Pain in muscle in the febrile state

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~~Pain is~~ Many diseases have their own sequel of pains,

Pain in Muscle in the febrile State

Pain, the very present factor with which many diseases are associated, is recognised as an aid to diagnosis, by the Physician, ~~as~~ is made the chief complaint by the patient serves as Nature's method of communicating to both, the necessity for relief of some diseased part of the economy. Pain, so far as the preservation of the individual is concerned must be recognised as a blessing, although frequently baptised with or regarded as a curse; & many diseases are allowed to run riot & work endless & incurable harm before they are recognised owing to the absence of pain. The Kidney is hopelessly destroyed in Bright's disease & death may be at hand without Nature even ~~interfere~~ whisper it if the fact by her right-hand attendant in disease.

Sarcoma may invade the muscle sheath long before pain forces the sufferer to get relief; or disease of the nervous system may leave the patient a mental wreck for all that pain ~~tells us~~ indicate. ℋ The presence or absence of pain therefore, in disease is a fact which may wreck the patient but help the Physician, or leave the patient to comfort & the Physician with a more intricate problem to solve as regards the localisation of disease. ~~In many ways do we find, pain discussed by medical writers. The classical work on "Rest & Pain" may be said to complete the subject from that point of view.~~

~~Pain~~ Many diseases have their own sequel of pains.

pains

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all of which are (repeated in patient after patient with almost identical similarity) true after being conned in the text-book list of symptoms given, ~~that we are quite familiar with the sets of pains, peculiar to particular diseases.~~ In no work however can I find an attempt to explain the ~~Anatomy of pain~~ [illegible] in the febrile state. This is the task I have set myself & as the subject is a long one, I have determined to curtail much of the detail of the original manuscript so as to suit the ~~paper to the present occasion.~~

The areas ~~seats~~ of pain in fever, be ~~it in~~ in the fevers of malaria, typhoid, typhus, ~~[illegible]~~, small pox, diphtheria, yellow fever, measles, ~~&~~ general and a host of others, are ~~chiefly~~ (a) in the lumbar regions ~~& the back generally,~~ (b) the temples, (c) orbits ~~& forehead~~ (d) the thighs & (3) the epigastrium. In these regions what do we meet with — which may be ache, muscle ache, but not the [illegible] in other regions we have [illegible] severe pain at the joints

I In the lumbar regions — a mass of muscle, the erector spinae, enclosed between the bony ~~&~~ vertebral processes & a dense fascia "the lumbar fascia". The pain met with here is agonizing in yellow fever, intense in small pox, & provocative of much discomfort in many other diseases.

Movement occasions its expression in many diseases, & aggravates its presence in some.

Compression eases the pain in one group, but in another increases it ~~it increases the pain~~. Heat will at times afford comfort relief ~~to one class but withhold it from another~~. These are everyday experiences, but in what tissue is the

tissue is the

3

pain resident; is it in the muscles themselves, ~~the~~ the fascia covering them, or in the nerves distributed to these regions; & if in any or one or other of these regions what is the exciting cause. Before attempting to deal with these, let us see what are the conditions met with in the other regions mentioned.

<u>II In the temporal region</u>. Patients when asked to indicate the seat of headache ~~in malarial~~ ~~fever~~, place one hand across the (temporal) ~~brow~~ with the thumb on one temporal region, & the finger tips on the other, & grasp the part ~~firm~~. ~~The tongues~~ ~~a line drawn across the forehead to which~~ ~~corresponds to the attachment of the anterior belly of the~~ ~~occipito frontalis~~ (to the aponeurosis) ~~are the seats of complaint~~.

Stet

There we find again a muscle, the temporal, enclosed, between the bones of the temporal fossa, & the scarcely less tense temporal fascia covering. The pain may be resident in the muscle, the fascia covering or in the nerve distributed to the region. The same conditions are present as in the loins & I would here remark, that many so called headaches are muscle aches, at any rate aches in regions where muscle holds a prominent place such as frontal headaches, & occipital headaches where the anterior & posterior bellies of the occipito-frontalis are ~~met with~~ inserted into their aponeurosis

<u>III. The third region</u> mentioned as a regular

regular

seat of pain is the thighs, & with them are to be included the legs. The thigh consists of a mass of muscle surrounding the femur, & enclosed in the fascia lata. The same anatomical elements are present as in the two previously mentioned. & in common with these, can therefore be dealt with. It will also be observed that in every region mentioned the muscles are attached to the fascia - a fact which will frequently occupy my attention hereafter.

IV The region of the Abdomen between the umbilicus & the xyphoid cartilage is a favourite seat of pain & it is given as the fourth region in which it is so frequently met with. Here again the same muscles, the recti enclosed between dense aponeuroses & it is possible abdominal pain in fever may in many instances be accounted for by that fact. Below the umbilicus a little distance, the sheath of the muscle is deficient behind, & the elements associated with the regions I have mentioned are wanting below the fold of Douglas, & it is noticeable that pain is not complained of there. The problem then seems simple - given a region in which a large mass of muscle is confined between dense tissues, such as bones & fascia (or fascia alone), in the febrile state & we have pain, is there any other factor in these regions with which we have to deal, any other pain-giving element? None, except it be in the epigastrium where it is possible, dilation or irritation of the stomach, both of them common

Common

factors in disease require to be explained away before being neglected; or it may be that the presence of the spleen active during fever in uric acid production & congested always, draws one's attention away from the muscle; & yet again the liver in the neighbourhood, seduces one's mind towards recognising the febrile disturbances known to reside within it, as the genesis of the pain.

