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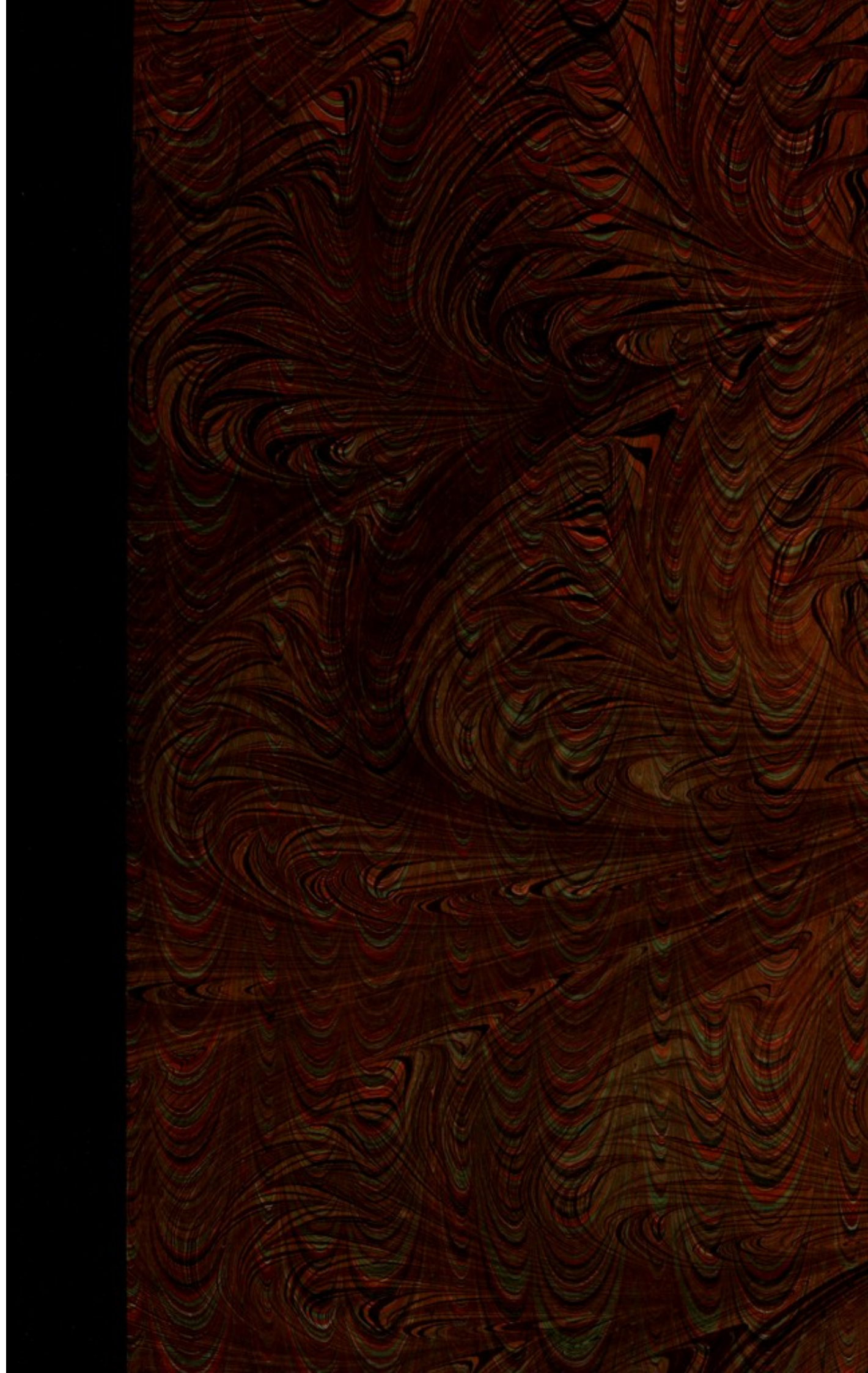
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