Counter-irritation - With special reference to the Theories on which its employment is based -.

by.

John W. Johnston -

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Historical.

Counterirritation in one form or another is one of our oldest remedies, and has been employed since the earliest ages, the theory of its action varying concurrently with the views of disease entertained from time to time.

Lubbock, in his "Dawn of Civilization" alludes to a primitive method of counter-irritation in use among savages, namely Sucking the skin over the affected part and then spitting, by way of extracting the evil spirit or demon which was supposed to be at work causing the disease. This remedy, in a slightly altered form, namely dry cupping is still used in some similar or analogous conditions. The theory of disease held by nearly all uncivilized and even partially civilized peoples, namely that the illness was the result of the invasion of an evil spirit, and which has even now its analogue in the attempt to attribute every disease

to which human flesh is heir, and even old age itself, to the entrance of a micro-organism of some sort, no doubt furnished the rational basis (if we may use the term) on which the use of some form of counter-irritation was practised.

In the ancient Indian medicine, moxas and the actual cautery were in use, and one of the axioms of this school is almost identical with an aphorism of Hippocrates, namely;- "The fire cures diseases which cannot be cured by physic, the Knife or drugs". Hippocrates used the actual cautery, poultices and caustics; his celebrated aphorism referred to above is as follows,- "What drugs fail to cure that the Knife cures, what the Knife cures not, that the fire cures, but, what the fire fails to cure, that must be called incurable.

Other instances among the ancients, are Aretaeus of Cappadocia, (A.D. 30-90) who employed bleeding,

leeches, blisters and the actual cautery; and Paulus Aegina who employed the actual cautery in abscess of the liver, empyema, old luxations &c.

The ancient Arabian physicians made great use of the actual cautery, so much so that this may be considered the national Arabian instrument; its employment was recommended in the most various diseases, from spontaneous luxations, and hernia to feebleness of memory. The work of the Spanish Arabian physician Chalaf ben Abbas Abul Caasim el Zahrawi chiefly consists of an enumeration of the indications for the use of the actual cautery.

Among the ancient Scandinavians the actual cautery was used for dropsy. And in the monastic medicine of the Middle Ages cauterization of various forms was employed, its use being even extended to spiritual conditions, as for example, where it is recommend-

-ed as an antidote to temptations of the flesh, the modus operandi being to hold the finger in the flame of a candle until the temptation vanished.

Coming to more modern times we find D. Thomas Percival in 1772 writing on the subject of counter irritants, and stating that though they were then, and since the beginning of the 18th Century, had been very largely employed, yet that the theory of their action was still undetermined and a subject of controversy. John Hunter refers to this method of treatment in his works, but seems to have preferred bleeding, cupping and depressant remedies, together with soothing or cold applications to the application of blisters and such like counter-irritant measures. Baron Larrey, on the other hand, expresses his firm belief in the beneficial action of the moxa and cupping, asserting

that it was by their "drawing off or inviting the humours" that they did good.

In his "Surgical Observations on injuries to the head and Miscellaneous Subjects" Abernethy mentions blistering as a method of treatment in inflammating symptoms succeeding concussion, and also in what he describes as idiopathic inflammation of the pia mater; but he seems to regard this method chiefly as an adjuvant to his favourite methods in inflammatory disorders, namely bleeding and mercury. In inflammation occurring in a knee-joint from which he had removed 2 loose bodies, he extols the efficiency of cold, by means of evaporating lotions, which may be regarded as an instance of counterirritation. He also mentions counterirritation as a method of treatment in the endeavour

to discuss certain tumours, and he advocates the treatment, by means of an issue in the loins, of lumbar abscess, where the pus is not so near the surface as to render early rupture inevitable - This last method of treatment has been in use comparatively lately, and even now may perhaps be occasionally practised, though probably not when there is definite evidence of the existence of pus - This probably that it was chiefly of service in tending to minimise movement of the Spinal column before the plaster jacket came so largely into use.

Syme used the actual cautery in hip-joint disease, and various members of the Edinburgh School were fond recently in the habit of using Corrigan's cautery in the early stages of articular disease, (probably most frequently tubercular), and apparently with benefit

From what has gone before

it will be seen that some form of counter-irritation has been used from remote antiquity, and it is a matter of common knowledge that it is in extensive use at present, its reputation being largely traditional, and its employment in inflammatory disease being based, in many cases of its application, even by medical men on no definite well-founded theory. Yet, in spite of the absence of any demonstration of the various steps by which the beneficial result is brought about, there is little doubt that the bulk of the medical profession and almost the whole of the public have quite as much faith in the various counter-irritants now used, as in the resources of the pharmacopeia; and if one were absolutely obliged to choose between the employment of counter-irritants and the administra-

-ion of drugs in certain diseases
eg. lumbago, pleurodynia, sciatica
various forms of eye disease, and
perhaps even some deeper seated
inflammations as pleurisy, peri-
carditis &c; it is probable that
many men would select the
counter-irritant in preference
to the drugs. It is doubtless a
relic of pure empiricism, but
many of our empirical remedies
(eg. vaccination) have survived the most
revolutionary changes in our ideas
as to pathology, while it is also
probable, that new theories of dis-
ease have been the cause of the
discarding of some remedies use-
ful in this day, and which
might still be in use, but for the
prejudice caused by the tempor-
ary acceptance of theories
which are extremely unlikely
to prove final -

Methods of applying Counter irritation

Having discussed the history

of the subject, I intend now shortly to mention the means by which counter-irritation is or has been applied; and, before doing so, it would perhaps be as well to endeavour to make a definition or a description of the term counter-irritation. D: J. Chambers says "Counter-irritation substitutes one disease which is less dangerous and powerful, and whose disorganizing tendencies are temporary, for another, which may be dangerous or painful and tends to destroy life". D: L. Beale in a reply to D: Chambers says. "I have always been taught that by counter-irritation we seek to establish an increased action in one tissue or organ, for the purpose of diminishing an increased action which is taking place in another tissue or organ, the performance of whose functions is of greater importance to the organism." Pereira's definition is concise "Counter-irritation is the pro-

duction of an artificial secondary disease in order to relieve another or primary one". In Billings' dictionary of medical terms the definition of counterirritation is,- "the production of irritation of the surface in order to relieve deep-seated disease;" and a counter-irritant is defined as "an irritant applied to a locality remote from the part to be affected." For the purpose in hand namely to describe the methods of counterirritation Billings' and Perera's definitions are sufficient. These methods may be roughly classified under three headings - namely rubefacients, vesicants, and caustics including under the latter heading the actual cautery. Frequently a substance, which, if applied for a short enough time, or properly diluted is merely a rubefacient, if applied for a longer period or in greater concentration may become a vesicant, or may even produce sufficient destruction of tissue to be

classed as a caustic

The chief rubefacients include mustard, capsicum, ammonia, turpentine, iodine, and various other less frequently used irritants. Simple poulticing, eg. in bronchitis, also comes properly under this heading. The efficient application of poultices produces reddening of the skin, and this surface reddening cannot be otherwise considered than as an example of counterirritation.

Vesicants include cantharides, croton oil, barbarated antimony &c, and probably the moxa and the application of Corilan's button may be properly classed under this head.

Under caustics we may include besides the various chemical agents used for producing superficial destruction of the skin, the various forms of cautery.

Issues and setons really form a class to themselves, most nearly approaching in their effects, the agents

mentioned under the heading of caustics.

Dry cupping and superficial acupuncture though notusually considered as counterirritants probably produce their effects in the same way.

