above the Pontine marshes." † It appears then, that in proportion to the degree and duration of heat, other causes concurring, is the severity and duration of fevers, until the temperature rises to 100°. "Putrefaction takes place most readily," says Fordyce, "in a heat of 100° of Fahrenheit's thermometer. It goes on much more slowly in a heat of 110°; it goes on more slowly in *less* degrees of heat than 100; and scarcely at all at 40°."

In respect to moisture, it may be observed, that when this is wanting, fever rarely occurs; and when it is entirely dissipated, fevers that have prevailed, disappear. It has a most important influence in modifying the influence of heat. In some dry situations, the hottest seasons are the healthiest. Lind states, that the hottest season of Senegal is the driest, and at the same time the healthiest. The inhabitants near the hot deserts of Africa, are invariably free from epidemic fevers. "In the hot countries within the tropics, in

* American Quarterly Review, Vol. IV. p. 296. † Ibid.

general, the hot and dry season is healthy." Lind, speaking of Guinea, says, this, as most tropical countries, has, properly speaking, only two seasons, the wet and the dry. The former is of about four months continuance, and is the season of sickness; whereas, for many months in the dry season, most parts of this country are equally healthy and pleasant with any in the world. No sooner, however, do the rains set in, than the ravages of disease commence, and continue throughout the wet season, and afterwards, till the attendant moisture is evaporated. As soon as this is effected, the health of the country is restored, except in those places which continue wet throughout the year. The same thing occurs in this country. Wet seasons, if hot, being generally more sickly than dry ones. The wet seasons of 1804, 1821 and 1823, were very sickly, and the dry one of 1822 was comparatively quite healthy. If there be exceptions, if dry seasons produce local epidemics, they are uniformly in marshy places, or in artificial ponds, where evaporation exposes decaying vegetables that were previously inundated. Hence it is that there are some, who, even in the present advanced age of medical science, believe that moisture alone will produce intermittent, remittent, or bilious fever.

But let such inquire of those who sail on the great lakes of this country, particularly Erie, and they will find, that vessels anchoring in the months of July and August on those parts of its shores that are marshy, have their crews affected either with intermittent or remittent fever, according to the advancement of the season, and that new cases cease immediately to ap-

pear, on sailing from such anchorage to the central part of the lake, or to a port having a bold shore, or which is destitute of decaying vegetables. In sailing from this lake during midsummer to Lake Michigan, crews are apt to suffer more or less with fever from passing through the river St. Clair, especially if detained by head winds, and the inhabitants of both its shores have suffered from fever and ague more than almost any other section of country, yet, on entering Lake Huron, new cases of fever in such crews immediately cease to appear.

From the sick records which I kept in the squadron on Lake Erie, I have found that the ships anchored at Put-in-bay, with healthy crews, in the month of August, 1813, that while there, and at Sandusky Bay, a few miles from it, which was still more marshy, there occurred, in the space of three weeks, more than one hundred cases of bilious remittent fever, and forty of them in the flag-ship, her crew consisting of one hundred and thirty men;—that on sailing in this time upon a short cruise across the lake to Malden, the fever was entirely stayed, but that new cases began to appear immediately on returning to their former anchorage, and that after the 10th of September, the day they sailed some ten or twelve miles to meet the enemy, no new cases occurred. In these lakes there is no salt to correct the febrific quality of the moisture in ships, and yet they are healthy when in the centre of the lake, whilst persons have, within my knowledge, caught intermittents and remittents by passing in a steam-boat in a clear night through the *marshes* between New York and New Brunswick, although the water all the way is salt.

But, while we deny that moisture is the sole cause of such fevers, we repeat that it is necessary for the progress of putrefaction, and consequently for the generation of fever. If there are apparent exceptions, if some places that appear arid are nevertheless sickly, it will be found that they are remarkable for having dews at night, which act like rain on decomposing vegetables.

But if, on the one hand, a total dissipation of moisture will arrest the progress of vegetable decomposition, and at the same time of fevers, so on the other hand the same effects will be produced by its superabundance. Thus, a bilious fever was arrested in Brabant, by inundating a marsh in its neighborhood; and Sir John Pringle relates, that the inhabitants of Breda adopted the same expedient with success. The marshes of Delaware are innoxious in seasons when they are completely overflowed. "The same is said by Dazille, of the marshes of Cayenne." Excessive rains have produced the same effect in many places in this country. In short, whenever moisture is sufficient to exclude air, the process of decomposition, as before stated, is suspended, and with it also the prevailing fevers we have mentioned. It is only then, where heat and moisture are duly proportioned, that fevers are produced, and these will be severe in proportion to the combined activity of these agents, a sufficient quantity of dead vegetables being present for them to act upon.

A sufficient quantity of vegetables we repeat, for this is as important to the morbific result, as the agency of heat and moisture. Wherever this is most abundant,

heat and moisture acting in due proportions, there fevers will be most prevalent, their intensity or malignity increasing according as the heat approaches the degree of 100° of Fahrenheit. Salt marshes have been supposed to form an exception, but this is a mistake. "They produce fever in Normandy, and on the French shores of the Mediterranean, in Spain, and throughout the south of Europe." In Holland, the severest seasons of fever have succeeded irruptions of the sea. The same thing is observable on our own sea-coast, and several writers have observed, that putrefaction is more rapid whenever salt and fresh water intermix upon vegetables; and that salt marshes situated at the confluence of fresh and salt water, are more pernicious to health than marshes surrounded by fresh water—and the effluvia exhaling from them in hot weather, every one must acknowledge, is more offensive.

In tropical countries, sickness prevails most in low and marshy plains, as Benin, New and Old Calabar.* "All those cities and stations in Africa, Asia and America, which have been the grave of unnumbered thousands, are situated at the mouths, or on the banks of rivers, in flat countries, which, in the rainy season, become one vast morass."†

In more temperate climates, similar spots are the seat of endemic fevers of a milder character. The artificial morasses, produced by building mill-dams, are the spots noted for disease—of this, every neighborhood affords instances.‡ Where vegetation is

* Lind. † Ibid.

‡ Cooke, Med. Record, Vol. VII. p. 451.

rank, and forms a thicket of grass and reeds, and these become moistened and matted together, they form what is termed a jungle. This kind of materials is so fruitful a source of fever, that in many places it has given rise to the name of jungle fever. The swamps and shores of lakes, ponds and rivers, when first cleared, present to the sun great quantities of underwood and jungle, which had before been excluded by dense foliage. "The dreadful fever, affecting the first settlers of the Gennesee country, from 1796 to 1800, arose from their clearing and settling the rich bottom land."* Doubtless, much of the salutary influence of the foliage of trees is ascribable to the changes produced upon the air by vegetable respiration. The ancients held their groves to be screens to their health, and "the unhealthiness of the Porta del Populo at Rome, arose from cutting down a wood that served as a screen to that part of the city." When cultivation of the soil has taken place for some time in the new countries, and vegetable matter is decomposed on the ground, and dried by ditching and draining, the inhabitants suffer less from fever—hence intermittents which, in their early settlement prevailed extensively in the western parts of Massachusetts and in Connecticut, on the rich bottom lands and *intervales*, have quite disappeared. But it is unnecessary to dwell longer on the well-known febrific tendency of marshes, and other moist places covered with dead vegetables, in hot seasons. It is known not only to the profession, but even to the vulgar, and to the less enlightened nations—to the lower orders of Europe,

* Amer. Quar. Rev.

to the negroes of Africa—and it is familiar to all the yeomanry of this country. Scarce an individual can be found in the profession, who doubts that intermittent, remittent, and yellow fevers, are proportioned in frequency and intensity to the amount and rapidity of vegetable decomposition.

This is, however, to be understood as referring to vegetables that are similar in kind. Different vegetables vary in their morbific effects, while undergoing decomposition. It is not produced at all by dead peaty bogs, or by peat which carries on no vegetation. Blades of grass are less baneful than more succulent plants, as cabbage and the bulbous roots, potatoes, turnips, &c. Large wood decays more slowly in successive concentric layers, and generates miasm slowly in proportion to its bulk, but "the poisonous effects of putrefying flax, hemp, indigo, and coffee, are well known in the storehouses on the wharves of New York and Philadelphia." Perhaps this more deadly character may be owing to confinement and concentration, and to the fact that a sort of fermentative heat is generated in the centre of the mass.