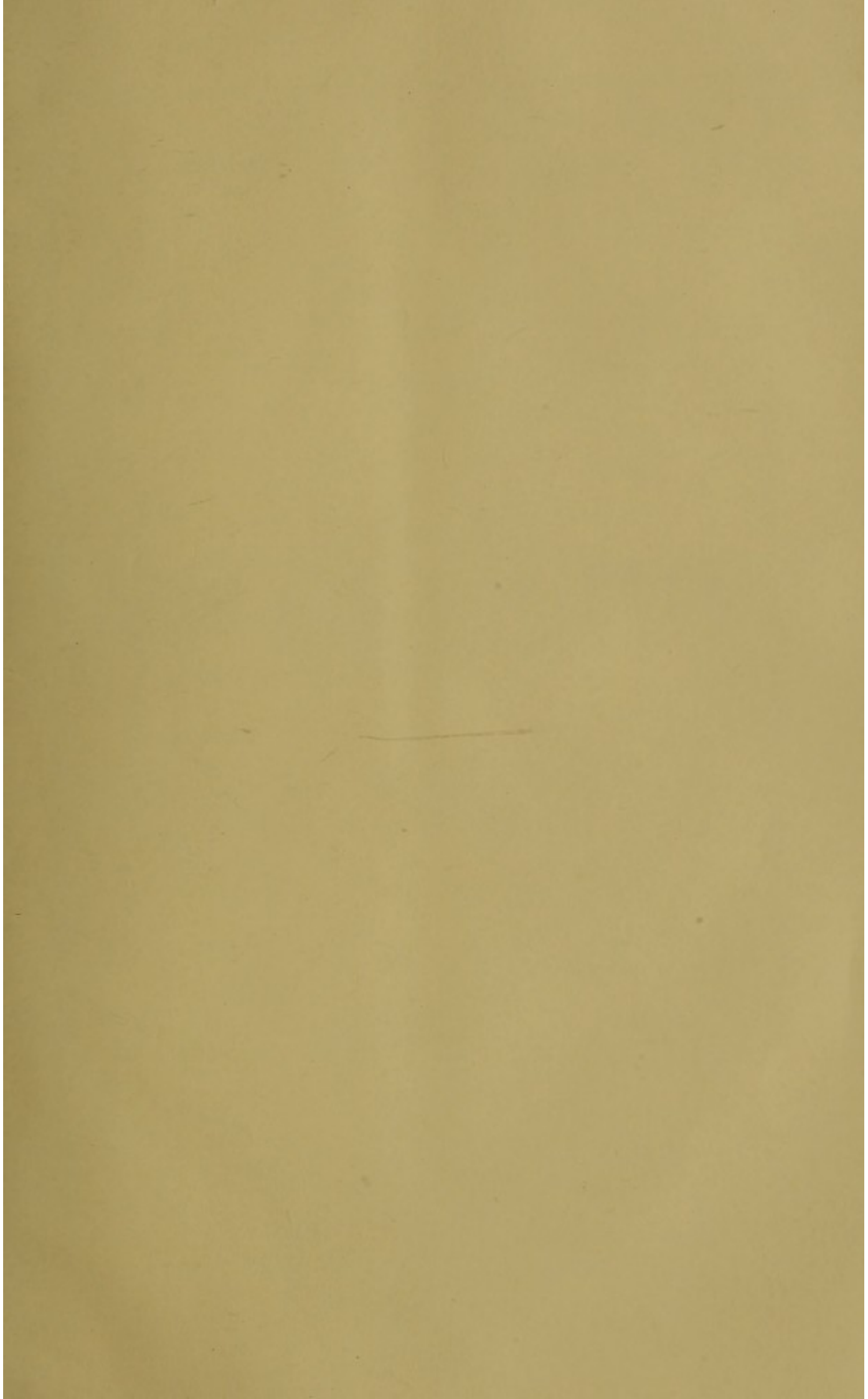
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DISEASE A UNIT;

