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OBSERVATIONS
ON THE
FUNCTIONAL DISORDERS
OF
THE KIDNEYS,

WHICH GIVE RISE TO THE FORMATION OF
URINARY CALCULI;

WITH REMARKS ON THEIR FREQUENCY IN THE

County of Norfolk.

BY

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Edinburgh, and Member of the Physical Society of Guy's Hospital.*

"PRINCIPIIS OBSTA, SERO MEDICINA PARATUR
CUM MALA PER LONGAS CONVALUERE MORAS."

Ovid.

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PREFACE.

The most profound obscurity having enveloped the origin of Calculous Diseases, and many fruitless attempts having been made to bring any investigation of their pathology to a satisfactory conclusion, the Author of the following Observations hopes it will not be deemed a presumption in him to give his humble opinion of their more probable source. In the course of his inquiry, he will endeavour to afford a more rational view of the exciting causes of these Diseases, and shew that their origin may in a great measure be attributable to the combination of many local circumstances.

It must always be a source of much regret that the causes of most diseases, and especially of those which are the most obscure, cannot admit of experimental illustration; and consequently, that the true method of eliciting truth, by rational induction drawn from the basis of experiment, cannot be brought to bear upon the question.

Having observed the extreme infrequency of these diseases in other parts of the united kingdom, and having been repeatedly asked by men of science in different medical schools the reason of their greater prevalence in this district, the Author must allow that he felt it somewhat humiliating to be obliged to withhold even a plausible opinion of the sources of these diseases, so long known to have been endemic in his native county.

After considerable reflection on the subject, he has made up his mind to give to the Profession the result of his imperfect inquiry, hoping that he shall be able to communicate some particulars with regard to the Diet, Climate, and Habits of the People of this District, which, he believes, have not been sufficiently attended to in prior investigations; which peculiarities, when compared

with those of other parts of the empire where calculous diseases are infrequent, may probably be thrown into the scale, when we are impartially weighing the mass of evidence on both sides of the question.

The true theory and practice of our art does not repose upon an approximation to the discovery of final causes; the most inquisitive and comprehensive mind will continually find ample employment in investigating the necessary effects of the above causes, or what may be justly considered in the true spirit of reason, those various modifications of vital laws or vital powers in health and disease, which constitute the only ultimate facts in physiology and pathology.

The following Observations will be divided into eight Sections.

I. Different Opinions on the Origin of Urinary Calculi.

II. On the External and Internal Cutaneous System, or Skin and Mucous Membranes.

III. On Natural and Morbid Sympathy.

IV. On Renal Secretions.

V. *On Diet and Habits of Life, as exciting causes of Renal Disorders.*

VI. *On Climate, as an exciting cause of Calculous Diseases.*

VII. *On the Action of Remedial Agents in Functional Disorders of the Kidneys.*

VIII. *Summary Conclusions.*

DIFFERENT OPINIONS ON THE ORIGIN OF
URINARY CALCULI.

THE origin of Urinary Calculi has frequently employed the speculative talent of many eminent men from the earliest period at which the study of the Medical Art seems to have been prosecuted with any legitimate method of investigation: and candour obliges us to confess that the prevailing views of the causes of these diseases have been hitherto merely conjectural.

It is by no means probable that demonstrative proof will be ever obtained as to the nature of such an obscure subject; but surely such obvious difficulties ought not to diminish the zeal of the industrious inquirer, when he reflects for a moment that he meets with no greater obstacles in his researches for the accuracy of truth, than would undoubtedly cross the path of the most diligent investigator of the causes why or how the liver secretes the bile, or how the same

gland should be capable of eliminating both natural and hydrophobic saliva.

The words *λιθος* used by the Greeks, and *Calculus* or *Sabulum* by the Romans sufficiently evince that the ancients believed that the animal concretions had a constitution analogous to those inorganic formations which are found in the mineral kingdom. Dr. J. M. Good* says in his study of *Medicine* that "so generally was the belief that the calculi of the bladder were found in the same manner, and consisted of the same materials as the stones of the mineral kingdom, that Dr. Shirley published a learned book as late as 1671, which is now become extremely scarce, entitled, "of the causes of the Stone in the greater world in order to find out the causes and cure of the Stone in Man."

Hippocrates imagined that when calculous disease was incidental to children, the concretions were derived from the milk of the mother; hence he says "at vero calculi morbo principium ex lacte oboritur, ubi puer lac impurum ex mammâ sugit." †

Some philosophers‡ who followed the opinion of Aristotle have asserted that man alone was subject to the stone, and that other animals were

* Vol. 5, p. 512, 2d. Edition.

† Lib. 64 de Morbis 5. 1. 512. 26.

‡ Journal des Scavans. An. 1668. p. 341.

altogether exempt from this malady : the incorrectness of this belief is now sufficiently established, for urinary calculi have been discovered in the bladder of different animals, as in that of the Mare,* Rat,† and even a calcareous concretion has been found in the centre of the yolk of a Hen's Egg.‡

The urinary concretions which have been extracted from the bladders of inferior animals differ from those of the human subject in containing no uric acid, and in consisting for the most part of carbonate and phosphate of lime cemented by animal matter. Carbonate of magnesia has been also found in the urine of herbivorous animals.§

It was formerly suspected that certain calcareous salts taken into the stomach with the water drank by the inhabitants of any district might pass through the circulating system, and become eliminated in the form of urinary concretions ; but the fallacy of that opinion is easily detected ; for these salts are generally present in the water used for domestic purposes in the state of carbonate or sulphate of lime, the former of which is only soluble in water saturated with

* Acad. Roy. des Sciences 1700. p. 41. † Fourcroy.

‡ Journal des Scavans 1600. p. 116.

§ Ann. de Chem. et Phys. xxii, 440.

carbonic acid, and the latter requires 500 times its weight of cold water for its solution.* It has been proved besides, by the experiments of Vauquelin, that if hens are fed for a considerable time upon food which contains no lime, they will continue to lay eggs as usual.

No lime is said to have been discovered in New Holland, yet the egg-shells of birds, and the bones of animals indigenous in that country, contain calcareous salts.

It was once a great fashion in medical opinion to ascribe the origin of a great many diseases to the bad quality of the water usually employed as a beverage or for culinary purposes: Bronchocele, or goître, and Cretinism, were said to arise from this cause, which was scientifically refuted by Professor Foderè,† the soundness of whose views in referring those diseases to the local physical effects of the climate I have ascertained from personal observation.

The attempt to explain the origin of urinary calculi upon chemical reasoning must be always attended with a complete failure; for, notwithstanding the rapid advances towards perfection which have distinguished that science during the

* Dr. Henry's Chemistry, vol. i, p. 589—593

† *Traité du Goître et du Cretinisme* par F. E. Foderè. Svo. Paris. Germinal An. viii. See also Remarks by the late Dr. Reeve, of Norwich, *Ed. Med. and Surg. Journal*, vol. 5.

last fifty years, it must be very obvious that the operations of chemical affinity must become altogether ineffective when we wish to make it exert any influence over vital laws; in fact, chemical agents, when they operate upon the animal economy, are altogether modified in their action by the laws of life.

The application of chemical reasoning to Pathology is in no case so erroneous, as when an endeavour is made to account for the origin of calculous diseases upon chemical principles: the necessary consequence of directing our investigation in such a path, is that we are apt to overlook altogether the susceptibility which the kidney as well as any other secreting gland has of taking on certain morbid actions.—As a proof of the tendency which an exclusive direction of our views to the play of chemical affinities has to render us blind to the consideration of the vital powers of a gland, that excellent practical chemist Dr. Marcet attributed the formation of urinary concretions to a separation and consolidation of certain ingredients contained in the Urine, for he says that “independent of any specific agency of the urinary organs themselves, calculi are liable to form in any of the cavities to which the Urine has access.”*

* Marcet on Calculous Diseases.

Chemical reasoning is besides equally as inapplicable to the pathological investigation of calculus, as it is to the cause of another obscure disease, rachitis; an opinion was once held that ricketts arose from the existence of the calcareous matter in the fluids in the form of a bi-phosphate, which from its great solubility could not be precipitated; therefore alkalies were sedulously given to neutralize the excess of acid. This notion has given way to the more rational views of M. M. Beclard and Jourdan who consider the disease as a real dropsy of the bone; the fluid being secreted by the osseous capillaries which are in a morbid condition approximating to that of inflammation; the rationality of this opinion is I think well established, for in ricketty children much phosphate of lime is found to be deposited in their urine. Now this deposition may be accounted for by the pressure of the fluid effused in the cancellated structure of the bone, during chronic inflammation and the inducement of a greater activity in the absorbents in consequence of this pressure. Hippocrates has even alluded to a primary disorder of the kidney, preceding the formation of calculus in this passage—“*Plerique vero Medici cum morbum non noscant, si arenam videant, vesicam calculo laborare existimant. Hæc autem minime sed Ren calculo laborat.*”*

* De intem. affect. 5. 5. 539. 34.

Such being the unsatisfactory nature of the deductions to be drawn from the above data, it may be correct to class the deposition of urinary calculi among those morbid secretions which are frequently eliminated from different glands whenever the capillary vessels of those organs are in an unnatural or pathological condition. The best method probably of arriving at a fair degree of accuracy is to bear in mind the physiological structure and relations of the surfaces upon which the exciting causes of calculus, as I conceive, make their first impression.

All impressions must be directly applied to the skin and mucous membranes or as Meckel scientifically calls them, the external and internal cutaneous system; the analogous structure of which I shall point out in the next section, and the necessary consequences of a disturbed condition of the blood circulating in those important organs.

ON THE
EXTERNAL AND INTERNAL CUTANEOUS SYSTEM.

The investigation of no part of the organic structure of man will afford a richer harvest to the pathologist than an accurate attention to the physiology and pathology of the cutaneous system, by means of which human beings are brought in contact with the surrounding world, and upon the surface of which all physical impressions are directly received.

A clearer view of the relative nature of this system cannot be given than in the following definition by that eminent Anatomist J. F. Meckel; "Le systeme cutané (systema cutaneum) forme un sac renversé sur lui-même, qui entoure tous les autres organes. On peut le partager en deux grandes sections, le systeme cutané externe et le systeme cutané interne. Le premier est généralement designé sous le nom de peau (cutis) ou celui de tegumens communs.

On appelle le second systeme des membranes muqueuses (*membranæ mucosæ*). Quoiqu'il y ait de grandes différences entre eux, ils ne sont cependant que des modifications d'un seul et meme type, puisqu'ils se continuent l'un avec l'autre sans la moindre interruption, et qu'ils ont, au fond, la même configuration, la même composition, les mêmes qualites et les mêmes fonctions."*

The skin and mucous membranes may be considered in the aggregate as a viscid envelope of capillary vessels and extreme nerves; these two divisions of the same system have between them the most delicate and mutual sympathy, of which the developement and casual retrocession of the Measles, Scarlatina, Variola and all the Exanthemata, afford an evident testimony.

But the cutaneous system not only claims our attention as the surface upon which all physical stimuli are perpetually operating, but as forming the most important organ of the whole animal economy, for in it terminates the capillary portion of the vascular system, which is the site of the function of secretion; it is also the me-

* Hebrêard, Memoire sur l'analogie qui existe entre le *systeme muqueux et dermoide*: *Mem. de la Soc. Med. d'Em.* Vol. 8. L'anatomie generale et pathologique de J. F. Meckel traduit de l' Allemand par Jourdan et Breschet. Vol. 1. Paris 1825.

dium of communication between the great venous and arterial trunks.

Upon the peculiar condition of the cutaneous capillaries depends that concatenation of morbid phænomena, called Fever.

When the balance of the internal capillary circulation preponderates over the external,* and Dropsy or Diabetes ensues, the cutaneous surface is found preternaturally dry; the internal vessels having an undue share of work thrown upon them from the deficient activity of the external, the secretions which are eliminated from the internal vessels become morbidly changed in quantity or quality.

It is most probable that this congested or dilated state of the renal capillaries always holds whenever a calculous diathesis is about to be established; and I am inclined to believe that the difference of the morbid fluids secreted by analogous vessels in calculus and diabetes, depends solely upon the different constitution of the individual affected with those diseases. The advantage of preserving the full activity of the circulation of blood upon the surface of the body as a preventive against calculous diseases, is re-

* For an ingenious and accurate view of the external and internal circulation, see an Experimental Inquiry into the Laws of organic and animal Life, by my friend Dr. Holland, of Manchester, 8vo. Edin. 1829.

markably illustrated by their extreme infrequency in hot countries, where the cutaneous capillaries are in full activity to supply the immense waste of perspirable matter, which is secreted in such profusion as we are not at all able to appreciate in this cold climate.