If required to specify instances in this country, wherein fever proceeded from vegetable decomposition, we might name a great number that are recorded in the early medical journals of New York and Philadelphia. The Medical Repository was commenced early after the prevalence of yellow fever in Philadelphia, and other seaports, and received the reports of physicians respecting it, from every quarter. The five first volumes contain a large number of instances, where yellow and malignant fever was decidedly and

unequivocally referable to vegetable decomposition. In some instances, fever was traced to damaged coffee, in others, to vegetable filth in docks, in others, to marshy ground, and some sporadic cases occurred in houses whose cellars contained rotten cabbages, potatoes, and turnips. The prize dissertation of Dr. Cooke, in the Medical Recorder for 1824, furnishes more histories than any other publication, of the remittent and intermittent kind of epidemic fevers in the middle and southern states, ascribable to no other cause than the foregoing. "And indeed so intimate and obvious is the connection between such cause and effect in a vast majority of cases, that wherever fevers of the last mentioned character appear, we are warranted in ascribing them to such causes, even where its existence is not manifest."*

The febrific cause may arise from stagnant pools, from the banks of rivulets and fish ponds in the neighborhood that were never suspected of it, or it may be brought from a distance by unknown currents in the air, and affect the residents of an apparently healthy situation. It may do this too, when persons residing nearer the source, but in places of different altitude shall escape its baneful influence. "Sometimes a house on the very bank of an unhealthy river will be comparatively healthy, while places, even high grounds, at a distance, will be affected, manifestly because it (malaria) is transported thither by breezes or currents of air." Dr. Macculloch, in his invaluable work, cites numerous cases in proof of this position.

* Macculloch.

Generally, however, the baneful product of vegetable decomposition, if undisturbed by breezes and currents, hovers around its source in the lower stratum of the atmosphere, and in the same temperature of it ascends only to a certain height, leaving the other strata comparatively free; hence the upper stories of houses near it are, with few exceptions, depending on vertical currents, far more healthy than the ground floors. When the air is heated by artificial fires, or by the sun, the poisonous exhalations are rarefied, diluted, or dispersed, and are less morbific; but on the approach of evening dew, they are condensed, and as it were, precipitated nearer the earth, where meeting new exhalations, they are concentrated and more baneful in their effects.* Hence, the beginning of the evening causes more cases of fever than midnight, when the poisonous exhalation is completely condensed upon the soil, and this last more than midday when it is rarefied and diluted and dispersed by heat.†

In respect to the distance to which malaria may be conveyed horizontally, by currents of air and wind, various opinions have prevailed, some having limited it about the spot where it emanated, while others think it may be transported many leagues. Blane presumes that the malaria never reaches beyond three or four hundred yards in a horizontal direction, pro-

* Lind.

† The Italians say, that however deleterious the evening air may be, the night air after 10 o'clock is not so.—*American Quarterly Review, Vol. IV.*

vided it be calm. Macculloch thinks that the intermittents of the west of England and Scotland are caused "by malaria transported from Holland, or the shores to the northward of it by fog and east winds." There are numerous records of ships that make the distance which malaria has come and affected their crews from two to six miles. But the maximum distance is not yet satisfactorily ascertained.

But what is the substance exhaled that bears so much disease on its wings? "Perhaps the best and the truest account of its nature would be," says Dr. Macculloch, "an acknowledgment of utter ignorance." Miasma or miasm is its common name, and those who maintain that morbific exhalations proceed from animal as well as vegetable substances, distinguish this by the term marsh miasma. "In Italy, the locality of such putrefying vegetables go by the name of maremmes, and the infectious matter there generated, when mixed with the atmosphere, is malaria, bad air." It was the ancient opinion that the deleterious quality of the air impregnated with it, is owing to animalculæ, which invade the body through the lungs, sometimes perhaps through the stomach, and even through the skin. "This is a speculation," says Dr. Macculloch, "that dates as high as Lucretius, Varro, and Columella, which seems to have been revived in the days of the microscope, by Kercher, and some others, and appears naturally enough to have found favor with Linnæus." A learned reviewer of Macculloch at the south, has adopted this opinion, and maintained it with many plausible and ingenious arguments, which

but for their lengthening this paper beyond reasonable bounds, I would gladly insert.*

It was attempted by many learned chemists to discover the poison among the ascertained chemical gases, and it was referred successively to carbonic acid, azote, hydro-carburetted, hydro-phosphuretted, and hydro-sulphuretted gas, and even ammonia, and also to a yet undiscovered compound of azote and oxygen, called septon. But as these gases can be applied to the human body in a more concentrated degree in the laboratory without producing fever, it was attempted by means of analysis which modern chemistry furnishes, to examine the air produced by marshes, and to inquire whether it did not really contain some peculiar volatile substance or compound, an *unknown* gas, the true source of the evil. The eudiometrical experiments of Gottoni and Moschati, produced no results, as might have been anticipated. Nor is malaria cognisable by the senses. It is supposed by common observers to be the same as the effluvia arising from marshes, which makes so strong an impression upon the olfactories in the twilight of evening. But although often, and perhaps generally, combined with such effluvia, yet "we do know," says Dr. Macculloch, (p. 50) "from ample experience, that malaria occurs in abundance where there is no smell." †

How does malaria, (for such I shall call febrific exhalations), find its way into the system? Some have

* See American Quarterly Review, Vol. IV. p. 286.

† See also p. 73 and 75.

supposed that it is admitted by every accessible surface. Others have contended that it affects the system through the stomach; and others, that it acts on the nervous system through the olfactories;* others, that it is absorbed by the skin;† and a still greater number that it is inhaled by the lungs into the circulation. There is no positive evidence, however, to establish any one of these theories. The suggestion that the stomach was the channel, arose from the fact, that when malaria produces malignant yellow fever, it affects the stomach, producing vomiting of malœna; hence many physicians have advised persons who are exposed to malaria, to chew substances, and not swallow their saliva. Among these was the late Dr. Miller of New York, who afterwards entertained the belief that the lungs are the chief if not the only channels of admission. It can hardly be supposed that the saliva, if impregnated with malaria, could blend with the food in the stomach, while undergoing the process of digestion, and retain any putrid quality, since it is the nature of the gastric juice to correct putrefaction, and as to the strong bearing of yellow fever upon the stomach, we know from the experiments of Gaspard, Magendie, and others, that water impregnated with putrid vegetable substances injected into the veins will produce the same gastric inflammation, the same vomiting of malœna as appears in yellow fever, which shows that the stomach is not the necessary, and probably from its antiseptic power, is in fact not the real organ of entrance. That the lungs and skin are

* Rosseau. † Brochi.

the entrances is the more general belief, and is supported by better evidence. It was ascertained by Bichat that fetor from putrid animal matter gained admittance through the skin. Having discovered that the flatus from his bowels acquired the smell of the air of his dissecting room, he respired for some hours through a tube which led into the open air, while he remained in a room containing highly putrid matter. The same effect was produced on the flatus, as when he respired the air of the room, and the same effect was produced by respiring the air of *the room* through a tube while he remained some hours in a pure atmosphere. These are offered as analogical proofs only, and even as such they are very imperfect, for the odor itself, as we have before observed, is not the malaria or febrific principle, and it is here an animal, not a vegetable fetor, that Bichat absorbed into his circulation from the lungs and skin.

What are the diseases produced by malaria?—This subject has received the particular attention of Dr. Macculloch, in his invaluable work on malaria. Few people in this country are aware of the multiplied and varied forms of disease generated by this noxious principle. It is believed by this author, and admitted by some others, who possess the best means of information, that nearly half the diseases which visit the human race proceed from this cause. Dr. Macculloch enumerates the following—intermittent and remittent, both simple and malignant, and nervous fever; dysentery and cholera; dropsy, œdema, obstructions of the liver

and spleen; neuralgia, and particularly that form of the tic doloureux, to which he would perhaps add, (Dr. Cooper thinks), the Dengue of Charleston and Havana. He is in some doubt as to scrofula and goitre, hebetude of intellect and general lassitude, rickets, hernia, rheumatism, sciatica, tooth-ache, asthma, peripneumony, dyspepsia, palsy, phthisis, and chlorosis. But most of these are certainly produced by other causes, and some of them are probably not entitled to a place in the list. The subject proposed for this dissertation embraces only fever, and under this head may be ranged as the offspring of malaria, the various kinds of intermittent, remittent, yellow fever, and a great proportion of the autumnal continued fevers of New England, whether inflammatory or typhoid. The yellow fever, as we shall attempt to show, may proceed from other causes than vegetable decomposition, as also typhus gravior or putrid fever, whilst typhus mitior is oftentimes the consequence of fatigue and other debilitating causes. A minute examination of the localities of this last disease in New England, will discover it to be more endemic around factories, and on the shores of our rivers that have been dammed, and produced marshes, than elsewhere.