OR,

MEDICINE A SCIENCE.

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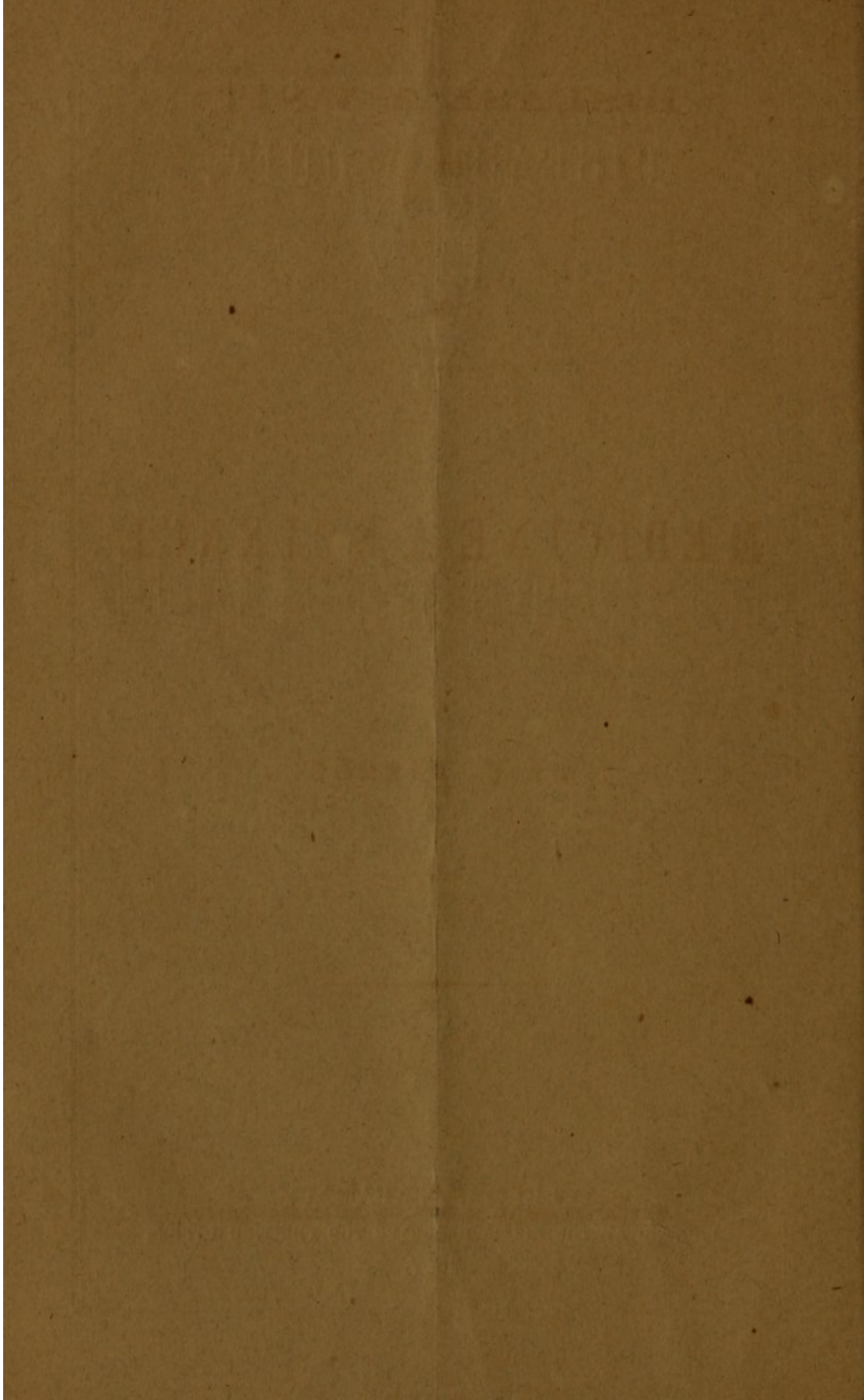
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## INTRODUCTION.

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"It is within our recollection, that when some one made a remark in his presence as to the value of his discoveries in the decomposition of the alkalies and earths, Sir Humphrey Davy observed: 'Perhaps you give me more credit than really belongs to me; others had invented the Voltaic battery. The time had arrived when it was to be applied to the purposes of chemistry, and it fell first into my hands.' Something like this may be said as to most of the great discoveries which have been made in the department of physical Science. Knowledge is, for the most part, slow in its progress. Among those engaged in the pursuit of it, there are few who do not add something, however small the contribution may be, to the general stock. At last, some one endowed with a more comprehensive genius, taking advantage of the labours of his predecessors, views the facts which they have collected in their relations to each other, traces analogies which they have overlooked, and from thence is led to further inquiries which open up new views of natural phenomena, and afford a deeper insight into the laws by which they are regulated."—*London Quarterly Review*, July, 1855.

