Counter-irritation. With special refer-
cence to the theories on which its
employment is based.

by

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Historical:

Counter-irritation 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.

Lustvedt, in his "History 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, is 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 practiced.

In the ancient Indian medicine, moras 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 five 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 Archaus of Cappadocia (A.D. 30-90) who employed bleeding,
leeches, blistering and the actual cautery, and Paulus Argina was employed in actual cautery in abscess of the liver, empyema, old lacerations &c.

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

Among the ancient Scythians the actual cautery was used for dropsy and in the monastic medicine of the Middle Ages in the initiation 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 fugee in the flame of a candle until the temptation vanished.

Coming to more modern times, we find Dr. Thomas Percival in 1772 writing on the subject of counter-purivitants, 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 medicines, together with soothing or cold applications to the application of these like counter-purivitant medicines. Baron Larrey, on the other hand, expresses his firm belief in the beneficial action of the fugee 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
whitening as a method of treatment
in inflammating symptoms suc-
ceding concussion, and also in
what he describes as idiopathic
inflammation of the hip joint;
but he seems to regard this
as chiefly as an adjuvant to
his favourite methods in inflam-
mating disorders, namely bleed-
ing and mercury. In inflam-
mation occurring in a joint from
which he had removed loose
bodies, he enters the ef-
ciciency of cold, by means of
evaporating lotions, which he
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 endorses the treatment, by means of an incision in the loin, of a lumbar abscess where the pus is not too near the surface as to render early rupture inevitable. This last method of treatment has been in use comparatively lately, and some may perhaps be occasionally practised, though probably not when there is definite evidence of the existence of pus. It is probable that it was chiefly of service in tendency to minimise movement of the spinal column before the plaster jacket came so largely into use.

Syme used the actual counter in hip joint disease, and various members of the Edinburgh School were quite recently in the habit of using Corrigan's counter in the early stages of articular disease, (probably most frequently tuberculous), 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 its amalga 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 on its application, even by medical men on no definite or well-founded theory. Yet, in spite of the absence of any demonstration of the various effects 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 a religious faith in the various counter-irritants now used, as in the remedies of the pharmacopoeia; and if one were absolutely obliged to choose between the employment of counter-irritants and the administration
ion of drugs in certain diseases, e.g. lumbago, pleurodynia, hysteria, various forms of eye disease, and perhaps even some deeper seated inflammations as pleurisy, pericarditis etc., it is probable that many men would select the counter-irritant in preference to the drugs. It is doubtful if a relic of pure empiricism, but many of our empirical remedies (e.g. vaccination) have survived the most revolutionary changes in our ideas as to pathology, while it is also probable that new theories of disease have been the cause of the discarding of some remedies useful in their day, and which might still be useful, but for the prejudice caused by the temporary acceptance of theories which are entirely unlikely to prove final.

Methods of applying Counter irritant

Having discussed the history
of the subject, I intend now shortly to mention the means by which counter-irritation is as has been ap-
plied; and, before doing so, it would perhaps be as well to endeavour to make a definition or a description of the term counter-irritation. Dr. J. Chambers says "Counter-irritation substi-
tutes one disease which is less dangerous and powerful, and whose disorganizing tendencies are tempo-
rary, for another, which may be dan-
gorous or painful and tends to de-
strory life." Dr. L. Reade in a reply to Dr. 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 in-
creased action which is taking place in another tissue or organ, the performance of whose function is of greater importance to the or-
ganism." Pellegrini'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' dicti-
ary of medicinal terms the definition
of counter-irritation is, "The production
of irritation of the surface in order
to relieve deep-seated diseases," 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 counter-irritation
Billings' and Perina's definitions
are sufficient. These methods may
be roughly classified under three
headings namely rubefacients,
vesicants, and scarificants 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 rub-
facient, if applied for a longer period
or in greater concentration may become
a vesicant, or may even produce suf-
ficient destruction of tissue to be
classed as a caustic

The chief substances include mustard, capersicum, ammonia, codine, turpentine, and various other less frequently used irritants. Simple poulticing, e.g., 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.

Varnishes include caustic nitrate, croton oil, tartarated antimony, and probably the mona and the application of Coriandrus butim 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.