To the above list may probably be added some cases of dysenteric fever and cholera morbus. This list of fevers bring in their train many chronic affections, such as visceral complaints, that may partake more or less of the nature of fever.

II. *The Effect of Animal Decomposition upon the Human Body.*—If medical men have generally agreed in opinion respecting the febrific nature of exhalations from decomposing vegetables, it is far otherwise in respect to those emanating from animal substances. There are probably at this time a majority of the best informed part of the profession who regard animal decomposition as innoxious in its effects, or at any rate as not productive of fever of any kind; and this opinion is now prevailing with the profession both in Europe and America. This is owing in no small degree to the distinguished rank and talents of several individuals who imbibed the opinion, and maintained it publicly, and with great zeal and ability, in works on fever, and in many of the periodicals of the present day. At the head of these may be named Dr. Bancroft, who, though not the first in declaring that animal putrefaction has no febrific qualities, has taken more pains to establish such a belief than any other individual. The other gentlemen I shall mention, are two distinguished professors, viz. Drs. Chapman and Warren of Philadelphia and Boston, who, to the many facts adduced by Bancroft as proofs of this doctrine, have added several corresponding ones from their own observation. The public teachers of medicine in our medical schools have likewise, in most instances, supported the same opinions. Such distinguished leaders in support of any doctrine, will naturally draw numerous advocates into their ranks, and hence we find the opinions of these gentlemen pervading the profession generally.

In the early ages of medicine, the opinions respect-

ing the febrific nature of decomposing substances, was the reverse of what we have stated it to be at present. Identifying the morbific character of putrescent substances with their sensible odor, they regarded their pernicious effects upon the constitution as proportioned to their offensiveness to the olfactories. "The Egyptians, Jews, Greeks, and Romans, were careful to dispose of their dead by burning, or by burying them far without the walls of their cities;" and their armies were cautioned against encamping long near a field of battle, lest the putrefying bodies of the slain should generate pestilential diseases. The same belief continues to prevail even in modern Europe. In France and Italy edicts were issued from time to time, by both secular and ecclesiastical authorities, from the eighth to the eighteenth century, against interments in churches and cities—and it is probable, that but for the writings of Dr. Bancroft and others, the same belief would have continued to this time. As the subject is interesting to health and life, it is time that the opinions of Dr. Bancroft and his disciples, as well as the facts on which they are grounded, should be carefully examined, and collated with other facts that will tend either to confirm or refute them. The question proposed for this essay presents an opportunity for doing this, and with the deference due to the elevated rank and distinguished talents of the gentlemen we have alluded to, a feeble attempt is here made to canvass the evidence on both sides of the question.

The reasons urged in support of the innoxious, or non-febrific nature of animal decomposition, are *first*, That the number of instances wherein fever has been

actually ascribed to such a cause, by those who believe in its power to produce it, is very small, and the cases are not well attested. *Second*, That when the cause has existed in greatest abundance, and was therefore most likely to produce fever, this has not occurred.

Let us now inquire what are the kinds of fever that have been attributed to this cause? Taking the nosological arrangement of Dr. Good, we may arrange idiopathic fevers under the following heads:—1st. Intermittent. 2d. Bilious remittent, simple and malignant; the last of which includes yellow fever. 3d. Hectic common inflammatory fever. 4th. Typhus gravior. 5th. Typhus mitior. 6th. Synochus. From this list we are justified by the nature of their known causes, by the local circumstances of places where they occur, as well as by their general character, in dropping all except yellow fever and typhus gravior. Most, if not all practitioners, will concur in the opinion, that the other kinds have rarely, if ever been attributed to animal decomposition. Alibert remarks, that intense application to dissections has in some instances caused malignant intermittents in Paris. But I have witnessed no such effect there, nor elsewhere, whilst many physicians of the first respectability, who have passed years in such employments, deny that such fever has, in any instance within their knowledge, been ascribable to such a cause.

The two fevers just mentioned have been variously named—typhus gravior being termed the hospital, jail, or ship fever, and by some malignant typhus or putrid fever; the other has been called typhus icterodes—malignant bilious remittent, but more commonly yellow

fever. Those who believe that vegetable decomposition alone produces fever, (leaving contagionists out of the question,) ascribe both kinds to this cause alone, and those who believe in the febrific qualities of animal as well as vegetable decomposition, attribute yellow and putrid fevers to each of these agents, or to both combined, under the name of vegeto-animal putrefaction.

To the above causes of these two fevers, may be added that of contagion, which is strenuously maintained by some as the most frequent cause, and is as warmly opposed by others. But as the question of contagion is foreign to our present investigation, and would require a volume to support or refute it, we here take leave of it, and return to the question. *If yellow and putrid fever can be produced by animal decomposition, why are there not more and better attested cases to prove it?*

In answering this question, we are to keep in mind the circumstances which we have already considered, as tending to give efficacy to vegetable decomposition as a cause of these fevers—they are intense heat, moisture, and abundance of decomposing materials. Now, a careful examination of the two cases will show that these three circumstances occur often, in respect to vegetable matter, and but very rarely in respect to animal matter.

In the first place, in respect to heat and moisture, animal matter is rarely found like vegetables in suitable relation to them. It is not abundant like vegetables upon marshes, where the sun can act upon a broadly-extended surface of it, and that too while in a con-

stantly moist state. When exposed to the degree of heat that will elicit the cause of such fevers from vegetables, animal matter soon parts with its own moisture by evaporation, and becomes perfectly dried. The jerked beef prepared for commerce under the tropical sun of South America, is a proof of this fact. Every anatomist knows, that his preparations can be preserved in midsummer, if hung in a draught of air. The human bodies preserved for centuries in the cemetery near Palermo, were secured from putrefaction by heat, as are the bodies of those who fall in the deserts of Africa.

Where, however, a carcass is not placed under such favorable circumstances for desiccation, we know that it can exist in a putrid state but for a comparatively short space of time. The law imposed upon animals, "eat or be eaten," is imperative, and we know, without referring to scripture, that "where the carcass is, there will the eagles be gathered together." Carnivorous animals, large or small, are always at hand to consume every species of carrion. In the Carolinas, large-sized buzzards are very numerous, and such value is attached to them, as scavengers and consumers of putrid animal matter, that they are suffered to hover around cities in large flocks, and to pursue their work unmolested.

One of the signs of approaching malignant fevers, is increasing swarms of flies, and of other insects, which, whether they have just sprung from putrid matter that has escaped human observation, which is to generate the disease, or are provided for the purpose of removing such matter, we know that they are present to consume putrid animal matter.

Add to this, that in all populous places where such fevers spread, the police is always peculiarly observing of dead animal substances. Guided chiefly by the impressions made upon their senses, the peculiar offensiveness of effluvia from putrid animal substances, as well as the loathsome sight of them, leads to greater precautionary measures. A dead cat in the street is removed and buried, whilst putrid vegetable matter remains collected around the walls of buildings, and putrid coffee is thrown into the docks. A dead rat concealed in a dwelling, will extremely annoy the inmates, till every pains is taken for its removal, or will drive them to some other part of the dwelling that is less scented; whilst putrid potatoes, turnips, and cabbages in the cellar, of an hundred times the bulk, are often entirely disregarded. The crew of a ship in sickly ports in hot seasons, will, if left to their own inclination, sleep on deck, in an atmosphere loaded with morbific vegetable exhalations, whilst a single putrid rat, or even mouse, concealed in the cabin or forecastle, would cause a thorough purification of the apartment. The shores of rivers and streamlets, bordered by marshes, are often visited in a summer's evening with delight and temporary refreshment, whilst the stench of a slaughter-house, in the neighborhood of a city, though containing scarcely a visible portion of decomposing animal matter, is turned from with disgust. With such precautionary measures in the one case, and neglect of them in the other, because the senses are differently affected, can it any longer excite wonder that the fevers we have mentioned, supposing them producible by it, should so rarely proceed from

animal decomposition, and yet so frequently from vegetable decomposition? Seeing too that the latter is so abundant about populous places, and requires only a long-continued heat, from 80 to 100°, to act upon it, whilst putrid animal matter is at such times, for the reasons we have mentioned, so rarely to be found.

Much has been said of the influence of city interments upon the public health, and those who hold to the innoxious nature of animal putrefaction, might refer me to burying-grounds for sufficient quantities of decomposing bodies. It is not worth the time to examine the fine-spun theories published by Dr. Pascalis, to show that "the fetid gases in a grave can permeate the superincumbent earth, and exhibit phosphorescent light hovering over the spot, and impregnating the atmosphere with morbific principles." Sufficient for the present discussion is the fact, that, when the yellow fever broke out in New York, from Coentis' slip,* and spread through the neighborhood, its progress was immediately arrested by covering the putrid animal and vegetable materials from which it issued, with fresh earth. But because dead bodies, when covered with earth as in this case, and also as in graves, do not produce fever, are we to infer that such bodies would not produce fever if exposed to the open air?