In accordance with the foregoing we find that the Science of Astronomy was the Growth of ages; that its ultimate perfection by Newton, consisted, in great part, in his collecting together its scattered materials; in showing the Relation which the facts and their minor generalizations attained by his predecessors, and cotemporaries, from Pythagoras to Hooke, bore to each other.

So with Harvey's discovery of the 'Unity' of the Circulation. It was known to some of his predecessors and cotemporaries, that blood circulated in the veins, in the arteries, and in the lungs; but these were supposed to be distinct, specific systems, having no relation or connection. Harvey generalized; showed the Relation which these supposed distinct systems bore to each other,—connected them together.

And so it must be with all complex subjects which rest for their elucidation and establishment upon observation or experiment, and inferences therefrom; and it may be safely affirmed that any Theory of such complex subject which purported to be strictly new—new to those acquainted with the *subject matter*—could not by possibility be true. Facts, and their minor generalizations,



as they furnish the *conditions* of scientific generalization or Theory, must necessarily *precede* that generalization or Theory.

It follows that if complex Pathological phenomena are amenable to the Inductive method of investigation, whenever they are successfully generalized,—as generalized they may be, will be, since the Inductive and Deductive methods do not differ, in kind,\*—little that is new, or which is not *implied* in the knowledge of those acquainted with the subject matter, will be revealed; and if we are successful in our attempt to show the relation which pathological phenomena bear to each other,—if we are successful in our attempt to connect them together,—it will be because there are so few links of connection to be supplied, the work having been almost completed by others, our predecessors and cotemporaries.

\*Whately's Logic, pp. 207—210. Mills' Logic, 2d Book.



## DISEASE A UNIT ;

—OR,—

## MEDICINE A SCIENCE.

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For clearness and precision, we make the following sub-division of our argument :

1st. From the Analogy furnished by Astronomy, there is nothing in the present Empirical State of Medicine which forbids the conclusion that it is capable of being reduced to a demonstrative Science ; from Analogy, there is nothing in the Diversity of pathological phenomena which forbids the conclusion that all are produced by a common cause.

2d. The names of special diseases refer to organs, localities, and prominent symptoms, but do not imply states, or causes, and therefore do not obstruct the conclusion that all are produced by a common cause.

3d. All exciting or predisposing causes of disease, produce a common state, marked by the terms debility, dilatation, congestion, or obstruction.

4th. A definition of the terms, debility, dilatation, congestion, or obstruction, showing that they are marks of each other, and marks of Pressure.

5th. Induction ; or inferences from observation verified by experiment, establishing the fact that congestion—pressure—is a *vera causa* of several pathological phenomena, or, as they are called, special diseases.

6th. Ratiocination ; extending the inference on the basis of the previous step, from several to all pathological phenomena,—connecting them together.

7th. Verification by Experiment ; as in producing general congestion, and thereby producing all pathological phenomena.

8th. Elimination of the cause through Treatment,—another Experiment.

These points are so inextricably connected, afford such strong support to each other, that we shall not dwell at any considerable length upon either, except, perhaps, the 6th, or Ratiocination ; and the authorities adduced in the development of the subject matter, and in showing the extensive connections or generalizations already attained, will be admitted, it is presumed,



to belong to the first class. More might be added, did repetition beyond a certain point, add to the weight of testimony.

Turn we now to the argument—

1st. ANALOGY.—If Medicine is not destined to forever halt in the domain of Empiricism, if it be capable of becoming a Science, then there must be a common condition lying at the bottom of all special diseases,—then, from Analogy, all pathological phenomena must be connected through a common cause. These connecting links are the *materials* of Science,—the ‘Stuff it is made of.’