Each & all of these may be eliminated as pain giving factors of the nature complained of, by a little careful attention, & with the exception of the near approach of the musculo-tendinous, diaphragm, we are thrown back upon the Rectus muscles encased in their aponeurosis & with numerous nerves finding their way through the muscle & through its aponeurotic sheath. The problem is therefore reduced in all instances to being either muscle, nerve or fascia; for admitting the abdominal pain to be in the muscle or its surroundings, we have got rid of the bony factor present in the first three mentioned regions. Vide ante will be discussed when we are better prepared with deliberative premises.

Is the pain met-with, resident in fascia, muscle, or nerve. Fascial we can scarcely suppose it is, neither appreciated by the fascia, nor is it in the tissue of the fascia itself: but fascia is so constant an

all of which are repeated in patient after patient with almost identical similarity of time after time copied in text book list of symptoms given

In no work however can I find an attempt to refer pain to particular tissue in any given region. Pain is regionally localized but not structurally ~~differentiated~~ differentiated ~~the country is~~ ~~delineated but~~ told off but not delineated.

In this paper ~~I~~ I have given the results of a study of pain in the febrile state undertaken with the idea of ascertaining to what tissue pain ~~in febrile~~ ~~states~~ may be referred, & to analyse as minutely as possible not only tissue but to what element of tissue pain may be affixed.

Constant aim

element in the regions mentioned, that we cannot summarily dismiss it from the enquiry.

Pain when referred to fascia may arise from its unyielding powers, its impermeability & its impossibility of being ~~either~~ expanded ~~lengthened out or retracted~~. When an effusion, be it exudation or extravasation, finds its way beneath fascia, the qualities of the tissue are such that the fluid & the tissues from which it emanates are compressed, when the nerves supplying these tissues are stimulated to register pain. But the pain is of a typical kind a tense dense, burning pain & with this form we have ... with the febrile state.

Is this the cause of pain, ? namely - the fascial unexpansion before distending muscle bulk. I think not. Is there aught else by which we could account for fascia as an element of pain. It may be, we have to deal with, not an increased effusion in a muscle inclosed in fascia but with a muscle in a state of ~~con~~ contraction, whose fibres are attached to the fascia, but which being as unretractive as inexpansile refuses to be dragged in with the contracting muscle & the pain is felt at the insertion of the fibres into fascia. That this is the case may be believed in many regions. Rheumatic pains in the limbs are referred to the spots where muscular fibres are connected with tendons, ~~of the muscle~~ with bones, ~~&~~ or with the fascial coverings. The thigh muscles

Here explain ... breadth of fascia

are so liberally attached to fascia that this element predominates throughout. As an opposite example take the gluteus maximus throughout its length it runs without fascial connection; & it is merely encased in a slender sheath of split fascia, & it is only at its insertion into fascia ~~over~~ the great trochanter, where we find expression of rheumatic pain. Along the outside of the thigh, where lies the ilio-tibial band of fascia lata is the elected seat of rheumatic pain, & this above all other stretches of fascia is under the influence of muscular contraction, by the tensor fascia femoris & gluteus maximus muscles. Therefore it is doubtful if in rheumatic pains we have pain in muscle itself, or only at those spots where muscular fibres end in tendons, fascia or bones. In the various regions mentioned therefore what have we present. Bone is eliminated in the case of the seat of pain in the rectus. Tendon is eliminated in the case of the erecta spinae & temporal muscles, but we have a fascial covering & not only that but muscular fibres arising from the fascia in these regions. Bone then & tendon are eliminated as necessary elements to the presence of pain in the febrile state & we are left with fascia either as a covering or as giving origin to the fibres of the muscle contained. In the Rectus abdominis at the upper part

Upper part

the fibres do not come form the aponeurotic covering, therefore one might say the fact of muscular fibres being connected with the fascia have nothing to do with it, & formulate at once the opinion that it is the fact of muscle being enclosed in fascia only, which determines the seat of pain & that this must therefore arise from distention of the fascial contents.

on the supposition that fascia is the seat of pain

Accepting these premises I might set to work at once to prove what could cause ~~effusion~~ pain in ~~the~~ muscles so placed & reflect the fact of fascial connection with muscle, & find one at this stage sufficient grounds to believe so, the argument would be much simplyfied.

But on looking back over the ground one is not willing to allow a factor which enters so largely into the regions in which pain is felt to drop out of sight because it seems to be neglected in the case of the rectus muscle.

After all is it the case with the Rectus muscle? Hardly! although the fibres of the muscle do not arise from the fascial covering directly, still in the rectus are the lineae tendinosae, to which by the way the fascia is firmly fixed. The muscular fibres of the Rectus have attachment to their lineae transversae & it is really over the upper two lineae at which the ~~most~~ most fixed pain is rooted.

Rooted

With this after thought there as it were, we are thrown back a step, no longer is it simply a muscle with a fascial covering merely, but in all instances, the fibres of the muscles in question are connected in all cases directly or indirectly with the fascia of the region. The conclusions to be drawn from the argument if pain from a fascial point of view is caused by a distention within a fascial covering, the attachment of the muscular fibres thereto is presumably an unimportant factor; but if the pain is of the nature of a spasm of muscle the attachment of the fibres of the muscular contents to the fascia covering is all important. Laying aside the discussion of Fascia, for a time, we come next to Muscle. And when we say Muscle, we mean the blood supply of muscle as well as the various elements, & at the same time by, although it is difficult, to separate in the discussion, muscle from the nerves & nerve endings. Plainly then it seems to be the case that Pain felt in fever, is in muscle, be it at the attachment of muscular fibres to fascia or tendons or in the nerve endings within the muscle. The impression is of course conveyed actually by nerves, but whether the pain is in the muscle elements themselves

either in the ~~nerve endings~~

or primarily arises is novel and will remain for discussion.