The application of cold, though undoubtedly coming under this class of remedy cannot be conveniently included under any of the classes mentioned above, though probably most nearly related to the rubefacients. Brown-Séquard believes that ice is the most powerful means of counter-irritation which we possess. He says "Ice is the most powerful means we possess to produce a reflex contraction of blood-vessels;" he then goes on to cite instances of its efficacy in various inflaming conditions and in checking haemorrhage. He also says:- "These facts give a great probability to the view that ice acts as an irritant of incident nerves, and

through the influence of this irritation on the spinal cord or base of the brain, producing a reflex contraction of blood-vessels."

Of the various means above enumerated, the only ones in frequent use at present are the poultices of various kinds, rubefacients, blisters and somewhat rarely the cautery (as a counter-irritant). Moxas, setons and issues have disappeared from modern practice, and their disappearance is not to be regretted, as we are able to produce all grades of useful irritant action by the means enumerated above. The tendency of later times has been to use much milder means for exciting counter-irritation than formerly, and in this connection I may quote Laycock who says "Upon the whole in acute cases both experience and theory are opposed to the use of violent counter-irritation: rubefacients at the most are all that are needed. But even these

are more doubtful than local rededatives with warmth and moisture.

Theories as to the method of action of Counterirritants.

In considering the various theories which have from time to time received acceptance as explaining the method in which a counterirritant acts, it is necessary to take into account the various opinions which have been contemporaneously current as to the process of inflammation; for, although counterirritation was formerly made use of in the hope of "discussing indolent swellings" and in the treatment of various nervous and general conditions, it was in inflammatory diseases of various grades that it found its most frequent application.

The most primitive application of counterirritation in some form,

was doubtless by way of exorcising or withdrawing the evil spirit to which all diseases were attributed. Even Paracelsus (quoted by Gillies) seems to have held this primitive opinion as to the nature of disease; he says. "a disease is a certain being, bred after that a certain hurtful strange power hath violated the vital beginning and hath pierced the faculty thereof, and, by piercing, hath stirred up the Archaeus with indignation, fury or fear." The Archaeus besides having other functions was the presiding spirit of the whole animal economy. As described by W. Austie "it (the Archaeus) was an actual entity, endowed with a personality, an intelligence, and the most lively emotions." Disease was thus an external force which, entering the body, excited the rage of the Archaeus, and prompted him to send into the affected parts an irritating ferment, which called the blood into them and thus excited inflammation.

The form of this idea is still largely prevalent in our modern theories of inflammation, although with a preference for concrete and more easily comprehensible terms we have substituted the nervous system for the Archaeus; and indeed it is striking how comparatively little difference in essentials there is between the ideas of Paracelsus and those of recent writers on this subject.

In this connection it may be interesting to quote W. F. Reeves (Lettsomian Lectures Jan. 1894). He gives the following illustration of inflammation in aseptic case. "A man, let it be supposed, receives a lacerated wound of the hand in dissecting the body of a patient dead of puerperal fever. He becomes thereby inoculated at the wounded point with what is practically a culture of pus-producing cocci. Now, as the human body is an excellent medium for the cultivation of bacteria,

the microorganisms begin forthwith to settle down and multiply. But here steps in the process of inflammation. Under its aegis the cells of the body rise in their millions against the invaders, and there takes place at the point of the outbreak a battle, which, if the account of Metchnikoff and others is to be accepted, is without a parallel in the very deadliest warfare inaugurated by man". He goes on to say "It is by the inflammatory process that the poison is destroyed and the growth of the parasite is arrested. But for inflammation, a man who is accidentally inoculated with a septic micro-organism becomes at once little more than a test-tube prepared for the favourable development and culture of the particular coccus or bacterium." If we take into account his ignorance of the existence of microorganisms ("a certain strange hurtful power"), and

the fact that he apparently did not recognize the purposive and conservative rôle of the inflammatory process. Paraceleus does not so greatly differ from Treves in his theories as we should expect from the strides which pathology has made in the interval of time between the two authors. Treves seems to approach inflammation too exclusively from the surgical side (his special subject is peritonitis). In Surgery the chief causes of inflammation are micro-organisms and their products, but inflammation, as we recognize it from its typical vascular phenomena and from the so-called cardinal symptoms, is undoubtedly sometimes the result of other forms of irritation besides the introduction of septic organisms, witness the gouty and rheumatic inflammations as they appear in the joints and in fibrous tissues generally; and in these latter forms of inflammation

the purposive and conservative nature of the process is by no means ocular. In fact, it may be said, the inflammatory process in the joints temporarily locks up an appreciable portion of the gouty poison, thus giving the emunctory organs an opportunity of eliminating the remainder. A case which I have recently seen is a good illustration of this. A gentleman, aged 68, but who from his general condition and mode of life ought to be considered somewhat older, and who was suffering from by no means very advanced stage of cirrhosis of the liver, got an attack of acute gout in the left great toe joint. The gouty inflammation subsequently affected the corresponding joint on the other side and some of the phalangeal joints of the fingers. Now, while the inflammation was present, the general condition and mental symptoms were by no

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seems indicative of an unfavourable result. But, as the inflammatory symptoms subsided, the general condition deteriorated. He lost power, the temperature was slightly elevated, at first he was mildly delirious and rambling, but afterwards he became somnolent and difficult to rouse; his pupils were contracted and did not react to light, the tongue was brown and dry. He eventually died, the symptoms bearing a strong resemblance to those we see in cases of narcotic poisoning. During his illness, (about 6 weeks), from time to time a joint became acutely affected, and coincidently with this, each time, there was some improvement in his general condition. This case which at one time would have probably been considered as an instance of metastasis from the joints to the brain and vice-versa, can

be fairly explained in the following way. Owing to the state of his liver, his nitrogenous waste was not sufficiently elaborated to admit of its satisfactory excretion by the kidneys (which were not affected); his ~~[illegible]~~ illness generally was simply a case of autogenetic poisoning by his own waste, and, as from time to time part of the waste material was locked up in one or more joints (there becoming inflamed), there was an amelioration in his other symptoms.

Inflammation has been defined, as "the succession of changes which occurs in a living tissue when it is injured, provided that the injury is not of such a degree as at once to destroy its structure and vitality." (Burdon-Sanderson). Injury to the tissues may be produced by various so-called irritants. These irritants used to

used to be classed as mechanical, chemical, and vital, this last group consisting of those cases which we should now describe as septic. The action of the irritant, of whatever nature, produces as a result a series of vascular phenomena which have been very fully studied. These vascular phenomena, as produced presumably through the agency of the vaso-motor nervous apparatus, may be shortly described as follows. There is an initial widening of the calibre of arteries, veins, and capillaries and acceleration of the blood current, followed by contraction of the arteries and slowing of the blood-stream; stasis in the capillaries ensues, with diapedesis of leucocytes and effusion of serum. At the same time there is proliferation of the connective tissue corpuscles, and these young leucocytes or phagocytes, together with those which have escaped through

the capillary wall, constitute the army of defence against the invading microorganisms, where these are present, either as the exciting cause or as mere concomitants of the inflammation. It is not necessary here to discuss the possible terminations of inflammation and the fate of the inflammatory effusion. Apart from the origination and widespread acceptance of the theory of phagocytosis, the recognition of the large part played by microorganisms in disease has not produced much modification in our ideas respecting the pathology of inflammation. Councilman and subsequently Klemperer (quoted by Hamilton) both experimented on this subject. They inserted under the skin, with antiseptic precautions, vaccine tubes containing turpentine, and after the wound had healed, broke the tubes thus liberating the irritant. Councilman as the result of his experiments came to the conclusion that-

purely chemical irritants, in the absence of microorganisms, were capable of producing both inflammation and suppuration. Klemperer, on the other hand, states that if the antiseptic precautions were complete and microorganisms rigidly excluded, no suppuration took place. I will be seen therefore that though we must admit chemical agents as causes of inflammation, the question whether they can also produce suppuration is still sub judice. The importance of this question is minimized, when we remember the fact that microorganisms can gain access to various deep-seated structures without any breach of surface, and without our being able to trace the route whereby they have obtained access to the affected part. Instances of this are the pus-producing cocci in acute osteo-myelitis, and the tubercle bacillus in various

conditions of bone and other or-
gans. In this connection Hamilton
says "It is very questionable whether
the micrococci found in abscesses
are the invariable cause of the inflam-
matory effusion and suppuration, or
whether their presence is in any way
more than a mere coincidence."