That there is nothing in the present Empirical State of Medicine—nothing in the doctrine that pathological phenomena are produced by distinct, specific causes, and therefore not capable of connection—which forbids the conclusion that all may be produced by a common cause, is seen in the fact that Astronomy was once in a state of Empiricism; that Astronomical phenomena were once thought to be produced by distinct, specific causes, and therefore not capable of connection.

That there is nothing in the Diversity of pathological phenomena which forbids the conclusion that disease is a unit, is seen in the fact that quite as great Diversity in what are called physical phenomena, have been reduced to a common Law.

“Complex and obscure as the laws of the material universe may appear to the superficial observer, surrounded by difficulties and lost in the maze of phenomena around him, he might be tempted, like the philosophers of old, to refer every effect to its own peculiar cause; a cause innate to the substance, essential to it, and animating like a soul. Far otherwise are the conclusions arrived at by him who, patiently investigating the appearances of the material world, is guided by the inductive reasoning of the Baconian school; *he* traces effects to their proximate causes, and generalizing these, is led to the discovery of a few simple laws, obeying which, atom unites to atom, and mass to mass, to form a world, rolling in its appointed sphere around the centre of our system, the great source of light and heat; *he* soon discovers that, in the beautiful simplicity of Nature’s laws, the apparently most insignificant, and the most gigantic effects are frequently produced by one and the same cause; *he* discovers that the very law which presides over the motions of the luminous orbs which roll in space around him, causes the scattering of flour from the edge of the mill-stones, and of drops of water from the wet revolving carriage-wheel. That the law regulating the falling of an apple towards the earth, is identical with that which retains the mountains on their broad basis, and the planets in their spheres. Nay, more, he learns that with such consummate wisdom have cause and effect been related, that the very same power is often sufficient to produce effects apparently totally opposed. Thus, the force by which the Ocean is retained in its bed is the same as that by which the ships float upon its surface, the law which regulates the velocity of a falling avalanche, is identical with that by which



the balloon ascends in the air—and the power by which the torrents in the falls of Niagara acquire their terrific velocity, is the same which has retained unmoved for ages, the solid rocks from which they descend.”—*Bird's Natural Philosophy*, p. 99.

2d. The Names of special diseases refer to organs, localities, and prominent symptoms, but do not imply states or causes, and therefore do not obstruct the conclusion that all are produced by a common cause.

Language, though a great, is not an unmixed good. ‘Being a powerful instrument for fixing ideas in the mind, it gives equal aid to the false and the true, and thereby tends to perpetuate the reign of whatever errors have once been clothed in words.’ A natural tendency of language is to fix in the mind the idea that everything has a *separate existence* which has a *separate name*; and it requires long experience and familiar acquaintance with the subject matter, to eliminate the error. To a person unacquainted with the subject matter, the separate names, Atlantic, Pacific, Indian, Northern and Southern Oceans, fixes in his mind the idea that there are separate existences, or separate and distinct bodies of water, corresponding to those names. In Pathology, names are necessary as marks put upon organs, localities, and symptoms, to render them subjects of discourse; but like those before mentioned, they do not imply separate existences, or causes. To illustrate: “Congestion of the intestines, causes diarrhœa; Congestion of the uterus, leucorrhœa; Congestion of the kidneys, watery, and sometimes albuminous urine; Congestion of the lungs and pleura, hydrothorax; of the heart, hydropericardium; of the abdomen, ascites, &c. (*Williams' Principles*, p. 159.) Now if the names diarrhœa, leucorrhœa, albuminuria, hydrothorax, hydropericardium, ascites, &c., were connotative, if they implied states or conditions, it is evident that their connotation would reside in the common condition—Congestion—as the cause of all. We shall hereafter see the whole list of special diseases arise from Congestion, and if their names went to the bottom, if they went down to conditions, they would connote this common condition, would *imply* ‘Unity’ in disease.

3d. All exciting or predisposing causes of disease, produce a common state, marked by the terms, debility, dilatation, congestion or obstruction.

A certain degree of pressure on the brain produces convulsion; the exciting cause may be a stick, a stone, a piece of metal, a spicula of bone, the finger, or blood: yet it is not to anything distinctive in the exciting cause, or in its operation, that we are to attribute the convulsion: it is in the point of agreement—pressure—that we are to seek the proximate cause.