Pain in muscle in the febrile state is associated with Rigors, high temperature, disturbed secretions, acidity excretions, vaso-motor affections of such a nature that the central vessels are dilated while the peripheral vessels of the skin are contracted. What Rigors are caused by muscular contractions, is apparent for they must consist of spasmodic contraction of the muscles before such motions could ensue. From the very feel-ings of these rigors we may learn something During the period of Rigor we know that the skin is cold, the surface blue from contraction of the blood vessels but that the temperature of the body as evidenced by the temperature of the mouth is actually fast rising. The muscles are all the while 'feeling' cold as evidenced by their spasm causing rigor. What makes them feel cold? the rush of blood to them of a higher temperature than they themselves possess. Cold & heat are relative terms, one feels hot or cold relatively to the air around them & vice versa. So with the appreciation of heat & cold by a muscle or organ a rush of hot blood finds a cold area

o the fact of the muscle, an organ, finding itself cold is evidenced by a rigor. As the temperature continues to rise so rigor continues until the temperature of the muscle is raised without of the blood finding entrance. When that is accomplished, what is the state of the muscle, its temperature is raised, blood is supplied with greater quantity from not only the dilated blood vessels but also from the increased rate of the heart-beat. During this time the skin is burning hot, with blood vessels, have not as yet undergone relaxation; when that comes about however the skin becomes the seat of a rapid exudation & partly by conduction & partly evaporation the skin of the body generally cools down. Does what take place in the skin namely-exudation take place in the muscle & become cause of a rigor? not in the argument. Given dilated blood vessels we have in a mucous membrane an increased exudation, in the skin transudation, in the liver, kidneys & solid viscera generally an arrest of their healthy excretion, functional action, in the lung hurried breathing & in the muscle what? increased bulk from the undue accommodation of blood, pass in the muscle & why not proceed to exudation

May the congestion be so great that an effusion of exudation extravasation may take place - in ordinary fever we have no evidence of such, but in yellow-fever post-mortem examinations frequently prove that actual extravasation has taken place. In yellow fever, perhaps more than any other, pain in the back is of marked intensity, & we find evidence of extreme congestion going on to extravasation; may not therefore the milder forms of lumbo-dorsal pain be due to congestion to a less extent, ending if with an exudation of serum from the walls of the blood vessels. If so we must have a tension within the fascial envelopes of the muscular regions in which such pain invariably occurs

Exudation within the muscle could be caused by ~~vaso-motor~~ obstruction owing to vaso-motor influence obstructing the passage of blood; & it is possible to be of such a high degree that even extravasation of blood might take place. Again the obstruction might be caused by an embolism of the capillaries. We have no proof of this. Were it embolic, much more frequently would we have the condition ending in deposits with abscesses; but such an ending we are clinically unacquainted. ~~[illegible]~~ Embolism need not be sought after to account for high temperature; the injection of the most perfectly aseptic fluid will cause increase of temperature where presumably no embolism takes place. Therefore we may dismiss the embolic theory ~~as~~ as being unlikely & as ~~not in fit to discuss~~ not suited to the evidence. ~~If the~~

But will the idea of exudation fit in with the character of the pain felt? Hardly. Pain experienced by exudation within a fascial envelope bears ~~a~~ ~~[illegible]~~ characteristic ~~picture~~ ~~trait~~ emblem of tense dense bursting unbearable pain ~~[illegible]~~ whatever position

Muscle may become rigid in part
from its blood supply being cut off but
will return with a renewal of the blood stream
should the whole undergo rigor mortis no renewal
takes place. but it appears the contracted
fibres undergo degeneration. But 10% NaCl
injected dissolves the myosin & injecting blood
afterwards will cause restoration.
Muscle ~~must the more~~ is less irritable when venous
blood is passed through it, less so in fact
than when no blood at all goes. ∴ pain in
muscle cannot be from CO_2 coming but
from increased oxydation
Rigor Caloris 40° Cent. the rigidity of muscle
resembling Rigor mortis
Nerves to a muscle ~~[illegible]~~ when stimulated cause
dilat[illegible]

bloodshed,
whether
must embark
a no.

is assumed that is not the case
in the pain in muscle in the
either the pelvic or rheumatic kind

15/12 60

Muscular fibres are capable of being directly affected by stimuli without the intervention of ~~any~~ nerves & the following ~~well known~~ experiment of by poisoning by curari settles this. ~~Tie~~ Tie a string round a frog's R. ~~leg~~ thigh to the exclusion of the sciatic nerve ~~&~~ ~~tie a string round all the tissues of the left thigh~~ & then introduce curari, it will be found that the muscles ~~of the left limb~~ ~~stop~~ do not respond to stimuli of the left sciatic whereas those of the R. limb do. whether stimulated above or below the level of the ligature. The blood supply necessary to carry the curari to the muscles is prevented reaching the muscle in the right limb & the nerve can therefore not exercise its full function whereas on the L. side the curari reaches the muscle & prevents nervous influence ~~the~~ ∴ the curari has effect not upon the nerves but upon the nerve endings in muscle - but the nerve endings in muscle are so intimately blended with muscular fibres that they ~~are~~ may be regarded ~~regarded~~ as part & parcel of the muscle - ~~either as a ment~~ In regard to the separation of nerve & muscle - muscle that is the furthest we can go. Poison a frog with curari, the stimuli to nerves will ~~be withheld~~ not affect the muscle to which the nerve goes but the muscular fibres themselves may be ~~sus~~ stimulated by direct ~~by~~ stimuli.

The nearest approach to separation between the muscle elements & the nerve is obtained by the following expt. with curari.

16 A3

There other experiments go far to prove that muscles are capable of being made to contract by stimuli applied directly to the muscular fibres themselves.