The part which the nervous
system takes in the inflammatory
process is of interest in connection
with the question of the utility of
counter-irritation in its treatment.
The general opinion is that the vas-
cular phenomena at all events are
produced through the vaso-motor
system of nerves, the irritation trav-
elling along afferent (Sensory?)
nerves to the vaso-motor centre, and
thence being reflected to the irrit-
ated part, where, as a result, the
vascular conditions already de-
scribed ensue. Hamilton says
"It seems more likely that most
of the vascular phenomena

are owing more to purely physical causes, connected with the circulation of the solid bodies suspended in the blood." This may be, but it is highly probable that the primary impulse to the typical vascular changes is received by way of the vaso-motor nervous system. Hamilton himself says "One of the chief influences which the vaso-motor nerves evidently exert upon the vessels in health, is in preventing the undue fluxes which otherwise are constantly liable to take place in parts where nerve control has been lost." The same writer quotes Lautkowski's experiments to prove that division of the Sciatic in the dog, has the effect probably by paralysing the vaso-motor nerves and increasing the distensibility of the vessel walls, of causing an increased flow of lymph from an artificially inflamed part. Columheim also refers to the

fact that inflammations are specially apt to arise in parts deprived of their nerve supply: e.g. the cornea after division of the 5th nerve, and in cases of ordinary paraplegia.

What part the nervous mechanism plays in the proliferation of the connective tissue elements has not been made out, but it is at all events possible that in this case also its influence is the governing one, rather than direct irritation of the structures themselves. In any case there is sufficient evidence that the vaso-motor nervous mechanism plays an important part in the production of the inflammatory process.

It may be convenient here to mention that many of the phenomena proper to inflammation, e.g. the effusion, and the ~~pseudo~~ appearance of new cells, occur after irritation in organisms possessing no obvious vascular system as

well as in non-vascular tissues eg. the cornea. But as these organisms grow and are nourished by food elaborated in their systems, there must become arrangement analogous to the vascular system of the higher animals whereby the pabulum is conveyed to the external parts of the body. In the cornea the lymph spaces take the part of the blood-vessels in conveying the necessary nourishment to the part, and in long continued inflammations of this tissue we know that the blood vessels themselves encroach on this structure, which normally is destitute of blood-supply.

There is another point in connection with the nervous aspect of inflammation, which is of importance as affecting our subject, and that is pain. This, one of the cardinal and classic symptoms of inflammation is

from the patients point of view the most engrossing, and to the medical practitioner it is also a matter of great importance. In the absence of pain, the whole process might go on from start to finish without the higher centres of the brain being influenced in any way, apart from their possible affection by the General constitutional disturbance which characterizes an inflammation of any extent or intensity. What is the cause of the pain in inflammation? The most probable explanation is that the pain is the result of tension in the nerve bundles, or compression of the sensory end organs where these exist, both being due to the congestion and effusion which are features of inflammation. Hamilton says definitely "the pain of inflammation is the result of

tension". This hypothesis, (the Causation of inflammatory Pain by tension), has one advantage, namely that there are hardly any instances of pain which are incapable of explanation by means of it; and that no other existing hypothesis so well accords with the known facts of inflammation.

In what, inflammation has may be described as the response of the organism to irritation. Its action has been described as purposive, in the sense in which this term is applied to certain artificially produced reflex actions in the laboratory. This is no doubt to a certain extent true in the case of septic inflammations, where the inflammatory process tends to prevent the General diffusion of the poison, but in some cases this is by no means so clear, as in the case of acute nephritis, where the inflammatory process and its re-

sults, are the things to be dreaded. ~~[illegible]~~.

Having thus shortly described the inflammatory process, the questions to be discussed are therefore – What part do counterirritants take in the treatment of inflammation? Have they any action beneficial or otherwise? And if so in what way does such action take place?

The question as to the nature of the action of counterirritants has been the subject of great differences of opinion, but in spite of this the method has held its own up to the present day, and in most modern textbooks, under

the heading "treatment", counter-irritation is one of the remedies mentioned in nearly all inflammatory diseases. Those who have watched the effect of a blister applied to the temple in acase of iritis can have little doubt as to the activity of the remedy, and in this instance at all events of its beneficial effects. Its application in inflammatory diseases of the eye is perhaps the nearest we can get to the employment of the experimental method in the decision of this question, and, as was alluded to by Dr. Argyll Robertson in his presidential address to the Ophthalmological Society, the testimony of competent observers is almost unanimously in favour of the opinion that its efficiency as a remedial agency is established. Still, in spite of the great preponderance of educated opinion in favour of counter-irritants

and their very extensive employment, their usefulness has been called in question, and evil effects (perhaps with reason in some cases) have been attributed to them by various observers. One of the most prominent of these was the late D. Austie, and I quote his very severe remarks. He says "the popular idea of counter-irritation is, that anything which hurts the skin is very likely to benefit the deeper tissues, whether these are half an inch distant, or placed quite in the centre of the body, and without any intelligible means of communication with the parts to which the counter-irritant is applied." He goes on to say "no proof exists that the artificial disease can influence the natural one, either for good or bad in a great number of instances in which counter-irritation is applied;" and further, "counter-irritation is a relic of notions be-

-longing to times antecedent to the birth of scientific physiology." He concludes thus,- "The tendency to apply counter-irritation is evidently due to the lingering love for something like a charm - for something mysterious or semi-fabulous in its operation, as to which one need not inquire too closely, but which is definite and tangible in its outward shape - a weapon ready to the hand of the feeblest, as the smooth stones of the brook were ready to the sling of the stripling David."

About the same time Dr. Dickinson was writing in the same strain; he says - "I do suppose that excoriations of the surface of the body, in themselves trifling, can produce deep-seated alterations in unconnected though neighbouring organs, & imagine that bedaubing the chest with tincture of iodine can modify

the course of a tuberculous disease in the apex beneath, or that a superficial vesication can promote the restoration of a hepatized lung, are views founded probably on no better reasoning than that which ascribed a formation the result of profound Geological changes to an artificial modification in the surface of the neighbouring soil." "A local application has a local action, it warms or cools, soothes or stimulates, or produces its appropriate effects, be it what it may, on the tissues which lie within short range of its immediate influence." "We cannot hope for benefits from Counter-irritation, we may therefore cease to apply irritants to the skin of the head in disturbance of the brain, to the back in affections of the Spinal cord, to the chest in diseases of the lung, and in General forbear to apply remedies to parts

which have no direct vascular connection with the structure diseased, unless the remedies are of such a kind and of such magnitude as to bring the whole System under their influence".