But secondly. *When animal decomposition has existed in greatest abundance, it has failed to produce fever.*

* Medical Recorder, Vol. II, p. 468.

Here we are met with the often-recited accounts of Bancroft and others, respecting the mass of putrid animal matter exposed to the air in the exhumation at Paris and Dunkirk, and in dissecting rooms, and the putrid emanations from the burial ground at Seville. Let us examine them—first stating them in Dr. Bancroft's own words.

"Many writers of celebrity, and among them the great Lord Bacon," says Dr. Bancroft, "have thought that no effluvia were so infectious and pernicious to mankind, as those which issue from putrefying *human* bodies, and it is still believed, that, in their milder state, they may cause putrid fevers, and in their more concentrated state, a true pestilence. There are facts, however, on a large scale, which completely decide this question;—two of these deserve particular notice. The first relates to the exhumation made in the church-yard of St. Elvi, at Dunkirk, in the year 1783; and the other to those made three years afterwards, in the church-yard of the Saint Innocens, at Paris. As the undertakings and results were similar in both instances, I shall, to avoid repetition, here describe only the latter, which I have preferred, because the corpses here taken up were much more numerous than at Dunkirk, and probably constituted the greatest mass of putrefying animal matter, of which we have any accurate information. The church-yard of the Saint Innocens, at Paris, situated in one of the most populous quarters of the city, had been made the depository of so many bodies, that, although its area enclosed more than one thousand seven hundred square toises, or near two acres, yet the soil had been raised by them eight or ten feet higher than the level of the adjoining streets; and upon the most moderate calculation, considerably more than six hundred thousand bodies had been buried in it, during the last six centuries, previous to which date, it was already a very ancient burial ground. Numerous complaints having been made concerning the offensive smells which arose from this spot, and sometimes penetrated into the adjoining houses; and the public mind being greatly alarmed, it was at last determined to forbid all future burials there, and to reduce

so much of the superstratum as would reduce the surface to the level of the streets. This work was undertaken in 1786, under the superintendence of M. Thouret, a physician of eminence in Paris, and in two years he accomplished the removal of that superstratum, almost the whole of which was impregnated, or *infected*, as M. Thouret styles it, with the remains of carcasses, and of quantities of filth and ordure, thrown upon it from the adjacent houses."

"'The exhumations,' (says this gentleman, in the narrative of them, which he published in the Journal de Physique for 1791, page 253) 'were principally executed during the winter, but a considerable part of them was also carried on during the *greatest heats* of summer.

"'They were begun with every possible care, and with every known precaution; but they were afterwards continued, almost for the *whole* of the operations, without employing, it may be said, *any precaution whatever;* yet no danger manifested itself in the whole course of our labors—no accident occurred to disturb the public tranquillity.'"

The facts here recited from Bancroft to prove the innoxious nature of putrid animal matter, relating to the exhumations at Paris and Dunkirk, make a strong impression on the mind of one who merely glances at them. But a close examination of particulars will show, that, if Dr. Bancroft has told the truth, he has not told the whole truth, but, like a skilful advocate rather than an impartial judge, he has suppressed important parts of the evidence, which, if related, would prevent him from making out his case, and take away the support he intended to derive from them, to his favorite hypothesis.

In referring to these, and all other cases of animal decomposition, we are to bear in mind the circumstances we have already related of vegetable matter, as necessary to constitute it a cause of malignant, yel-

low, or putrid fever. And in the first place, in respect to heat. This, it has been shown, must range above 80° of Fahrenheit for several days, in order to generate these fevers from vegetable decomposition. Now what was the temperature at the time the exhumations took place? "They were commenced at Paris in December, 1785, and continued till May, 1786—renewed again in the following December, and continued till February; and from the month of August, 1787, to the month of October."* There were then only one or two months of the time in which malignant putrid, or yellow fevers, from even vegetable putrefaction, or any other cause are supposed to occur. "They took place in the night season only."† Johnson says, "that miasm from marshes is expanded by heat, and that the evening air cools and condenses it. That it is the descending vapor of evening that precipitates with itself the miasm that had been elevated by heat, and hence twilight of evening is the time of greatest danger," and that it is comparatively safe afterwards, is stated, as before observed, by the Italians. Now in the present case there was no emanation in the day time, because the bodies were not uncovered till evening for removal, and then the cool air had no tendency to evolve and raise it from them.

2d. As to quantity of matter, "six hundred thousand bodies," says Bancroft, giving an impression that an immense number were exposed at one time, when in truth they were removed as fast as uncovered.

3d. To give credibility to the account of such num-

* Dictionnaire des Sciences Medicales, art. Exhumation, Vol. XIV. p. 196.

† Ibid.

bers being buried, he is obliged to admit that they were six centuries' work, yet, not to lose by this concession of great length of time they had lain, he takes care to add in a note, that ninety thousand, (and this I admit is sufficient for his purpose as to numbers,) were buried within thirty years. But he is cautiously silent as to the time of the last interments, and also as to the time that animal matter is supposed to retain its febrific qualities. Now what is the fact in respect to these particulars. In respect to the duration of the morbific principle, in decomposing animal bodies, Maret,* an eminent French writer, states three years as the time for complete decomposition, when the grave is four feet deep, and four years when it is six or seven. M. Burdach, in his Physiology, (Leipsic, 1810,) states, that the decomposition of dead bodies takes place at three periods. *The first is that of fermentation*, which lasts many months; then there is a tumefaction of the body, from the development of gaseous substances, which escape with an extreme fetor. In the second, which continues from two to three years, the soft parts are converted into a brown or green pulp; the mass lessens, because it is in a great part volatilized and converted into carbonated hydrogen, sulphur, phosphorus, carbonic acid, ammonia, and vapor. During the third epoch, the gaseous products completely escape, and there remains a dark-colored earthy matter.

What says Fourcroy? This gentleman, who was employed for chemical purposes in the exhumation of

* Dictionnaire des Sciences Medicales, Vol. XIV. p. 192.

St. Innocens, states "three years as a term during which the septic poison must take place." * Speaking of this very exhumation, he remarks, (p. 142,) "we had a strong desire to satisfy ourselves, by experiment, what was the nature of the destructive air, or 'septic explosion,' emitted from corrupting bodies, but we had no opportunity, in consequence of there having been no burials there for three preceding years; the last deposit there being in 1782." Now the month of August, 1787, was the time when "the bodies were removed in the hottest weather," as Bancroft relates it, which was five years after the last interment, and two years after morbific miasm, according to Maret and Fourcroy, had ceased to exist. Nor is it at all likely that the last interments, five years previous to said August, were specially reserved for this hot month, but most probably much older interments. There were, therefore, no bodies removed that were in a stage of decomposition favorable for producing febrile diseases, in *any* weather, however hot, even had the whole number been exposed to the air of midday at once.

But "the bodies," says the report, "were in every stage of decomposition." This expression is, however, to be understood as qualified by the time, that is, they were in every stage of decomposition after more than three years interment, in which time the septic emanation is completed. And should circumstances of soil or manner of interment prevent putrid fermentation, from taking place within that time, it is

* Pascalis, p. 150.

probable that the deleterious emanations are decomposed, and re-combined in new and harmless forms.

Another fact, particularly worthy of notice, which Bancroft unfairly or ignorantly omits to mention, is—

"The great number of torches and fires that lighted all parts of the cemetery and shed around a melancholy glare," and "the thick clouds of smoke that surrounded and covered the place of labor." *

Fires and smoke have been found of great utility, especially in military service, as was proved on a large scale by Bonaparte, before Mantua; and in Africa, the experiment in a small way has proved successful.

"Emigrants proceeding to Alabama and other southern regions, from the low countries of Carolina, find no injury from sleeping in the open air, as their custom at night is to build a large fire of logs, and lay themselves beside it, on some part of their baggage. The effect of fires in destroying malaria, is plain, if the fact of its existence depends upon the presence of moisture; for the moisture being evaporated by the heat, the poison is either dispersed with the vapor, or, if separated from it, falls innoxious, and probably inert. It is on the same principle that smoking segars on the decks of ships is salutary. The heat and smoke keep a dry atmosphere about the uncovered face, and the air respired, being thus deprived of miasmata, is safe."