“As the most proper commencement of a systematic treatise on Surgery, we shall begin by describing a state commonly known as *prostration*, *collapse*, or shock to the nervous system; by which terms we signify that general depression of the powers and actions of life, which immediately follows any



severe injury, such as a compound fracture or gun-shot wound. Causes: Great and sudden extremes of grief, or joy, or fear, or cold; large doses of any active poison, such as arsenic, or sulphuric acid, or tobacco; the sudden impression of miasmata, or of morbid poisons, as the plague; great loss of blood and mechanical injuries."—*Druitt's Surgery*, 1st Chapter.

"*Debilitating* causes of predisposition are the most numerous of any. So we might expect from the fact that constitutional strength generally implies power of resisting disease. The weakness which renders the body liable to disease is that especially which enfeebles the heart and impairs the tone of the arteries; it is often accompanied with an unusual susceptibility of the nervous system, which increases the liability of the body to suffer. The following are the chief of this class: Imperfect nourishment—impure air—excessive exertion of body or mind—want of exercise and sedentary habits generally—long continued heat—long continued cold—habitual intemperance with intoxicating liquors—depressing passions of the mind, such as fear, grief, and despondency—excessive and repeated evacuations, either of the blood or of some secretion—previous debilitating diseases. Hitherto we have considered only those circumstances which predispose to disease by their weakening influences. There are others of a somewhat opposite character, which favour the production of disease by a state of excitement or activity."—*Williams' Principles of Med.*, pp. 23—28.

"Caloric, or heat, as it is commonly termed, acts as a stimulant when applied to the animal body its effects being local or general according to the extent and degree of its application; it increases, like most other stimulants the action of the heart and blood-vessels; but (as is also the case generally with stimulants), a secondary effect occurs, which consists in a collapse (or in an action lower than that which is natural) after the excitement has subsided. Effects exactly the reverse of these take place from the abstraction of caloric, or, to use the common phrase, from the application of cold. Heat is therefore a stimulant, and cold a sedative."—*Cyc. Pract. Med.*, Art. Cold.

This extract illustrates this important point, viz.: that stimulants and sedatives produce a common state—'an action lower than that which is natural'—secondarily in the case of stimulants, and primarily in the case of sedatives.

"Malaria, and the influences which produce continued and exanthematous fevers, seem to have the same effect as external cold, but it is not so easy to explain how they operate. The cold stage of these diseases exhibits in a high degree the marks of intropulsive congestion; and it is well known that in ague the congestive enlargements of the liver and spleen are among its most remarkable phenomena. The congestions remaining during the febrile stages of fevers, seem to be the chief causes of their inflammatory complications."—*Williams' Principles*, p. 152.

"The direct effect of most of this class of causes (Infectious) is



*depressing*, and where they are strongest and prevail most, the resulting disease is one of depression, adynamia, asthenia, or prostration of the vital powers. These causes, as exhibiting a noxious property opposed to life, are therefore commonly called *specific poisons*. But there is the antagonist principle of vital resistance in the system, which leads to various processes of reaction, which may be exhibited in different degrees, according to the relative strengths of the poison and of this resisting power."—*Ibid*, p. 67.

"It appears from the preceding pages that weakened action of the heart is the effect, directly or indirectly, of the remote causes of fever. This therefore, is a link of the chain of causes and effects extending from the remote causes to the symptoms of fever. This conclusion is confirmed by the fact long since ascertained, that all fevers are preceded by weakened action of the heart."\* — *Cooke's Pathology and Therapeutics*, Vol. 1, p. 344.

4th. A definition of the terms debility, dilatation, congestion, and obstruction, showing that they are marks of each other, and marks of Pressure.

As these terms are applied indiscriminately to the heart and capillary, we will draw our illustration from the former; and it will be seen that they are marks put upon a *relatively increased pressure of blood to the returning pressure of the heart*.

