In this subject we ought to put every question whether it can be answered or not, and we should also say how far each one can be answered.

The laws by which motion is excited in the nervous system. In the last lecture I mentioned four circumstances, with regard to impressions, I said the first, were purely mechanical, secondly those accompanied with a sense of propensity to motion, but without propensity to particular motion: Thirdly those attended with a sense of propensity and determination to motion, without any view to the end or purpose: Fourthly those in which there is a propensity of a view to the end to be thus obtained; it is the last act that are called most commonly voluntary. We will the end and effect. But it is agreed that we do not will all the means by which it is produced, such as the contraction of the several muscles. Further we do not properly will even the motions whole of our body or particular parts, which are answers to the effect of the will. In throwing a stone
I left up my right arm & set back my right foot, and then bring my arm forward, now in this situation I exert a variety of muscles without being either conscious of it or the particular motions I use in the action. When a child gets attempts to throw a stone, he does it awkwardly, but acquires more skill at every effort. Nobody will say that they have sense of motion in performing the actions more artificially; therefore the last of the four cases of impressions and those are merely shades of the same colour. A still further illustration is to observe, that in the case of our action are in consequence of imitation. In every case we have no more than the sense of doing imitation. There is a connection between disposition to imitate & the action. The motion may be the cause of the effect; & does not depend. I will to sing a song which, in my particular case is a very unsentimental volition. A man in that case that he moves. Take, view then of a motion in conducting actions some have talked of motions directing the motions and with a view to an end: I allow the view to the end but no more. If some of our actions be at all times without perception, without volition, you will perceive how far the opinion is wrong. This is the Italian Doctrine. I am not disposed to take much pains about it or to go into a long description of it: my premisses are for the Italian Doctrine but my reason is against it. I will give the considerations that determine me on this subject. First, to well profitably is truly in directing the action of the judge securely our view of body and purpose are all determined by motions arising ultimately from impressions, and our impressions are in proportion to emotions and sentibility taken together. Then the foundation of all our judgments of the operations of medicine. As I gave a certain proportion, my case which be a general rule, but upon experience, I find that the person had more or less sentibility which therefore altered my rule. I find also that certain circumstances in the body increase sensibility in which case the dose must be less; and when I find a larger, or the usual dose did not reduce the effect, I perceive it corresponds to a quantity of sense in the stomach. If the stomach in the beginning of a fever will hardly bear fifty of Castor oil, & that in an advanced state it will scarcely be moved by fifty. I find that the two,
Disease to commit effects the operation of the medicine, but the converse distrofication so quick in the case of fever counteracts it. In the case of witness we see that the immediate effect is a reversed in a proportion to the mischief it effects and that what we do and what we do not do is directed. In the human body there is a constitution whereby the several operations that produce disease, at the same time excite such motions as counteract the effects of the disease, but we cannot see that it is with any perception of the end. Nature directs the means for the exhibition of the extraneous body, brings on inflammation here and there. It is the nature of our clinch to change into heat and to undergo sublimation, to destroy the cellular substance, and make an acception by which the extraneous body is thrown out. But does nature constantly adopt this effect to the mischief of the extraneous body, and direct it in proportion to the salutary end. And [O] from the same destruction and same heat, produce, in some cases, a poison instead of calculable but now this is genuine which I would not implicate in the same mistake the matter, but in the state of organization of the present fever. The there is a constant principle in the soul yet that is unrepresented, connected with the organization of the body, and the chemical conformation of it. This constant principle may have a share in the operation and take it to be a cure. But still it must be determined by the mechanism of the body. Unless matter agitate on stimuli, causes effect, " cosa in anime acta" and in P. 175 of Dr. Wall. "No eu can we" says he consider the mind as acting ignorantly or irresolutely.