What then becomes of this formidable array of six hundred thousand bodies removed from the cemetery of St. Innocens, which occupies the front ground of the picture drawn up by Bancroft, and is copied verbatim in two of our public journals, in Boston and Philadelphia, by two of the first medical men in our country, and minutely repeated before classes, by al-

* Dict. des Sciences Medicales, Vol. XIV. p. 187.

most every professor of theory and practice in our medical schools. 1st. They were removed as fast as they were uncovered. 2d. The exhumation took place at a season of the year when malignant fevers, caused by malaria, are known and believed by Bancroft not to exist, with the exception of two months, August and September, and in the night season too, when the degree of heat of *those* months is not sufficient to produce malaria. 3d. They were removed full two years after the time that an eminent chemist, who was present, states that they had ceased to be productive of morbific gas; and lastly, with such precautions and preservatives, by fire and smoke, as would probably have disarmed the exhalations of their poison had there been any.

Another case of disinterment, quite as formidable, is given by Bancroft, which took place at Dunkirk, in 1783, and which he declines relating, "because," he says, "the undertakings and results were similar in both instances, and he wished to avoid repetition." When did this take place? It was commenced on the 26th of February, and finished on the 16th of April,* a season in which no fevers from malaria, of either vegetable or animal origin, are believed even by Bancroft to exist.

Now I appeal to the reader, I appeal to the candid part of the profession at large, whatever may be their opinion of the noxious or innoxious nature of animal decomposition, to decide if it was fair and candid in Dr. Bancroft to shuffle the two reports of Paris and

* Dict. des Sciences Medicales, art. Exhumation, Vol. XIV. p. 196.

Dunkirk exhumations together, and turn up the face of one, and declare to the world, that it is an exact representative of the other, when the most material point, the "*hottest weather*," is stated in the one case to have existed, and is italicised by him as a most material fact, and could not have existed in the other, the weather being cold, partly in winter.

Dr. Bancroft next goes on to recite M. Berthe's description of burying-places at Seville, and tombs and vaults at Cadiz, in the spring after a destructive yellow fever of the preceding season, and concludes by saying, "that *the heats of the spring* mentioned in Berthe, *(which, I need not observe, are considerable at Seville,)* were at this time beginning to be felt; and the ground being clayey, was cracked into wide and deep crevices, through which a fetid odor was exhaled, the result of the decomposition which was going on among those heaps of bodies;" and "that many thousands of the inhabitants of Seville also came thither in processions, from curiosity, or to testify their sorrow and respect for their departed friends." "*Thus it appears*," adds Dr. Bancroft, "*that the putrid emanations from the bodies of many thousand persons who had recently died of yellow fever, did not, and therefore could not, produce that disorder.*"

Now the italicised lines are here supplied by Dr. Bancroft himself, and serve to show his readiness to bend and qualify evidence to suit his purpose. "*The heats of the spring*," says Berthe; and who, let me ask, will pretend that the thermometer ranges at Seville so high as 80° in the spring for a succession of days, or that the yellow fever ever prevails there till the sum-

mer is far advanced? Yet, apprehending that the word "spring" would imply a moderate temperature, he gratuitously supplied a qualification to make the heat greater, in the mind of the reader, than it actually was, and such as is requisite to produce malignant fevers from malaria, which, as we have before stated, ranges, during the prevalence of yellow fever, at 80° and upwards.

Yes! "*greatest heats of summer*," which, in the Paris exhumation, Dr. B. thought of so much importance in his report that it made him italicise the words, but which in the Dunkirk case, that took place in cold weather, he thought of no consequence to distinguish it from that of Paris, yet here he would fain make the impression that "*greatest heats of summer*," (or that degree which he elsewhere deems essential for the production of yellow fever,) occurred in the spring! And because these bodies "*did not produce yellow fever*," at a season of the year when such fever never exists from any cause, the gentleman concludes forthwith, and positively declares that they "*could not produce that disorder*" at any season.

He next alludes to an anecdote related by Howard, who says—"The governor of the French hospital at Smyrna, told me, that, in the dreadful plague there, his house was rendered almost intolerable by an offensive scent, especially if he opened any of those windows which looked toward the great burying-ground, where numbers were left every day unburied, but that it had no effect on the health of himself or his family. An opulent merchant in this city, adds he, likewise told me, that he and his family had felt the

same inconvenience without any bad consequences." This presents a strong case. But the febrific principle was probably in a great measure excluded by keeping the windows closed. For the smell, I repeat it, is not the febrific principle, nor is it to be understood as always proportioned to it. This story about Smyrna comes third-handed, and without any statement of the distance of the burying-yard from the house, or of the temperature of the air. There may have been too a loss of susceptibility, from some cause or other, in the two families referred to, or they would have died from the general distemperature of the air that was sweeping off their neighbors with the plague. It may have been that a row of trees intercepted the passage of the poison, as it will vegetable malaria, and yet this would not obstruct the offensive smell.

In the appendix of Bancroft is a long account of the innoxious effects of dissections. But are these ever prosecuted in the heats of summer, when yellow fever prevails?

The account of an adipocire establishment, near Bristol in England, is unaccompanied by any statement of the season of the year, or of the temperature of the atmosphere, or the number of persons employed or exposed to the effluvia, or of the amount of putrid animal matter existing at the same time.* The same

* Had Dr. Bancroft inquired what temperature is necessary to produce adipocire, he would have learned, that the animal matter and the water must be kept below 45 degrees, or adipocire cannot be formed. Every anatomist knows, that maceration of bones cannot take place successfully in a temperature below 40°—because, instead of decomposition and solution of the animal matter that adheres to the bones, it is in fact converted into a kind of adipocire.

imperfection attends the accounts of the dead bodies washed on shore near Aboukir, the glue, soap, candle, catgut, and leather factories.

I contend for no more in respect to heat, moisture, and abundance of materials, to give febrific activity to animal decomposition, than is already conceded, by Bancroft and others, to be indispensable for the production of yellow fever from vegetable decomposition. When, therefore, the above instances cited by Bancroft, to which many others have been added by the Boston, Philadelphia, and Baltimore writers; when, I say, these instances are accompanied with evidence that heat and moisture concurred at the same time, and in the same degree, as is admitted to be necessary for the production of yellow fever from vegetable matter, then, and not till then, is any of this negative kind of evidence admissible against the febrific power of animal decomposition. As well might one contend against the generally received doctrine that marsh miasm possesses febrific qualities, and, pointing to the swamps and marshes, both fresh and salt, of New England, demand why these do not annually produce fever.

"In regard," says Bancroft, "to the morbific effects supposed to result from the putrefaction of fish, they appear, so far at least as regards fever, to have had no existence." This assertion I shall have occasion to notice hereafter, and refute by positive testimony to the contrary. That the boiling of blubber should be harmless notwithstanding its offensive effluvia, is what might certainly be expected, considering the great power of fire, as before stated on several authorities, to destroy malaria.

The use of fish for *manure*, as herrings, alewives, &c., is adverted to by Bancroft, and also by the gentlemen before alluded to in Boston and Philadelphia. It should be borne in mind, however, that these fish are most of them buried, and that such of them as are above ground, are strewed over it, and from their small size are soon dried; they are not thrown in heaps in the manner that putrid coffee, potatoes, and cabbages, were, when *they* produced yellow fever, as appears from the several reports contained in the Medical Repository, and other publications. From those it seems that a sort of intestine heat and fermentation in the centre of the mass is necessary to produce yellow fever. Now, the time required for this heat to generate in animal or vegetable substances from the evolution of new gases, is quite long—in the human body buried many months, and almost as many weeks above ground, whilst two or three days are sufficient to desiccate small fish strewed upon the ground, and prevent the fermentative process from taking place, although they may evolve disagreeable effluvia, as stated to be the case by the Boston and Philadelphia writers, of those strown upon the grounds near Newport, and on the banks of the Delaware.

Thus, I have examined nearly all the facts related by Bancroft, and the other gentlemen alluded to, and have shown that there were circumstances connected with each that weaken its force, and in almost every instance destroy it altogether, as a proof against the febrific power of animal decomposition.

The Boston and Philadelphia writers attach great importance to the exhumation of St. Innocens, as settling the question that animal decomposition never causes fever. In this they choose to "*go for the whole*," whilst Bancroft, from whom they have copied this account of St. Innocens, and almost every other fact they advance, warily shields himself by a saving clause in his conclusion, which they have not seen fit to avail themselves of. The clause is this. "If putrefying animal matters are not completely harmless, they are at least innocent of the charge of producing *contagious fevers*." Contagion was his subject of discussion, and he does not positively deny that fevers which are non-contagious, (and such he regards yellow fever,) can be produced by animal decomposition.