What have the "stimulate muscular contraction. a high temperature of the blood supplied. will that cause contraction of its self We know that contraction of muscle will cause increased temperature, but that will increased the converse true is that temperature of the body will cause spasm is not proven. But it is not increased but increasing temperature with which we are dealing & it is no doubt that which causes the rigor ~~of~~ therefore the ~~rigor action namely the~~ that is the cause of spasmodic activity of muscle. Given an increasing temperature of the blood to muscle what follows are manifestations, are co-incident ~~of~~ spasms, ~~that~~ alternate contractions & relaxations, pain in the muscle. The increasing temperature of the blood, rigor & muscle-ache are co-incident. is it not possible may be probable that the first is the cause of the second & the second of the third.

What have we besides to stimulate muscle. An increased supply of blood that is an increased supply of oxygen. The frequency of the heats would provide for that. but does it necessarily imply

17 14

Is the oxygen conveyed in greater quantity? That more blood goes there is little doubt but that more oxygen is actually brought may be open to question. Are the blood corpuscles in fever capable of taking up more or less oxygen? and there a long question opens up. Is the hurried breathing caused by the inability of corpuscles to pick up sufficient oxygen? Is it in other words the hunger of the tissues for Oxygen? Hungry tissue might mean either that increased chemical changes were going on in the tissues which thereby demanding more oxygen & therefore increased breathing; or it might mean that the corpuscles were unable, at the ordinary rate of circulation, to maintain the staple or even lessened demand. That is a long question you will perceive & what may out of it can we get

IV.

Is the oxygen ~~consumed~~ used up, or is it left to knock at the muscle gates begging admittance? During activity the muscle oxygen is consumed & CO_2 & lactic acid produced but the assumption of oxygen is not in the ratio of the CO_2 given out. During tetanus especially the difference is thus more clearly marked.

Now oxygen cannot be extracted in the free state from muscle by an air pump. therefore it is not likely that O. is lying in waiting consumption but rather that the increasing temperature & the increased quantity of blood is associated with increased consumption of O. extended mostly in maintaining increased Chemical change within the muscle.

a It may be that the activity of the muscle produces from efficient O. a different product from excretion

Increased chemical change implies increased production of CO_2, lactic, and ~~&~~ alcoholic extractives generally. ~~But~~ CO_2 produced in quantity means increased respiration & yet end of the same ~~time~~ & that we have yet but CO_2 is not the direct result of oxidation of ~~the~~ some Carbon during ~~the~~ muscular contraction because CO_2 is produced in a muscle contracting in an atmosphere in which no O. finds access. therefore if there be no O. present within ~~the~~ atmosphere & none because can be extracted by the air pump that is none exist for it is plain that the CO_2 must

16 T 40

come

from the splitting up of some
more complex compounds especially of the
blood because lactic acid & CO_2 are produced
in almost constant proportions. But in
fever no voluntary motions are present in
the regions in which pain is complained of
in fever the tissues but, assuming that
blood is
of oxygen means increased oxidation & producing
& the muscle instead of expending energy in
motion does so by the increased
chemical change within its substance.
After all what is tiredness a feeling of tiredness. After all what is
tiredness is a muscle produced by
over-exertion but the feeling left from
chemical change. The muscle is producing
CO_2, lactic acid & [illegible] rapidly, the amount of O is not
sufficient to be compensatory & the over production
of the excretions mentioned is associated
with the feeling of exhaustion. What have
we in fever? a feeling of tiredness. blood is
carrying a greater quantity about & higher
temperature increased chemical change must
cause & the feeling of tiredness left there
is not reason not to believe is associated with
CO_2 & lactic acid & other products.

Motion in muscle causes tired-
ness the way ~~but~~ known. Since any
motion in the febrile state what are
signs but motion &c. the feeling of
pain in muscle might come from
the rapid contraction relaxations
going on during the period of rigor.
But in many febrile states no rigors
are antecedent to high temperature
& at any rate no appreciable rigor.
Besides the temperature caused by
~~increasing~~ muscular contraction
are but slight about 1° F. therefore
rigors cannot be the cause ~~of the~~
~~increased~~ of muscular exhaustion
but they may in a small way
help with the increasing chemical
changes to exhaust the muscle.
Can now the increasing temperature
of the blood have to do with muscular
exhaustion. When one is making
tea of tea the leaf is put first in to cold
water then the temperature is gradually
raised ~~to~~ the water passing from
cold to cool temperate, tepid warm
hot scalding boiling. During each
of these stages of water & it may
be at much finer grades of elevation

Apart the coarse adjustment here given, different elements are absorbed from the beef. May not sometimes the same be going on in muscle, may not an elevation of temperature wash out of the muscle different substances ~~of the~~ at a temperature four degrees above the normal is it not likely that numerous muscle ~~exhaustions~~ are carried over ~~it~~ necessitating in addition chemical change & exhaustion. But an exhausted muscle ~~became~~ from ordinary walking becomes one - simply a chemical & rather a metabolic change, there be here a sore muscle in which injury ~~may~~ may represent more than still the rapid & abnormal metabolism can have to exhaust & render muscle sore.

It seem to me of no moment in whatever way muscular exhaustion takes place whether by increased temperature or prolonged exercise. If the muscle's manufacturing elements rapidly the result upon the muscle will be the same.

a

I am willing to discuss with a premised the pains in the various regions from other stand points.

Many say the pain in the back is associated with renal congestion. ~~[illegible]~~ That renal congestion in common with other organs takes place there is no denying but that renal congestion causes the pains met with in small pox is not ~~[illegible]~~ proven. If renal congestion causes it I own about the pain in the thigh temple & belly. Oh! the thigh & leg pain is a myalgia! the temple head pains a cerebral congestion! the orbital ache a special unexplained peculiarity probably cerebral! & the belly pain a sympathetic ~~reflex~~ from congested abdominal viscera. Instead of a great common cause one is willing to tinker at the explanation & devise new theories for each ~~[illegible]~~ region. It is like the rejection of Darwinism — who condemned nature to a mere tinker — ~~to~~ or degraded her from the ~~[illegible]~~ almighty revelation of ascending generations to a mere jobber in the ~~[illegible]~~ articles of organisms. Why run away after special application to special regions. Acute congestion of the lung does not as far as I am aware give rise to specialty ache ~~[illegible]~~ other than a back ache.