It is much to be regretted that in the majority of calculous diseases post mortem examination throws no light on their pathology. M. Martinet in his *Manual of Pathology* translated by Mr. Quain, p. 240, says that "the substance of the Kidney is in most cases of a natural appearance." Dr. Baillie describes no diseased appearance of the Kidneys except from the pressure and irritation of large calculi lodged in the substance of the Kidney, he says "the formation of calculi is not peculiar to the Kidneys but it is a more frequent disease in them than in any other part of the body." "It would appear that a very small portion of the natural structure of the Kidneys is capable of separating very nearly the ordinary quantity of urine."—*Vide Works of Dr. Baillie, by Wardrop. Vol. 1. p. 250. 253.*

ON NATURAL AND MORBID SYMPATHY.

The term Sympathy in Medical language is altogether conventional and admits of different definitions, according to the peculiar ideas of those Physiologists who have been pleased to employ it. Dr. Whytt was inclined to believe that Sympathy, strictly speaking, was that mysterious and inexplicable communication either synchronous or consecutive which takes place between two distant organs not having any immediate or direct connexion with each other through the medium of nerves. According to his opinion Sympathy could be only carried on through the medium of the sensorium, or that an affection taking place in one organ could not be experienced by another, until a certain impression had been made upon the brain, the common centre of every sensation.

Dr. Monro, primus, his talented contemporary, took altogether a different view of the

subject: he considered that Sympathy could only arise between two adjacent or remote parts, by the instrumentality of those nervous fibrils which formed the chain of mutual union by their passing from the one to the other.

Authors have generally divided morbid Sympathies into the single, reciprocal or mutual, and the compound. Of the single Sympathy that between the shoulder and liver in disease of the biliary organ is an excellent example; but we are not aware of any pain at the spinal extremity of the phrenic nerve producing a mutually morbid sensation in the liver. The presence of the oxyuris vermicularis in the rectum generally produces an itching of the mucous membrane of the nose: but we are not acquainted with the transfer of morbid irritation to the rectum when the nasal membrane is affected with polypus or inflammation.

When the stomach is irritated by any unnatural stimulus the brain becomes sympathetically affected, this is evinced by dizziness and head ache; on the other hand a disturbance of the equilibrium of the cerebral circulation calls into immediate action the Sympathies of the stomach, and nausea or vomiting takes place: this is remarkably shewn in the phænomena attending sea sickness: the above are examples of mutual Sympathy.

Pathologists have been long aware of the remarkable alteration which takes place in the blood of distant organs after the receipt of different local injuries: the vessels of the remote organ are then known to secrete pus: is not this morbid phenomenon equally as singular as the secretion of lithic acid from the vessels of the kidney?*

Distant organs sometimes become consecutively affected through the medium of a third organ, e. g. affections of the uterus, as carcinoma uteri have a remarkable tendency to produce sickness of the stomach, and subsequently pain of the head, in such a case the Sympathy may be strictly called compound, for probably the head would not become engaged except through the intervention of the stomach, so justly called the centre of sympathy. The remarkable manner in which the genital passages sympathise with the mammary gland was practically known to the Scythians, who were in the habit of irritating the vaginæ of their mares in order that they might obtain a more plentiful secretion of milk.

Such have been the generally received notions on the subject of Sympathy, but M. Broussais,

* For an excellent account of the Sympathetic Irritation or Inflammation in the Liver, Lungs, &c. in consequence of Injuries received upon distant parts, see *Recherches et Observations sur l'alteration du Sang dans les Maladies*, *Revue Medicale*, tomes 2, 3, and 4, par M. Velpeau.

whose talents and eminence as a teacher continue to exert a most extensive influence over the minds of the junior medical practitioners in France, has entered much more extensively into the doctrine of sympathies. This pathologist has certainly been of great service in introducing his "Doctrines Physiologiques," as an improvement upon the "Medicine expectante" of the former French school, and in his aphorisms or propositions he has drawn our attention to a more minute examination of morbid sympathy. Thus he says Prop. LXXXV. "The nerves are the only agents of the transmission of irritation; a process which constitutes the morbid sympathies. These then take place in the same way as sympathies in health, with this difference, that in disease the nerves transmit more irritation, or a mode of excitement at variance with the vital laws."

Prop. CCXXI "Intermittent and remittent irritations change their places and terminate spontaneously by critical metastases. If they do not change their places in this manner they become continued, either in the acute or chronic form."*

* Histoire des Phlegmasies ou Inflammations Chroniques, 2 vols. 8vo. Paris 1808—Cullen's First Lines by Drs. W. Cullen and J. C. Gregory, 2 vol. 8vo. 1829.

Although a great deal of truth is evidently contained in those two propositions, so far as they tend to prove that many diseases which appear strictly local are secondary or sympathetic ; still it is impossible to analyze the Broussaian doctrine of the origin or “ point de depart ” of not only fever but of all topical diseases, being situated in the mucous membrane of the stomach and intestines, without seeing the untenable or fallible basis upon which it is founded.*

It has been urged by some Pathologists that M. Broussais has been too limited in his ideas when he refers all diseases to irritation or inflammation of the mucous membranes : but a little reflexion will call to mind the penetration of the mucous tissue into not only the interior of the teeth and the minute bronchial tubes, but into the substance of every conglomerate gland, the inner tunic of the minute excretory ducts which anastomose with the capillary parenchyma of the gland being always formed of mucous membrane.

That there is a direct communication between the Stomach and Kidneys is sufficiently obvious, and is thus accurately described by M. Meckel, whose authority is deservedly esteemed for the

* For a full account of the Doctrine Physiologique, Vide *Examen des Doctrines Medicales*—Paris 1821, 2 vol. 8vo.

minuteness of his descriptive Anatomy, "les nerfs des Reins sont très petits, proportion gardée ; ils provient du plexus rénal du grand sympathique, se collent à la surface des artères, et ne s'enfoncent pas à une grande profondeur dans la substance de l'organe"—"La partie supérieure des ganglions semilunaires envoie de chaque côté quatre ou cinq branches considérables, qui, fortifiés par des filets du plexus mésentérique supérieur, descendent vers les artères rénales, et, s'entremêlant de cinq ou six petits ganglions subalternes forment, le plexus rénal (plexus renalis) de chaque côté qui donne des ramifications nombreuses aux capsules atrabillaires et aux Reins."*

With respect to the nature of Sympathy, I am inclined to entertain an opinion somewhat analogous to that of M. Broussais, although certainly the extent to which that gentleman's ideas have led him is a striking instance of the great lengths which our enthusiasm frequently carries us in the prosecution of a favourite theory.

I look upon the nerves as the chief agents for the transfer of irritation both natural and morbid ; Sympathy therefore may be considered as that remarkable function in which a stimulus, either natural or morbid, is received upon one organic extremity of a sentient or motor nerve,

* Opus citatum tome, 3me.

to be conveyed consecutively to that of another, and producing there a condition of the nerves and blood vessels analogous to that which is present at the point where the primary impression is received.

It has been a long time inferred that external agents, or stimuli are conveyed to distant organs by two methods, the one of absorption, and the other of nervous transmission; I think however by the late excellent experiments of Dr. Addison and Mr. Morgan, that although it is difficult to deny the absorption of such stimuli, still we must come to the ultimate conclusion that their action really consists in an impression made on the extremities of the nerves along the course of which the impression is actually transmitted.*

This principle of the transfer of irritation from one organ principally affected to another more or less distant, and which is affected secondarily, will lead to the explanation of the "modi operandi" of some remarkable agents in the cure of disease; every medical man has observed the kind of specific action which attends the application of leeches to the abdomen in inflammation of the gastro-enteric mucous mem-

* Vide an Essay on the operation of poisonous agents on the living body by J. Morgan, F.L.S. Surgeon to Guy's Hospital, and Thomas Addison, M.D. London 1829, Ed. Med. Surg. Jour. 1829.

brane ; Dr. Armstrong used to say in his lectures in 1824, that he could compare it to nothing less than a charm—can we for a moment imagine that the abstraction of such a small quantity of blood, as generally follows the application of one or two dozen leeches, does really induce all the benefit derived ? certainly not ; but if we admit that such a transmission of stimuli created by the leech bites or the minute particles of cantharides when a blister is applied does really take place, through the medium of the spinal and ganglionic nerves, so as to constrict the capillary vessels of the mucous membrane, and in that manner remove the interstitial pressure produced by the dilated vessels upon the sentient nerves of that membrane we shall come to a more rational view of the subject.

John Hunter's theory of contiguous Sympathy will afford no clue in the investigation of the above remarkable phænomenon ; for there are too many tissues intervening between the external surface where the remedy is applied, and the deep seated mucous membrane in question, to enable us to explain it according to the ideas of that celebrated Physiologist. Upon what other principle but the conveyance of stimulus can we explain the good effects arising from the introduction of a seton or issue opposite to the

part affected in deep seated inflammation of any viscus ?*

The rationality of the presumptive evidence upon which this view of transferred irritation either ab extero or ab interno is founded, receives additional strength from the following remarks of Dr. Prout—"The greater proportion of those cases (of the phosphatic diathesis) which have come under my own observation, has been distinctly traced to some injury in the back: this injury has been of a character not very capable of being understood or described; but perhaps some idea of it may be acquired by my stating that for the most part it has arisen from a fall from a horse, in which the person has received a violent general concussion of the spine, and often at the same time some local injury about the back, but not of such a nature as to confine him long, or to lead him to think that he has received any material injury." He says also "I have never had an opportunity of inspecting a body after death under these circumstances: perhaps this would throw some light upon the subject. It is, I believe, a very old observation, that injuries of the back produce alkaline urine, yet, what is remarkable, no one seems to have thought of applying the remark to the present

* Mr. Earle has some judicious observations in the London Med. Chir. Transaction, Vol. xi.

form of the disease. This appears also to hold in other animals as well as man; thus I have frequently observed jaded and worn out horses pass great quantities of lime in their urine; I have known the same also take place in dogs, and particularly of the sporting kinds; and in both these instances have thought it probable that the circumstance was connected with some strain or injury of the back produced by over-exertion or other cause.”*

From the best chemical authorities it appears that the primary formation of calculous nuclei takes place in the Kidney: the secondary or vesical nuclei are perhaps almost always constituted of the primary or renal nuclei which have descended into the bladder from the kidney. That the phosphates may be secreted by the vesical arteries and thus have their origin ab initio in the bladder cannot be doubted, although it most probably happens that they have generally a secondary origin, their nuclei being frequently formed of lithic acid secreted by the Kidney,† or which is a more rare circumstance of some foreign body escaped per urethram into the bladder.

It may therefore, I think, be justly inferred

* An Inquiry into the Nature and Treatment of Gravel Calculus, &c. by W. Prout, M. D. F. R. S. London, 1821.

† Opus. Cit.

from the previous observation of facts, that the presumptive origin of calculus is very frequently of a sympathetic nature, the morbid irritation produced in the stomach by the presence of unnatural stimuli, being transferred to the Kidneys in the vessels of which organs a certain condition is established favorable to the elimination of the constituent principles of urinary calculi.

When after every attempt to investigate the causes of Sympathy, we find ourselves obliged to rest our opinions upon principles which do not admit of positive demonstration, let us always bear in mind the observations of one of the greatest ornaments of the profession, that "toute explication physiologique ne doit offrir que des aperçus, des approximations ; elle doit être vague si je puis me servir de ce terme. Tout calcul, tout examen des proportions des fluides les une avec les autres, tout langage rigoureux doivent en être baunis parceque nous connoissons encore si peu les lois vitales, elles sont sujettes à tant de variations, que ce qui est vrai dans le moment ou nous etudions un fait, cesse de l'être dans un autre moment et que l'essence des phenomenes nous echappe toujours ; leur résultats generaux seuls et comparaison de ces resultats, les une avec les autres, doivent nous occuper."*

* Bichat. Anatomie generale Tome ii, p. 535.

ON RENAL SECRETIONS.

The Kidney is undoubtedly an organ which receives a larger quantity of blood in proportion to its size than any other in the human body. M. Magendie says, "Aucun organe ne recoit, en ayant egard à son volume, autant de sang que le Rein."* In the natural condition of the renal circulation the Kidneys secrete urine of a perfectly healthy quality, but when its circulation becomes deranged, lithic, oxalic, phosphoric, and muriatic acids are secreted in excess, in combination with lime, ammonia-soda, and magnesia.†

* *Precis elementaire de Physiologie* par F. Magendie, 2me. Edition Tome 2d. Paris 1825.

† It is very probable that the ingenious views of Dr. Prout are correct with respect to the formation of the pink amorphous sediment, this eminent chemist believes that from the well known action of nitric acid upon lithic acid out of the body, we may infer that in a certain morbid condition of the Kidney,

The urine perpetually varies both in composition and quantity, even in a state of perfect health: when the weather is cold the urine is always increased in quantity and is very pale; the same change also takes place from drinking a large quantity of diluent fluid: in hot weather the activity of the cutaneous vessels in secreting perspirable matter diminishes the necessity for an elimination of so much excrementitious fluid by the Kidneys, and consequently the quantity of the urine is diminished; it is high coloured and contains less water. The urine in a healthy condition of its secreting organ should be, when first passed, of a pale amber colour, and should subsequently become of a reddish colour after standing a short time in the vessel: this healthy change has been accurately observed by Celsus. "Scire autem licet integrum corpus esse cum quotidie mane urina alba; dein rufa est."*

The most probable theory of secretion† is, that the immediate or proximate principles of all nitric acid is actually secreted, and produces the generation of purpurate of Ammonia of which the pink sediment is composed—Opus Cit. p. 125.