Irritants are defined really from aclass to themselves, most nearly approaching in their effects, the agents
Dry cupping and superficial acupuncture, though not usually considered as counterirritants, probably produce their effects in the same way.

The application of ice, 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 it are the patients. Dr. Esmark believes that it 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 in the skin on the site of insertion. It is efficacious in various inflamed conditions and in checking haemorrhage. He also says: "These facts give 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 potions of various kinds, subfasciens, blister and somewhat rarely the cautery (and contumacious). Monas, debons 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引用 a local cook who says "Upon the whole in acute cases both experience and theory are opposed to the use of violent counter-irritation; subfasciens at the most are all that are needed. But even this
are more doubtful than local sedatives with warmth and moisture.

Thiais acts 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 "discressing 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 exercizing 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 in 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 St Anato "It (The Archaeus) was an actual entity, endowed with 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 Archaens; 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. J. Ferrey (Letter on the Decline of Man, 1894). He gives the following illustration of inflammation in a septic 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 their work 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 this takes place at the point of the outbreak of battle, which, if the account of Metchnikoff and others is to be accepted, is without a parallel in the very deadliest warfare inflicted by man. The reason 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 coccius or bacteria.” If we take into account his ignorance of the existence of microorganisms ("a certain change hurtful power"). And
the fact that he apparently did not recognize the prophylactic and conserva-
tive role of the inflammatory process, Paracelsus does not so
greatly differ from Treves in his
views 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 irrita-
tion besides the introduction of
septic organisms, witness the joint
and pneumatic inflammations
as they appear in the joints and the
fibrous tissues generally. And in
these latter forms of inflammation
the purposive and conservative na-
ture of the process is by no means
no clear. In fact, it may be said,
the inflammatory process in the
joints temporarily coalesce up an
appreciable portion of the joint, thus
thus giving the inflammatory organs an
opportunity of eliminating the re-
mainders. A case which I have
recently seen is a good illustra-
tion of this. A gentleman, aged 68,
but who from his general condition
and mode of life ought to be consi-
dered somewhat older, and who was
suffering from a very advanced stage of nephrosis of the
livers, got an attack of acute joint
in the left great toe joint. The
joint inflammation subsequently
affected the corresponding joint
on the other side and some of
the phalanxial joints of the finger.
Now, while the inflammation was
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mental symptoms were by no
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advanced stage of evidencing the
disease, got an attack of acute gout
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gouty inflammation subsequently
affected the corresponding joint
on the other side and some of
the phalanxal joints of the finger.
Now, while the inflammation was
present, the general condition and
mental symptoms were by no
means indicative of an unfavourable result. But, as the inflammatory symptoms subsided, the general condition deteriorated. The loss of power, the temperature was slightly elevated, and just 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 are in a case of narcotic poisoning. During his illness (about 2 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
He fairly explained 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 feverish illness generally was simply a case of autogenous poisoning by his own waste, and, as time went on, part of this waste material was locked up in one or more joints (these becoming inflamed). There was an asepsis 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 to destroy its structure and vitality. "Borden Saunders" injury to the tissues may be produced by various causes, called irritants. These irritants lead to
used to be classed as mechanical, chemical, and vital. The last group consisting of those cases which we should now describe as allergic 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 are produced presumably through the agency of the vasomotor 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 deapleseis 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 there are present, either as the exciting cause or as mere concomitants of the inflammation. It is not necessary here to discuss the precise 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 Klemperer (notably 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. Klebs, on the other hand, states that if the antiseptic precautions were complete and microorganisms rigidly excluded, no suppuration took place. It 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 post-execution cocci in acute osteomyelitis and the tubercle bacillus in various
conditions of local and other organs. In this connection Hamilton says: "It is very questionable whether the micrococci found in abscesses are the invariable cause of the inflammatory 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 vascular phenomena at all events are produced through the baso-motor system of nerves, the irritation travelling along afferent (sensory?) nerves to the baso-motor center, and thence being reflected to the irritated part, where, as a result, the vascular conditions already described 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 Szentkostavitski's experiments to prove that division of the sciatic in the dog, has the effect probably by paralyzing the vaso-motor nerves and increasing the distensibility of the vessel walls, of causing an increased flow of lymph from an artificially inflamed part. Colinchem 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 paralysis.