The symptoms are too general to allow of a such an organ as the Kidney causing the pain ~~with congestion of other organs we have~~ complained of ~~but little evidence of sympathetic pain other than in the back.~~ Therefore why put down back ache to kidney congestion. If we had kidney congestion to any great extent we would expect much more frequently than we get them evidences of albumen, blood, tube casts & the like. Nor I do not think it is necessary to draw upon special argument for ~~a~~ every ~~of~~ this special symptom when a much more general explanation is at hand.

Myalgia or myositis ~~is adopted by some as a~~ might be ~~fallen~~ ~~back~~ upon by some as an explanation. Myalgia is an unknown quantity to me & I am not aware it could be presumed to attack a ~~[illegible]~~ region in back & the thighs without leaving permanent effect which in fever practically never arise ensue. Therefore there is no reason why we need adopt myalgia as an explanation. Certainly if it applies to one region it cannot apply to all. ~~Otherwise in this disease a fact which is totally~~ foreign to myalgia. But the feeling in the back & thighs are the same therefore it seems unwise to attempt other than a common explanation.

~~The Head~~ache ~~is put down as an affection of the~~ nerves

The information gathered from books is almost nil. Some such as Erichsen declaring that little is known or there with dismissing the subject. Others boldly launch into a muddled myalgia, myositis, muscular rheumatism with all the technical terms Torticollis, cephalagia, cervodynia. Pleurodynia, lumbago etc etc. From these We can learn nothing. From treatment can We learn much. I have drawn up a table of In hand to show what may be learned from treatment.

Kidney. Dry heat to Moist Heat.

Lumbago.

Besides I have here a table dealing with Cumbago which may be worth something in the argument.

Lumbago

	Dry Heat	Moist Heat	Pressure	Rest	Gentle friction.	Handrubbing	Cold	Elec
Renal Colic / Kidney Calculus acute.	N.R.	Relief. cures	N.R.	N.R.	N.R.	N.R.	Intensifies	
Aching.	do	do.	Relief	N.R.	"	"	"	
Mus. Rheum.	comforting	N.R.	~~Pain~~ N.R	improving Relief	Pleasant	Relief.	Irritates.	Relieves
Febrile state	N.R.	~~N.R.~~ Easier	~~Pain~~ N.R	Improving	do.	Pleasant "	Irritates.	N.R.

l.

∴ Kidney aching is Relieved by pressure & moist heat.

∴ Renal colic ~~acute Cal~~ " " " moist heat.

M. Rheum: is Relieved & cured by Electricity

but muscular pain in the Febrile state is only ~~[illegible] Feb. only~~ improved ~~& easier but not~~

when ~~relieved entire~~ temperature goes down.

Muscular ache attending all fevers & inflammatory disorders though possibly due in some ill-defined way to cerebral congestion is chiefly caused by the action of the blood altered in character & elevated in temperature on the muscular fibres ~~of the~~ around the skull or on the nerve endings within them. Mark, the nerve endings by the usual experiment just quoted proves the identity of nerve endings with muscular fibres therefore by using the word nerve endings I do not thereby depart from the muscle itself as being the seat of pain.

Aching in the orbits is a symptom of marked character in febrile ~~& many other~~ troubles. The pain is deep seated, pressure relieves it for a time & it is increased by movement of the eyeballs i.e. action of the muscle ~~[illegible]~~. The pain here ought to have wide discussion. The muscles of the orbit are fixed behind to a ligament ~~[illegible]~~ (Zinn) & in front to the sclerotic coat. What keeps the eyeball from being pulled backwards, is there any ligament no. They are always in a state of high tonicity as evidenced by their sharp & precise movements in other words they are always on the stretch.

What is there - a cushion of fat of sufficient density to keep the eyeball taut under the ~~tension~~ # relaxation of the muscles. The fat is infiltrated with blood vessels especially a venous plexus. Into this plexus finally the Ophthalmic vein and the vein of the muscles. That this plexus is capable of distension to a great extent is well known. To such an extent even that exophthalmus may occur & no evidence of the cause is found. Vaso motor dilation is ascribed as the cause where nothing else is possible. Again pressure relieves it for a time the finger tips pressed above & below the eyeball affords relief. That is to say the emptying the veins by pressure relieves the tension for a time & relief ensues. Relief of what? in what structure can it be? the vessels themselves no? Exophthalmus is unattended with ædema of the tissues; it may be presumed to be in the muscles ~~& the fat~~ confined to their substance & allows exit & relief some for a time during which time the muscles are capable of moving about themselves without, & with much relief from pain

the metabolic products are helped out of the muscles by the pressure

The summary of the argument thus is this. Pain in muscle proper is present in two distinct forms - Rheumatic, & febrile. Rheumatic pains are of the nature of a spasm & are witnessed where muscles are attached to fascia & tendons above. Hence it is they are so frequently referred to fascial regions where no muscular fibres exist as over the great trochanter, to lines, to those regions of joints where tendons exist, as over the joints of the upper & lower extremities. These pains are relieved by pressure, kneading & electricity.

Allied to Rheumatism in name is the muscular state met with in Gonorrheal rheumatism. This I believe to be a true myositis - i.e. an affection with the muscle tissue associated with spasm amounting to a tetanoid state - unrelieved by Electricity & by kneading.

Finally pain in the febrile state is accompaniment caused by an expansion of muscle caused partly by the contraction in the initial stage of rigor but mostly by the metabolic changes, rapid & decidedly abnormal from the increased

1

Quantity of ~~blood~~ blood of an increased temperature causing ~~waste~~ removal from the muscle of substances if does not give up to blood ~~in excess~~ ordinarily ~~during temperature~~. Superadded to these must be added a ~~the~~ variable amount of pain induced by the increased ~~bulk of the blood~~ metabolism & the bulk of blood at any time within a muscle more especially when confined with narrow limits of tense fascia.