To quote some opinions on the other side. At the time (1869) when the first discussion on this Subject was taking place, various medical men replied to Dr. Austie and Dickinson upholding the Practice. Dr. French says "as a remedy of great efficacy its claim is as well established as any other." Dr. Paine also took part in the discussion and expressed his belief in the rational use of what Dr. Austie and Dickinson had so unsparingly condemned. Brown-Séquard, writing in 1866, evidently believed in counterirritation, though he had some peculiar ideas as to the mode and site of its application, at one time advocating the appli-

-ation of heat, at another that of cold, and in some cases (reflex paraplegia and reflex anaesthesia), heat and cold alternately. He details an experiment: "We found that dipping one hand into water at freezing point produces in the other hand considerable contraction of blood-vessels and a corresponding diminution of temperature"; and he relates a case of renal haematuria, followed by coma, relieved by heat applied on the skin of the loins and sides of the abdomen by means of a large silver spoon dipped in boiling water. "To our surprise and delight we soon found the respiration improving, and in less than quarter of an hour the convulsions ceased, and the patient came to his senses and passed a little water." "No doubt the irritation of the skin had acted by a reflex action on the secretory nerves of

the Kidney and produced the secretion of urine".

Dr. Lumpton writing in 1869 at the time of what may be called the great controversy on counter-irritation says "I now believe that blisters do immense good by diverting the patients attention from the internal organ or part affected." There is a good deal to be said for this view of the question, as there is no doubt that what has been called the expectant mental attitude of the patient is a potent factor in promoting recovery.

Ringer is of opinion that blisters lessen the pain of pneumonia and pleurisy, promote absorption in hydrothorax, relieve asthma especially the bronchitic form, and the pain of renal and biliary calculi and neuralgia, besides doing good in many other conditions which do not require mentioning in detail.

Lauder Brunton chiefly believes in it on account of its power in relieving pain.

Having quoted the above authorities, as showing the differences of opinion existing among abe men, the question arises whether we have so many nearer to a definite judgment as to the value of counter-irritants. While our applications of this method have gradually become both less frequent and less severe, there can be no doubt that the experience of the present as well as past generations of medical men goes to show that considerable benefit is to be obtained by the use of counter-irritants in suitable cases, chiefly of inflammatory disease, and it may be convenient to mention here, rather than later, some of the conditions to which the method is applicable.

Notably in iritis both the Syphilitic and the so-called rheumatic forms

are undoubtedly benefitted by a bleed to the temple. Here the effects of the inflammation (Synechiae) rather than the diffusion of the poison exciting it, are the things to be feared. Again in acute rheumatism, the authority of competent men goes to shew that a bleeding has at all events the effect of diminishing pain. Of its action on the disease itself is not so obvious, though this statement applies rather to the period antecedent to the introduction of the salicylate than to the present time. O-Hanlon of Belfast, who believes that, in the first instance, the poison of acute rheumatism is largely or entirely situated in the fibrous structures of the heart, from which it afterwards becomes distributed by means of the circulation, believes that he can abort an attack by a timely bleed over the precordia. It would seem, speaking generally that counter-

irritants are more effective in cases where the irritant is a chemical one, eg. gout and rheumatism, than where the irritant is of bacterial origin eg. septic peritonitis and pneumonia &c. In septic cases the irritant is or is produced by a microorganism having practically unlimited power of self-multiplication, and the inflammatory process tends to confine the invader to its point of entrance; but chemical poisons, so far as we know, have no such power of self multiplication and consequently their diffusion throughout the system, though undesirable as a rule, is less to be feared. Even in septic cases, however, counter-irritant applications have their value in relieving pain. In peritonitis such an eminent clinician as Sir James Simpson made frequent use of turpentine stupes, and no doubt from experience he found that this treatment was of benefit

to his patients. In pneumonia, also, where the acute stage of the disease in ordinary cases has a fairly uniform duration of 7 or 8 days, it is hardly probable that external applications have much influence on the definite series of pathological changes taking place in the affected patch of lung, but during the first 48 hours, at all events, the continuous application of hot poultices seems to have a decided influence in relieving pain. After the first 48 hours, however, with the pain much diminished or gone, where the temperature is high, the breathing difficult and the patient probably perspiring profusely, though continuous poultacing may not be absolutely detrimental, it is often a source of discomfort to the patient and then better dispensed with.

It is possible to imagine that there are (speaking generally) cases of inflammatory disease,

~~disease~~, where the response to an irritant is greater than is required to repair the injury inflicted by the irritant - unfortunately there is no reliable guidance in the way of symptoms to assist us in forming the opinion that this condition exists. Possibly, when the pain is out of proportion to the constitutional symptoms and physical signs, we may suspect that this condition of over-response may be present, and then, I think, a counter-irritant would be useful called for and probably beneficial.

In various forms of haemorrhage counter-irritation is very rarely used. In haemoptysis the application of ice or ablutions over the affected part is usually included in the routine treatment of this condition. S. Theodore Williams prefers the blister and believes that it does good by the withdrawal of serum, as there is usually a plenitude ab

lesion which is equivalent to a vascular connection between the parietes and the affected patch of lung. His objection to the ice is that one cannot hope to purge the tissues of the parietes and the substance of the lung as well. Perhaps the effect is accountable of explanation by the reflex vaso-motor theory (presently to be discussed) both in the case of the bladder and the application of ice

In vomiting it is a frequent practice to apply a blister or mustard plaster over the epigastrium. Personally I have not found this treatment particularly successful, but many practical men make use of it and believe that it is of value.

For the vague pelvic pains which women suffer from, often without any very definite disease of the generative apparatus to account for it, a blister in the

groin is highly recommended by good practical authorities, though where I have practised this method I have not been much impressed by the results. Probably many of these cases depend on chronic congestion of the pelvic organs generally, perhaps analogous to the haemorhoidal congestion from which so many women suffer, especially those who have borne children, and whose habits are sedentary and enervating. The continuous hot douche which may possibly be looked upon as a method of counter-irritation analogous to a hot poultice ~~appears~~ seems to be a more efficient agent in these cases though many of them appear to resist all methods of treatment.

The practice of blistering or applying preparations of iodine to the cervix is not so common as it used to be, but even now some men consider it an efficient

method of treatment in some cervical and uterine conditions, and for relief of symptoms attributable to the pelvic organs generally.

In the male generative organs counter-irritants should find a large field for their application. In acute orchitis both cold and hot applications have been recommended; the latter are undoubtedly more comforting to the patient but probably the application of one or two leeches is even more effectual. Blistering along the course of the urethra was at one time employed as a remedy in gleet but probably now it is rarely used.

In enlarged (strumous) lymphatic glands, the time-honoured method of applying tincture of iodine has had to give way before the thorough removal of the glands, if possible prior to sup-

-puration. But in spite of this I cannot help thinking that I have seen the application of iodine of benefit in this condition and I quote a case in support of this contention. A lady aged 34 had had a chain of enlarged glands behind the right sterno-mastoid since an attack of Scarlet-fever in childhood. At this time (aet. 34) there appeared some consolidation of the apex of the right lung with other Symptoms of early phthisis. As part of the treatment of the disease in the lung, tincture of iodine was applied over the right apex, and, though the lung disease progressed, still after about 6 weeks of the iodine painting, the whole chain of enlarged lymphatic glands had practically disappeared. I cannot help thinking that the application of the iodine and the disappearance of the very prominent

enlarged series of glands were causally related, and know of no evidence that the origin & progress of tubercular disease elsewhere tends in any way to affect beneficially already-existing disease of the same nature.

In asthma especially bronchial asthma, (Ringer) the application of a blister, a mustard plaster or turpentine stupes is undoubtedly beneficial; and some such application, more particularly that of moist heat in the form of a poultice or otherwise is of great service in acute laryngitis. In chronic laryngitis and in chronic conditions generally counter-irritant such as tincture of iodine whose action can be continuously kept up for some time is usually preferred. In the early stages of acute bronchitis, before the amount of secretion is proportionate to the amount of cough and dyspnoea, the appli-

ation of hot poultices is of undoubted service, but when the secretion has become profuse their usefulness ceases, and I believe that they may become injurious, though other forms of counter-irritation such as the application of iodine may be beneficial. In the broncho-pneumonia of children, where the jacket poultice is a favourite application, care must be taken that the poultice is not too heavy nor too tightly applied, or, by interfering with the respiratory movements, it may do more harm than good.

