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I.

Dissertation
on
Pathological and Physiological Action.

By
William Coley Betts,
of Wilton, Connecticut,
Candidate for the Degree of Doctor in Medicine.

An Inquiry into Physiological and Pathological Action

In considering this subject it may be well to begin at the root of the matter. It is a fact that the matter from which all animal forms are produced, is at first without form, a mere homogeneous mass, contained in a round disk, of simple animal matter. Containing when analyzed elements similar to other animal matter. Therefore the first assimilation of new matter, forming vessels, must take place, without the agency of vessels, or any of the parts, or organs which are subsequently formed. Now as to the power, which moved upon, and set this simple organic matter in motion, first forming the vessels, and through them, carrying and depositing the frame work, and superstructure of this complicated and admirable machine. It may be said that it is the power of the Almighty. Well it is, in the same sense, that the power of the Almighty formed all things. But where is the harm, or what can be the objection, to calling it the vital power, or a vital principle, as well as to call certain powers, of which we know nothing, except the phenomena, viz Caloric, Electricity, including perhaps, Galvanism and Magnetism, Gravitation, & thus go on to explain the various phenomenon produced

by this, as to explain those produced by the above named powers or principles. The next question which follows in order is, (It being admitted that in the outset, there is a power, and this power may be called the vital power, or vital principle, ^{which} begins the work, in first forming out of a homogenous mass of simple matter, forming vessels through which matter is conveyed, & deposited.) Does this vital principle, after having done this, cease ~~it~~ to exert its power, thus leaving the car of life, so set in motion, to go on by its own momentum, or rather by the aid of other powers, which come in by the by. viz the powers or circumstances, of its receiving support, through its connection with the mother, and subsequently from the external world; Or does it continue in force, bringing these last named circumstances to its aid, and so continue through life? Why should it cease after having begun the work? Are the other powers sufficient without it? Or is it not necessary, to the formation, completion, and preservation, of this wonderful machine? In short, Is it not necessary, as a formative, preservative, and conservative principle, in the organic and animal world. Man it is known, has a wonderful power, of resisting, & reacting against those agents, and influences, which tend to his destruction. In proof of which, many examples might be given.

if it were necessary. The next question is, what are the laws, by which this vital principle is governed, in its connection with man, and to what extent it is alone sufficient, to react against and overcome those powers and influences, which tend to its destruction, and also to what extent other powers or influences are necessary to be brought in to its aid, to enable it effectually to resist and overcome those powers and influences which tend to its destruction is the question, the solution of which, would give to, medical science, a greater degree of perfection than it has attained, or probably ever will attain. With regard to the last question, which is the all important practical question. It might be well to inquire, whether there are any known laws by which it is governed, and if so, what they are; but if not, whether it is not reasonable to suppose, there are laws, governing the organic Kingdom, as well as the inorganic Kingdom, which is known to be governed by certain definite and fixed laws. Are her Elements different? They are the same, but somewhat differently combined? Does this vital principle, of which the inorganic Kingdom is not possessed, make this difference? Or finally, are there not certain definite and fixed laws. And are not some of them known? Is it not unreasonable to suppose that we should be placed here by our maker, amid so many

destructive agents, & left without any guide or compass;
The blind to lead the blind, & of course all to fall into
the ditch; & thus producing amid his Kingdom, an anoma-
lous one. It may be taken for granted that he has not
thus left us. In pursuance of this part of the subject, it
may be well first ^{to inquire} what may be understood by Physiology,
or Physiological action. It may be defined to be a proper
balance, & harmonious action of all the functions of life.