What part the nervous mechanism plays in the proliferation of the connective tissue elements has not been made out, but it is still 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 various nervous mechanisms play an important part in the production of the inflammation process.

It may be convenient here to mention that many of the phenomena proper to inflammation, e.g. the effusion, and the partial appearance of new cells, occur after irritation in organisms possessing no obvious vascular system as
well amid non-vascular tissues, e.g. the cornea. But as tissue organsims grow and are nourished by food elaborated within their systems, there must become arrangement analogous to the vascular systems of the higher animals whereby the protoplasm 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 parts, and living contained inflammations of this tissue we know that the blood vessels themselves are saturated with this tissue, 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 patient's point of view the most engrossing, and to the medical practitioners 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 and organs where there 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 cause
of inflammation 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 short, inflammation has
may be described as the response
of the organism to irritation. Its
action has been described as pur-
posive, in the sense in which this
term is applied to certain artifi-
cially 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-
sult, are the strip to be dreaded.

In the superficial part, it occurred often, but in the deeper
structures, it was extremely rare.

Having thus shortly described
the inflammatory process, the
questions to be discussed are these
ful. What part do counterirritants
play 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 acts the nature
of the action of counterirritants
has been the subject of great dif-
ferences of opinion, to wit, with
this the method has held its
own up to the present day, and
in most modern textbooks, under
the leading treatment. Counterirri-
ration is one of the remedies men-
tioned in nearly all inflammatory
diseases. Those who have watch-
ed the effect of a briicu applied
at the temple in acne opitis
will have little doubt as to the ac-
tivity of the remedy, and in this
instance as in all others of its ben-
eficial effects. Its application in
inflammatory diseases of the eye
is perhaps the nearest we can
get to the employment of the experi-
mental method in the decision
of this question, and, as was
alluded to by Dr. Lyttelton
Robinson in his presidential address
to the Ophthalmological Society,
the testimony of competent ob-
servers 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
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. Austin, and I quote his very severe feelings. 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 cannot say "so 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-
Hoping to trace antecedents 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—something mysterious or semifabulous 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: "To suppose that excoriations of the surface of the body, in themselves irritating, can produce deep seated alterations in unconnected though neighboring organs, to imagine that tracheitizing 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 hepatic lung, are views founded probably on no better reasoning than that which ascribed a formation the result of profound pathological changes to an artificial modification in the surface of the neighbouring skin. "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 constant irritation, hence there is cease to apply irritants to the skin of the head in disturbance of the brain, to the back in affection 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 diseased, unless the remedies were of such a kind and 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. Austin and Dickinson upholding the practice. Mr. French says "as a remedy of great efficacy its claim is as well established as any other." Mr. Painin also took part in the discussion and expressed his belief in the rational use of what Dr. Austin and Dickinson had done sparingly condemned. Bouin, Segard, 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...
vation of heat, cut another that of cold, and in some cases (reflex paraplegia and reflex anaesthesia), heat and cold alternately. He states 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 loin and side 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 half an hour the convulsions ceased, and the patient came to his senses and passed a little water." "Is doubt the irritation the skin had excited by a reflex action on the sensory nerves of
The kidney and produced the secretion of urine.

D. Syme, writing in 1869, at the time of what may be called the great controversy on counter-irritation says: "Now believe that blisters do immense good by diverting the patient's 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.

Ruge is of opinion that blisters lessen the pain of pneumonia and pleurisy, promote absorption in hydropsy, relieve asthma, especially the chronic form, and the pain of renal and biliary calculi and neuralgia, besides doing good in many other conditions which almost require mentioning in detail.
Lander 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 surgeons, the question arises whether we have any nearer a definitive judgment as to the value of counterirritants. 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 often obtained by the use of counterirritants in suitable cases, chiefly of inflammatory disease, and it may be convenient to mention here, Robin stream later, some of the conditions to which the method is applicable.