*Hope on the heart*, page 293 :—

"Dilatation of the heart is a purely mechanical effect of over-distention.—Blood, accumulated in its cavities (congestion), exerts a *pressure* from the centre towards the circumference in every direction; and when once it surmounts the resistance offered by the contractile and elastic power of the parietes, these necessarily yield and undergo *dilatation*." "Taking into consideration this form alone, (simple dilatation), and admitting on the foregoing grounds, that it is capable of producing all the phenomena of an obstructed circulation, we have next to inquire how, or by what mechanism it produces them. To answer this question—it produces them by putting the muscular fibres preternaturally on the stretch, whereby their contractile power is diminished: "they lose, as it were, in force what they gain in length;" and it is this deficiency of power (debility), in the mainspring of the circulation which constitutes the obstacle (obstruction), if it may be so called, to the circulation; in the same way that weakness of the spring of a time-piece retards its movements."—*Ibid*, page 299.

We here see that the terms debility, dilatation, Congestion and obstruction, are marks of each other, and marks of pressure. Under our 6th division—that of Ratiocination—this will be amply illustrated and confirmed.

5th. Induction:—or inferences from observation verified by experiment—establishing the fact that congestion, pressure, is a *vera causa* of several pa-

\*Boerhaave's Practical Aphorisms, 563. Cullen's First Lines, 34, 46. Darwin's Theory of Fever, Supplement, 1, 1, 6. Rush's Works, Vol. 3, pp. 3, 4.



thological phenomena ; or, as they are called, special diseases.

“The effects of pressure have often been observed by experiments on animals. If the cranium of a dog is trepanned and pressure performed on the *dura mater* to a *certain extent*, the animal shows signs of great uneasiness, and is affected with general convulsions ; if the pressure is *increased*, the convulsions cease, the breathing becomes stertorous, the animal torpid and comatose ; if the pressure is *diminished*, the breathing becomes more free and the convulsions return ; and if it is entirely *removed*, the animal soon completely recovers. The principal causes of pressure are congestion, effusion, &c.”—*Cyclopædia, Pract. Med. Vol. 1, page 316.*

“I confess that the difficulty is not wholly relieved by these considerations. But it is a difficulty which cannot invalidate the evidence of numerous facts that attest the agency of pressure, as, at least, one cause of Coma. The presumption of agency arises whenever Coma immediately succeeds to pressure ; and it is converted into certainty if, upon the removal of pressure, the Coma immediately departs. Now the annals of physic are full of instances of this kind. In experiments upon animals, stupor has been brought on, and made to cease, at the pleasure of the operator, by applying pressure to the exposed brain, and by remitting that pressure. Nay the experiment has been tried on the human brain itself. A man who had undergone the operation of trepanning, and had recovered, was in the habit of exhibiting himself for money in Paris, where Haller saw him. He suffered the spectators to make pressure upon his brain, where it was covered by the integuments only. This always put him into a state of coma or deep sleep ; but sensibility and the power of voluntary motion returned at once when the pressure was taken off.”—*Watson's Practice, page 310.*

“In one rabbit I tied the jugular veins on each side of the neck. When it was at liberty, it ran about, cleaned its face with its paws, and took green food.

Its respiration was reduced to sixty-eight inspirations in a minute, which is about half the natural number. After four hours it ran about as if nothing had happened, and eventually recovered.

When it was killed and injected, I found, on each side, three anastomosing veins, passing from the anterior to the posterior part of the jugular veins, and conveying the blood from the head to the heart ; but the vertebral vein had remained whole, and become enlarged ; and it passed on the forepart of the vertebra, from the head to the space between the fourth and fifth cervical vertebra, where it entered the vertebral canal.