* Liber primus.

† Although the theory of secretion is buried in such profound mystery, one interesting fact is well established, that particular fluids are secreted by vessels of a particular shape; hence the renal capillaries are, I believe in most animals found to be of a coiled shape; and those of the uterus tortuous.

secreted fluids exist in the blood, and that they are merely separated or eliminated from the general mass of the circulating fluid by the specific function of particular sets of capillary arteries, distributed to particular glands. M. M. Prevot and Dumas have lately proved that urea, one of the distinguishing proximate principles of urine may be detected in the blood. The results of Dr. Christison's observations fully confirm the conclusions of those physiologists, for he has detected urea, cholesterine, and oleaginous matter in the serum of the blood;* and it is by no means irrational to suppose that lithic acid exists in the same fluid, although I am not aware of any physiological chemist having yet discovered it.

The delicate susceptibility of the Kidney, or the property it has of being acted upon by sudden or unusual irritants is daily within the observation of every individual: it is rather a matter of surprise that the secretion from this organ is not more frequently deranged in quality, when we consider the extremely complicated nature of this fluid, as analyzed by Berzelius.

Dr. Prout judiciously observes,* "that all other circumstances being the same, an unusually heavy meal, especially of animal food or of bread,

* Ed. Med. and Surg. Journal, Oct. 1829.

† Op. Cit.

is invariably followed by the deposition of the lithate of ammonia," and "an abrupt or decided change in the time of partaking it; such, for example, as dining at noon, or eating supper, (to which the person is not accustomed) will very frequently produce the same effect."

During the progress of that natural irritation produced upon the mucous membrane of the stomach, by the presence of proper alimentary matter, it is established that some of the clear ropy fluid of the stomach, which is nearly or entirely destitute of acidity, becomes converted into muriatic acid. Now, since this fact is ascertained by the researches of some of the best chemists in Europe, with respect to the continual change in the secretion from the gastric capillaries, can it be longer a matter of surprise that the renal vessels, from the influence of healthy irritation, should be stimulated to secrete lithates and phosphates in a natural quantity; while, from the action of morbid irritation, they may be induced to secrete the same salts in preternatural quantity.

The connexion of the calculous and gouty diatheses, with primary irritation of the gastric mucous membrane or indigestion, had been observed more than a century since by the learned Dr. Pitcairn: he says, "qui bene nec coquant

nec stomacho valent, facile fieri calculosos, et nullos fere calculosos stomacho valentes.”*

Most individuals find that the urine becomes more or less turbid whenever acid eructations denote that a morbid change has taken place in the secreting power of the stomach ; this is the repeated consequence of excess of study, extreme mental irritation and the different exciting causes of indigestion.

Celsus noticing this functional disorder, says, “Si hoc crassa carunculas quasdam exiguas quasi capillos habet, aut si bullas et male olet, et interdum quasi arenam, interdum quasi sanguinem trahit, dolent autem coxæ, quæque inter has superque pubem sunt, et accedant frequentes ructus, interdum vomitus biliosus extremæque partes frigescunt, urinæ crebra cupiditas, sed magna difficultas est, et quod inde excretum est, aquæ simile vel rufum vel pallidum est, alvus vero cum multo spiritu redditur, utique in renibus vitium est.”†

The elimination of albumen from the Kidney in dropsical diseases had been long since observed by Dr. Blackall : but the profession I think is much indebted to Dr. Bright, of Guy’s Hospital,‡

* Element. Medicinæ Physico Mathem :—Hagæ Comitum, 4to. 1718.

† Liber. 2dus.

‡ Reports of Medical cases selected with a view of illus-

for having first pointed out the frequent connexion of some forms of dropsy with organic disease of the Kidney; now we have observed in the analysis of urine by Berzelius that albumen does not exist in that fluid during a state of perfect health; therefore it must be inferred that there is primarily a condition of morbid irritation, sometimes called a low or subacute inflammation affecting the secreting vessels of the gland.

The symptoms perhaps at the commencement of this morbid secretion are so little attended to by the individual, that the time is passed for the removal of the disease when it is thought proper to have recourse to medical treatment.

Mr. Howship judiciously remarks on albuminous urine, that "the most frequent and least important cause of this appearance is the occasional effect of common cold, in which after a sense of weight and irksome uneasiness about the loins, the urine is voided turbid, but on standing deposits a greater or less quantity of fine whitish coloured flocculent matter," "analogous to this appearance is that which is observable upon the crises of feverish indisposition." "In these affections the urine is tinged either more or less decidedly either of a pink or a dull red colour,

trating the symptoms and cures of Diseases, &c. 1827.—Dr. Christison's Cases, Ed Med. and Surg. Jour. Oct. 1829.

the principal seat of irritation in all these cases, I believe, to be the mucous membrane lining the cavities of the Kidneys :” “ an attack of gout is commonly productive of some disturbance in the circulation through the Kidneys, being attended with a flocculent pink coloured albuminous deposit in the urine.”*

Hippocrates notices the different appearances of the urine in chronic and acute disorders of the Kidney : Quibus in urinarum summo bullæ consistunt, renum morbum eumque longum fore significat ;” Aph. 34. “ At quibus summa urina pinguis est, et conferta, is renum morbum eumque acutum significat.” Aph. 35.

The general effect of the unnatural elimination of albumen from the Kidney upon the general mass of circulating fluid, is to diminish its quantity of serum or albumen ; and as we shall afterwards find, when we discuss the principle of nutrition, the importance of albumen as a proximate principle, the state of inanition and debility into which the individual is thrown in these cases, admits of easy explanation.

The saccharine matter secreted in Diabetes is another remarkable instance of the consequence of morbid irritation in the Kidneys. The pathology of this disease is still open to as much

* Howship on the Urinary Organs, 8vo. London, 1823.

investigation as that of calculus. Dr. Baillie says that "opportunities do not frequently occur of examining the state of the Kidneys in Diabetes; I have once however been able to make this examination in a satisfactory manner, where a person had been long affected with Diabetes, and had been long a patient under my care in St. George's Hospital; in both Kidneys the superficial veins were much fuller of blood than usual, forming on their surface a most beautiful net-work of vessels. The whole substance of the Kidney was much more vascular than in a healthy state, approaching a good deal in appearance to what takes place in inflammation."*

Dr. Pemberton was of opinion that Pyrosis and Diabetes insipidus were vicarious of each other; the decayed function of the Kidney appearing to be consecutive to the primary functional disorder of the stomach.†

The peculiar pathognomonic characters of Diabetes are the high specific gravity and saccharine quality of the urine, which contains also little or no lithic acid, and but a small proportion of urea: in this disease the urine is passed in quantities almost incredible. The true nature of this renal disease has been also the subject of

* Op. Cit. p. 246, Vol. 2.

† On the Diseases of the Abdominal Viscera.

much controversy, according to Rollo it arose from bad assimilation,* Cullen, spasm of the renal artery,† Monro tertius disease of the lymphatics,‡ Latham, deficiency of phosphoric acid,§ and Watt, inflammation of the kidney.|| Now of all these incongruous views of the disease, I feel quite satisfied, that the last is the only correct one, and that it is so, is sufficiently evident from the influence of the best remedial agents, blood-letting and opium, combined with an animal or nutritive diet.

In all cases of Diabetes, the functions of the skin are always so much suspended that the necessary elimination of its secretions does not take place: in fact every medical practitioner must have observed that in those disorders of the Kidneys, the consecutive effects of which exhibit themselves in the form of Dropsy, Diabetes, Hysteria, or Calculus, a certain morbid condition of the cutaneous system always exists.

Dr. Wilson Philip has given in the Medical Transactions of the Royal College of Physicians,¶ a series of interesting experiments, which shew

* Cases of Diabetes Mellitus, 2d Edit. London, 1798.

† First Lines of the Practice of Physic, sec. 1504.

‡ Annals of Medicine, Vol. viii. p. 388.

§ On Diabetes, p. 151, 152, London, 1811.

|| Cases of Diabetes, &c. Paisley, 1808.

¶ Vol. 6th, p. 172.

the remarkable tendency which the presence of an acid in the stomach seems to have in leading to the deposition of lithic acid in the urine: while on the other hand a diet composed chiefly of animal food would appear to be less liable to generate an unnatural degree of acidity in the stomach, and lead rather to the deposition of the phosphates.—With respect to the nature of the acid generated, it would appear most probable, that the pink sediments are produced by the secretion of nitric acid, acting upon lithic acid, as is found to be the case out of the body: but it seems also that the addition of any acid even the carbonic, to the urine, will afford a precipitation of lithic acid.

Since we find from experiment that the ingesta will sometimes induce acidity in the Stomach, it is most probable that it is not necessary that the diet should be of itself essentially acid, in order to establish that morbid condition; but that it should be of such an irritating indigestible quality, as to occasion that peculiar state of gastric derangement, called *Dyspepsia*, in which an acescent condition of the gastric fluids always exists.

One interesting fact has been long known, that litmus paper placed in contact with the skin for a few hours, becomes reddened, evidently denoting the secretion of an acid which passes off

by the sensible and insensible perspiration. Now, when the cutaneous secretion is more or less suspended, we always detect the presence of a large portion of lithic acid in the urine: the secretion from the Kidney is, I believe, in these cases, always vicarious to that of the skin, the condition of which always regulates the state of the urinary secretion: the experiments of Mr. Abernethy, have shewn that the transpiration from the cutaneous surface of a limb will render turbid a solution of lime, thus demonstrating the secretion of carbonic acid by the skin; when therefore this acid is not secreted in its natural quantity by the skin, nothing is more probable than that it is got rid of from the mass of the circulation through the medium of the Kidneys. We are all aware that during digestion the cutaneous transpiration is at its minimum, because the intracutaneous or mucous capillaries of the stomach are in a state of super-excitement, more blood being retained in them for the secretion of the gastric juice; it cannot be more singular that the renal capillaries, the trunks supplying which are derived from the common aortic current at no great distance from the cœliac trunk, should secrete a preternatural quantity of carbonic acid.

In Hysteria the proportion of water in the urine is always augmented, the secretion being

then passed in large quantities of a remarkably limpid colour : this disorder in which the action of the Kidneys is so much altered, depends upon derangement of the functions of the stomach and intestines : the flatulence and constipation generally accompanying the complaint proving the existence of considerable morbid irritation in the alimentary canal, the functions of the Kidneys becoming engaged through nervous sympathy.

I have thought proper to introduce the above remarks on the pathology of Dropsy, Diabetes, and Hysteria, with the view of rendering them illustrative of the more special objects of these pages, an inquiry into the causes of calculous disorders. It may, I think, be rationally inferred, that the formation of urinary calculi is no more to be explained upon principles exclusively chemical, than the causes of the other renal diseases ; but that all those diseases have a striking relation to each other ; similar organs and similar vessels being essentially engaged in each ; and that probably similar exciting causes may produce either Calculus, Dropsy, Diabetes or Hysteria, according to the susceptibility of the individual constitution upon which they act.

The necessity of paying minute and early attention to the slightest symptoms of renal disorder is sufficiently obvious : the hopeless chance of cure of chronic cases did not escape the scru-

tinizing observation of Hippocrates, he says
 "Renum vitia supra quinquagesimum annum
 sanata non vidi." De morb. vulg. Lib. vi, sect. 8,
 4. and "Renum et vesicæ vitia in senibus ægre
 curantur." Aphor. sect. 6, 6.

ON DIET AND HABITS OF LIFE, AS EXCITING
CAUSES OF RENAL DISORDERS.

It has been long acknowledged that diet, or the alimentary matter introduced into the stomach for the purpose of nutrition, must either tend to preserve the healthy condition of the vital powers, or render them predisposed to the occurrence of disease. Man, omnivorous as he is called, is under complete subjection to the direct influence of air, heat, light, atmospheric pressure, and other physical stimuli which are continually acting upon his external cutaneous system, and which chiefly modify the climate in which he resides : he is no less liable to be constitutionally or sympathetically affected by all the various stimuli, which are introduced upon the surface of the internal cutaneous system or mucous membranes.

To the combined action of external and internal impressions, I am inclined to refer that sin-

gular constitutional difference in mind, temper, activity and general habits which distinguishes one race or nation of people from another. Every one knows and feels by the general sensations of his own person, the striking contrast between living in the murky atmosphere of this insular country, and under the unclouded skies of a more southern climate ; the mind then becomes more volatile, and the temperament of the individual seems to acquire an approximation to that of his fellow creatures among whom he is sojourning.