The Boston writer, with a spirit of candor that marks his whole paper, concludes it by saying,— "Should a difference of opinion exist on any important point, I hope these remarks will have the effect to call it forth." I therefore respectfully ask leave to dissent from his conclusion in one particular, even were the facts sound and incontrovertible from which he draws it. The case, says he, of the cemetery St. Innocens has been considered to be conclusive of the non-febrific nature of animal decomposition, if no positive and satisfactory facts can be adduced on the opposite side. Now, I maintain that this cemetery case, and all the other facts cited, amount to no more than negative evidence, and that unless the gentleman can show that they combine every circumstance that could favor the operation of animal putridity in causing fever, which would be next to impossible, the evidence

amounts only to probability, and is not "*conclusive*," even if no facts were adduced on the opposite side to prove that it does cause fever.*

One well established fact, however, proving beyond doubt that animal decomposition possesses febrific properties, is sufficient to controvert all the negative evidence to the contrary, which the gentlemen have adduced. It is now my purpose to offer many such facts.

1. The Rev. Henry Channing, in a letter to Dr. Mitchell, (see Medical Repository, Vol. II, p. 402,) states it as his own opinion, and that of Dr. Coit, Dr. Lee, Mr. Woodman, and Mr. Holt, that the yellow fever which prevailed in New London, in 1798, was caused by putrid fish. Of the whole number of cases of fever, (246) "two hundred and thirty-one were clearly traced to the spot where the sickness commenced, that is, the persons were conversant, or had been in that part of the city a few days before they were seized," and "scarcely a single person escaped the disorder who resided in that part of the city."

"It appears," says Mr. C., "that there was a large quantity of dried fish, in a bad state, in four or five stores, within twenty or thirty rods of each other, and all in the limits referred to. These fish were taken in the Straits of Bellisle, which being a high northern latitude, they were cured with a much less quantity of salt than usual. They were brought to this port in the autumn of 1797. The heat of the summer having been very

* The Philadelphia writer expresses himself to the same effect as the Boston writer, in the following words. "It follows from the preceding series of facts, that animal putrefaction alone cannot be assigned as an epidemic cause, or scarcely indeed as a morbid agent."

great, many of these fish were found to be in a moist, slimy state, early in August last. From a quantity lying in bulk, in a store occupied by Mr. Jones, (who fell a victim to the epidemic,) a quantity of green and yellow purulent matter ran upon the floor. It was thought by the owners, that, if they were spread in the sun, in the open air, the fish might be preserved; which was done, extending them a considerable distance in the street and wharves. While thus exposed to the excessive heat of the sun, with light winds, the effluvia in the neighborhood were very offensive."

Mr. Channing states, that there was not even a shadow of ground to suppose that the disease was imported—and the situation of New London is elevated "with scarcely any low lands to generate marsh miasmata." The harbor is spacious, near the sea, from which refreshing breezes are experienced during the summer. The heat of the summer of 1798, it may be mentioned, exceeded both in intensity and duration, what had been known within the memory of the oldest inhabitants.*

2. Dr. Samuel Osborn relates in the Medical Repository, Vol. I, p. 210, a case of yellow fever, caused by exposure to the exhalations of putrid beef. The patient, a soldier, was excused from duty on account of a violent and obstinate gonorrhœa; and a lodging was assigned him in a house without the garrison, on Governor's Island. In a few days, he was attacked with symptoms of yellow fever, and as his physician observed, in his visits, a very offensive smell in the house, he ordered the cellar under the patient's bed to be examined; where were found three barrels of beef

* See also a second letter from Mr. Channing, Vol. II, p. 405.

in a state of extreme putrefaction. "So exceedingly offensive was the smell emitted from this mass of animal putrefaction, that the soldiers who were employed to remove it, were several times forced to desist, for the purpose of breathing fresh air, before they could accomplish their design." On the removal of the beef, the patient gradually mended.

3. Dr. Coffin, in a pamphlet on the danger of interments, states that—

"A man was killed by accident in Orange, New Hampshire. In about ten weeks after the burial, the body was taken up to be deposited in a different place. Twenty persons were present at the disinterment of the corpse, which was in a putrid state. Thirteen of these persons fell sick of fever not long after their exposure to the putrid gases from the dead body, and several of them died."

"There was no other assignable cause for this fever than these noxious gases from the dead body, the season and the place being otherwise quite healthy." *

4. In Johnson's *Medico-Chirurgical Review*, Vol. II, N. S. p. 202, there is related an instance of fever of the putrid kind, and resembling plague, produced from a putrid human body.

"An American merchant ship was lying at anchor in Whampoa Roads, sixteen miles from Canton. One of her crew died of dysentery; he was taken on shore to be buried. No disease of any kind had occurred in the ship from her departure from America, till her arrival in the river Tigris. Four men accompanied the corpse, and two of them began to dig a grave, but unfortunately they lit upon a spot where a human body had been buried about two or three months previously, (as was afterwards

* I regret that the temperature of the weather is not given, though I have understood that it was hot.

ascertained). The instant the spade went through the lid of the coffin, a most dreadful effluvium issued forth, and the two men fell down nearly lifeless.

"It was with the greatest difficulty their companions could approach near enough to drag them from the spot, and fill up the place with earth. The two men now recovered a little, and with assistance reached the boat, and returned on board. On the succeeding morning they were visited by an assistant surgeon from an English Indiaman in the roads, who reported the following symptoms, viz.: very acute head-ache, with a sense of giddiness and dimness of sight, (which had existed more or less from the moment of opening the grave); eyes of a peculiar muddy appearance, resembling that generally observed in cases of Indian cholera; oppression about the præcordia; dull heavy pain in the regions of the heart and liver, with slight palpitation at times, and fluttering pulse; sense of extreme debility, with occasional convulsive or spasmodic twitchings of the muscles of the lower extremities; nausea; slight diarrhœa; rigors, succeeded by flushings of the face, neck, breast, and upper extremities; tongue white, and much loaded; pulse from 110 to 120, weak and irregular; urine scanty and high-colored; skin sometimes dry, sometimes covered with a clammy sweat. On the fourth day from the commencement of the attack, numerous petechiæ appeared over the breasts and arms; and in one of the patients a large bubo formed in the right groin, and another in the axilla of the same side, which speedily ran to suppuration. To one the disease proved fatal on the evening of the fourth day; to the other, on the morning of the fifth. For two days previously to death, the gums bled freely. The symptoms were so completely similar in both the cases, that it is needless to repeat them here."

The post-mortem appearances evinced a highly putrid state of the system.*

One of the two not immediately engaged in digging the grave, was attacked on the eighth day from his

* See Med. Chir. Rev. Vol. II, p. 203.

being on shore with "violent retching, and laboring under all the symptoms of the former patients in an aggravated degree. Was bled twenty-five ounces, and recovered."

5. Mr. Samuel Russel, of New York, in a letter* to Dr. Mitchell, states, that two hundred barrels of herring, in a considerably offensive condition, were shipped, in July, 1801, to St. Croix, and the market being bad, were taken to Kingston, Jamaica, where they were placed in store.

"By this time, the fish were discovered to be fast spoiling, and advancing rapidly through the putrefactive process. The master of the store and his clerk lived and slept in a room directly above that in which the fish were now lying and corrupting. *They both were invaded by yellow fever.*"

6. The yellow fever which prevailed in Newburyport, in 1796, appears to have been caused by putrid fish.

"Respecting the origin of the disease," says Dr. Coffin, "there have been but two opinions. Some have supposed it was generated here; others, that it was imported from the West Indies in a vessel which arrived in May. The captain's account is, that about twelve days before his arrival here, two of his men died on board of a putrid fever, after which he immediately cleansed the vessel by washing it with vinegar, smoking it with tar, and scrubbing the cabin and steerage floors. He threw over the clothes which the sick had worn, and their bedding. Their other clothes were locked up in their chests, and afterwards sent home to their friends in a neighboring town, without communicating any infection: the rest of the crew escaped the disease. Here it may be remarked, that if the vessel, on her arri-

* Med. Repos. Vol. V, 1822, p. 345.

val, had been stationed at some other part of the harbor, it would have been conspicuous, whether it brought the fever or not. But not far from the wharf at which it was unloaded, a great quantity of fish had been dressed for the West Indies, and the entrails left exposed to the air. The weather being uncommonly moist and warm, the exhalation was very offensive to the neighborhood. In one of the houses nearest the fish offal, the three first persons were seized with the disease; and within twenty or thirty rods the greater number of its victims lived. The majority of those who recovered lived in other parts of the town. Most, if not all, who had it at a distance, had frequented the infected neighborhood, but did not communicate the infection to their attendants. These are the principal facts from which the fever's origin must be determined." *

7. "In the summer of the year 1783, M. Faure, a merchant of Narbonne, in Lower Languedoc in France, bought a house which had previously been occupied as an anatomical hall; and, being desirous of having a cave dug in the cellar, employed three men to do it. In digging, they came to the wall of a necessary, which had been the common receptacle of the remains of human subjects, and which was covered in to prevent detection; and, on extracting a few of the stones with their picks, an offensive, putrid matter rushed through the aperture, and suffocated them. M. Faure, going to see the workmen, descended but two or three steps before he fell senseless. The neighboring people, perceiving the putrid smell, went to the house, and of nine that entered to bring out the sufferers, six died. M. Faure was removed, but died in four days; and the unfortunate laborers survived their release but a day or two.