Notably in irritis both syphilitic and the so-called rheumatic forms
are undoubtedly benefitted by a
belief in the temple. Here the effects
of the inflammation (sympaehis) rather
than the diffusion of the poison ex-
citing it, are the things to be feared.
Again in acutile pneumatitus, the author-
ity of competent men goes to show that
arthritis has at all events the
effect of diminishing pain. Its
action on the disease itself is not
so obvious, though this statement
applies rather to the period ante-
cedent to the introduction of the
sphygmatic than to the present
time. D. Starkein of Belfast, who
believes that, in the first instance
the poison of acute pneumonia
is largely or entirely situated in
the fibrous structures of the heart, from
which it afterwards becomes dis-
tributed by means of the circula-
tion, believes that he saw about an
attack by a timely blithe over
the forecordia. It would seem,
shaking generally that counter-
irritants are more effective in cases where the irritant is a chemical one, e.g., snot and rhinorrhoea, than where the irritant is of bacterial origin, e.g., septic peritonitis and pneumonia. In septic cases the irritant is or is produced by a micro-organism having practically unlimited power of multiplication, and the inflammatory process tends to encircle 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 and applications have their value in relieving pain. In peritonitis such an eminent clinician as Sir James Simpson made frequent use of peritoneal shreds, and to doubt from experience he found that this treatment was of benefit.
to his patients. In pneumonia also, where the disease in ordinary cases has a fairly uniform duration of 7-8 days, it is hardly probable that external applications have much influence on the definite series of pathological changes taking place within 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 respiring properly, though continuous poulticing 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 counterirritant would be useful, called for and probably beneficial.

In various forms of haemorrhage counterirritation is very largely used. In haemoptysis the application of ice or a blister over the affected part is usual, included in the routine treatment of this condition. Dr. Theodore Williams prefers the blister and believes that it does good by the withdrawal of the irritant, and that is usually apt to necr
lesson which is equivalent to a vascular connection between the
pamellis and the affected parts of the lung. Its objection to this idea is
that we cannot hope to fuse the tissues of the pamellis and the
substance of the lung as well.
Perhaps the effect is an example of
explanation by the reflex vasomotor
theory (presently to be discussed) both
in the case of the blister and the ap-
lication of ice.

In vomiting it is a frequent
practice to apply atabula or
mustard plaster on the epigast-
rium. Personally I have not found
this treatment particularly success-
ful, but many practical men
make use of it and believe
that it is of value.

For the vague pelvic pains
which women suffer from, with-
out any very definite dis-
case of the generative apparatus
to account for it, at times in the
Grow is highly recommended by good practical authorities, though 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 hemorrhoidal condition 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 to be a more efficient agent in these cases than many of them appear to exhibit all methods of treatment.

The practice of blistering or applying preparations of iodine to the cervix is not as 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 do not 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 fleet but probably it is rarely used.

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


operation. But in spite of this, I cannot help thinking that I have seen the application of iodide of potassium 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 sternoclavicular joint since an attack of scarlet fever in childhood. At this time (36th year) 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 4 weeks of the iodine painting, the whole chain of enlarged lymphatic glands had practically disappeared. I cannot help thinking that the application of the iodide and the disappearance of the very prominent
Relaxed series of glands were
causally related, and hence
opposes evidence that the drug
of proper tubercular disease
which tends in any way to affect
beneficially already existing
disease of the same nature.

In asthma especially bron-
chial asthma, (Ringer) the application
of abietina, a mustard plant, or
turpentine stupes is undoubtedly
beneficial; and some such application
more particularly that of moist heat
in the form of suppuration orettening
is of great service in acute laryn-
gitis. In chronic laryngitis and
in chronic conditions generally
amides counter-irritant such as
brinich or iodine whose action
can be continuously kept up for
some time is usually prepared.

In the early stages of acute bronch-
itis, before the amount of operation
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 the forms of counter-irritation such as the application of iodine may be beneficial. In the broncho-pneumonia of children, while the pocket poultice is a favorite application, care must be taken that the poultice is not too heavy but two lightly 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 favorite application, but such a good authority as D. Theodore Williams prefers the application of blisters 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 styptic 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 some 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. Ruiger 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-Boo: Insegard, precision, quoted). Ruiger 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, meningees, disease, and other acute conditions they are usually recommended. In the best books, Dr. Simmonds proposed (ice) in the form in which the counter-irritant is usually employed. Gowers in his book on nervous diseases says regarding disease of the spinal membrane: "Heat 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 blisten behind the ear undoubt-
edly affords relief, the abstraction of blood by leeching is even more rapid and efficient.