In congestion of the lungs both acute (which, I believe, may exist without pneumonia necessarily ensuing), and hypostatic, the application of a counter-irritant such as mustard is apparently of great value and almost invariably employed.

In phthisis, counter-irritation of some kind has long been a

recognized method of treatment, both in the earlier stage of consolidation, and also after this has broken down and been replaced by one or more cavities. Iodine is the favourite application, but such a good authority as D. Theodore Williams prefers the application of a blister in both conditions

In acute pleurisy and pleurodynia counter-irritation unquestionably relieves the pain, and in the latter condition may of itself be curative.

In effusion into the pleural cavity (hydrothorax), the application of flying blisters or the continuous use of iodine is much employed to promote the removal of the fluid. I believe that counter-irritation is of value in this condition, but that where there is any quantity of fluid, early and if necessary repeated aspiration is a much quicker way of arriving at a

satisfactory termination.

In the acute diseases of the circulatory system, prominently endo- and peri-carditis a blister is commonly made use of, and I think with undoubted benefit. In more chronic conditions such as valvular disease and failure of compensation I do not know that any form of counter-irritation can be used with advantage. Ringer recommends blistering in acute phlebitis, but cold soothing applications are probably more serviceable and are certainly more frequently employed.

In renal congestion and the early stage of acute nephritis counter irritation or bloodletting is employed with benefit. (v. Brown-Séquard previously quoted). Ringer recommends it also in the pain caused by the passage of a renal calculus.

In diseases of the nervous system counter-irritant applications are largely employed; and in neuralgias, meningitis, Menières disease, and other acute conditions they are usually recommended in the text-books. In Sunstroke cold (ice) is the form in which the counter-irritant is usually employed. Powers in his book on nervous diseases says regarding disease of the spinal membranes:- "next in importance to rest is counter-irritation; and again speaking of inflammation of the spinal cord:- "there is, however, one therapeutic ~~method~~ measure of unquestionable value in the treatment of the late stages, and that is the repeated application of the mild cautery."

In disease of the eye and ear the utility of counter-irritation has not been seriously questioned by practical men. The eye

I have already alluded to, but, in acute otitis media, while a blister behind the ear undoubtedly affords relief, the abstraction of blood by leeching is even more rapid and efficient.

In the surgical diseases of the locomotory system blistering has been largely displaced by massage, e.g. in the treatment of effusion into joints, chronic tenosynovitis, old Sprains &c, although no doubt the older remedy was useful in its time. It is still the favourite treatment in veterinary surgery, where blistering and the use of the cautery seem to be of almost as universal application as they were with the old Arabian physicians as mentioned in the early part of this Paper. Counterirritants have already been mentioned in the treatment of rheumatism;

in muscular rheumatism and rheumatism of nerve sheaths, e.g. sciatica, counter-irritation probably occupies the chief position as a therapeutic measure.

The antiseptic method has decidedly limited the sphere of counter-irritants in Surgery by bringing almost every organ and tissue safely within reach of the Knife; and hence the frequency of the application of such measures as the actual cautery e.g. in early bone disease has been very much diminish-ed.

It has to be remembered that, though the essentially reparatory nature of the inflammatory process must be admitted in general, there are cases in which the results of inflammation may be more disastrous primarily to the organ affected, and secondarily perhaps to the effec-

-ciency or very existence of the individual. Peritis and Neph-ritis are cases in point. And in this class of case it is surely legitimate by whatever means we possess and among others by counter irritation to endeav-our to limit and minimize the effects of the inflammatory process.

In the discussion of the question as to how a counter irrit-ant acts, I do not intend to en-quire into the supposed explanations which have been given of it in former times, which were found-ed on theories which we do not now accept: e.g. One mentioned by Paulet:- "the discharge carries off the peccant humours." To do so would be to take up a large and most unprofitable amount of space. I will therefore only men-tion those theories which have had the support of well known

authorities in modern times.

The first theory which I shall discuss may be called the Direct Stimulation theory. Those who adopt this view hold that that result of a counterirritant which is largely visible, namely the increased vascularity in the skin and presumably also in the underlying structures is practically the sole effect of a counterirritant. The most recent writer on the subject (Gillies) adopts this view. He looks upon every inflammatory disorder as being artificially an example of a local failure of nutrition, and considers the inflammatory process as an effort of the organism to repair the damage done. It will be observed that he does not give to micro-organisms the pre-eminent position now usually claimed for them in the initiation of inflammatory disease. And a good deal can be said in favour of this opinion. When we

coincide that the pneumococcus has been found in healthy Saliva, and the wide distribution, one might almost say omnipresence of some other micro-organisms, notably the bacilli of suppuration, and the tubercle bacillus, it becomes extremely probable that there must be some local lesion or disturbance of nutrition before the micro-organism can make good its attack. Gibbs does not believe that the inflammatory response to irritation can ever be excessive in amount, but he does believe that there are cases in which it is insufficient to effect the necessary repair, and these latter are the instances which he would select for the application of a counter-irritant. It seems difficult to avoid the conclusion that, if the self-regulating mechanism of the human body may vary in the direction of under-response, it may also vary in the direction of

over-response. Pain, Gillies looks upon as "the prayer of the part for more food"; and he believes that the relief of pain by counter irritation is brought about through the increased blood-supply induced by the application. As applied to many cases this view is at all events intelligible, but it is difficult to see how an increased blood supply, even if we could comprehend how this is brought about, e.g. in a deep seated organ like the Kidney, could improve the secreting power of that organ inclosed as it is in an unyielding capsule, when it is in a condition of acute congestion. That a counter irritant is of benefit in congestion of the Kidney is the testimony of reliable observers (v. Brown-Séquard previously quoted) and therefore though this theory may explain some cases (e.g. Neuralgia in Anaemic subjects) as well as any

other, yet there are instances, (e.g. contracted Kidney, bleeding to temple in iritis &c), in which some other methods of action must be considered as affording a more probable explanation of the facts as ascertained by clinical observation.

Under this theory of Direct Stimulation, it will be convenient to mention a view of the subject propounded by Professor Cleland of Glasgow in a suggestive paper read by him before the Clinical Society of Glasgow in January 1892, and by him styled "Corpuscular Action." In this paper, he gives evidence of the transmission of impulses from corpuscle to corpuscle under conditions of irritation and nutrient activity, and instances the changes taking place in cartilage while undergoing ossification. He considers the spreading of peritonitis between contiguous loops of intestine

as an instance of corpuscular action; he says:- "No doubt this may be considerably accounted for by chemical affection of opposed parts. It is not however the less a corpuscular action; it is the poison thrown out by one corpuscle or set of corpuscles which poisons others. He also instances the phenomena of an attack of acute Gout, beginning in the sheath of a tendon, and finding its way to the surface, where it manifests itself as erythema, regardless of the course of vessels or nerves. "The details by which the transmission is brought about are unknown; but by the total disregard to vascular and nervous dispositions we are taught in a striking manner the possibility of vital actions travelling by a route which can only be governed by corpuscular forces". "In the case of the action of bleaks on deep parts, it is impossible

to account for the benefit by the infiltration of cantharidine to the deep part, and an explanation of the effects must be sought in the establishment of a current of action or rather what may be called infection of irritation from one corpuscle to another." The violent action near the surface becomes the excitant of less violent action in corpuscles underneath; and, when one considers how even to reach the muscular wall, tissues almost destitute of capillary supply and poor in medicated corpuscles have to be traversed, one sees that it is not merely when a serous cavity has to be crossed, that infection from corpuscle to corpuscle has to be invoked in explanation; and further one is led seriously to question if immediate contact of one corpuscle with another is necessary in order that action may be communicated."