The nature of the diet of the inhabitants of any country predisposes them to be affected by some diseases and to be less obnoxious to others ; in France, I have observed, that from the acid quality of the wine, cider, or small beer which is the common beverage of the majority of the inhabitants ; and from the large quantity of fruit and vegetables consumed by them, Diarrhæa is a more frequent disorder than in this country ; in consequence of which M. Broussais has found less difficulty in rendering his doctrine of "gastro-enterite" in some degree extremely plausible.

In Ireland and many districts of Scotland, the great mass of the people subsist on vegetable food (potatoes and oatmeal) and milk ; the bad quality of which diet has been a frequent exciting cause of Dysentery in the sister island.

At the most flourishing periods of the Grecian and Roman republics, the vigorous bodies of the citizens were solely nourished by plain vegetable preparations ; the diseases most prevalent among them were by no means of a highly inflammatory character in the aggregate, and were capable of being subdued chiefly by an attention to regimen.

It has long been a subject of inquiry whether man omnivorous as he is deemed to be, could gradually accustom himself to any diet, and enjoy all the benefits of constitutional power, whether he feeds upon the bark of a pine tree,* or upon the animal food and strong ale of the fertile vallies of England. The Ottomaques,† a savage uncivilized tribe in South America, are said to eat large quantities of a kind of clay ; though it is more than probable that they only consume such earthy substances for the purpose of allaying hunger ; some Physiologists of eminence‡ have ascertained that the muscular fibres of the stomach are at that time in a state of rigid contraction approximating to spasm, which condition is always temporarily relieved by most foreign substances placed in contact with the

* Von-Buch's Travels through Norway and Sweden.

† Humboldt Tab. Physico des Regions Equatoriales.

‡ Leuret et Lessaigne Recherches sur la Digestion, Dr. Park, Ed. Med. and Surg. Journal.

mucous membrane of that organ. Professor Jamieson in his Lectures on Natural History, used to exhibit a species of steatite, which was employed as an alimentary substance in some Islands of the Indian Archipelago.

The inhabitants of Greenland, Lapland, Kam-schatka and Terra del Fuego are known to subsist almost entirely upon animal food ; these people are a small inferior race of beings, and though their carnivorous habits are often assigned as the cause of their being at the bottom of the scale of human organization ; the cold ungenial climate in which they reside may be equally instrumental in retarding their developement, for the vital powers of the human as well as of the vegetable individual, require the continual stimulus of genial warmth to enable them to attain their full growth and maturity.

It has been a general notion that chyme is always homogeneous, being a greyish pulp of a sickly, sweetish taste, and slightly acid ; the more probable truth is, that there are as many species of chyme as there are of aliments, and that each has evident marks of difference from the rest, yet retaining some other points in common to them all.

The mode of action of those vital powers which are the instruments of nutrition have been enveloped in the mist of hypothetical reasoning :

juster notions on this obscure subject are beginning to prevail, and probably, at no distant period, we shall establish more definite and correct views of this important function. It is perhaps a very near approximation to truth, to divide all nutrient principles into three kinds—a saccharine, an albuminous, and an oleaginous principle: the fact is well ascertained, that two of these principles must be present in every alimentary substance, in order that it may conduce in the least degree to nutrition.

Dr. Prout, whose minute acquaintance with chemical science has been so frequently employed in the investigation of some of the most important branches of animal and vegetable chemistry, deserves the thanks of the philosophical world for turning his mind to a subject of so much interest as the relative nutrient properties of different alimentary substances.

After the most rigorous examination of the variety of alimentary matter, he has come to the conclusion, “ that saccharine bodies are composed simply of carbon, united to hydrogen and oxygen, in the proportions in which they form water: the proportions of carbon varying in different substances from 30 to 50 per cent. The other two classes, the albuminous and oleaginous, consist of compound bases (of which carbon constitutes the chief element) likewise

mixed with and modified by water, and the proportion of carbon in oily bodies which stand at the extreme of the scale in this respect, varies from about 60 to 80 per cent. hence, considering carbon as indicating the degree of nutrition, which in some respects may be fairly done, the oils may be regarded in general as the most nutritious class of bodies ; and the general conclusion from the whole is, that substances naturally containing less than 30 or more than 80 per cent. of carbon, are not well, if at all, adapted for aliment. It yet remains to be proved whether animals can live on one of those families exclusively, but at present experiments are decidedly against this assumption, and the most probable view is, that a mixture of two at least, if not of all three, of the classes of nutriment is necessary.”*

When the proportions between the saccharine, albuminous, and oleaginous principles are not duly balanced, or when two of those principles are not present in the alimentary matter received into the stomach, either assimilation or nutrition does not take place, or the ingesta act as sources of morbid irritation. We are aware that the stomach of man, and also of the lower animals, cannot be irritated by the exclusive use of a particular diet, without more or less disease being

* Mayo's Physiology, second edition, and Philosoph. Trans.

excited in some of the tissues of which the body is composed. The experiments of Dr. Starke, of Vienna, are well known as illustrative of this fact: after attempting to ascertain the relative nutritive powers of different substances, he had the fortitude to restrict his own diet to sugar and water; the consequence of this severe regimen was, great emaciation, and an incipient ulceration of the cornea.

M. Magendie made analogous experiments on dogs, and always found that ulceration of the cornea supervened to the protracted employment of a saccharine diet.

A remarkable instance of the kind of specific property of exciting diseases in parts remote from the source of circulation, is known to follow the consumption of bread made of diseased wheat or rye: full credit is given by many pathologists of eminence to this cause of gangrene of the upper and lower extremities;* and there seems to be no just reason for disbelieving the numerous cases of gangrene which prevailed sometimes epidemically, and could owe their origin to no more probable cause than morbid irritation excited in the stomach.

A very intelligent medical practitioner in this county informed me, that in the district in which

* Dr. Thomson's Lectures on Inflammation. Philos. Trans. 1762. Leveillé, Nouvelle Doctrine Chirurg. t. iv, 328.

he resides, abortions had become more prevalent, apparently from the extensive use of roasted grain, wheat or rye, as a substitute for coffee: this happened before the virtues of the ergot were generally known to the profession. Some persons have such peculiar idiosyncrasies, that from eating some kinds of fruits, as walnuts, or particular kinds of shell fish, an attack of urticaria will be sure to ensue.

It has been long observed, that when a calculous diathesis existed in any individual, together with a pre-disposition to a morbid irritability of the skin, a vegetable diet was found most beneficial in removing or alleviating those complaints. The chief objection to the almost exclusive employment of a vegetable diet is the tendency which such alimentary matter has to undergo the acetous fermentation: this is sure to happen if the gastric juice or fluid naturally secreted by the stomach be deficient in quantity or depraved in quality: this fermentation, so unnatural in a healthy state of the stomach, is more immediately prevented by the judicious use and admixture of animal food.

A well balanced proportion of animal and vegetable matter seems indeed most adapted for the purposes of nutrition, and for the prevention of that morbid irritation of the mucous membrane of the alimentary canal, which, when once

established, will frequently, by nervous sympathy, involve other functions.

The following comparative sketch of the most prevalent diet and habits of the inhabitants of Ireland, Scotland, and of the county of Norfolk, is to be considered as referring principally to that of the poorer class, from whom the great mass of patients admitted into county and other hospitals are derived, and upon which sources the authority of our statistical accounts, as to the frequency or infrequency of calculous diseases, mainly depends: how far it is probable that varieties of climate exert, in combination with an irritating diet, an influential power in the production of those diseases, will form the subject of a separate section.

In Ireland the majority of the lower classes throughout the four provinces use no other food than vegetable diet and milk, for the purpose of daily subsistence: this diet, although apparently unworthy of exciting the envy of the English peasant, is, I am convinced, upon the whole, more nutritious, and more capable of preventing the occurrence of deranged functions than the aliment upon which the inhabitants of this district chiefly subsist. The mild and unirritating quality of this food precludes the development in its various forms of scrophula, a disease, which may be considered to consist essentially

in an acquired liability to the deposition of tuberculous matter in different tissues, but particularly in the glandular. In close connexion with the scrophulous diathesis is always found the great prevalence of phthisis pulmonaris; for wherever one of those diseases is observed to affect a considerable portion of the community, the other, as its natural consequence, is always found to be more or less rife;* hence scrophula and phthisis are, upon the aggregate, considerably less frequent in Ireland than in England, and calculous disorders are likewise extremely rare in the sister island.†

* For some judicious allusions to the probable connexion in towns, between the scrophulous and calculous diathesis, see Dr. Yelloly's Remarks on the Tendency to Calculous Disorders. Philos. Trans. 1828.

† From personal inquiry I can corroborate the statement of Mr. Smith, of Bristol, as to the infrequency of calculous diseases in Ireland. Mr. Carmichael told that gentleman that the average number of cases cut in Dublin is about 8, and about 4 for all the rest of Ireland. In the year 1827—28, when I attended the Meath Hospital, containing always about 100 patients, there were only 2 stone cases, which excited so much attention, that most of the surgeons of the other hospitals were present at the operations, both of which terminated favorably under the hands of the scientific surgeons of that well-conducted institution, which, through the indefatigable exertions and marked anxiety to communicate instruction, so remarkably characteristic of its medical officers, is at the present period setting an example well worthy the imitation of every school of medicine in the united kingdom.

The poor of Ireland, although less obnoxious to calculus, from being subject to fewer vicissitudes of temperature, and from using a less irritating diet, are still however extremely susceptible of hepatic affections, to which the indulgence in their favourite beverage, whiskey, much predisposes them. Dr. Speer, in his Medical Report on the Diseases of Dublin, says, "that the use of this fluid with us is attended with great advantages is unquestionable, but that its abuse has completely thrown these advantages into discredit, is equally so. Indeed, in the entire mass of misery of our poor, whiskey is thought to form the principal remedy: they conceive it a cure for all complaints and all weathers; in warm weather it allays their thirst, when cold, it heats them; when wet, it dries them; in sorrow they fly to it as a charm and a blessing, and in its intoxicating draughts their misery is forgotten."*

Although the abuse of whiskey does in fact excite the liver to such an extent that hepatic disease is necessarily very prevalent in Ireland and Scotland, I am still inclined to believe that the "Potteen and "Glenlivet" are by no means so injurious to the vital powers of the human constitution, as the extreme use of those noxious

* Dublin Hospital Reports, Vol. iii.

spirits, British Gin and Brandy, which are, beyond all calculation, more accessory to the destruction of the health of our manufacturing population, than any liquid which ingenuity or the love of gain has invented for the annihilation of the physical and moral character of man. One great difference between the *modus operandi* of alcohol in the form of whiskey and in that of brandy or gin, is that the former always appears to have rather a tendency to relax the bowels than constipate them, which is, I conceive, one of the most unfortunate properties of the latter.

The reason of this decided distinction between those spirits I cannot pretend to explain with any degree of certainty ; but I think it most probable that whiskey, being derived by a purer distillation from grain, is not vitiated by certain essential oils which afford noxious qualities to the other.

The potatoe may be considered the staple article of food among the great mass of the Irish population. The introduction of this valuable root, in the reign of Queen Elizabeth, by Sir Walter Raleigh, has by many been considered one of the greatest blessings, and by others one of the greatest curses, which could have befallen this hitherto unfortunate country. The peculiar adaptation of the rich and fertile soil of Ireland

for the cultivation of the potatoe, has unquestionably, by affording an easy means of support, tended, in an incalculable degree, to swell the numbers of the dense population. The use of wheat bread is almost unknown over extensive districts in that country ; and, when we behold the human race generally possessed of a finer and more perfect physical developement than falls to the lot of those who are natives of what are considered more highly favoured portions of the united kingdom, we have a just reason to conclude, that the potatoe contains no inferior powers of affording nutrition.

Chemical analysis informs us, that the potatoe, although it contains a considerable portion of starch, which is the base of the saccharine principle, does not contain so much gluten as wheat-flour: the latter proximate principle abounds in wheat, and, by its stimulating, and, as they are generally believed, nutritious powers, from their approximation to animal gluten, distinguishes this grain from all other known vegetable productions. The potatoe, though not containing so large a proportion of starch, has evidently, from possessing a paucity of gluten, a closer relation to *Maranta arundinacea* (arrow root), *Cycas circinalis* (sago), *Iatropa manihot* (tapioca), and *Orchis mascula* (salop), than it has to the flour of the *Cerealia*.

M. Braconnot* states, that starch constitutes from 83 to 85 per cent. of rice, which is known to be a very nutritious unstimulating article of diet.

Since wheat flour contains a large proportion of gluten,† it is a question whether it is not consequently more liable to undergo the acetous fermentation, when constantly introduced into the stomach in such an alimentary form as to excite there a morbid irritation, and vitiate the natural qualities of the gastric juices.

It has been long observed that the employment of a small portion of animal food tends to correct the acetous fermentation which all vegetable matter is liable to undergo, to a greater or smaller extent, after being introduced into the stomach. Dr. Prout has also alluded to the important share which the albuminous principle has in assisting the function of nutrition: now this principle actually exists in considerable quantity in the whey (serum) and caseous matter of milk; hence the great advantage to be derived from the combination of a milk with a vegetable diet; and we are well aware, that, from the earliest dawn of memory, the notoriety of Ireland's butter-milk and potatoes has not been

* *Annales de Chimie et Physique*, iv, 383.