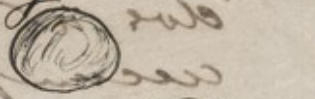
Pain referred to muscle is always of a neuralgic character; ~~be it~~ the pain of renal colic, the pain over the temporal muscle from toothache; the pain in the epigastrium from disease of the (6th dorsal) vertebra. ~~of the bitter taste~~; pain in the abdominal wall from disease of the ~~some~~ subjacent viscera. &c. &c. These are all relieved by heat especially of a moist kind & must not be confounded with pain in muscle itself.

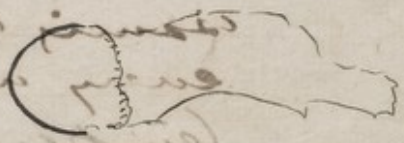
In Conclusion ~~I would recommend that~~ the Experiment I would like to see performed would be to ascertain what are the products of the venous

blood as it returns from muscle
~~of a~~ in the febrile state. This
does not seem to me difficult to
accomplish & I have little hesitation
in saying that the ~~ex~~ observer
will find different products
issuing with ~~each increase~~ in fraction of a degree
every increase ~~of even~~ 1 degree of
temperature. ~~If~~ with the increase
of 1°.7: we have an increase of
the out put namely CO_2 lactic acid
& extractives by alcohol, it is surely
to be presumed that an increase of
five or six degrees we would have
an out put of substances in excess
of & of a nature ~~foreign~~ to that
met with in health. ~~that~~ different
It is the gradually increasing temperature
of the blood which is so exhaustive.
The muscle is thereby exposed to
different temperatures & whereby different
material are dissolved or washed out
in so thorough a manner as to leave
the muscle exhausted & ~~[illegible]~~
~~of a nature [illegible]~~

can only be Co_2 of lactic.

Pain in limbs pain. Congestion of kidney
Some congestive trouble in the
head.
Increase of pain and co-incident
with temp
~~Pain in hip not felt~~
~~The are exhausted~~ exp





there is room for expansion
where as the pain complained

Greatest amount of pain
Epileptic fit- exhaustion. pain

Exhaustion & Effusion

Can you have increased thoracic power
supply with increased energy

Pain when referred to fascia ~~adapt~~
Can arise by the unyielding powers of the
impermeability, & the possibility of being either
bulged or ruptured. When an effusion, ~~be~~
it exudation, or extravasation finds its way ~~between~~
~~fascia~~ beneath fascia, the qualities of the tissue
are such that the ~~distension~~ fluid & the tissues
~~from the~~ which it emanate are compressed, ~~when it~~
~~the~~ the nerves supplying
these fibres are stimulated to register pain. ~~Is this~~
~~the pain is the~~ ~~caused by~~ fascia & if so is it effusion into
~~the~~. Is this the cause of pain namely the
fascial ~~no~~ inexpansion before distending muscle
bulk. Is there anything else by which we could
account for fascia as an element of pain.
It may be we have to deal with not an increased
effusion in the muscle inclosed in fascia but
with a muscle in a state of contraction whose
fibres are attached to the fascia but which being

as ~~incompressible~~ muscle retracting as it expands to
reflexes to the drag on it in with the contracting muscle
the pain is felt at the insertion of the fibres
into fascia. That this is the case may be
believed in many regions. Rheumatic pains
in the limbs are referred to the spots where
muscular fibres are connected with the
tendons of the muscles, or with the fascial
coverings thereof. The thigh muscles are so
liberally attached to fascia that this element
predominates through out. As an (opposite example) Take
the gluteus maximus. Here (apart from its tendon which runs
without fascial connection (it is inclosed in a sleeve or sheath of split fascia) but is only
at its insertion into fascia at the
great trochanter where it finds expression of
rheumatic pain. Along the outside of the thigh
where, the ilio-tibial band of fascia lata is the
elected seat of rheumatic pain, often above all other

the tubes of fascia ~~[illegible]~~ is under the influence of muscular ~~[illegible]~~ contraction by the tensa fascia femoris & gluteus maximus muscles. Therefore it is doubtful if rheumatic pains we have pain in muscle itself but only at those parts where muscular fibres end in tendons fascia & bones. In the various regions mentioned, therefore, what have we present. Bone is eliminated in the case of pain in the rectus. Tendon is eliminated in the case of the erector spinæ & temporal muscles, but we have a fascial covering & not only that but muscular fibres arising from the fascia in these regions. Bone then & tendon are eliminated as necessary elements to the presence of pain & we are left with fascia either as a covering & as giving origin to the fibres of the muscle contained. In the rectus abdominis at the upper part as the fibres do not

from the supernatural covering therefore we might say the fact of muscular fibres being connected with the fascia have nothing to do with it. I formulate it as one theory that it is the fact of muscle being enclosed in fascia only which determines the seat of pain & that this must therefore arise from distension of the contents. Accepting these premises I might set to work at once to prove what could cause oppression of the muscles so placed & neglected the fact of fascial connection with muscle & then we at this stage sufficient grounds to believe so the argument would be much simplified. But as I am writing back on the ground one is not willing to allow a factor which enters so largely into the regions in which pain is felt to drop out of sight because it seems to be neglected in the case of the rectus muscle.