In the surgical diseases of the locomotory system blistening has been largely displaced by massage, e.g., in the treatment of effusion into joints, chronic teno-synovitis, old sprains &c., although no doubt the older remedy was useful in its time. It is still the favourite treatment in veterinary surgery, where blistening 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.
cerebral, counterirritation probably
occupies the chief position as
a therapeutic measure.

The aseptic method has
decidedly limited the sphere of
counterirritants in surgery by
removing almost every organ
and tissue safely within reach
of the Knife; and hence the
frequency of the application of
such measures as the actual
causing (e.g., in early bone disease)
have been very much diminished.

It has to be remembered that,
though the essentially preparatory
nature of the inflammatory pro-
cess must be admitted in gener-
al, there are cases in which
the results of inflammation
may benefit discharge primary to the organ affected, and
secondarily perhaps to the effec-
cency or very existence of the individual. Tritis and hep.
tritis are cases in point, and in this class of case it is surely legitimate by whatever means we possess and among those by counterviritation to endeavour to limit and minimize the effects of the inflammatory process.

In the discussion of the question acts have a countervirilant effect, I do not intend to inquire into the supposed explanations which have been given spit in former times, which were founded on theories which we do not now accept; e.g. one mentioned by Parrots: "The discharge carries off the peccant humours." To do so would be to take up alone and most unprofitable amount of space. I will therefore only mention 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 the result of a counterirritant which is largely visible, namely the increased vascularinity 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 initially 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 microorganisms the pre-eminent position heretofore claimed for them in the initiation of inflammatory disease. And a good deal can be said in favour of this opinion. Then we
Consider that the perimembranous has been found unhealthy. Saliva, and the wide distribution, one might almost say omnipresence of some of the 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 function before the micro-organisms can make good its attack. One 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 one 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 unless as it is in an unpiling capsule, when it is in a condition of acute congestion. That a counterirritant is of benefit in congestion of the Kidney is the testimony of reliable observers (e.g. Broun. Lépoid provinse quoted) and therefore though this theory may explain some cases (e.g. neuralgia in academic subjects) as well as any
Other, yet there are instances (e.g. congested kidney, bladder, Temple in iritis etc), 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 review of the subject proposed by Professor Cleland of Glasgow in a suggestive paper read by him before the Clinical Society of Glasgow in January 1892, and by them titled "Conspicuous 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 dispersing of haemorhitis between continuous loops of intestine
as an instance of corporeal action; he says: "In doubt there may be considerably accounted for by chemical affection of opposed parts. It is not however the less a corporeal action: it is the poison thrown out by one corporeal or set of corporeal which poisons others. He also instances the phenomena of an attack of acute fevers, beginning in the sheath of tendon, and finding its way to the surface, while 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 corporeal forces. "In the case of the action of blisters on deep parts, it is impossible
account for the benefit by the infiltration of caustic ardent to the deep part, and an explanation of the effects must be sought in the establishment of a current 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 institute of capillary supply and poor in nucleated corpuscles have to be traversed, one sees that it is not merely when a serious 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 Dr. Gnilis nor Professor Cleland makes any direct reference to the role of the nervous system in the production of the effects of counter-irritation; but in Gnilis' pepper, though it is not directly mentioned, it appears to be implied in the production of superficial reddens, and also of the corresponding result in underlying tissues.

Before going on to the discussion of other theories of counter-irritation, it may be as well to mention the opinion of Graves, quoted by Ruige, which, in one particular, resembles the view taken by Gnilis 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 if the individual organ in whose neighborhood 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 entitled, 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 Austic and Dickenson, deny the anatomical grounds, the possibility of the drain of serum from the surface of the skin having any effect in diminishing fever, nor is an underlying disease. These writers seem to ignore the demonstration by Sir W. Jenner in
1864 of the anastomoses 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, whenever 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 an avascular 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 operum) 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 therefore placed in a more favourable position for taking up the effused fluid. Inflammation 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 baro-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 drainage of serum from the surface.
As this thing 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 abovesthreat of it under a separate heading. Fluid in the pleural and in joints have already been mentioned, and the remaining instances which may be cited belong to the locomotor system. In this system again, the introduction of massage under scientific auspices, and the free use of surgical means previous, 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 rheumatics, including the frequently occurring washwomen's wrist. These already alluded
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 flat which counter-irritation of any severity necessarily entails is of itself a great benefit. The idea that allergic "stimulates the absorptions" is not borne out in the present state of our knowledge, as we are still ignorant of any vasodilating nerves mechanism in the sympathetic 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 observed in case with the corresponding blood vessels, and if applied in sufficient strength it also by irritation 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 reflex is
prevented by the very frequent valves occurring in lymphatic vessels, thus
would thus be produced a minus pressure in terminal lymphatics
favourable to the absorption of effu-
sion. The above seems the most ob-
vious and also the most probable
explanation of this action of a conta-