† For different analyses see Dr. Henry's *Chemistry*, Vol. ii, Ed. 10.

limited to the mountains and bogs between Cape Clear and the Giant's Causeway. With respect to the nutritious properties of the potatoe, Adam Smith makes the following correct remarks: "The chairmen, porters, and coal-heavers in London, and those unfortunate women who live by prostitution, the strongest men and the most beautiful women perhaps in the British dominions, are said to be the greater part of them from the lowest rank of people in Ireland, who are generally fed with this root. No food can afford a more decisive proof of its nourishing quality, or of its being peculiarly suitable to the health of the human constitution."*

Salt-fish is used in considerable quantity by the inhabitants of the maritime counties in Ireland; but, in the midland counties, from the present imperfectly encouraged state of the fisheries, the natives subsist chiefly upon their ancient vegetable and milk diet.

When we reflect upon the probable consequences of the employment of such a diet by the larger part of a population residing in a climate more favourable to the healthy exercise of the functions of the skin, and contrast it with the indigestible and irritating nature of the food, and the unwholesome beverage used by the

* Wealth of Nations, Vol. i, p. 251.

inhabitants of another district, we have, I think, just reason to infer, that the tendency to certain disorders would be much diminished among the former people.

The habits of the lower orders of Irish in their own country are directly opposite to those of the English and Scotch working classes : In Ireland, this class of people make use of little comparative bodily exertion, in order to obtain a supply of their slender diet ; the almost complete occupation of the soil, except upon a very few estates, by the renters of a few roods of land, chiefly appropriated to the growth of potatoes, renders the prospect of obtaining an addition to their humble pittance, by working for a liberal employer, altogether hopeless.

Hence the poor peasant, ignorant during his whole life of the means of bettering his condition, but rarely sees in the neighbourhood of his miserable cabin, the comfortable establishment of the opulent yeoman, from whom he might obtain a reward for that industry which cannot be exclusively directed to his own little occupation. The consequence of such a total want of stimulus to the physical exertions of man, is, that he falls into a kind of supine apathy ; and, when the peasant does work, he seems to indicate, by his careless motions, that he shall reap no benefit for the extra exertion of his strength,

beyond what is merely necessary for the maintenance of himself and family.

These small potatoe-growers are likely to keep in full activity the functions of the skin, for, during the greater part of the year, they are in the habit of wearing, even at the time of what they may call labour, a warm frieze coat, with a broad cape: this great coat is rarely thrown aside, being to the peasant a kind of perpetual vade-mecum. The kind of spade employed for digging their ground and taking up their potatoe-crop, has a handle of such extreme length, that it reaches even to the peasant's chin; thus the long lever obtained by the use of this implement precludes the necessity for putting into severe action the muscles of the back and loins, in order to raise the weight of earth in the ground. The violent exercise of the lumbax muscles, which must affect the functions of those organs in apposition with them is unknown: the Irish peasant is rarely seen to place his hand upon his loins, to relieve the uneasy sensation produced by over-tension of the lumbax muscles, which is so frequently observed among the most industrious labourers of this district when they are induced to work hard at task or taken work.

To the severe muscular action which attends the use of the short-handled spade in ditching, of

the scythe in mowing, as in Norfolk during harvest, and of the flail in thrashing out the yearly corn, the Irish peasant is almost a perfect stranger: with his long-handled implement, he turns over, with an apparent unconcern, his small space of potatoe-ground, exhibiting in his erect military figure, of which he is not a little proud, more the appearance of a recruit at drill, than that of an agricultural labourer. Upon the habits of the manufacturing population of Ireland it is altogether unnecessary to make any particular comment, for that splendid but unprofitable country has not enjoyed, up to the present period, scarcely any opportunity of directing its over-teeming population to such a source of industrious employment.

In Scotland, calculous diseases are somewhat more frequent than in Ireland, but infinitely less so than in the Norfolk district;* as I consider the nature of the food of vast importance in exciting indirectly these diseases, I shall make some remarks on the predominant quality of the diet in North Britain. The alimentary articles most in use are oatmeal, milk, salt and fresh fish, cheese, and vegetables; the large consumption

* Mr. Smith is probably not far from the truth when he calculates that stone cases do not average more than 12 annually. Mr. R. Smith's statistical inquiry into the frequency of calculus. *Med. Chirurg. Trans.* vol. xi.

of oatmeal by the lower classes is proved by the vast number of retailers of that article, who are found in the principal streets of Glasgow, and of the old town of Edinburgh; wheat bread is almost unknown in the dwelling of the Scotch cotter; his food consists principally of oatmeal made into a kind of thin pudding, called in the vernacular dialect of the country, "Parritch;" another favourite dish formed of oatmeal rendered acid, and merely a modification of the former, is called "Sowens;" cheese is much used by the peasantry, who derive also a tolerable supply of milk from their own cows or from their master's dairy; a supply indeed of oatmeal and milk, forms a part of the contract between master and servant, or labourer, at the time which the mutual engagement for employment and services takes place.

Although I am happy to agree upon the virtues of the potatoe with a celebrated author whom I have lately quoted, I must differ from him in opinion, respecting the qualities of oatmeal; "In some parts, he says, of Lancashire, it is pretended, I have been told, that oatmeal is a heartier food for labouring people than wheaten bread, and I have frequently heard the same doctrine held in Scotland. I am, however somewhat doubtful of the truth of it. The common people in Scotland, who are fed with oatmeal,

are in general neither so strong, nor so handsome as the same rank of people in England, who are fed with wheaten bread. They neither work so well nor look so well; and as there is not the same difference between the people of fashion in the two countries, experience would seem to show that the food of the common people in Scotland is not so suitable to the human constitution, as that of their neighbours of the same rank in England.*

Now, since the time of that great political economist, we are aware that no inconsiderable portion of the English lower classes in many counties, and that almost the whole of the Welsh peasantry are fed upon bread or cakes made of oatmeal or rye; that in those districts where such a custom prevails, they procure daily a more plentiful supply of other articles of food, as milk and cheese, than falls to the lot of those who consume wheaten bread. In those countries besides, the poor have generally an abundant supply of cheap coal or turf for fuel.

The happy descriptive talent of Scotland's favourite poet has given the following correct and interesting delineation of the simplicity of that diet, which during the period of his youth formed his own humble subsistence :

* Wealth of Nations, Vol. i, p. 250, published 1776.

" But now the supper crowns the simple board,
 The halesome parritch, chief o' Scotia's food :
 The soupe their only Hawkie* does afford,
 That 'yont the hallan snugly chows her cood :
 The dame brings forth in complimental mood,
 To grace the lad, her weel-hained kebbuck † fell,
 An' aft he's prest, an' aft he ca's it guid ;
 The frugal wifie, garrulous, will tell,
 How 'twas a towmond auld, sin' lint was i'the bell."

Burns' Cotters' Saturday Night.

There can be no doubt that the above diet is highly nutritious, as well as mild and unirritating. The late Dr. Gregory, of Edinburgh, investigated the manner of living among the great mass of the Scotch population, in order to inquire into the relative nutritive powers of a particular diet: he ascertained that the farm-servants consume, upon the average, only $2\frac{1}{2}$ pounds of oatmeal, and two pints of milk daily: with this diet they were able to pursue their usual labour, and enjoy excellent health.

Some medical men have entertained an opinion that a scrophulous diathesis was induced by the continual use of vegetable food as the chief means of sustenance; but the reverse seems evidently to be the case, as has been clearly proved by that excellent pathologist Dr. Alison.‡

* Cow.

† Cheese.

‡ On the Pathology of Scrophulous Diseases. Trans. Med. Chir. Soc. Edin. Vol. i.

One great object in pursuing any particular dietetic regimen as a preventive of disease, is to employ that which tends to secure a regular peristaltic action of the intestinal canal: this happy effect is probably found to attend more frequently the use of oatmeal diet than that of any other. Those gentlemen who have had the privilege of attending the excellent lectures of the present erudite Professor of Materia Medica in the University of Edinburgh, will remember, that when illustrating the dietetic properties of the *avena sativa*, Dr. Duncan used to relate a very interesting case of an English gentleman, who, after trying the various remedies for constipation without success, and receiving no benefit from the advice of the most eminent medical men in London and Edinburgh, happened to remain a short time in one of the counties of Scotland: he there restricted himself exclusively to a porridge diet, which speedily restored the natural healthy action of the bowels.

A relaxed state of the bowels can occur but from two causes, increased secretion from the mucous capillaries, or increased peristaltic action, which two conditions however are so connected, that they are generally found to be combined. A meal of vegetable diet, which relaxes the bowels, must necessarily render the intestinal capillaries more active in the function of secre-

tion, and consequently less work will be thrown on the vessels of the kidney.

A considerable quantity of fish, both fresh and salted, is consumed in different districts of Scotland, and one extraordinary circumstance attending the use of this food is, that it seems to illustrate the specific action of a peculiar diet upon particular functions, for it is an unquestionable fact, that in all the fishing villages, where a large quantity of this diet is eaten, the population increases in a much more rapid ratio than in other villages.

In respect to the habits of the Scotch people, it will be generally found that they are diametrically opposed to the Irish: the former, instead of being volatile in temper and careless in their endeavours to obtain subsistence, are remarkable for their very cautious manner of undertaking any project; living in a much colder climate than the Irish, it seems as if nature had so modified their dispositions as to give them a kind of intuitive desire of making up by the prudence of their general domestic economy for the otherwise deleterious effects of the less genial atmosphere which surrounds them.

The happy results of a well-regulated management of the poor, is I believe in no part of the world better exemplified than in Scotland. In that country the workman is considered as

worthy of hire ; a mutual though not obligatory contract exists between the employer and the employed : the former regulating the price which he gives for labour, according to the supply of the only article of exchange which the poor man has to give, his own physical strength ; whilst the latter, perfectly acquainted with the non-existence of any poor laws which tamper with the spirit of industry, looks to his personal exertions alone for the means of life. Hence, putting in practice the celebrated maxim of Lord Kames, that “ the fear of want is the only thing which can render man industrious,” the Scotch legislators of a former period have richly deserved the blessing of their country, in laying the foundation of a system which has placed the lower classes of Scotland in a situation both general and moral, incalculably more enviable than that of their Southern brethren.

The population in Scotland is certainly much thinner than in Ireland or England ; hence, the relative comforts of the people are increased. Large quantities of whiskey are consumed by the people at large, the natural consequence of which, as in Ireland, is a considerable augmentation of hepatic diseases : scrophula I have observed to be more common there than in Ireland.

Although the general economy by which the Scotch lower classes are managed necessarily

gives birth to industry for the purpose of self-preservation, the working classes, at least the men, artificers in towns excepted, do not appear to use so much muscular exertion during their labour as the inhabitants of this district; the women, however, work extremely hard. In this respect there seems a remarkable analogy between the habits of the Scotch and French, which is plainly observable by any one who has traversed many of the provinces in either country; the onus of the labour in both countries is thrown upon the female peasantry.

Norfolk has long ranked among the most opulent and most productive of the English counties: there is no county more remarkably distinguished for the persevering industry of its inhabitants, who have overcome most of the disadvantages attending the occupation of a very inferior soil, and have rendered many large tracts of country capable of the growth of an abundant produce, which were formerly little less than barren sandy wastes.

The working classes in this county subsist almost wholly upon farinaceous food, which, without reflecting upon its intrinsic quality, has been supposed by most persons to contain more power of nutrition than any other form of vegetable diet used in the British dominions. From this opinion I am inclined altogether to dissent

when I take into consideration all the circumstances connected with its consumption.

The majority of the poor are in the constant habit of eating wheat bread made from flour, of as good a quality as that generally used by the higher ranks of society : this bread, nevertheless, is eaten at a period so early after its being manufactured, that it is certainly much less digestible than if it was not used till two or three days after being baked ; in fact, I have no doubt that the spongy nature of this new bread not merely diminishes its capability of being digested, but tends very frequently to make it become a source of morbid irritation to the stomach.

A traveller would be surprised in passing through this county to observe that the poorest cow-boy is found eating bread of the whitest, and what is generally called of the first quality. This bread, baked frequently the day previously, forms the breakfast and dinner of the labouring person : this is generally washed down with mere common water or tea, milk being obtained with much difficulty, from circumstances to be afterwards mentioned. When the labours of the day are terminated, the supper, which is the principal meal, is composed of the same kind of good wheat flour, made into a culinary preparation unknown to the house-keeping of almost every part of England, Suffolk being excepted, in

which county a very similar farinaceous diet is used, and which is probably one of the exciting causes of the calculous diathesis prevailing in that county, in an inferior degree only to that which so remarkably distinguishes Norfolk ; this preparation is called a dumpling.