After all is it the case with the rectus muscle
Hardly. although the fibres of the muscle do not
arise from the fascial covering directly, still in
the rectus and the linea transversa both in
the way the fascia is firmly fixed. The muscular
fibres of the rectus have attachment to the
linea transversa or it is really over the other
two linea transversa at which the most part
here is rooted. With this after thought then
what we are thrown back a step
no longer is it simply a muscle with a
fascial covering merely but in all instances
the muscular fibres of the muscles in question
are connected in all cases directly or indirectly
~~directly with~~ with the fascia ~~of~~
~~the case with the fascia~~ of the region.
~~Before we~~ ~~The point I wish to~~ The conclusion to be drawn

from the argument we if Pain, from a fascial point of view, is caused by
a distension with a fascial covering the
attachment of the muscular fibres thereto is
presumably an important factor, but if
the pain is of the nature of a spasm of muscle
the attachment of the fibres of the muscular
contents to the fascia covering is all important.
Laying aside the discussion of Fascia for a
time we come next to Muscle. ~~The Blood~~
and when we say muscle we mean the blood
supply of muscle as well as the sarcous elements
~~for the same time~~ try, although it is difficult to
separate in the discussion muscle from the nerves & nerve endings.
Plainly then it seems to be one that Pain felt in
fever is in muscle be it at the attachment of
muscular fibres of fascia & tendon or in the
nerves endings within the muscle. The impression
is of course conveyed centrally by nerves but whether
the pain is in the muscle ~~or organs~~ elements themselves

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Pain in Muscle.

Pain, the very present factor with which many diseases are associated, is recognised as an aid to diagnosis by the Physician, as the chief complaint by the patient & as nature's method of communicating to both the necessity for relief of some diseased part of the economy. Pain so far as the preservation of the individual is concerned must be recognised as a blessing, although frequently baptised (regarded as) with a curse; & the many diseases are allowed to run riot & work endless & incurable harm before they are recognised, owing to the absence of pain. The kidney is frequently destroyed before in Bright's disease & death may be at hand without Nature ever whispering the

fact by the right-hand attendant in disease.
a Sarcoma may invade the muscle
sheath long before pain forces the sufferer
to get relief; in disease of the nervous system may leave
the patient a mental wreck for all that
pain tells us. ~~No discussion of Pain that is~~
The presence & absence of pain therefore in disease
is a fact which may vex the patient but
help the physician or leave the patient to comfort
the physician with ~~the doctor is~~ a more intricate
problem to solve as regards the localization
of disease. In many ways do we find
pain discussed by medical writers. No Classical to work on "Rest
& Pain" may be said to complete the subject
from that point of view. ~~That~~ Again so many
diseases have their own sequel of pain, &
of which are time-after-time cured in ~~the~~ the

list of symptoms given, that we are briefly furnished with many of the sets of pains peculiar to particular diseases. In no work can I find however an attempt to explain ~~from the~~ ~~anatomical, physiological & pathological~~ the Anatomical & physiological causes of pain in muscle. in the febrile state. This is the task I have set myself & ~~without~~ as the subject is a long one I have determined to curtail much of the detail of the original manuscript so as to suit the paper to the present occasion. ~~The~~

The seats of pain in fever be it, in malaria, typhoid, typhus, Rheumatism, small pox, diphtheria, yellow fever, measles or a host of others, are chiefly ~~situated~~ in the lumbar regions of the back generally, the temples forehead, the thighs & the epigastrium. In these regions what do we meet with? In the lumbar region pain

— a mass of muscle the erectors of spine enclosed between the lumbar vertebral processes & a dense fascia the "lumbar fascia." The pain met with here is agonising in Yellow fever, intense in Small-pox, & provocative of much discomfort in many other diseases. Movement occasions its expression in many diseases & aggravates its presence in some. Compression eases it in some parts but in another it increases the pain. Heat will afford comfort to one class but ~~cold~~ will hold it to another. There are many causes, but in what tissue in the pain resident is it in the muscles themselves, the fascia covering them or in the nerves distributed to those regions; ~~if the pain after a stroke of apoplexy is an effusion into the muscle & causing pain by the compression~~ & if in any or one or other of these what is the exciting cause. Before attempting to deal with these let us see what conditions are the

with in the other regions mentioned.

II. In the temporal region. Patients when asked to indicate the seat of headache in malarial fever place one hand across the brow, with the thumb on one temporal region & the finger tips on the other, or ask the part firmly. The temples, a line drawn across the forehead from one to the other corresponds to the attachment of the anterior belly of occipito frontalis & are the seats of complaint. Here we find (as in the temporal fossa) a muscle, the temporal, enclosed between the layers of the temporal fascia & the scarcely less tense temporal fascia covering. No pain may be resident in the muscle, the fascia covering or in the nerves distributed to the region. The same conditions are present as in the brain & I would here remark that many so called headaches, are muscle aches or at any rate aches in regions where muscles hold a prominent place such as frontal headache, & occipital headache when the anterior & posterior bellies of the occipito frontalis

are met with.

III. The third ~~regs~~ region mentioned for a regular seat of pain is ~~in~~ the thighs. The thigh consists of a mass of muscle surrounding the femur & enclosed in the fascia lata. The same anatomical elements are present as in the two previous mentioned & in common with these can be dealt with. Pain is not confined to ~~in~~ the thigh itself & thus although an enormous mass of muscle is IV. The region of the abdomen between the umbilicus & the xiphoid cartilage is a favourite seat of pain & it is given as the fourth region in which it is frequently met with. Here again we have a muscle the rectus enclosed between dense aponeurosis & it is possible abdominal pain may, in some instances be accounted for by the fact. Below the umbilicus a little distance, the sheath of the muscle is deficient behind & the elements associated with the regions I have mentioned are wanting below the fold of Douglas.