tinuative, but there may be some
cases e.g. in the application of prepara-
tions of iodide and mercury where
the remedial agent actually pene-
trates to the affected part. If its act-

io, when it reaches the affected
part we know little; possibly it
acts as a bactericide e.g. in Syphilo-
ic Conditions, and thus by checking
the continuation of the cause of the
inflammatory effusion, it thereby
renders its absorption a less dif-
ficult undertaking.

Reflux Vaso-Motio Theory

What may be called the
reflex vaso-motio theory of counterirri-
ation is probably the one that has
bulked most largely in the professional mind. This theory took its rise prior to the time when inflammation ceased to be looked upon as other than an unmined evil. ProfessorSanders in his lectures about 1880 coined 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 organism to a fortress, that disease must be considered rather as a mutiny of the members of the fortress 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 continuance of which the most vigorous measures were to be taken.

In spite of the addition to our knowledge since that time. The reflex vasomotor theory of counter-irritation 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 available 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 different sensory nerves which communicate with the vast 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 itself a danger),
we ought to employ them.

Probably the origin of this theory arose from the observa-
tion of the phenomenon of metastasis as observed in some inflamma-
tory disorders, e.g. chronic rheumati-
ism and orchitis. Dr. Watson in
his lectures (p. 163) says: "When the
symptoms of inflammation thus
suddenly desert one part and show
themselves immediately afterwards
in another, (as not infrequently hap-
pen in respect to the joints in
chronic rheumatism and between
the parotid gland and the breast
or mamma in the boils), metas-
tasis 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 irritate. 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, these terms counter irritation, derivation and resolution 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 necrotic is sufficient," and Stait (Pract. Med. 1870) at that time expressed his belief that an orchitis complicating a gonorrhoea was a purely vascular condition, the result of hyperemia.
passing from the urethral cavity to that of the testicles. Our present views anti metastasis may perhaps be expressed thus:—As the result of the entrance of 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. Thence locking up a portion of the circulatory poison; if, by any means, this portion locked up in the inflamed part becomes absorbed 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.
Professor Chirncke (Proc. 279, 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 acute inflammation by blood-letting, by relief of vascular tension directly or indirectly." He cites the fact of there being arterial anastomoses 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 vasomotor theory. He says, "The vaso-
motion 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 counterirritant causes, through the different nerves, constriction of the vaso-motor centre for the skin, (with concurrent 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 in 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 samebranches 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 andflexed. I will shortly bring forward some further evidence in this 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 vasomotor 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 Shilling 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 panic communicating, 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
centric either in skin areas or internal organs. This question
(the topography of the vasomotor system) is still further complicat-
ed by the existence of centrics closer than those in the cord. (Quo-
ted by Hamilton) states that an artery in the limb of a frog showed Spon-
taneous contractions nine days after amputation; and therefore
he concludes that there exist within the frog's limb, some
means probably fasciculatig, by virtue of which the arteries may
contract in concert with each other, independently of any fasci-
culus contained in the trunk.

Brown-Séquard (quoted by Gillies) in his lectures on the Nerv-
ous 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 spinal cord. 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.

Lay cooks usually may be quoted. (Med. Juris 1/710,595) "The change we induce by counter-irritation locally is of the nature of inflammation, either with or without effusion, exudation, etc., and may add suppuration in the case of ulcers and abscesses." (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 mere local results, it is necessary that there be a 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 therewith. (2) There must also be efferent continuity between the centre and the part to be modified.

This writer, like Professor Cheyne and Sir Thomas Watson, includes enemics, 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 a view 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, Swain, Gruntz, Breves (B.M.J. 3/3/194).

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 oblique muscles, and the transversalis.