It may not be ineptly compared to a sound mind, or what
is usually termed common sense, viz. That it is not a single fac-
ulty of the mind, but is the result of a due balance, & harmonious
action, of all the faculties of the mind. If this definition is correct.
Pathology, or Pathological action, must consist in a disturbance
of this balance & harmony of action, in the living economy,
or in a want of due balance & harmony of action, in all the
faculties of the mind just as unsound mind, or want
of what is usually called common sense, is the result of a want
of balance, & harmony of action, in all the faculties of the mind.
It follows then, that if disease, or Pathological action, consists
in, or is the result of, a disturbance in this balance and
harmony of action in the living economy, the indications
are, to assist the vital force, in restoring balance and
harmony of action. Now the question is, how can this best be

accomplished; the solution of which has been and is
the Suſp. Lencæ (Chief walk) of the whole medical world, &
has thus far, baffled all their science and skill. But, if what
some of the most distinguished of the Medical world have
said, be true, an attempt is ^{at} least laudable, by "said
Sydenham, the practice of physic, consists chiefly, in being
able to discover the true indications, & not medicines to medicate
-ms. to answer them. They who have overlooked this point, ^{have} trust
empirics to imitate physicians." Senac observed, that The estab-
lishment of just principles, besides being the proper end of
observation & facts, is certainly what confers upon them their
highest value." Huxham remarked, that we must not forget,
that it is principles, not phenomena, - laws, not uncalculated facts,
which are the objects of inquiry." The celebrated (Dr Rush, said
a single just principle in our science, is worth more, or will
lead to more truth, in one year, than whole volumes of uncombined
facts, will do in a century." Said Lawrence, we have workmen
in the mine and quarry; they have raised & roughly
fashioned an abundance of materials. It appears then,
that if the opinions of these men are true, there are just
principles, & established laws, in the living animal economy.
"British and foreign Medical rev. vol 1st P 110. The
actions of living beings, whether normal or abnormal, are

as amenable to general laws, as those of inert matter,
& the discovery of those laws, is within the reach of those,
who search after them in them in the right track,"
"Said the profound Lord Bacon, although nothing
throughout nature, really exists, but individual bodies,
having simple individual actions, according to laws,
yet in everything, that, ^{laws} and the tracing, finding out,
and explaining it, is the foundation of science, an experiment,"
"And said Wardrop, "In endeavoring to explain any of
those phenomena, of organic beings, which have hitherto
evaded research, it may be anticipated that, if such
enquiries be successful, they will not lead to the discovery
of any new laws, but unfold the same simplicity of means,
for performing those operations of the economy, which have
already been discovered." Thus it may be seen, that, if the
opinions of these distinguished men, be correct; not only
is the foundation & most important part of Medical sciences,
to discover the true curative indications, - the laws by which
the actions of living beings are governed, & the establishme
nt of just principles, but, that the discovery of these laws,
is within the reach of those, who search after them in
the right track. Now as disease, or Pathological action,
consists in a disturbance of Physiological action, It

follows in place to inquire. First, in what this altered action consists, Secondly how it can best be restored. It may be well first to consider, what is called simple Inflammation. By simple Inflammation, may be understood, an irritation, in a part, by which a preternatural quantity of blood is drawn to the irritated part, in accordance with the law of, Ubi Irritatio Ibi Fluxus producing fullness, redness, heat, pain, & sometimes, tenderness of the part, Now if this definition is correct, there can be, no such thing, as a general inflammation, throughout the entire system. For there cannot be more than the whole, or natural quantity of blood in the system, and if this is equally diffused, throughout the system, how can there be any preternatural determination, which is necessary to constitute Inflammation? There probably, may be, and is sometimes, a general fullness of blood in the system, without any preternatural determination to one part, constituting what is sometimes termed, a phlogistic state of the system, or entony, or entonic action; but could this properly be called inflammation; unless there was ~~some~~ determination, or pathological action; or in other words, while it remained ~~in~~ equally diffused throughout the system.