"In the mean time, the smell increased to such a degree, as to create a pestilence, and the neighbors were obliged to remove; but a great many of them died. The mayor of the city being informed of the circumstance, had the cellar filled up, and the house closed. But the malignant effluvia had pervaded the town, and a great many died of the *pestis*. The disease was attended with the black vomit, but not communicated by contagion." †

* Med. Repos. Vol. I, p. 504. † Ib. Vol. IV, p. 245.

8. In Washington, a small village, containing about four hundred inhabitants, situated six miles from Natchez, and occupying a high situation, remote from any swampy ground, the yellow fever prevailed in 1828, and was unquestionably occasioned by a quantity of putrid fish and hams lodged in a grocer's store. A minute and faithful history of the fever is given in the Medical Recorder, for April, 1826, by a distinguished physician, Dr. S. A. Cartwright, on whose mind there appears to have existed not the shadow of a doubt that it was solely referable to the above-mentioned cause. The great length of his paper prevents its insertion in this essay.

9. Dr. Caldwell, in his appendix to Alibert, p. 61, traces the yellow fever of one season in Philadelphia, to heaps of decaying oyster remains. The account is drawn out at too great length for insertion, but the proofs are satisfactory to my mind.

10. In Dieppe, a city in France, a pestilential disease was produced in 1776, by putrid oysters in the shell. Cited by the foregoing author from "observations on the epidemic diseases, and constitution of France."

11. "It appears, from a statement by Dr. Dick, published in the Medical Repository of New York, that the pestilential fever which prevailed in Alexandria, in 1803, originated from the septic exhalations thrown into the atmosphere by a large bed of putrid oyster shells."

12. Dr. Rand, in his history of the yellow fever in Boston, relates the case of a person who was employed to remove some hides in a very putrid state, upon a point of land opposite Wheeler's wharf, and who sickened and died on the third day. This history of Dr. Rand describes the masses of animal matter in a putrid state on Fort Hill, Stoddard's wharf, &c., and the cases of the fever that originated from them.* "Three lads, apprentices to Mr. Manston the cooper, by repacking some of this beef, were seized with the fever and died."

* Medical Repository, Vol. II.

Now, had the same number of persons been employed in moving the coffee on the wharf in Philadelphia, and all shared the same fate, is it likely that such a difference of opinion would have existed respecting the origin of the fever in that city in 1793?

13. A case is reported by Dr. Cogswell, of Hartford, of a man who was attacked with putrid fever, by passing a night in a boat containing barrels of putrid and highly offensive beef.*

14. "In 1748, at New York, a great quantity of salt beef, partly putrid, having been purchased by poor persons, took it to their chambers, and they were almost all victims of the yellow fever."†

15. Ship General Green sailed from Newport to the West Indies, and a great part of her crew were attacked with malignant fever. She had on board putrid fish and beef, that was so offensive as to require being thrown overboard. Here I would observe, that, although the animal putrefaction was the most apparent cause, yet some may feel disposed to cavil, and attribute it to vegetable putrefaction in the vessel.

16. In the month of July, ——, a very corpulent lady died at ——. A great heat prevailed at the time. A week or two subsequently to her death, there were about 180 persons in the church, in which she was entombed, sixty of whom were taken suddenly ill, and several died. Suspicion rested upon her tomb as the cause, and it was accordingly opened by four men. They were all taken ill, two of whom died.‡

17. The sepulchral vaults of the principal church of Dijon being crowded, were ordered to be cleared. Disinfecting agents were employed, which only masked the putrid effluvia for a moment, for it returned and spread to the neighborhood, where the

* See Webster on Plague and Pestilence.

† Dict. des Sciences Medicales, Vol. XXX, p. 548; extracted from Valentin, p. 121 to 124.

‡ Gazette of Health, No. I, p. 2.

symptoms of a contagious fever began to appear, which was referred to this cause.*

The above instances are sufficient, in my mind, to establish the fact, that animal decomposition in particular stages of it, and under certain circumstances, will produce certain fevers, viz. the yellow and the putrid. Omitting further evidence in my possession, I shall now content myself with adverting, in a few words, to what seem to be necessary conditions to give activity to the process.

1. It must be in certain stages of the process, viz. the fermentative, as Burdach of Leipsic, before mentioned, terms it; that is to say, from two or three weeks to several months, varying no doubt according to circumstances of situation and state of the materials. The above instances confirm this opinion.

2. The heat must range at from not far below 80 to 100 degrees, if the materials are uncovered, though in a grave it must necessarily be less.

3. The mass must be large and moist.

4. I may remark that it seems to be immaterial whether the substance be free from salt, or imperfectly cured by it, though the evidence from the foregoing cases, and from those that are to be added in the appendix, rather goes to prove that a little salt hastens the process, and this accords with the effects of partially salted vegetables in salt marshes; and it is remarked by Webster and M. Brown, that fresh meat, in water slightly salted, will corrupt sooner than in perfectly fresh water.

* Guyton de Morveau, p. 25.

Let it be recollected, as a matter of some weight, that the negative evidence of Dr. Bancroft and others, viz. the cemetery of St. Innocens, Dunkirk, &c. was adduced by a man who aimed at a victory over what are called contagionists, and in doing so, to establish by evidence the innoxious nature of animal putrefaction, in which he has endeavored to make the most of the facts his industry could collect, and who has evidently perverted them, (in some particulars at least), to suit his purpose; whilst the instances I have adduced as proof against him are from the pens of men who had no favorite hypothesis to establish, nor any motive to deviate from a plain statement of facts. There does appear then sufficient evidence for the conclusion, that yellow and putrid fevers do result from animal decomposition, though for reasons before stated, viz. scarcity of materials in the proper season of the year, and other necessary circumstances, they are comparatively of rare occurrence.

To the evidence drawn from cases, I will add the result of the experiments of Gaspard* and Majendie, made to show the effects of putrid animal and vegetable substances introduced into the veins. Supposing vapor to be the medium by which the febrific agent is evolved, how does it affect the system? It is first inhaled into the lungs; these, according to Majendie, expose a surface, at each inspiration, "several times greater than that of the human body;" thus, admitted, it enters the blood, for odors are found by experiments to enter the circulation at a single inspiration. Now

* Gaspard, as given in pages 24 to 37 of Vol. I, No. I, Monthly Journal of Medicine.

Gaspard proves that putrescent animal substances, injected into the blood, produce prostration of strength, dysentery, inflammation of the stomach and intestines. Water impregnated with vegetable putrefaction, produced similar though less violent symptoms. M. Majendie has also produced, in the same manner, diseases resembling those which result from vegetable malaria. He ascertained that infusions of different kinds of putrid animal substances were followed by different effects; "that water in which putrid fish had been soaked," (mark the coincidence with the cases I have cited of yellow fever produced by fish) "produced, when injected into the blood, symptoms resembling yellow fever."

III. *The comparative influence of both animal and vegetable decomposition as a cause of fever.* I will not undertake to say what would be the proportion of cases of fever, if decomposing animal matter were as abundant in hot weather as vegetable matter is; nor will I say that it would then cause all the kinds of fever that I have shown, in the first part of this essay, do proceed from vegetable malaria. Perhaps it is the adynamic kind of fevers only, as malignant, yellow and putrid, that can be produced by it. If so, there would then be a vast disproportion in the number and kinds of fevers that result from the two causes. As it is, taking into consideration the disparity as regards quantity of the two kinds of matter actually existing in a state of decomposition, I think that the cases I have shown authorize the inference, that the febrific effects of animal and of vegetable decomposition, so far as regards putrid and yellow fever, are about equal.

APPENDIX.