It will be observed that neither D-Gillies nor Professor Cleland makes any direct reference to the rôle of the nervous system in the production of the effects of counter-irritation; but in D-Gillies' paper, though it is not directly mentioned, it appears to be implied in the production of the superficial redness, and also of the corresponding results in underlying tissues.

Before going onto the discussion of other theories of counterirritation, it may be as well to mention the opinion of Graves (quoted by Ringer) which, in one particular, resembles the view taken by Gillies on the same question. Graves insisted on the different and even opposite effect of blisters according to the degree of their action, believing the primary action of a blister to be that of a stimulant to the body generally, and to the individual organ in whose neighbourhood it is applied; but if

allowed to remain long enough, he believed that it depressed the bodily powers in proportion to the amount of serum withdrawn from the vessels and so lost to the system.

As I have already given instances in which the beneficial action of a counter-irritant is incapable of explanation by any variety of the direct stimulation theory, I will proceed to mention briefly the second theory which I propose to discuss, and which, from its leading feature may be named the direct drain of serum theory.

Many of the writers on the subject of counter-irritation, among them Austie and Dickerson, deny on anatomical grounds, the possibility of the drain of serum from the surface of the skin having any effect in diminishing congestion in an underlying organ. These writers seem to ignore the demonstration by Sir W. Turner in

1864 of the anastomosis between the parietal and visceral branches of the abdominal aorta, thus constituting direct vascular communication between the surface and the contained abdominal organs. In the case of the lung no such vascular communication between the blood supply of the lung and that of the parietes has so far as I am aware been shown to exist: but as I have already pointed out, wherever there is a pleural adhesion, (as is most frequently the case in all diseases of the lung which reach the surface of the pleura), this adhesion constitutes a vascular connection and permits of the surface drain of serum producing some effect on the underlying affected patch of lung.

In the case of effusion into a joint, this (the drain of serum) is probably the method in which

the remedial action is brought about. By distending the vessels of the overlying skin and unloading them of their serum, the vessels of the Synovial membrane are depleted and are thereby placed in a more favourable position for taking up the effused fluid - In pleurisy with effusion this is also the most probable explanation of any beneficial action resulting from blistering. In acute head affections generally blisters have almost entirely been displaced by the application of ice, which presumably acts reflexly through the vaso-motor mechanism, Still there is undoubtedly communication between the vessels of the Scalp and the sinuses in the dura mater, and where blisters have been found of benefit, their effect, in part-at-least, may be due to the direct drain of serum from the Surface.

as this theory appears to occupy the most important position in explaining the effects of counter-irritation in promoting absorption of effused inflammatory material generally, it may be convenient to consider this subject above rather than treat of it under a separate heading. Fluid in the pleura and in joints have already been mentioned, and the remaining instances which may be cited belong to the locomotory system. In this system as in others, the introduction of massage under scientific auspices, and the free use of surgical means previously alluded to have largely displaced the time-honoured blister; but there are still some cases in which counter-irritation is part of the orthodox treatment as in tenosynovitis, including the frequently occurring washerwoman's wrist. I have already alluded

to the frequent use of counterirritation by veterinary surgeons in whose practice diseases and injuries of the locomotory system bulk so largely; and the presumption is that it is a remedy of great value as it would not otherwise retain the confidence of the veterinary profession and of their employers the public, to whom the services of domestic animals represent so much hard cash. There can be no doubt that the absolute rest which counter-irritation of any severity necessarily entails is of itself a great benefit. The idea that ablation "stimulates the absorbents" is not borne out in the present state of our knowledge, as we are still ignorant of any vaso-motor nervous mechanism in the lymphatic system analogous to that which controls the arterial system. Laycock (loc. cit.) asserts his belief that the action of a counter-

irritant in promoting absorption takes place through the medium of the nerve centres, but he does not give any detailed reasons for this opinion. So far as we at present understand the Elements entering into the causation of the movement of the lymph current, it seems impossible to suppose that a locally applied counter-irritant can influence them in any way. It is extremely probable however that counter-irritation causes dilatation of the terminal superficial lymphatics, as is obviously the case with the corresponding blood-vessels, and if applied in sufficient strength that it also by vesication empties these superficial lymphatics of their contents to a very decided degree, in this way the deeper lymphatics communicating with them are also depleted, and, as the causes influencing the outflow of the lymph remain the same, and reflux is

prevented by the very frequent valves occurring in lymphatic vessels, there would thus be produced a minus pressure in terminal lymphatics favourable to the absorption of effusion. The above seems the most obvious and also the most probable explanation of this action of a counter-irritant, but there may be some cases eg. in the application of preparations of iodine and mercury where the remedial agent actually penetrates to the affected part. Of its action when it reaches the affected part we know little; possibly it acts as a bactericide eg. in Syphilitic Conditions, and thus by checking the continuance of the cause of the inflammatory effusion, it thereby renders its absorption a less difficult undertaking.

Reflex vaso-motor theory

What may be called the reflex vaso-motor theory of counter-irritation is probably the one that has

bulked most largely in the profess-
ional mind. This theory took its rise
prior to the time when inflammation
ceased to be looked upon as other than
an unmixed evil. Professor Sanders
in his lectures about 1880 was in
the habit of using a metaphor with
reference to disease generally, which
well indicates the mental attitude
of the profession at that time. He
used to say, comparing the organ-
ism to a fortress, that disease must
be considered rather as a mutiny
of the members of the garrison than
as an invasion from without: at
that time the visible vascular and
cellular changes were looked
upon as constituting the disease,
against the extension and continu-
ance of which the most vigorous
measures were to be taken.

In spite of the additions to our
knowledge since that time the
reflex vaso-motor theory of congest-
ion still survives, and the

unquestioned beneficial action of counterirritation in some cases, is difficult or impossible of explanation on any of the other theories at present in existence, though the hypothesis itself is doubtless assailable from many sides.

This theory may be shortly stated as follows.- An irritation applied to the skin over an inflamed organ, travelling by way of afferent (sensory?) nerves which communicate with the vaso-motor centre for that organ, stimulates the centre, and by this means tends to diminish congestion and the consequent effusion of serum in the inflamed part. Whether it is always desirable even if it be allowed to be possible thus to limit and restrain the inflammatory process is another question. If we admit that the resulting inflammation is sometimes out of proportion to the irritation exciting it, (as I think very probable),

then we must also admit that if we possess any means capable of modifying the inflammation, (which in many cases is of itself a danger), we ought to employ them.

Probably the origination of this theory arose from the observation of the phenomenon of metastasis as observed in some inflammatory disorders, e.g. acute rheumatism and orchitis. D. Watson in his lectures (I. p. 120) says; "When the symptoms of inflammation thus suddenly desert one part and show themselves immediately afterwards in another, (as not unfrequently happens in respect to the joints in acute rheumatism and between the parotid gland and the testicle or ovarium in the mumps), metastasis is said to take place. This transference, as it were, of morbid action, from one part to another is a very curious circumstance. It is one which we sometimes endeavour

to imitate. We excite inflammation upon the surface, where we know its effects will be of comparatively little consequence, in the hope of diverting it from some internal organ in which it threatens to work serious or even fatal changes. We follow the same principle perhaps when we apply purgative medicines to the alimentary canal. To denote this mode of cure, by stimulating distant parts, the terms counter-irritation, derivation and revulsion are applied."