Now that there is greater probability of congestions taking place in this state of the system is generally believed but whether the probability is greater that Inflammation will take place may be examined For example in Apoplexy which occurs in persons of a full habit while Inflammation often occurs in persons of an opposite habit Apoplexy is believed to be a disease of congestion while inflammation may occur & often does without a very great degree of congestion while the system has but comparatively but a small quantity of blood May not this be explained by the fact that in Apoplexy there is a sluggish movement in the circulation & torpor of action while in Inflammation there is celerity of movement in the circulation and violence of action Now as in Inflammation the blood moves with greater rapidity than in Apoplexy. The latter being an affection where there is fullness of the vessels while the former is an affection where there is less fullness - often comparative a small quantity of blood in the system Does it not follow that the blood circulates more rapidly when not full than when full - This being the case would not diminishing it as in venesection be

likely to increase its celerity. Now on the principle of
Vbi Irritatio Vbi Fluxus there being an irritation in
a part & the blood being able to move faster while there
is but little comparatively in the system would it not
be drawn to the irritated part with greater violence
thus augmenting the Inflammation - Is not this view
supported by the fact of inflammations especially
of the brain being aggravated by bleeding often
A striking example is related in Mackintosh's Practice
(Vol. 2^d. Page 420) viz. Concius Mervey was attacked with Fever
in the beginning of 1823. in the course of the disease he required several
general and local bleedings for the removal of slight local inflam^{and}ations.
On the 21st day of which the fever, when perfectly sensible and
being in a state of very great weakness - he told me he had passed
a confused restless night & that he had had some headache
which he attributed to repeated errors in diet & having overloaded
his Stomach. He was relieved by the exhibition of laxative medicines.
On the 23^d day when he was reduced to a state of great debility
he became quite delirious & so furious that it required two
men to hold him down in bed. The extremities were cold - pulse
weak at the wrist - of thready smallness & beating 160 to the min-
-ute. And his head was hot. There was a small flushed spot on
each cheek & during the two following days four leeches were app-

laid to the head & afterwards ten without any mitigation of the symptoms. And he was thought to be too weak to bear any further loss of blood. Ice was assiduously applied to the head from the commencement hot fomentations to the legs. Sinapisms to the feet and hot bricks were placed around the extremities. Still his legs and feet were cold the sinapisms although frequently renewed had not produced the least redness. The pulse had become more feeble he raved incessantly. There was *Subsultus tendinum* to a great degree - the tongue was hard dry fissured & of a dark colour. As neither Coma nor convulsions nor paralysis had taken place & as the pupils still contracted upon the application of light it was thought that no organic mischief had as yet taken place and as the usual means had failed to produce heat in the extremities hot spirit of Turpentine both separately and combined with *Aqua Ammonia* was applied to the legs and feet but without producing the slightest redness. Blesters had been applied to each leg & thigh the night before but they produced no effect. As a last resource a towel kept in boiling water was applied to each foot - This measure succeeded in producing a considerable degree of redness. But it is remarkable that there was only one very small vesication

about the size of a suppurated on the left instep.
At the moment of the application of the ~~room~~^{boiling} water he
became calm & sensible - looked about him as if he had wakened
out of sleep and knew every person in the room which
he had not done which he had not done for several days.
And he complained of great pain in his feet. The pulse soon
became more distinct less frequent & the tongue moist -
Blisters were again applied to the thighs. Towards the afternoon
he became worse & at night I found him delirious and
insensible with *subtus tendinum* a dry tongue and
a small quick pulse. The extremities and particularly
the feet were quite cold although warm fomentations
& hot bricks had been alternately applied & although
the scalded feet were dressed frequently with hot spirit
of Turpentine to keep the action which had been excited in
these parts. The blisters which had been renewed on the
thighs had not risen. Boiling water was again applied
to both legs from the knees to the ankles. The relief was
as instantaneous & decided as had been produced by the same
means in the morning but it was permanent & from this
time his recovery went on without a bad symptom. A super-
ficial slough separated from each leg in the course of ten
days & there was some constitutional irritation produced