Soon after the Treatise on Malaria first appeared in the Philadelphia Journal of Medical Sciences, the Lancet, a London periodical, gave it a spirited review, in which the writer exhibits more sarcasm than candor, and, by a frivolous attempt to sustain the positions of Bancroft, involves himself in a series of contradictions and absurdities.

Every reader of Bancroft will agree in my statement, that he relies more upon the exhumations of Paris and Dunkirk for proofs of the innocuous nature of animal decomposition, than upon any others. He has placed them in the van of his argument, expecting, no doubt, to conquer public opinion by firing a broadside, and then pouring in scattering guns and musketry before the mind could rally from the first shock. It was my aim in the treatise to show, that his broadside consisted of noise and smoke rather than any missile from which the opposite side of the question could sustain injury.

I think it will be admitted that no one previously had attempted to refute, or even to question, the validity of this evidence; and that I succeeded in refuting it, the reader will admit. Even the reviewer finds it necessary to concede this point, and agrees that "these exhumations do not deserve the importance attached to them by Bancroft and others," because "the temperature was not only moderate but cold during the greater part of these operations; that in the last year of the interments, when the autumn months were encroached upon, the exhalations had by this time become wasted." Yet, in the face of this concession, he modestly proclaims, "We have now, we believe, satisfactorily shown, that Bancroft's doctrine has sustained no deterioration from Dr. Parsons's objections."

Next in importance is the Seville church-yard, respecting which the reviewer says—"When Dr. Parsons states that during

the spring the temperature of the air does not amount to 80 deg. in that city, he is probably correct, but either intentionally or otherwise, he omits to inform us whether processions were not made to the same grounds during the following summer, and whether, during the fiery time that immediately succeeded the cooler months, the same smells were not exhaled. It is perfectly reasonable to presume the affirmative of both these propositions, and then what becomes of Dr. Parsons's objections?" In reply, I contend that it was for Bancroft to show that the graves remained as they were, without any additional covering, during the succeeding summer, and that no fever occurred. The evidence was produced by him, and, as in other cases, he has undoubtedly made the most of it. All that I attempted was, to refute the evidence he adduced, which I have done by showing, that when the church-yard was in the condition he states, yellow fever could not occur from any cause, the temperature of the air being below 80 deg. What may have occurred afterwards it remained for him to show, and was no part of my duty. From his silence, however, it is presumable that there was nothing in the following summer to strengthen his side of the question.

The three proofs relied on by Bancroft to support his doctrine, are then set aside,—two of them by the admission of the reviewer, and the reader will admit that the third is even more effectually refuted—the assertion that Dr. Bancroft's doctrine has sustained no deterioration, to the contrary notwithstanding.

The writer knows, when he alludes to the dissections carried on in London and Dublin in summer with impunity, that the rooms are ventilated or fumigated daily—that highly putrid bodies are not dissected—that the very act of dissecting disturbs that quiescent state of the materials indispensable for the evolution of the poison from animal or vegetable matter;—and he ought to have known, that adipocire-making can be carried on only where the air and water are at a low temperature; so also of other manufactures he has mentioned, with the exception of glue, candles, soap and the like, which are made by strong heat, which is at once destructive of the noxious principle; and yet he repeats the harpings of Bancroft and others, upon such subjects, as conclusive evidence that fever cannot be produced by putrid animal matter under other and entirely different condi-

tions, and such as he agrees is necessary to evolve it from vegetable matter.

The learned critic attempts to scrutinize the facts I have adduced to prove that animal matter has, in several instances, caused malignant fever, and complains that I have not given a satisfactory account of all the circumstances of the cases. If I possessed the dexterity exhibited by him and Bancroft in repairing flaws and supplying defects in testimony, his demands would have been satisfied. But I chose rather to state cases as I found them recorded. Many others that have more recently come to my knowledge might be added, but the same objection lies against them, viz. that they are not moulded and qualified in every respect to suit the requisitions of the reviewer. He has, however, added some cases himself, but which he hopes may yet be refuted. But for this gratuity on his part I feel less indebted to his candor than to the fact, that these cases were staring him in the face on the previous pages of the Lancet, and which therefore compelled him to notice them.

Although living in the very focus of medical science, the reviewer has, with all his industry, been able to muster but one instance of this negative kind of evidence, that combines the three essential conditions of animal and vegetable matter, viz. abundance of material, moisture, and high temperature, and this is the knackeries of Montfaucon, near Paris, where horses are slaughtered and left to putrefy, and this is introduced with a flourishing air of triumph, demanding why yellow fever does not appear. In reply, I would indicate to him the marshes in the latitude of these knackeries, in France, and to the thousand accumulations of vegetable matter in a state of decay, and ask why, if such materials produce malignant fever, (and he admits they do in some places), why not in all these? And when he has answered me satisfactorily, he has a right to demand why, in the single case referred to, the fever did not occur from animal decomposition.

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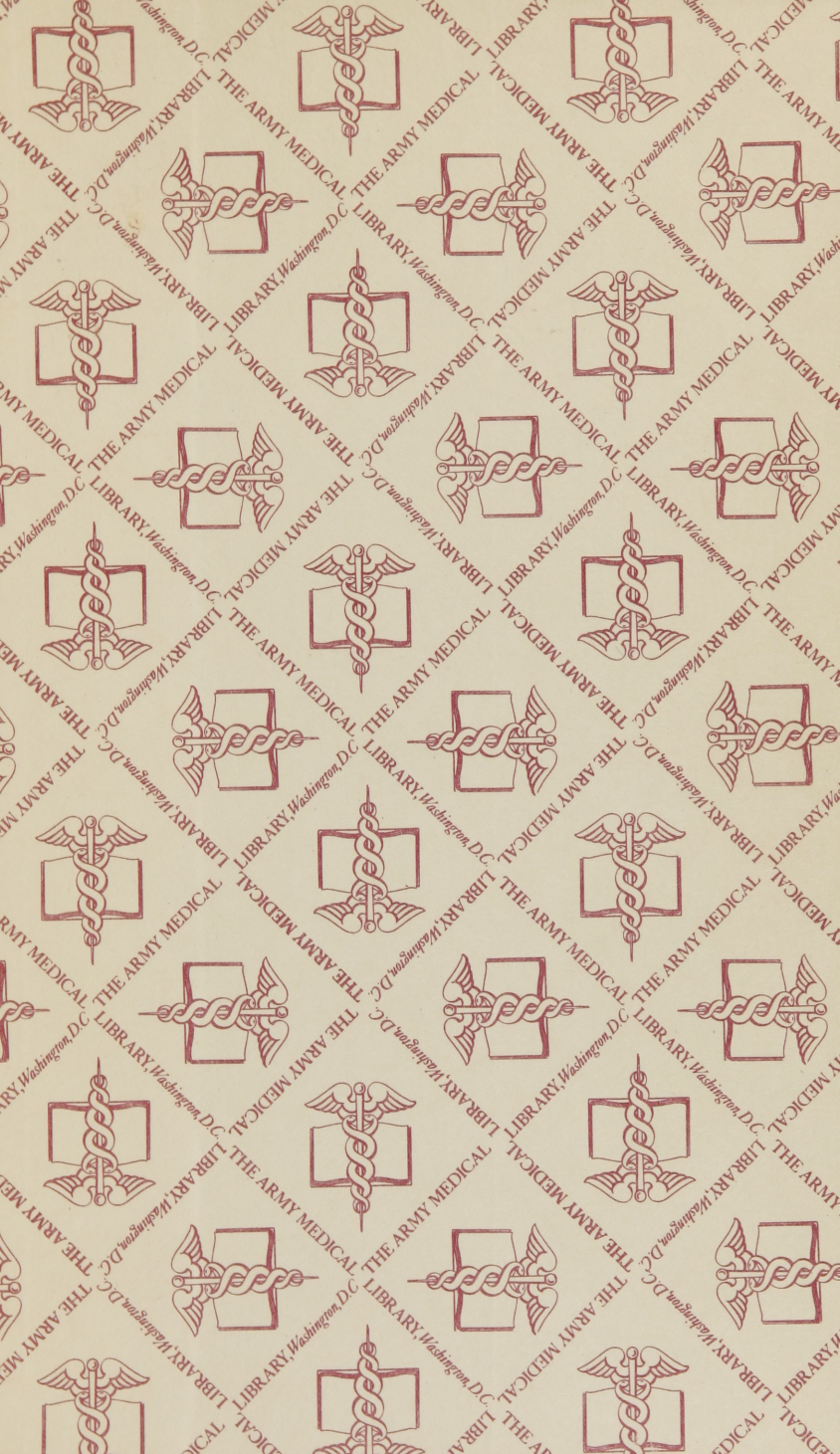
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