More than that, these identical nerves take an important part in the nerve supply of the abdominal viscera and of the peritoneum. There are certain great nerve centres with in the belly with which the sympathetic is conspicuousely 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 via whirling or in great 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 pleurae through 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 diminish the vasomotor 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) Hehere 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 advanced, and in which this theory seems to afford the most probable explanation of observed facts. Henry (quoted by Brown-Séquard, loc. cit.) states that "after the application of a cold douche on the skin, a congested spleen or con- 
sealed liver will sometimes diminish in volume much more than it had 
been stated by other practitioners." We have all seen iritis improve 
after a blisters to the temple, with 
only the remotest possible direct vascu lar connection. And asthma 
and Sputum cases of phlegmia are 
sundoubtedly relieved by counte 
liration. 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 counterirritant. Custom and experience alike point to the skin overlying the affected part, and this position very frequently fulfils Brown-Séquard's requirement that the stimulated surface should receive its nervous supply from the same segment of the cervical spinal axis as the part which we wish to influence. Where this condition is doubtfully fulfilled (e.g. in case of a lump) 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 ample scientific basis for our practice. Dr. Chapman of Norwich (quoted by Ringer) believed that he could influence the brain motor system by the application of ice or hot water bag to the spine. The cold application producing dilatation of vessels, and the hot application contraction of vessels in the sphere of the nerves connected with that part of the spinal cord on 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. Dr. Austin who does not altogether deny the possible good effects of blistering, "even in inflammatory diseases," urges "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 neuralgic of persons above middle life, a blister over the cervic-occipital nerve at the base 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, Ségard (loc.cit.) also admire 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 lie in the region of the supra-otical or supra-tracheal nerves, but while on the contrary we wish to dimin-
finish the blood-supply our application should be to the base of the neck.

And have said, these irregular methods of applying Counter irritation have at 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 in function, 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 facts 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 applications over the trunk of the nerve supplying the affected organ, or, except in special cases, over the central nervous system, where we have in the overlying skin a structure, provided with end organs especially adapted to receive impressions, and which is, at all events more probably than any other situation which may be selected, is neurons in 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 this benefit, admittedly resulting in certain cases of the application of blisters, 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 been mentioned in connection with this subject. It was suggested some time by the perusal of the pamphlet on "Corpuscular Action" by Professor
Cleland of Glasgow. A counterirritant and if sufficiently strong produces in the skin all the phenomena of inflammation, including diapedesis of leucocytes and proliferation of the capillaries 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 certainly favour proliferation and the throwing out of fluid." Professor Cleland does not believe that a certain set of capillaries are at all ever set apart for purposes of phagocytosis. He says: "The leucocytes are yet unvallled and undifferentiated flesh from the rest of the tissue diffused through the body in mucous membranes, in
connection with glands, and in the interior of bones, and from some special organs, such as the lymphatic glands and spleen, and it is in this unwalled condition when the nutritive functions are at their highest, that corpuscles are best fitted to take up solid particles into their interior, whether nourishment or to carry them away. He thinks that after blood-letting many 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
encite, extending to the deeper layers of the skin, and perhaps even to the underlying connective tissue and the 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 seminal juice" 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 counter-irritation...
...and is very commonly applied, both over a cavity in a tuberculous ulcer, 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 diminishing by reflex action the congestion there existing. These instances seem impossible of reconciliation on any single theory. Why the same remedy should act in one case in the way of direct stimulation, and in another condition of the same organ as a reflex contra-stimulant is very difficult of comprehension. But until our knowledge of physiology 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, and 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 fomentics 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, while 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 counterirritation may occasionally be of benefit.
In conclusion, counterirritants have been and are now becoming largely replaced by the remedies, more direct in their action, more simple, understood, and presumably more efficient; but it is certain we are not now, and doubtfull 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 care of at least two recent winters (Stangos B.M. 18/3/79 and 18/4/79) is noticed in the Annual Report of Alumminia to revert in first measure to the perhaps scientific but therapeutically incompetent method of expectancy, i.e., I think, to be deprecated. If a method of treatment does no more than inspire the patient with confidence, then unless it is likely the actual injurium, I think it ought to be applied. With reference to
Counterirritation, it is to be hoped that increasing physiological knowledge may still further enlighten us as to its method of action, and renders our use of it more discriminating and precise.

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