during the course of that process; but the ulcerations healed
kindly. He was for several months very lame not from the
immediate effects of the ulcerations but from the contrac-
tion of the flexor muscles of the leg, which inconvenience
arose from the bent position in which he kept his limbs
during his illness but he gradually recovered the free
use of them; and the last accounts I heard six years after-
wards informed me that he was in the enjoyment of perfect
health and strength & able to earn a livelihood for his
family by manual labour. He gives this as an Illustration
of the impotence of strong counter action & that too on the lower
extremities. For say he on the same page I beg to enter my
strongest against the application of blisters to the head or
even to the upper part of the neck in inflammation of
the brain. They ought to be applied to the lower extremities
Further he says I urge this recommendation from the results
of long & attentive observation; and independently of the
disputed theory as to whether the vessels of the head can
contain more blood at one time than at another &c—
If it be true that every fact involves a principle this
fact or the above named facts may be regarded as involving a
very important principle & as replete with instruction.
Here we have a case of a man who had been or was

ill of a fever & on the 21st day while in a state of great weakness began to have headache with confusion & restlessness - was relieved by the exhibition of laxatives and on the 23^d when reduced to a state of still greater debility becoming quite delirious & so furious as to require to be held in bed - The ordinary treatment applied without effect the extremities becoming cold - pulse weak at the wrist of thready smallness and beating 160 per minute - head hot &c. In short a very marked case of Phrenitis in an extremely weak & debilitated subject with a very small & frequent pulse &c. Thus it may be seen that the blood moves with great celerity while there is comparatively but a small quantity in the system & also that Inflammation occurs under such circumstances, when there is sufficient irritation it may be very violent. A case occurred about four years since in an adjacent town to this where a man was attacked with Phrenitis of an ordinary habit, was bled early in the disease & freely - venesection repeated several times, cold lotions applied to the head & if I mistake not blisters applied in the regions of the head - frictions, sinapisms &c applied to the lower extremities. In short the ordinary treatment was followed but the man died I think the third day. Here is presented two examples of the same affection

occurring it is true in some what different habits
so as perhaps to justify bleeding in the one case while
it would not have been & was not practiced in the
other. Each refusing to submit to the ordinary treat
one receiving extraordinary treatment & recovering while
the other not receiving such treatment did not recover
This extraordinary treatment consisting in an artificial
irritation or action being made on the lower extremities
of so violent a nature as probably to exceed in strength
the original Pathological action in the head. May not
this example be used as a Key to let in to the explanation
of various pathological actions & also to explain various
artificial actions produced by various means both in-
ternally & externally by which the vital power is enabled
to bring about a Physiological action in the living economy
Now it being true that the whole contains the parts that
make the whole. May not this be considered in that
light being of the highest degree (probably) of Patholog-
ical action compatible with life & recovery, and that
therefore that principle of treat which would be effectual
in the highest degree of Pathological action apply
in Pathological actions of a minor degree. There is
a transfer or translation of a powerful Pathological

action from a vital organ to parts of less importance in the living economy by artificial means or in other words an artificial disease excited to overcome a natural one. Thus confirming that what is thought to be a law of the living economy first more particularly observed by Dr John Hunter viz that two diseases could ^{not} be ~~or were~~ not maintained in a high state of pathological action at the same time but that one took the precedence leaving the other without support. It is true that there are cases of apparent exceptions to this rule but it is probable that if they were well understood they would not be found to be real exceptions or to mitigate against this law. For example a case was presented a few days since in the Clinic of a man who having received an injury in the region of the ankle joint a slight cause had had simultaneously with that tumour or enlargement of the glands about the groin & also a considerable irritation in the lungs - or rather (if I mistake not) the difficulty of the lungs was mitigated on the appearance of the enlarged glands. Also another case was presented previous to that of a little child that had an enlargement of the glands of the neck & a considerable irritation in the lungs. But this fact in connection with it is to be observed viz