action. And he might have added that action is the immediate consequence of the nature of the stimuli. I conclude by5 looking out what ought to be our conduct in this kind of physiog on the animal body. We should take with every phenomenon of the animal body, but as it can be accounted for by the laws of mechanism or chemistry, how far it is reducible to the general laws of motion in other bodies. Clearly we may examine the operation of a cause in the unit of perception. And hereby when perception appears, we should consider the effect according to the body's power, namely sensibility and unison nonstop.
Her Delirium. Perception. If we resolve any of these into the arbitrary motions of the will, we make unintelligible jargon. By what noun are the action of the nervous system regarded? The first is very general, it is the effect of the repetition of the same action, the first object of which is greater facility or greater strength. Every muscle becomes stronger, and the man who continues to lift a bell, till it is grown up will almost be able to lift the bull. In some measure it depends upon increasing some of the fibre; but it depends more upon the nervous power being determined more firmly and more resolutely into the muscles. I think this is evident from the effect of electricity in curing瘫痪 muscles, where it not only restores the fibre of the muscle, but also the power of the will; and therefore it restores the communication between the sensorium commune and muscles. We have reason to believe that one of the causes of life, mobility, or of no mobility at all, is elongation, and mobility may be increased readily, like the elasticity of elastic bodies which is acquired by repeated motion. The sense of elasticity or rigidly at times all first toca of motion, but repetition gives us agility, in the same motion afterwards. A man gives no more instance, but shall proceed to an illustration of a different kind; we have this proof of facility, that the motion can be renewed by weaker impressions than were at first necessary. A man takes a dose of amyl nitrite and repeats it several times. The first effect of repetition is that the dose must be increased as the repetition goes on. It said that the force of repetition is constantly becoming weaker if weaker. But if this repetition goes on for a greater length of time, it seems to produce a facility of motion in the sense of the element, and now a much life does than before will produce vomiting. It may be in some measure thus explained. They will take place sooner or later according to different circumstances of sensibility or mobility, and according as the person is disposed to be affected by one law or the other. Now if that is the case, while the repetition has not been able to
towards place, so far the law of sensibility will
place. But I think it is much more powerful
in the last case, that our motions will be easi-
easily rendered, from the mobility being increased.
All habitual motions are thus easily made

Lection. LVI. Sec. 3.

I said that every action by frequent repeti-
tion, becomes more easy and is performed with
more strength. If we suppose that the nervous
nerve is confined to the nerves by the surrounding
bars, we can easily see that those may res-
act the nervous power, according to their grade
or degree of extensibility. But, by frequent
motion, the nervous power will be increased
at and hence easiness of motion. It appears
that in consequence of that faculty, a much
less impression will be sufficient than that
which produced the same action at first. It
may then be varied considerably by taking
off the resistance; I can suppose that irrita-

ility and sensibility are not proper, and being
by connected together. The explanation of irri-
tability which I received for this place is this.
D. Haller & other who mention a power
of contractility, resting in the muscles, make
it a condition of the vis inertia, but we have
refused the vis inertia and therefore the op-
inion of irritability depending on it. Other
we refuse the vis inertia of Haller use the
term irritability, gautius has said it and
proposed a proposition which most physiolo-
gists who refuse the vis inertia have remark
of these are impurities attended with per-
ception that do not evidently to see produce
contraction, only give perception to these
the term sensibility may be confined, and
the term irritability may be applied when
contraction is produced. D. Gauius defines
sensibility "at loci sub stimulis in motus
corruptus in corne". But sensibility and
motion, and both more or less fit to produce habitual contraction, as the last are more or less fit to receive the influence of the former. In these, and accordingly a force vastly less may in certain circumstances produce these motions. We can readily hence understand the proposition of the inactivity, that habit renders our active, while it diminishes our passive power, improves our inactivity, while it diminishes our sensibility.