The dumpling is formed by adding yeast or ferment to flour, which is made up into a kind of paste or dough ; the panary fermentation is then allowed to take place, and the dough is laid a rising, as it is called, for a short time : after being formed into round lumps it is put into a pot of boiling water, in which it is boiled about twenty minutes, if the palate of the consumer wishes for a light dumpling ; if he prefers it heavy, the dumpling is allowed to boil for a few minutes longer.

The dumpling, in this spongy condition, is introduced into the stomach, necessarily producing in that viscus an excessive degree of distension, whenever the appetite is sufficiently acute to render the consumption of a large quantity indispensable. But a comparatively small quantity of potatoes, or other vegetables, is combined with this farinaceous diet : indeed the proportion of vegetable matter used for this purpose is much less in Norfolk than in other parts of the kingdom.

The non-fermentation of the bread used by the

commonalty of any country has been often looked upon as the "fons et origo" of half the diseases of the external and internal cutaneous system which prevail endemically or epidemically: that this opinion may be in some degree correct, it is extremely probable; but how often do we find that diet of inferior bread, imperfectly fermented, tends in no degree to retard the physical developement of man, or render him liable to disease, especially when this diet is combined with wholesome beer, milk and oil. I have been particularly struck with this fact in observing the superior stature and physical power, as well as the healthy appearance, of the French peasantry in the northern departments, from which are obtained the "elite" of their military force. These people derive subsistence chiefly from a black ill-fermented rye-bread, of an appearance and taste more repulsive than any I have seen in the British dominions.

Instead of that wholesome beverage, buttermilk, or that excellent stomachic and tonic, good home-brewed beer, the Norfolk workman is generally obliged to wash down his indigestible meal with nothing but water, or if with beer, it is most frequently with the heterogeneous and deleterious compound sold under that name at the public-house. A small portion of fat-dripping from the meat of their

more opulent neighbours, cheese or bacon, is combined with the dumpling by the happier few who can better procure such an adjunct; but those who can thus afford to combine such albuminous and oleaginous principles with the saccharine matter derived from the flour, form but a small proportion of the commonalty.

No alimentary preparation is less capable of digestion than the Norfolk dumpling, when eaten in the quantity in which it is consumed by the hard-working peasant: it gives great distension to the stomach, and being made of flour deprived of the bran, or cortical envelope of the grain, it has a natural tendency to induce constipation, when not combined with laxative adjuncts: it is therefore in this respect extremely inferior to oatmeal cakes, which have the property of inducing continually a regular action of the bowels by the mechanical stimulus of the particles of bran upon the nerves of the intestinal mucous membrane.

Norfolk being for the most part a corn county, but very few cows are kept in proportion to the number of square acres,* and of these cows scarcely any are the property of the cottager, who is therefore throughout the whole district generally incapable of procuring the necessary

* The number of square acres in the county are 1,094,400.

supply of milk. Potatoes and other vegetables are cultivated for their own use by the working classes upon a comparatively small scale, their garden-ground being very limited; thus the chief food upon which they subsist is bread and dumpling, each made of fine wheat flour.

Within a few years a small quantity of home-brewed beer has been made by the working classes; but even now the majority of the people are obliged to procure beer, when it is in their power, from the public-house; where they obtain a beverage possessing none of those admirable tonic properties which so peculiarly distinguish good English beer, and which undoubtedly render it more capable of affording nutrition and assisting digestion than any other beverage in the world.

There can be no doubt that the greater portion of public-house beer is equally or more deleterious than the whiskey, as it is used in Ireland and Scotland. In fact, the less prevalence of scrophula in Ireland may be rationally attributed in a great measure to the more simple and less adulterated nature of the food used by the great body of the inhabitants of that country: Indeed it is most probable that the general diet of the poorer Irish contains more real nourishment than that of the same class of people in England.

Every one who has travelled through different

counties in England must be immediately struck with the different quality of the beer to be obtained at country inns, and that which is to be procured in the same kind of houses in Norfolk. The reason is obvious ; there is less home-brewed beer in Norfolk than in any county in England ; but, in its place, we find the various kinds of " fine ale" and London porter—the complicated composition of which would require a minute chemical analysis to describe.

The inhabitants * of the county of Norfolk are probably as much distinguished for their general cleanliness and industry as the natives of any part of the united kingdom. When, during the war, a ready sale was obtained for their agricultural and manufactured produce, the stimulus to exert the full physical power of the human frame was energetically obeyed and persevered in.

It is only necessary for an individual of common observation to travel from the county of Norfolk during the season of harvest, to discover that the working classes in this county make use of more muscular exertion during that period of vital importance to the whole community, than

* The population of Norfolk consisted of 344,368 according to the census of 1821—of these 36,368 families were employed in agriculture, 26,201 in trade, and 11,928 not comprised in the two preceding classes.

will be found during the same season in any other part of the British empire. This disposition to employ their physical force is not limited to the time or season of harvest ; for during the various calls of an admirably arranged rural economy, the peasantry of this district, when they are properly encouraged, may be considered a laborious people.

A very powerful action of the lumbar muscles is exerted in threshing corn, in lifting heavy weights of earth in ditching, and other agricultural operations. When the labourer finds himself capable of earning good wages by what is called taken or task work, he will then often complain of a strain in the loins, and demonstrate his uneasiness by making use of pressure with the hand upon that region.

The same extent of pre-disposition to active exertion I have not witnessed in any other country : even in Flanders, which has been rendered by the industry of its inhabitants the garden of Europe, through the excellence of its cultivation ; here the physical force used by the individual is a kind of inertia compared with the vigorous activity of the Norfolk people.

Reflexion upon the above facts may induce the rational inference that when the lumbo-iliac muscles are very powerfully brought into action the adjacent renal organs may be often func-

tionally disturbed ; this we repeatedly find to be the case in horses and dogs whose natural powers have been over-exerted ; and whenever a young horse has got what is called a strain in the loins, the thick urine which he is found to pass evidently denotes a functional disorder of the kidneys. Many individuals who are not accustomed to horse-exercise often experience a sharp pain in the loins ; and soon after this strong action of the lumbar muscles is suspended a copious deposition of red sediment, or lithic acid is found to take place ; a similar fact has been frequently noticed in children affected with diseased lumbar Vertebrae.*

The relative situation of the kidneys with respect to the *psoæ* and *quadrati lumborum* muscles, and also their attachment to those muscles through the medium of adipose membrane and small blood-vessels ought to be reflected upon when we investigate the obscure pathology of these organs. I am convinced that the great liability of the kidneys to be functionally disordered in consequence of over-exertion of the lumbar muscles has been much overlooked.

The important influence exerted upon the kidneys during the action of those muscles is very evident : that very superior anatomist, the

* Mr. H. Earle. Med. Chir. Trans. Vol. xi. part 1st.

late Mr. Wilson, says—that “Branches from the lumbar arteries are sometimes found to enter the kidneys from behind; and I have also found branches from the renal arteries passing out from the substance of the kidneys, and forming communications with the vessels of the neighbouring parts.”*

The preceding observations made upon the habits of the people of different districts are only brought into notice as collateral circumstances which may probably be made to bear upon the investigation of these obscure diseases.

There are other important considerations connected with variety of climate in the districts in question, which may be found to throw some light upon the general pathology of calculous disease.

* Wilson on the Urinary and Genital Organs. Page 24.

ON CLIMATE AS AN EXCITING CAUSE OF
CALCULOUS DISEASES.

It has been long noticed by medical men, who have had opportunities of practising their profession in different climates, that the temperature of the surrounding atmosphere has a vast influence in exciting deranged function in some organs of the human body, while, at the same time, other functions are more likely to remain in a perfectly healthy condition. An acquaintance with the physiology of the sanguineous system affords an easy explanation of the cause of these phœnomena: it will prove that the natural or morbid state of every function, or that of health and disease, depends upon the relative condition of the external and internal capillary system of vessels, in which is seated the power of eliminating from the general circulation whatever is necessary to be secreted for the preservation of the health of particular organs, or what-

ever is essentially excreted in order to prevent its retention exerting a noxious influence upon the animal economy.

Every day observation teaches, that in all diseases, whether considered as primarily commencing in the nervous or not, the sanguineous system must be necessarily drawn into the morbid concatenation ; and that in renewing what is called the balance of the circulation, by removing topical congestion in one of its divisions, and restoring the natural vascular fulness in another, is seated the principal art of the practice of medicine and surgery.

Medicine indeed is truly an imitative art ;* and the physician, the minister of nature, observing the way in which functional disorder is removed by a critical sweat, purging, vomiting, expectoration, hæmorrhage, or discharge of urine, is judiciously led to employ those remedies, the operation of which is, strictly speaking, to produce artificially those necessary effects which cannot without hazard be trusted to the inherent power of the vital laws.

Atmospheric temperature is a most powerful

* For excellent views on the true principles of medical practice see an Essay on the Agreement between Ancient and Modern Physicians, or a comparison between the practice of Hippocrates, Galen, Sydenham, and Boerhaave, by J. Barker, M. D. Lond. 1748.

physical agent, by acting directly on the cutaneous system, and thus rendering the circulation either external or internal, so that some organs have a disproportionate share of work thrown upon them, by which a morbid functional condition is established, not to be removed but by the application of an opposite temperature to the surface of the body.

The liver and skin have a very important sympathetic relation to each other in health and disease: they seem indeed very frequently to be synchronously affected, the activity of their respective capillaries being so much increased, as well as protracted for so long a period, that a morbid deposit takes place in the tissues, of which those organs are composed, presenting every form of chronic cutaneous disease and hepatic hypertrophe. Hence it has been long observed, that cutaneous and hepatic diseases are less endemic or epidemic in cold climates.

On the other hand, when too much work is thrown upon the pulmonary or renal vessels, and a congestive state of the lungs and kidneys is induced, the functional disorders of those organs are always relieved by withdrawing the excess of circulating fluid retained in them; this desideratum can be obtained in no way with so much facility as by removing the individuals affected into an atmosphere containing

a sufficient degree of caloric to stimulate the capillary vessels to dilate themselves, and retain upon the surface of the body a larger share than usual of the sanguineous fluid.

Thus, disorders of the lungs and kidneys are always relieved if not removed by a change of residence to a warmer climate; and even, during the heat of summer in this country, individuals long subject to a morbid irritation of the kidneys, generally find that the distressing nature of their complaints is considerably diminished.

One fact is established with respect to the infrequency of calculous disorders in some climates: that within the tropics the human body seems but rarely obnoxious to the generation of urinary calculi: the best information which we can procure as to the diet of the inhabitants of those regions, assures us, that those people chiefly subsist upon vegetable food of the most simple nature, and particularly of rice, tapioca, arrow root, and other similar articles of food of an unirritating quality. A very large proportion of the natives of Hindoostan pursue this method of subsistence; and, were urinary calculi at all prevalent among those natives, who form the chief part of the military force in the service of the East India Company, there can be no doubt that such concretions would have been detected by the able military surgeons who have

been for a considerable period sent out from this country to practise their profession in that part of the globe.

Many medical men have doubted whether the apparent result of the inquiries of Mr. Copland Hutchinson,* as to the infrequency of calculous diseases among sailors, is a fair criterion of the preventive influence of a more regular atmosphere and a well-regulated diet : I am altogether of that gentleman's opinion, for I think it more than probable that if the 86,000 patients admitted into the naval hospitals had spent the greater part of their lives upon land, instead of being at sea, more than eight calculous cases would have been found among them.†

When we reflect for a moment upon the above facts, we must rationally come to the conclusion, that some material difference in the climate of different districts must continue to act as a collateral exciting cause of the frequency of calculous diseases in the one, and their infrequency in another.

Ireland, when viewed with relation to the na-

* Med. Chir. Transactions, Vol. ix.

† What a contrast between one case to near eleven thousand admissions, according to Mr. C. Hutchinson's report ; and the result of the total admissions to the Norfolk and Norwich Hospital, in which the stone cases are in the proportion as one to forty during the last fifty-six years.—See Dr. Yelloly's Paper, Philos. Trans. 1828.

tural fertility of its soil, and the superior mildness of its climate, is by far the most valuable integral part of the British empire : the rich deep loam, replete with decomposed vegetable matter, covering the spacious plains between the bold ridges of elevated hills which cross the country in different directions, is admirably adapted to be converted into a kind of Eden by the hand of well-encouraged industry ; even its bogs, those grand and sublime specimens of the devastating operations of the overwhelming deluge, exhibit, in their reliques of antediluvian vegetation, a real source for the derivation of human subsistence, infinitely more prolific and advantageous than the wide and desolate districts of sand which form no inconsiderable portion of this county.

Ireland enjoys a climate less favourable, I believe, for the generation of urinary calculi than either England or Scotland ; and particularly less so than the Norfolk district. From reflecting upon the geographical situation of that island, it must be admitted that its peculiar position would naturally render its climate more genial and mild than that of this part of England : situated in the Atlantic, at a distance of about twenty leagues from North Wales, and four leagues from the south-west coast of Scotland, it has to the eastward, upon the opposite or English

coast, a lofty range of hills which runs nearly parallel with the shore in a direction from north to south : some hills of this range attain in North Wales an elevation of between three and four thousand feet.