As the glands diminished in size the difficulty of the
lungs increased & as they enlarged the lung difficulty was
diminished. As these were both of that Diathesis commonly
called Scrophulous Diathesis. May not these developments of the
noma be regarded as arising from the same general cause
& in this view be regarded as one disease. And even here
while there was increased action in one part there was
diminished action in the other part. Again for examples
in chronic Fistula in ano as well as numerous other
chronic affections of a similar nature there is not only
a popular notion that it will not do to heal them but
a notion of Physicians that it will not do in very many
cases but this morbid action be transferred & concentrated
in some other & more important part. A great many exam-
ples of this nature might be named including those produ-
ced artificially as seactions &c but as they all come
under the same law it is unnecessary. It seems to be
a fact then in the living economy not to allow more than
one violent Pathological action to be supported at once
& if as Prof Parker of N. Y. says a law is nothing but a
fact it may be said to be a law of the living economy
How far this principle or law would apply in the treatment
of Nonmalignant & malignant affections if early & judiciously

applied or administered & whether in malignant affec-
tions especially as Fungus Hematodes Cancer to the whole
constitution is or is not so much deteriorated as to forbid
or prevent the successful application of this principle. Or
in other words If a powerful artificial ^{action} were made & kept
up in some part either near or remote thus treating &
concentrating the morbid action & leaving the naturally diseas-
ed part for the vis Medicatrix Naturae a vital power to
do what she could in restoring ^{to} a Physiological condition.
If it be admitted that a law is nothing but a fact &
stating that fact quoted from (MacKintosh) as a law it
would seem to be so (if the conditions were similar & the
changed action sufficiently powerful). Whether in doing this
a liability to the same accusation that Prof. Low received
from his patient after having used the Rhus Toxicodendron
for Paralysis viz You have cured me but you have killed
me. Which however was not the case. Now with regard to
this changing Pathological action I would not be understood
to mean that every Path Act of the head must be trans-
lated to the feet & legs though this may be the best place
for it till the vital powers shall have restored the Physiolo-
gical action of the head. And then it may be cured as
quick as possible. It often happens that in affections

of the brain there is a fullness & perhaps congestion of that organ. This state may best be removed by venesection, after which it may be best to make an impression so as to change the current or Pathological action. This may be done internally or externally. Internally by the exhibition of appropriate medicines & Externally as by blisters or rubefacients even to boiling water or some of the stronger Mineral Acids &c if the case demands it just as a judicious physician who manages Diseases according to the indications in the particular case in hand — There is no doubt as is the opinion of Dr Holland that there too much indiscriminate bleeding in affecting of the brain & that if there was more discrimination or a better understanding of their nature there would be less bleeding especially in the different forms of paralysis. Holland's Medical Notes Page 31th The vague conception that all diseases of the brain depend upon some inflammation or pressure which it is necessary to remove too much prevails & directs the practice on them & if the seizure be one of a sudden kind this method of treatment is often pursued with an urgent & dangerous activity. Little heed is taken of the many cases where the symptoms depend upon irritation alone or on a loss of nervous power or in deficient circulation of the blood

within the brain or on altered qualities of this blood
or it may be on morbid changes in the nervous subst
ance itself. Further he says Thereby might suggest that
in some of these various cases the loss of blood would
lead to mischief. Experience undoubtedly proves it &
there is cause to believe that this mischief though abated
of late years is still neither infrequent nor of small
amount. Again says he. It is certain indeed that there
is a state of brain best perhaps represented to us in its
general effects of diminished nervous power which tends
to produce sometimes Spasmodic seizure sometimes delir
ious or maniacal affections. sometimes palsy of differ
ent parts of the body. These effects being in no wise obvia
ted by depletion but rather increased by all such
means. While they are relieved by remedies which tend
to excite the energy of the sensorium & to augment the
general power Page 32^d he says Delirium preceded
generally by vertigo is known as an effect of extreme
starvation without other obvious disease. as frequently
recorded in the narrative of Shipreckt &c The condition
of the patient in Delirium Tremens on whatever proxim
ate cause this may depend is one of the most
marked instances of that state of brain which any