Other Laws of Habit—

Most actions may be associated with compulsions, that are not otherwise naturally stimulating. Take the natural stimulus to the contraction of the Bladders of urine, is either the fullness or some stimulus within it. Now to renew this action every other circumstance that happens to be associated with it at the same time is often requisite. Thus people who make music before they go to bed will naturally take
up the chamberpot and set about it when
he is naked before the bed; and when a man
has indulged too freely in strong liquors and
is put to bed sooner than usual, he will naturally arise at the accustomed time
to do the office. Most of our actions then
be associated with impressions that do not nat-
urally prove a stimulus, but which ever ap-
to renew the volition. Thirdly, actions are asso-
ciated with actions without any final purpose,
and too frequently repeated together, come to be
almost ineradicably connected; hence the unison
motion of both eyes. Fourthly, actions fre-
quently repeated with a determined force and velocity
are only removed with the same degree of force
almost very nearly. Hence the conviction of every
workman with his particular utensil; and
a man will stay for a great length of time
with his own face who will not advance
at all of horrid. Lastly, associated actions is
are repeated only in the order in which they
have been habituated. In the memory, we
want to recall certain verses of a Poem; if
we catch the first word the rest follow sponta-
enously. This is the foundation of the incan-
pery train of thinking. Lastly in consequence
of these actions periodically repeated, after each
repitition for a certain number of times, they
become spontaneously periodic. In the instance
of the Stafford clock who was used to repeat af-
ter the clock thro' all the house; this came to
be so strong a habit that when the clock was
out of order the Best served instead of it. This
appears a very mysterious, but it is a simple
law of the animal economy; admitting a
certain order nothing is more easy than to
repetit order, if the repetition be strong en-
ough. I conclude by saying that if any of
you do not perceive the use of marking these
 Laws of habit, I am to attend. That every observer has remarked, that the economy of man either physical or moral is made up of habit. I imagine that it is not strictly connected with the animal economy but that it is in the vegetable also. In supporting our virtue and guiding our existence we may depend upon it in great measure, but habit may be equally prejudicial to both.

This general law of the nervous system, and first some circumstances relating to contraction are to be taken notice of. Contraction is naturally succeeded by relaxation, thus the effect of stimuli produce contraction, yet when continued it alternately produces contraction and relaxation. A part of the illustration of the same is that when the stimuli is removed, the alternate contractions and relaxations continue to be renewed for some time when relaxation should take place. If the nervous fluid is elastic, it is accumulated in a muscle, by the elasticity of the surrounding parts, and if from the nature of the measure to recur itself and pass out of the nervus, relaxation takes place. There are two circumstances belonging to the law of contraction. The first is that this alternate contraction affects certain muscles and not others such as all the straight muscles, whereas when they are cut out of the body, on the other hand, muscles that are not straight as in the vesica urinaria, are nothing like alternate relaxation. When diminished, a stimulus will make it contract, but it will go on to a relaxation state and continue in that. An explanation of this may be in the straight muscles being not conscious, but that while the relaxation follows the contraction, it will not push the muscle straight. The oscillation will produce the alternation. It is not easy to conceive that
The relaxation will stretch out the muscular fibre. But when it is connected with a quantity of cellular membrane, that too will hinder the stretching out of the muscular fibre. A difficulty attends the contraction of the muscle of the heart, of which you may try this experiment. Where there are a set of fibres about a hollow cavity, first let they surround a cavity: they are much in the condition of the muscular out of the body. I take it to be owing to this that from the connection of the vessels it produces a quantity of fluid and is relaxed again. It chiefly happens when the muscle is out of the body that the fibres more easily recover their straight situation; and also the heart is entirely muscular. Another seeming difficulty arises from the motion of the intestines alternately contracting and dilating, but I imagine there is a galaxy. It is true the muscular fibre in the bladder suspends relaxation by the nervous power springing out of it. And the same motion in the intestines is only propagated from one place to another. It is not the muscular fibre alternately dilate or contract, it is only in consequence of the motion of air or liquid that that alternation is noticed. Further it is only the ordinary degree of force that can produce this alternation. On the other hand, a certain degree of force continues to go on and contract, which contraction is not easily overcome by antagonistic muscles. This is what we call a spasm. It certainly depends upon the particular organization of muscular fibres. Next we consider the alternate vicissitudes of exercise and rest, sleeping and waking.

Lect. LVII. Feb 11th.

With regard to motion and rest we shall offer our conclusions on the theory. Either to the theory of this subject has been acknowledged
to be obscure, and must be so till we know more of the nature of which it is an affection. The cause of waking has been supposed to be a fluid intested; and it has been thought that it must be interrupted, and that waking should cease for some time till it is resumed again. Very many objections lay against this theory. It is difficult to say how such a fluid as the nerves should be exerted as how it should have a needlelike. I post over many arguments; the chief is this, that the doctrine of a fluid is not at all reconcilable with the phenomena of sleeping and waking. After labour both of body and mind, is under a strong propensity to sleep; a certain stimulus will dispel that propensity, and establish the most perfect waking. Now stimulus may give motion but I have not the least idea of its supplying matter. And the effect of stimulus goes so far that we cannot suppose that sleep depends upon an excited accumu-