Hence Ireland must be always peculiarly sheltered from the baneful effects of the easterly wind, which has been observed in all ages to exert a more malignant influence upon animal and vegetable life than any other aerial current to which a country, from its local position, may become obnoxious.

The more equal temperature of Ireland is so propitious to the growth of vegetable life, that, in Gaelic literature, the appellation of "green Erin,"* and, in a more recent age, that of the "emerald isle," has been obtained for this country: the happy accuracy of those terms rests upon an unsophisticated observation of nature long before the natural history of climates had been explored or investigated by the scrutinizing eye of modern science.

Another range of hills or mountains considerably more elevated than any in the neighbourhood of the eastern coast of England, the Wolds of Yorkshire excepted, runs very near the shore through most of the eastern counties of Ireland—

* Ossian's Poems, Temora, Book i.

forming a second or more immediate barrier against the power of the east and north-east winds, when they take their course towards that island. In a direction from east to west, and from north-east to north-west, other bold ranges of hills traverse that fine country: so that Ireland is equally protected from the chilling blasts of the north.

When we come to view the physical and topographical features of the county of Norfolk we shall find a most remarkable contrast to the preceding delineation of Ireland: Nothing is a better general thermometer of the climate of any country than the relative presence or want of verdure in the indigenous vegetation: It is only necessary for a person of common observation to pass at the termination of autumn from the county of Norfolk to the other side of the Irish channel: While he leaves behind him merely the shadow of vegetable life, upon setting foot in Ireland he will be immediately struck with the lively verdure which covers the surface of the whole country, except where the rocky substratum is near the surface of the soil; and, should he proceed to the western and southern sides of the island, he will find the vegetable world more replete with all the exuberant vigour of health and energy, than is generally exhibited on the

eastern coast of England at the commencement of a genial summer.

It is moisture combined with warmth which renders that country so propitious to vegetation, and with regard to the predisposition to the calculous diathesis, it is extremely probable that such a state of atmosphere is a great preventive ; while an opposite climate, or that of moisture combined with cold, may render England (particularly some parts of it) and Holland very productive in those diseases.

The calculous diathesis seems to be unquestionably more frequent where phthisis pulmonaris is a common disease : Hence it has been observed that the former diseases assume an endemic character in the county of Norfolk, whilst the different forms of pulmonary disease, and particularly phthisis, are probably as much or more rife in that district than in any part of England. In Ireland, the comparative infrequency of calculus and phthisis has been equally noticed :* this surely may be rationally referred in a great measure to the superior mildness of its climate. I have witnessed, however, a great number of cases of tubercular phthisis in the Meath hospital at Dublin : Still the comparative

* Dr. Speer, Op. Cit.

rarity of the disease in Ireland is, I believe, perfectly correct.

The fenny districts of Cambridgeshire * and Lincolnshire † are well known not to afford so many calculous cases as the higher and drier soil of Norfolk, while phthisis pulmonaris is also extremely less frequent in the former localities : the moister condition of the atmosphere, which is milder in the fenny countries, may probably be the cause of this difference.‡ May not the milder temperature of those localities be owing to two causes, either the derivation of a considerable portion of radiant heat by each wave or current of air as it passes over an extensive tract of soil before it arrives at those districts, or the immense evaporation from large masses of water rendering the neighbourhood of such, cooler in summer and milder in winter, in the former caloric being absorbed as the watery particles pass into a state of vapour ; in the latter season, the particles in a state of vapour becoming condensed, and consequently setting at liberty a large portion of free caloric.

* Med. Chir. Trans. Vol. x, p. 29.

† Idem, p. 38.

‡ Dr. Clark, in his Notes on Climate, &c. London, 1820, remarks the rare occurrence of phthisis in similar situations on the continent of Europe.

Not being able to furnish at present a sufficiently precise report of the mean temperature of the county of Norfolk—as I cannot ascertain that a correct registry of the height of the thermometer during each month in the year has been yet kept in this district—I shall trust to the sufficiently infallacious test of the low comparative temperature of the county during the cold months, from personal experience during a residence in different years in the localities in question.

It may not be injudicious, in the absence of such precise information as to the actual low degree of temperature of this county, to compare the average temperature of the two capitals, London and Dublin, during four years, 1815-16-17-18, taken from the registries of Mr. Howard, and one of the editors (Doctors Barker and Cheyne) of the Account of the late Epidemic Fevers in Ireland.*

After examining the tables of those gentlemen, the following interesting facts will be immediately evident, that, out of the twelve calendar months in each year, the cold months of January, February, March, September, October, November and December, are, upon the average, 5°

* A tabular view has been given by those gentlemen of the average temperature of the two capitals.— Vide Op. Cit.

warmer in Dublin than in London: while, during the warm months of April, May, June, July and August, the average heat of London exceeds that of Dublin by more than 1° . It may be urged that the situation of Dublin, near its extensive bay, would tend much to modify its climate from the perpetual action of certain physical causes before-mentioned: that such a situation, like that of every maritime capital, must be, to a certain extent, under the influence of such causes, cannot be denied. I am inclined, however, to believe that the climate of every city, as well as larger territory, even in a maritime situation, will lose much of the benefit connected with it, unless it may be protected from the chilling blasts of the north and east by adjacent barriers of hills of sufficient elevation.

If an accurate account was taken of the comparative temperature of most of the Irish counties, and of the county of Norfolk, a much greater discrepancy would be without doubt discovered, than between the temperature of the two capitals: The remarkable modifying influence of certain indelible physical characters of each country must always render the climate of the one more mild and genial than that of the other.

There would appear to be a very considerable analogy between the mild climate of the southwest of England and that of Ireland with respect

to the infrequent occurrence of calculous disease : The surgeons of the Exeter Hospital have reported that their institution has within its circle the stone cases (with very few exceptions) of a population of 600,000, and that there were admitted, from 1806 to 1816, eighteen stone cases, or about $1\frac{5}{100}$ each year, and, from 1811 to 1818, there were nine cases, or $1\frac{2}{7}$ each year.* The climate of Devonshire in November, December and January, is 5° higher than that of London.†

A remarkable contrast to the above exists, on the other hand, in the county of Norfolk : Dr. Yelloly, in his paper before quoted, has ascertained, that during a period of fifty-six years, since the establishment of the Norfolk and Norwich Hospital, there has been no less an average than 10—26 stone cases per annum, or, taking the population of the county, according to the last census, at 351,000,‡ there will remain one case for every 34,000 inhabitants ; and the stone cases, in proportion to the total admissions, have been about as one to forty : This gentleman is most probably correct in considering the London district as second only to Norfolk in the prevalence of calculous diseases—one operation

* Mr. Smith's Inquiry, Med. Chir. Trans. Vol. xi, p. 25.

† Dr. Clarke on the Influence of Climate, 1829.

‡ *Ibid*, 1828.

being performed in the metropolis for every 38,000 inhabitants.

When we come to reflect upon the nature of the ordinary diet generally used in London, and compare it, in its adulterated condition, both as solid and liquid food, too notoriously ascertained by Accum and other chemists, with the simple unsophisticated diet employed in Ireland, we shall have greater reason to feel surprised that the morbid irritation of such unnatural stimuli upon the delicately sentient surface of the mucous membranes do not more universally generate both calculus and scrophula—the less susceptibility of the Irish to those complaints can be no matter of astonishment.

With respect to the climate of Scotland, it is well known that it is very cold during winter: that this season sets in earlier and is protracted longer than in the southern parts of England: its eastern and south-eastern counties are particularly exposed to the influence of the cold cutting wind which traverses the north sea from the German and Danish shores. Excepting those situations, a considerable portion of Scotland is well protected from the northern blasts by the bold chains of the Grampian and other mountainous ranges which take a direction from N. E. to S. W. and from E. to W. The western districts are particularly well sheltered in this

respect, and enjoy a climate considerably milder than the eastern. In many of the better sheltered districts also, where those fine tracts of alluvial soil called *carses* are situated, vegetation appears to be as far advanced, if indeed it is not earlier than in the county of Norfolk. Taking these facts into consideration, I should question whether a large portion of Scotland, although the most southern part of that country is about 3° of latitude farther north than the county of Norfolk, does not experience as mild and genial a temperature as the latter.

I think there is just reason to infer that there would be a greater quantity of calculous diseases in Scotland were it not for the tendency which the Scotch diet has to keep up a considerable action of the gastro-intestinal capillaries, and thus, by its laxative stimulation, induce those vessels to continue in a state of super-secretion—while the vessels of the kidneys have their share in the function of elimination consequently diminished.

The geographical situation of the county of Norfolk renders its inhabitants more exposed to the impression of cold chilling winds than any other county of England; the whole of its north and east sides are directly acted upon by winds from those quarters—the former of which meets with no interruption to its progress from the icy

deserts of Spitzbergen, and the latter passes over the flat districts of Holland and the north of Germany, to pour its unbroken and malignant force upon the exposed shore of this eastern county. From its peculiar position, and the absence of hills of sufficient elevation parallel with the shore, the air of this county is extremely cold in winter, and, during the early parts of the spring, vegetation is generally kept back by sharp easterly winds and a vast quantity of sleet.* The direful effects of the east wind in this county are not confined to human and vegetable beings: It has been always remarked by the proprietors of extensive flocks of sheep, that, during "the lambing season, in the months of February and March, whenever the east wind sets in and blows without intermission, as it frequently does, for many days in succession, the lambs become what is called ricketty—a morbid condition, attended with distortion of the spine, and more or less incapacity for motion:—If the wind continues long in the east and north-east quarters, such a state of paralysis is induced among these animals, that they never perfectly recover the use of their limbs; but, if this morbid condition has existed only a short time, and the wind shifts suddenly to any other quarter, the lambs recover the power of motion as if by a charm."

* Kent's Survey of Norfolk.

**ACTION OF REMEDIAL AGENTS IN CALCULOUS
DISEASES.**

When we reflect upon the administration of different remedies for the removal of disease, we are obliged to come to the humiliating acknowledgment of our ignorance of their real mode of operation ; but we may probably anticipate that this lacuna in medical science may, through the rapid discoveries making every day in animal physiology and pathology, be eventually filled up.

Unless rational views of the method by which medicines act upon the animal œconomy are decidedly adhered to, the practice of medicine would be a complete series of experiments, or altogether empirical. That much of our knowledge of the action of remedies must be derived from experience, it is absolutely necessary to confess ; and that many remedies have virtues attributed to them which they do not possess :

hence, in scrophula, numerous agents from the vegetable and mineral kingdom have had their virtues extolled to the skies, because the salutary operations of nature have been overlooked, and the pathology of the disease imperfectly understood.

Mineral waters, however inert may be their chemical constitution, have, even in the present day, the exclusive and superstitious reverence of the fashionable world, who, when they become the most punctilious votaries of Hygeia, forget that the virtues of a small stream, whose ebullition from the bowels of the earth is altogether accidental, are of a most equivocal nature ; while a due regard and credit is not given to the *medicina mentis*, and the powerful influence of a regular exercise in an unpolluted atmosphere, combined with the judicious use of a dietetic regimen and the other non-naturals.

The remedies which act upon the renal glands may be divided into three classes.

1. Those which are absorbed and pass through the circulation: the evidence of whose action upon the renal secretions is ascertained by the precipitation of new salts from the urine.

2. Those whose absorption into the circulation is not proved: which act sympathetically upon the kidneys, after removing the functional derangement of the stomach, which had previously existed.

3. Those which exert a sedative action and allay the morbid irritation of the kidneys.

In the treatment of calculous disorders, pure alkalies, alkaline salts, acids, and astringents, have each enjoyed their share of reputation, according to the diathesis which appeared to prevail. With respect to alkaline medicines, the question is, whether their beneficial effect is strictly upon the composition of the urine, or rather on the function of digestion: I am disposed to think that the first mode of operation is very clearly ascertained: The latter method, however, in many cases, is highly probable.

It cannot be denied that alkaline solutions may be absorbed in the stomach, and transported through the current of the circulation to the kidneys: They seem to exert there a considerable chemical influence in changing the morbid condition of the urine secreted. Various products of the vegetable world have been long known to have the peculiar property of passing through the circulation without undergoing any material change "in transitu:" Rhubarb and madder stain the urine of a deep yellow or blood-red colour: From the terebinthines the urine acquires the odour of violets, and its peculiarly disagreeable smell after eating asparagus is well known.

Dr. Darwin detected nitrate of potash in the

urine of a friend within half an hour after it had been taken ; he then ordered him to be bled, but could discover none of it in the blood. Sir E. Home and Mr. Brande repeated a similar experiment with prussiate of potash ; they were equally unsuccessful in obtaining any traces of that salt in the blood.

M. Magendie * made analogous experiments with the prussiate of potash, and did not succeed in detecting it until he had experimented with a larger quantity : then the prussiate of potash became evident. This physiologist experienced equal difficulty in detecting the same salt when mixed with urine and with blood out of the body : the smallest quantity in the former was discovered by the usual chemical tests, but some inappreciable cause prevented the detection of it in the latter.