It will be noted that Sir J. Watson does not attempt to explain the theory of metastasis, but simply mentions the fact of its occurrence. Laycock says, "the theory that metastasis is neurotic is sufficient", and Hart (Pract. Nov. 78) at that time expressed his belief that an orchitis complicating a gonorrhoea was a purely vaso-motor condition, the result of hyperaemia

passing from the urethral centre to that of the testicle. Our present views as to metastasis may perhaps be expressed thus;- As the result of the entrance of a poison into the blood, or by the retention in the blood of substances which in a healthy condition ought to be excreted, a certain organ or tissue becomes inflamed, thereby locking up a portion of the circulating poison; if, by any means, this portion locked up in the inflamed part becomes reabsorbed into the blood, it tends to affect some part of similar structure elsewhere. Mr. Jonathan Hutchinson's view is similar in many respects to the above. He believes that in an inflamed tissue a certain poison is produced, which, gaining access to the circulation, tends to affect other parts and preferably those identical in all respects with the original part

inflamed. Mr Hutchinson thus endeavours to explain the phenomenon of symmetry in skin eruptions.

Professor Chiene (Pract. 2/79: p. 179) explaining the action of counterirritants gives a case of assumed congestion or inflammation of the kidney. He says:- "Counterirritants come under the class of remedies which relieve or cure inflammation by blood-letting, by relief of vascular tension directly or indirectly." He cites the fact of there being arterial anastomosis between the vessels of the kidney and those of the skin overlying it, and shows that if the vessels of the skin are dilated, the vessels of the kidney supply the blood for it. While admitting thus the effect of a counterirritant in causing divergence of the renal blood-supply to some extent, he also invokes the reflex vaso-motor theory. He says "the vaso-

motor centre for the Kidney is in close apposition to the vaso-motor centre for the skin over it." "When the Kidney is inflamed ---- the vaso-motor centre has lost control of the blood-vessels of the Kidney, - its function is in abeyance, it is congested." He goes on to say that a counter-irritant causes, through the afferent nerves, congestion of the vaso-motor centre for the skin, (with concomitant dilatation of the skin vessels); and the Skin vaso-motor centre being in close anatomical contiguity with the vaso-motor centre for the Kidney, this latter congested centre is depleted of its superfluous blood and tends to regain its function, thereby diminishing the congestion in the Kidney. This state of affairs is, at all events, conceivable if we admit the close anatomical contiguity of the vaso-motor centres for an organ and for the skin

overlying it. Of this, I do not think there is any direct evidence but analogy seems to point in this direction. Hilton, in his book "Rest and Pain," points out that "the same trunks of nerves, the branches of which supply the groups of muscles moving any joint, furnish also a distribution of nerves to the skin over the same muscles and their insertions; and the interior of the joint receives its nerve supply from the same source!" This is to explain why an inflamed joint is necessarily rigid and flexed. I will shortly bring forward some further evidence in the same direction, but admitting the correctness of Hilton's view, there is some probability that what holds good for the sensory and motor nerves of a joint and its overlying skin also holds good for the vaso-motor nerves, and it is at least possible that this analogy may be

extended to other organs as well as the joints.

The more minute topography of the vaso-motor system is not well made out. Landois and Stirling describe two chief centres in the medulla, each having control of its own side and representing the upward continuation of the lateral columns of the cord. They also mention subordinate centres in the grey matter of the spinal cord having connection with the chief centres in the medulla, and from which fibres pass out to their areas of distribution either through the anterior roots of the Spinal nerves, or, through the rami communicantes, into the Sympathetic, and thence reach the blood-vessels to which they are distributed. I cannot find any definite information as to the exact topography of the vaso-motor

centres either for skin-areas or visceral organs. This question (the topography of the vaso-motor system) is still further complicated by the existence of centres lower down than those in the cord. Dastre (quoted by Hamilton) states that an artery in the limb of a frog showed spontaneous contractions nine days after amputation; and therefore he concludes that there exist, within the frog's limb, some means probably ganglionic, by virtue of which the arteries may contract in concert with each other, independently of any ganglia contained in the trunk.

Brown-Séquard (quoted by Gillies) in his lectures on the nervous system to the Royal College of Surgeons 1858. says:- "When we wish to produce a modification in the condition of any organ, we must apply the means of irritation that we prefer to the

parts of the skin or mucous membrane, which have the most evident nervous relation to it. In most cases the parts acting with greatest power upon another are those which receive the nerves from the same segment of the cerebro-Spinal axes. If we wish, for example, to act upon the Kidney, the Skin of the abdomen in its upper part is the best for the application of any kind of irritation.

Dry cocks over this may be applied. (Med. Times 1/71 p. 595) "The change we induce by counter-irritation locally is of the nature of inflammation, either with or without effusion, exudation, ~~of~~ and I may add Suppuration in the case of issues and setons." (Heat, cold, and other physical irritants are included under counter-irritants.) "They act either locally on the tissues, including the nerves and blood vessels,

or else on the nerve centres, through the nerves, and thence by reflex action on the same or a distant organ or tissue. For the purpose of effective counterirritation, beyond merely local results, it is necessary that there be "1) continuity of sensory or afferent trophic nerves between the surface irritated and the nerve centre to be acted upon, otherwise no change can be effected therein. (2) There must also be efferent continuity between the centre and the part to be modified." This writer like Professor Cheine and Sir Thomas Watson includes emetics, purgatives, diaphoretics and diuretics as counterirritants. His conclusion is as follows.- "When an irritant is applied to a nerve and excites reflex movements they are conservative in character. So also when it excites the reflex nutrition which is the result of its action on the trophic system." Perhaps this is as definite as we can afford to be

in the present state of our Knowledge.

In reference to the subject of the mutual relations of various skin areas and their underlying organs in the matter of nervous supply I may quote Treves (B.M.J. 3/3/94). "The skin over the greater part of the abdomen, over that part at least beneath which lie the chief viscera, is supplied by the lower seven dorsal or intercostal nerves. The same nerves supply the muscles of the belly, namely, the rectus, the two obliques muscles, and the transversalis. More than that, these identical nerves take a most important part in the nerve supply of the abdominal viscera and of the peritoneum. There are certain great nerve centres within the belly with which the Sympathetic is conspicuously concerned, and from which the organs of the abdomen are supplied - - - - and it is most noteworthy that the contribution which they receive from the Spinal

nerves, is derived in whole or in greater part from the lower seven dorsal nerves through the Splanchnics.. It thus happens that an arrangement exists for the most rapid possible conduction of reflex impulses".

It may also be noted that the anterior and posterior pulmonary plexuses though chiefly composed by the vagus and Sympathetic also receive branches from the Spinal nerves ~~mainly~~ Supplying the Chest-wall.

To show that the desire to stimulate the vaso-motor mechanism, in order to diminish congestion and effusion in inflammation, has long been an important motive in the use of counter-irritants, I may quote Meryon (Lancet II/71 p.704) He there says:- "In Some forms of inflammation, and inflammation in Some form lies at the root of most diseases, we have the pathological counterpart of the result of section of the Sympathetic".

Physiologically there are many undesirable breaks in the Chain of evidence required to prove conclusively how the reflex vaso-motor influence is brought about; but clinically it would be very difficult to deny that many cases occur, in which other theories fail to explain the results obtained, and, in which, this theory seems to afford the most probable explanation of observed facts. Henry (quoted by Brown-Séquard Lancet I/66 p. 139) states that "after the application of a cold douche on the Skin, a congested Spleen or a congested liver will sometimes diminish in volume much more than had been stated by other practitioners". We have all seen iritis improve after a blister to the temple, with only the remotest possible direct vascular connection, and asthma and suitable cases of bronchitis are undoubtedly relieved by counter-irritation. Therefore I think that

we must retain this theory, provisionally at all events, until the advance of our knowledge shall either have established it or rendered its operation clearer; or on the other hand we are able definitely to reject it and substitute for it some more probable explanation of the observed facts.