The problem often seems simple - fever in region in which a large mass of muscle is confined between dense tissues such as bone & fascia or fascia alone & in the febrile state we have pain; & is there any other factor in these regions with which we have to deal, any other pain giving element? none, except it be in the epigastrium where it is possible dilatation or irritation of the stomach both often common factors in obscure regions & the explanation may be before being neglected; or it may be that the presence of the Pyrexia active blood fever in uric acid production & congestion always draws our attention away from the muscle & yet again the pain in the neighbourhood seduces our mind towards recognising the febrile disturbance & that it known to reside within it & the fever of the pain. Each & all of these may be eliminated as pain

giving factors of the nature complained of & if, by a little careful attention & with the exception of the near approach of the (muscle tendinous) this appears we are thrown back upon the nerves muscle encased in its muscle & with numerous nerves finding their way through the muscle & through its aponeurotic sheath.

The problem is therefore reduced in all instances to being either muscle, nerve or fascia; & admitting the abdominal pain to be in the muscle (or its surrounding) have got rid of the many factors present in the first three mentioned regions.

Is the pain met with in (Viddlat) fascia, muscle or nerve. Fascial we can scarcely suppose it is, neither appreciated by the fascia nor is it the tissue of the fascia itself, but fascia is so constant an element in the region mentioned that we cannot dismiss it from the beginning.

Pain in ~~[illegible]~~ fever

89186

The subject of pain in ~~[illegible]~~ fevers is one which ~~must have~~ has been written upon ~~and discussed but somewhat~~ and described ~~to~~ from a clinical point of view but I have ever failed to come across in any medical work an attempt to account for the ~~[illegible]~~ seat & nature of ~~the~~ the described pain. In different fevers pains are resident in different ~~places~~ parts of the body & many fevers ~~[illegible]~~ have the pains located in characteristic ~~[illegible]~~ parts. Pain in the back in Small pox pains in the bones ~~[illegible]~~ in ~~[illegible]~~ malarial fever, pains in the neck in scarlet fever ~~[illegible]~~ measles & diphtheria combine in every case ~~with~~ with headache ~~[illegible]~~ are some of the more ordinary. It is to investigate the ~~nature~~ seat & nature of the described pain that this article is written. Take a case of malarial fever.

as being familiar to all my
hearers in what region are these
pains met with. Particularly
the lumbar region the, temples, the
epigastrium & the thighs.
The pain in the back is situated
more particularly in the lumbar
region ~~the~~ in which situation an
enormous mass of muscle with
a great responsibility is situated
tightly enclosed in the dense ~~[illegible]~~
lumbar fascia.
The situation of the pain in the head is expressed
by the patient by pressing
the forehead with the hand ~~&~~
with the thumb in one temple
other finger tips in the other. Here
again is a mass of muscle the temporal
muscles, ~~and~~ bound ~~in~~ by a
strong fascia - the temporal fascia
The pain in the thighs is described
as pain ~~[illegible] [illegible] through the muscles~~

Have we evidence of pain other than injury without ~~these~~ increased temperature — toothache ~~the~~ pain in various regions from anaemia & ~~chronic~~ ~~of~~, ~~fatigue~~ debility, colic, ~~possibly~~, distension of the bladder, dyspepsia,

Does the retention of carbonic acid alone cause pain in muscle. I think not, the pain in muscle in asthma is never noted nor in emphysema or chronic bronchitis

Is it effusion of blood in to the muscular sheath which causes pain. from clinical evidence this cannot be, the most evident knowledge we possess of that kind is the rupture of a vein in the substance of the gastrocnemius or soleus giving rise to acute pain subsequently at the start. The muscle becomes hard & boardy its fibres can be felt the muscles remains in its rigid & painful condition for weeks & there is frequently if not always a discolouration of the skin at the end of a ~~the~~ fortnight — the usual discolouration consequent upon the subcutaneous extravasation of blood.

Is it tetanic?

need we assume a special bacterioid action before catarrhal fever is produced? No! the introduction of a small quantity of any fluid into the nervous system to render complete unaseptic will cause a temperature of rise to all the conditions of fevermess. & with this pain in muscle is not part of the phenomenon. Therefore neither the ~~presence of retention of CO2~~ insufficient exodus of CO_2 from the blood as found in asthma nor the presence of high temperature will account for the pain present in the great masses of muscle in the stage of invasion of fever.

Bacilli may always be found during the period of invasion of the fever but that during the acme they disappear & spores only can be discovered. May not this be a capillary embolism in muscle during the invasion causing pain but the more minute spores can readily pass in the circulation & so clear it

The bacilli have been found chiefly in the spleen of the human subject or the marrow of bones of animals experimented on.

During illness it would seem as though the ~~potential energy~~ metabolism of nutrition ~~when~~ was ~~wholly~~ to be devoted to the production heat instead of being divided between that & ~~the~~ mechanical labour ~~and~~ in which ~~that~~

It would seem as though it were molecular labour that is intimately associated with production of heat & it may be the pain in muscle. for the heat giving power are the internal work of the body, internal & muscular mechanism & the accompanying friction

Heat is produced by the muscular metabolism. Muscular metabolism means CO_2 & lactic acid.

after death the temperature frequently rises owing to the check to the loss of heat from the cessation of the circulation.

Rigor mortis causes a marked accession of heat

N.B. see page 348 Foster's physiology [

N.B. see page 285 - CO_2 is in the muscle not in the blood through the muscle. Might not the pain in muscle be congestion of O.

~~[illegible]~~ from being beaten all over evidently therefore Incidental to the muscles. Here we have a muscle enclosed in a dense fascia – the fascia lata. ~~[illegible]~~ Before discussing the projectile pain let me consider the seat of the pain so far as we have gone. The seats of pain of are the place where the chief mass of muscles are collected namely the Erectors of the back. the temporal muscle in the scalp ~~[illegible]~~ the external group of muscles in the thigh. First as to the headache is it a cerebral headache I admit not, it is situated in the temporal muscles or in the muscles of the orbit or not within the calcarium. Compression of the temporal muscle produces pressure on the upper part of the eyeball backwards into the orbit.