The use of alkalies is particularly indicated in that form of the functional disorder which is characterised by the appearance of crystallized red sediment, or gravel, in the urine ; for the secretion of such a deposit is generally a fair criterion of the lithic acid being in excess. Dr. Prout judiciously remarks, that, in this form of the complaint, alkalies, to be really useful, must be conjoined with alteratives and purgatives.†

* *Precis elementaire de Physiologie*, Tome ii.

† *Op. cit.*

In this opinion I must coincide with him, for exclusive dependance upon the chemical remedies cannot be relied on: therefore they should be combined with those remedies which diminish gastric irritation. This excellent chemist has also pointed out the necessity of not carrying too far the use of alkaline medicines, for, should the excess of lithic acid be more than saturated, the lithates of soda or potash (according as the alkaline matter employed has been potash or soda) will be precipitated. The operation of the remedy in this instance will be as bad as the disease, for the new salts precipitated will be less soluble than the lithate of ammonia.

It is very difficult to ascertain with any degree of accuracy the existence of the oxalate of lime, or the cystic oxide diathesis—the progress of the latter towards the generation of that peculiar calculus being extremely rare; the infrequency, or perhaps non-occurrence, of the former, unless combined with the lithic acid diathesis, is so well known, that its existence is altogether conjectural. Dr. Prout thinks that the oxalate of lime is both preceded and followed by the lithic acid diathesis, and, as the two are both of the same general nature, he judiciously recommends a mode of treatment founded upon the same general principles.*

* Prout, *Op. cit.* p. 145.

The phosphatic diathesis, denoted by the paleness of the urine, which contains a white earthy matter, is always attended with extreme morbid irritability of the whole system: Some writers and practitioners have imagined that it always arose from direct irritation of the mucous membrane of the bladder: They seem to have grounded their views upon the fact, that pieces of bougies, or other foreign bodies, which may have been passed per urethram into the bladder, are often found encrusted with the phosphates. Now, if the phosphoric acid was always secreted by the vesical capillaries when irritants were present in the bladder, it is most probable that the majority of calculi would be encrusted with those salts: the existence of pure lithates and pure oxalates in the bladder diminishes the plausibility of this conjecture.

The administration of acids has been recommended by high authority,* in that form of renal disorder characterised by the white sabulous deposit in the urine: Vegetable and mineral acids have been highly extolled, with the idea of introducing through the kidneys another acid as a substitute for the one which is defective, and is secreted in a healthy state of those organs. Now, two of the acids which are supposed to be bene-

* Dr. Wollaston, Phil. Trans. 1797.

cial by undergoing this transition through the circulation are the sulphuric and muriatic acids, both of which we continually observe to be most powerful general tonics ; they seem, indeed, by restoring the healthy condition of the stomach to exert a most decided influence upon the whole constitution. Is it not much more probable that, in calculous disorders, they extend their sympathetic action to the capillary vessels of the kidneys, which we may rationally suppose are in a state of debility and dilatation, analogous to those of the mucous membrane of the stomach when long submitted to the action of morbid irritants.

The aqua mephitica alkalina,* or a solution of a fixed alkaline salt, formerly obtained much celebrity. That this remedy acted both directly upon the stomach by correcting the unnatural condition of the gastric secretion, there can be no doubt ; and indirectly by relieving the sympathetic irritation of the kidneys, restored the functions of the latter to a more healthy state. The decided benefit sometimes obtained from a

* An Account of the Efficacy of the Aqua Mephitica Alkalina, by W. Falconer, M.D. F.R.S. 1792. This alkaline solution was first used medicinally by the philosophic friend of Dr. Priestly, Mr. Bewley, a surgeon at Great Massingham, in this county, who succeeded Dr. Robert Hamilton, of Lynn Regis, when that gentleman retired from general practice in the former place.

few drops of liquor potassæ, taken into the stomach in gonorrhœa, may be explained by the existence of a somewhat analogous sympathy between the gastric and the extreme portion of the genito-urinary mucous membranes.

The powdered leaves, and also the infusion of the arbutus uvæ ursi, have been long considered a most powerful remedy in calculous disorders. I have certainly seen much benefit derived from its use in allaying irritation of the urinary system, and it is probable that its employment at a very early period, when the first changes in the urine indicate the commencement of the lithic diathesis, might be found highly beneficial. De Haen first drew the attention of practitioners to its use in disorders of the urinary passages : Dr. Cullen believed that the action of the remedy depended upon its astringent property. If this really is its mode of action, I should expect that this astringent power is conveyed by nervous sympathy to the renal vessels, in which it diminishes the tendency to take on an unnatural power of secretion. But with respect to the action of uva ursi, though it may not be irrational to attribute to it a specific quality, it is always found that the symptoms for which it is employed are sooner removed by its being combined with opium, hyoscyamus, or muriatic acid ; and an individual action is therefore often attri-

buted to it which should be equally referred to the use of the sedatives. Dr. Ferrier, of Manchester, in his excellent *Medical Histories and Reflexions*, says, "I have given this medicine in a considerable number of nephritic cases, in very moderate doses, and always with manifest advantage. When the pain is very acute, and the pulse quick, I begin the cure with bleeding and a gentle purgative, composed of manna and a neutral salt: This purgative I repeat twice a week, and, on the intermediate days, direct the patient to take five grains of uva ursi and half a grain of opium three or four times a day, according to the urgency of the symptoms. I have never found larger doses necessary. This method always relieves and generally effects a cure."*

Lime-water was formerly brought into much notice by Dr. Whytt, of Edinburgh. The properties of this remedy must have been, of course, of an antacid nature. The irritating effect of the acid upon the sentient nerves of the stomach must have been necessarily counteracted by employing this alkaline earth.†

* Vol. i.

† However imperfect may be our knowledge of the *modi operandi* of medicines in the present day, I think we have clearer views upon that subject than those of the mechanico-humoralists at the commencement of the last century: Thus Dr. Whytt says, that lime water, "when mixed with the blood or urine, seems to

The *diosma crenata*,* or buchu, appears to be particularly beneficial in allaying morbid irritation of the urinary organs, the bladder, urethra, and also the rectum. It seems to have the power of correcting the morbid secretion from the kidneys; and is much used by the natives of the Cape of Good Hope as a remedy for gravel.

With respect to the existence of specific remedies there has been much discussion, and many have concluded that sulphur for the itch, and mercury for siphilis, are the only medicines of that nature with which we are acquainted: I think, however, that many remedial agents may have a certain or specific power of acting upon particular tissues endowed with a particular susceptibility of being excited. May not the *modi operandi* of most medicines be defined to be the modes of action of specific stimuli upon specific susceptibilities? In this way, we may rationally account for the influence of some terebinthines upon one mucous membrane in a state of morbid irritation, expectorants upon another, and different purgatives upon different portions of the alimentary canal: It is not irra-

exalt their salts and oils, and upon the solids it acts as an astringent. Hence it ought to be of use where the blood is watery, sluggish, viscid, and inactive, and the solids weak or relaxed."—
An Essay on the Virtues of Lime Water, 1765.

* Treatise on the Buchu, by R. Reece, M. D.

tional to believe that uva ursi and buchu have a specific action upon the kidneys.

The probable truth of these views is confirmed by the interesting results of the endermic method of administering remedies, the success of which method evinces that the various active agents in the materia medica will produce their full influence upon the peculiar tissues upon which they are designed to act, whether they are applied to the skin, or mucous membranes, or even injected into the blood.*

Certain peculiarities in the organization or constitution of different human beings seem to exist, which are not perceptible to human sentient power: these peculiarities are nevertheless appreciable by a class of animals infinitely lower than man in the scale of organization, the delicacy of whose sensitive apparatus is infinitely more refined. Bugs are well known to have a most remarkable inclination to approach and attack the skin of some individuals, while other persons may sleep with them in the same bed, in different places and at different times, without ever experiencing the least inconvenience: these little animals must be able to recognize a distinct modification or discrepancy in those indi-

* *Essai sur la Methode Endemique, &c. &c.* par Ant. Lember, Hospital Assistant, Paris, 1828. *Ed. Med. and Surg. Jour.* 1829.

vidual atmospheres which surround all human beings, and for some of which the animal has a marked predilection or affinity, to the total exclusion of the other.

The eye, ear, and tongue, are endowed with particular susceptibilities, which they derive from the possession of particular nerves, which have all an ultimate origin in or connection with the medulla oblongata, or that small portion of the cerebral matter, which is alone essentially necessary to the continuation of life; these specific nerves having thus a direct communication with each other at their cerebral extremities, form one chain of continuity with the sentient portion of the medulla spinalis, of which, in fact, they should rather be considered as offsets or prolongations. The sentient nerves distributed to the different internal viscera, are offsets of different continuous portions of the cerebro spinal system; therefore, if we are obliged to admit that some of the superior offsets of this system are endowed with specific sensibilities, may it not be perfectly rational to invest the others with the possession of certain inherent properties. These physiological reflexions may probably throw some light on the *modi operandi* of medicines.*

* That much yet remains to be known respecting the functions of the spinal marrow there can be no doubt. M. Magendie

Besides the general treatment of these functional disorders, by the exhibition of remedies termed constitutional, I should highly recommend the application of setons, issues, or perpetual blisters to the lumbar region, as nearly opposite as possible to the site of the kidneys: conceiving in my own mind an opinion, that primary disorder of the renal vessels is the "Fons et origo mali," the most rational treatment is to make use of what is called counter-irritation, or to establish the source of a perpetual stimulus to the disordered vessels of the organ affected, with a view of constricting those vessels, and

and other physiologists have, within a few years, given very remarkable cases, the accuracy of which we have no reason to call in question. In one case the destruction of the superior third of the spinal marrow, in its dorsal portion, had taken place, and a complete isolation of its superior and inferior parts; to the extent of six or seven inches in length; yet the patient could walk about till near the period of his death, preserving almost to the last hour great mental energy and powerful generative faculties. This individual died of a pectoral complaint. M. Magendie concludes probably with much reason, that the great sympathetic nerve was not the medium of communication in this case between the superior and inferior portions of the medulla spinalis; for all sections, and even compressions of the marrow, intercept the determination of the will relatively to the motions, and render the parts which receive the nerves below the point compressed insensible. *Journal de Physiologie*, 1823. *Med. Chir. Review*, 1823.

thereby arresting the progress of the morbid secretion.*

* Since venturing to suggest the above rationale of treatment, I was happy to find that Mr. H. Earle, in his paper on renal calculi, entertained views very analagous to my own. Med. Chir. Trans. vol. xi, part 1st.

SUMMARY CONCLUSIONS FROM THE PRECEDING
OBSERVATIONS.

1. That the proximate cause of calculous disease is, a certain disordered condition of the capillary vessels of the kidneys, which organs, instead of eliminating from the arterial blood sent to them, the natural secretions, are found to secrete a fluid, the constituent principles of which are different to those of healthy urine.

2. That the circulation of the blood in these vessels becomes disturbed by the application of morbid stimuli, internally to the mucous membrane of the alimentary canal, or externally to the cutaneous system.

3. Even in a state of health the constitution of the urine is perpetually changing, owing to the varied irritation of unnatural stimuli, applied externally or internally.

4. A very frequent cause of calculous disease is, the presence of bad alimentary substances in the

stomach and intestines, the sentient surface of which having become morbidly irritable; this irritation is sympathetically conveyed by nervous transmission to the capillary vessels of the kidneys.

5. The impression of cold disturbing the functions of the skin, and destroying the balance of the circulation, may induce in one constitution dropsy, in another diabetes, and in a third calculous disease.

6. The inhabitants of those countries, where calculous diseases are most prevalent, are continually liable to functional disorders of the kidneys, from the use of an irritating diet, and from exposure to a cold climate.

7. The general diet of the great mass of the inhabitants of the county of Norfolk, though composed chiefly of food prepared from wheaten flour, is, owing to the alimentary form in which it is consumed, much more likely to induce morbid irritation, than the diet of the same classes of people in Ireland and Scotland.

8. Certain physical characters of the earth's surface, together with the peculiarity of its geographical situation, must always render the county of Norfolk more liable to ungenial vicissitudes of climate than other districts, in which calculous diseases are infrequent.

9. That wherever phthisis pulmonaris and

scrophula are less endemic, calculous diseases are likewise extremely rare.

10. In hot climates, where the stimulus of heat retains on the surface of the human body a large proportion of the sanguineous fluid, the generation of urinary calculi is almost unknown: the exclusive use of a vegetable diet may probably contribute to their non-formation.

11. That although alkaline and acid remedies seem to produce their effect by acting chemically upon the constitution of the urine, it is probable that they act likewise as antacids and tonics, by restoring the functional condition of the stomach, and consequently improving the composition of the blood.

12. That sedatives and counter-irritants act by their stimulus being conveyed through nervous transmission to the disordered renal capillaries, and removing the morbid condition of those vessels, during the existence of which urinary calculi are generated.

FINIS.