There has been some difference of opinion as to the best-site for the counter-irritant. Custom and experience alike point to the skin overlying the affected part, and this position very frequently fulfils Brown-Séquards requirement that the stimulated surface should receive its nervous supply from the same segment of the cerebro-spinal axis as the part which we wish to influence. Where this condition is doubtfully fulfilled (e.g. in case of the lungs) we can only be guided by experience, until a fuller knowledge of the functions and inter-

communications of various parts of the nervous system shall have supplied some scientific basis for our practice. D. Chapman of Norwich (quoted by Ringer) believed that he could influence the vaso-motor system by the application of ice or hot-water bags to the spine: the cold application producing dilatation of vessels, and the hot application contraction of vessels in the spine of the nerves connected with that part of the spinal cord over which his application was made. This method, which was well known, and presumably fully tried, has now fallen almost entirely into disuse, one of the few instances of its survival being perhaps the use of the ether spray to the spine in cases of chorea. D. Austie who does not altogether deny the possible good effects of blisters, "even in inflammatory disorders," enjoins "precise attention to the physiological

relations of the nerves of the irritated part with those of the organ we seek to influence." As an example he recommended, in the facial neuralgia of persons above middle life, a blister over the cervico-occipital nerve at the nape of the neck. He further says:- "I cannot but suppose that, in cases where blisters have seemed really to exercise a powerful influence on inflammation of distant organs, it must have been because a lucky chance applied the irritation to a nerve centrally connected with the nerves of the affected part." Brown-Séquard (loc. cit.) also advises this method of application, e.g. in eye affections; where we desire to increase the blood-supply to the eye, he recommends that our application should be in the region of the supra-orbital or supra trochlear nerves, but where on the contrary we wish to dim-

-inish the blood-supply our application should be to the nape of the neck.

As I have said, these irregular methods of applying counter-irritation have as the result of experience fallen almost entirely into disuse; and probably they originated rather in the desire of the writers for fuller knowledge as to the mutual relationships of various parts of the nervous System, than owing to their possession of such knowledge. Austin's injunction, to give precise attention to the relationship of the nerves of the part irritated to those of the part to be influenced, is incapable of being carried out, because our present knowledge of such nervous relationships is by no means precise. In the absence of this desirable precise knowledge, we have only the anatomical guides which I have recently discussed and

the teachings of experience in actual practice.

It is difficult to see what advantage is to be gained in making our application over the trunk of the nerve supplying the affected organ, or, except in special cases, over the central nervous system, when we have in the over-lying skin a structure, provided with end organs specially adapted to receive impressions, and which is, at all events more probably than any other situation which may be selected, in nervous communication with the underlying structure which we wish to influence

Two other theories as to a possible mode of action of counterirritants may be mentioned. The first of these, which has recently been suggested in a paper in the British Medical Journal, which I have not been able to identify, attributes

some of the benefit, admittedly resulting in certain cases of the application of abelisles, to the re-absorption of an antitoxin which is supposed to be developed in the effused serum. I do not know of any evidence that any antitoxin occurs under these circumstances. And, as in the great majority of cases the blister is directed to be opened and suitably dressed, there is no opportunity for the absorption of the antitoxin even if its presence were demonstrated. Therefore, in the absence of any evidence tending to establish the truth or even the probability of this hypothesis, I do not think that it requires any further discussion.

The last theory to be discussed is one which I have not previously seen mentioned in connection with this subject. It was suggested to me by the perusal of the pamphlet on "Corpuscular Action" by Professor

Cleland of Glasgow. A counter-irritant if sufficiently strong produces in the skin all the phenomena of inflammation, including diapedesis of leucocytes and proliferation of the corpuscles of the deeper layers. If its action proceeds to vesication, it is in many respects equivalent to bloodletting to the same extent. Even in the efficient application of ordinary poultices reddening of the skin is produced which lasts for some little time. "They (poultices) also pretty evidently favour proliferation and the throwing out of fluid." Professor Cleland does not believe that a certain set of corpuscles are said were set apart for purposes of phagocytosis. He says:- "The leucocytes (phagocytes) are the young corpuscles as yet unrivalled and undifferentiated fresh from the reticiform tissue diffused through the body in mucous membranes, in

connection with glands, and in the interior of bones, and from more special organs, such as the lymphatic glands and spleen: and it is in this unrivalled condition when the nutritive functions are at their highest, that corpuscles are best fitted to take up solid particles into their interior, whether as nourishment or to carry them away". He thinks that after blood-letting more of these young leucocytes are liberated from their places of origin, and gives this as an argument whereby the practice of bleeding in fevers, (a measure regarded as assisting the tendency to recovery by many competent men in times comparatively recent), might perhaps be justified. I think that the same argument must be considered as holding good in reference to the application of counter-irritants. The irritation which they

excite, extending to the deeper layers of the skin, and perhaps even to the underlying connective tissue and there exciting cellular proliferation, may perhaps furnish a reinforcement to the phagocytes engaged in resisting the progress of the disease, and in this way favour the limitation of the morbid process.

Of the theories which have here been discussed, probably the two best supported by reason and also by clinical evidence are that described under the title "Action by withdrawal of serum" and which might equally well be styled "Action by direct derivation of blood-supply", and that named "Action by reflex vaso-motor influence". The "direct stimulation" theory and the "reflex vaso-motor" theory seem to be in contradiction with one another. Yet in the practice of good clinical observers a combination

-ant is very commonly applied, both over a cavity in a tubercul- ous lung, presumably to stimulate the tendency to contraction and repair, and over a patch of lung in the early stage of pneumonia presumably in the hope of diminish- ing by reflex action the congest- ion there existing. These instances seem impossible of reconciliat- -ion on any single theory. Why the same remedy should act, in one case in the way of direct stimulation, and in another con- dition of the same organ as a re- flex contra-stimulant is very dif- ficult of comprehension. But until our knowledge of physiol- ogy and therapeutics from the scientific side, is wider and more exact than at present, I do not see that we can trust to any safer guide than that furnished by the experience in actual practice of competent men.

There is little doubt that the application of this method of treatment, as of all other active methods, is capable of doing mischief. In bronchitis, for example, in the early stages, where there is considerable cough and dyspnoea with little secretion, I have no doubt that the continuous application of hot poultices does good by increasing the amount of secretion from the congested bronchial mucous membrane, in this way by depletion actually widening the lumen of the tubes; but, where the secretion is well-established & profuse, the same remedy does no good, and may indeed do harm by rendering the secretion so profuse that the patient is unable to get rid of it. Even in the latter condition however, other forms of counter-irritation may occasionally be of benefit.

In conclusion, counterirritants have been and are now being largely replaced by other remedies, more direct within action, more fairly understood, and therefore presumably more efficient; but it is certain we are not now, and doubtful if we ever shall be absolutely independent of this old and in the first instance empirical, but in certain conditions, admittedly efficient remedy. The tendency noticeable in the case of at least two recent writers. (Stanges. B.M.J 24/3/94 and. Jumain Lic. quoted in Med. Annual/94 Art. Albuminuria) to revert in great measure to the perhaps scientific but therapeutically incompetent method of Expectancy, is, I think, to be deprecated. If a method of treatment does no more than inspire the patient with confidence, then unless it is likely to be actually injurious, I think it ought to be applied. With reference to

communication, it is to be hoped that increasing physiological knowledge may still further enlighten us as to its method of action, and render our use of it more discriminating and precise.

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