large depletion might hurry on to fatal result. I might quote
much from this most distinguished observer & profound philosopher
but will quote but once more. Speaking of Coma he says (Page 33rd)
The state of Coma is indeed a very ambiguous one as respects
our knowledge of its proximate cause in the ordinary use of the
term the notion pressure is associated with it by most prac-
titioners & this even where it seems but an excess of the condition
of sleep. But it is familiar to us also as a concomitant & token
of the last stage of debility & is often expressly induced by deple-
tion & other depressing causes as well as by those which are
known to produce direct pressure on the brain. Page 34th Even
in children we have express instances of a state having all
the characters of Coma but which is proved by the precursory
causes as well as by the effects of medical treatment to
depend on general feebleness of circulation & deficiency
of nervous power. There is reason indeed to presume that
the two states just alluded to are really distinct & that
the former is much more nearly akin to the condition of
syncope than that of pressure. Or however related as respects
the nervous substance itself so deficient in the operation of
the causes producing it as to require a method of treat-
ment altogether opposite. Here then the governance of names
must be put aside & the more carefully from that close

resemblance of symptoms which makes the utmost
discretion of the physician necessary rightly to direct his
practice for their relief. Nor can any rules be given
at once general & exact enough to supersede the particular
judgement in each case. Thus in view of these sentiments
it follows that those physicians who treat diseases according
to their name irrespective of the particular circumstances of
the case are in one respect at least similar to a certain
Physician's horse which while his owner was riding him
in the spring of the year got mired. And it occurred that
he rode him that way in the summer when it was dry
but on coming to this place could not get him along
This shows that the horse had a better memory than
judgement

Prof. Eves Lecture room 1840. But to return from this somewhat
of a digression & just glance at the history of medicine
Scientific & medicine ^{(the latter} quack, of which there is an abundance
from its origin to the present time; including Thomsonianism or igno-
rant quackery - Hahnemanism or learned empiricism & Electro-
Galvanism or Electro Magnetism or rather Animal Magnetism
& also all quack nostrums. Now all these not only lay claim
to accomplish mighty wonders but it is an indisputable
fact that in their train follows many restorations to say
nothing of the number they kill. Now if it is true that

every organ in the body has its peculiar & appropriate stimulus by which it is excited into action. & If it be true also as said Abucromby that a ^{Physician} ~~Medical~~ man is a blind man armed much more is it true with regard to quacks who according to the doctrine of chance must necessarily wound & destroy to a greater or less extent. It must be that there is a powerful principle in the living economy the tendency of which is to preserve it in a Physiological condition. If it were not so the system could not withstand the action of so many agents which tend to its destruction. And not only that but making use of those very destructive agents which she is in a Pathological condition to assist her in bringing about a Physiologic^{cal} condition as for example a man having paralysis of the organs of speech being thrown accidentally from his horse was enabled both to surprise himself & horse by singing who another being cured by eating cucumbers & thereby producing cholera. Now if every fact involves a principle these facts involve a principle & show that by a sudden & powerful impression in the one case & ^{an} artificial disease in the other enabled the vital power to bring about a Physiological condition. May not the explanation of the fact for fact it is and

Prof. Ves. Lectures on the Human Body 1843

facts are stubborn things) that such a great variety and
contrariety & even contradictory practice that has obtained
all of which more or less successful; thus giving rise to
the common saying that doctors disagree. And also to the
moral of Physicians themselves viz that it is astonishing
that such contradictory treatment should be so successful
Also to the fact that disease will sometimes yield
to almost everything in the Materia Medica & even to
impressions on the mind alone. May not all this
be accounted for on the principle of a changed &
translated action or if the remedies are applied
direct of a new action being set up (pathological
it may be called) in the part thus allowing or assis-
ting the vital power in bringing about a Physiolog-
ical action. From the fact that the living economy is
subject to & affected by an almost infinite number & variety
of agents & impressions & the generally admitted opinion that
every agent exerts changes in the Physiological & Pathological
action or condition peculiar to itself & that such agents
may be used to assist the vital power in restoring the proper
balance & harmony of action in the living economy stimu-
late us to untiring industry & perseverance

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