In a second rabbit, I tied the jugular veins on each side of the neck as before. The animal's respiration became slow, but it ate green food, ran about, and was difficult to catch ; but for five days after it appeared dull ; its ears had dropped. On the seventh day it was seen to be convulsed, and frequently rolled over. Its voluntary powers were lost, as well as its sensation, in a



great degree. On this day it died. On examination a clot of blood was found extravasated in the left ventricle of the brain. Hence it follows that apoplexy will occasionally result from an obstruction to the return of blood in the jugular veins; and this I have known to happen from enlargement of the glands in the neck of a boy."—*Sir Astley Cooper's Experiments. Guy's Hospital Reports.*

"The adequacy of venous obstruction to produce dropsy, is well illustrated by some experiments of Lower. He tied the jugular veins of a dog, expecting the animal to die of apoplexy; instead of this result, the face and head of the animal became much swelled with œdema. He then tied the ascending cava; ascites and anasarca of the lower extremities were the result. Disease affords numerous examples of dropsy and flux from venous obstruction."—*Williams' Principles of Medicine, page 182.*

"The fact, then, which is beyond dispute, of the frequent pre-existence of local engorgement and distention of the capillary circulation, gives support to the hypothesis that, (in certain cases at least,) the issue of blood results from pressure, whereby the blood in substance is urged through passages naturally impermeable by its red particles, but now mechanically dilated in consequence of the *vis a tergo*. Although the dilatation cannot be made sensible to the eye, this seems the simplest and most obvious explanation applicable to some forms of idiopathic hemorrhage, and to the secondary species of that which is symptomatic. That blood may be thus exhaled, independently of any disease of the vessels themselves, we know from experiments made on animals, and from the observation of what sometimes occurs in the healthy human body. Boerhaave produced hemorrhage into the intestinal canal of a living dog by placing a ligature on the vena porta. An extreme turgescence of the whole venous system is one of the results of sudden strangulation. Dr. Yelloly accordingly found such turgescence conspicuous in the bodies of five criminals who had recently suffered death by hanging; and in two of these instances, blood in considerable quantity had exuded from, and coagulated upon, the mucous membrane of the stomach."—*Watson.—Art. Hemorrhage. Cyclopaedia, Pract. Med.*

6th. Ratiocination:—extending the inference, on the basis of the previous step, from several to all pathological phenomena—connecting them together.

To recapitulate:—It has now appeared, 1, from Analogy, that there is nothing in the present state of Medicine which forbids the conclusion that it is capable of being reduced to a demonstrative science—nothing in the diversity of pathological phenomena which forbids the conclusion that all are produced by a common cause. 2. That the names of special diseases refer to organs, localities, and prominent symptoms, but do not imply states or causes, and therefore do not obstruct the conclusion that all are produced by a common cause. 3. That all exciting or predisposing causes of disease, produce a common state, marked by the terms debility, dilatation, congestion



and obstruction. 4. That these terms are marks of each other, and marks of pressure. 5. That congestion, pressure—venous congestion, a retrograde pressure of venous blood—is a *vera causa* of flux, hemorrhage, dropsy, pain, convulsions, coma and apoplexy. We have thus obtained the inductive step to the general conclusion that debility, congestion, or pressure, is the cause of ALL pathological phenomena—that venous congestion, a retrograde pressure of venous blood, is the cause of all *constitutional* diseases—and if it hereafter appears that congestion is *common to all*, that venous congestion is common to all constitutional affections, that it precedes and coexists with all, then that general conclusion will receive, if not demonstration, at least very strong support.

The chief illustrations of our argument will be drawn from the heart. As the same doctrines are held with respect to the heart, that are held with respect to the capillary, and as the same terms are indiscriminately applied to each, it will follow that what is true of the former, is true, in kind, of the latter.

We shall see that Dilatation of the Heart, corresponds to Congestion of the Capillary, to Ague of the system, and to all Passive diseases; and that Dilatation with Hypertrophy of the heart, corresponds to Reaction or Inflammation of the Capillary, to Fever of the system, and to all Active diseases.

We shall see that Dilatation, and dilatation with Hypertrophy of the heart, are produced by congestion, pressure; and then it will follow that all *passive* and *active* diseases are produced by pressure also.

*Degree* and *duration* of congestion or pressure, are elements, are essential to the recognised developement of certain pathological phenomena. This is illustrated in the heart. A certain *degree* of congestion or pressure, excites the heart to *increased* action, which, if continued for a certain *time*, results in hypertrophy; but if the congestion or pressure passes a certain degree, it *diminishes* the action of the heart; so that *diminished* action and *increased* action, or dilatation and hypotrophy, are produced by the same cause, differing only in *degree*; and as they apparently differ as much from each other as do any pathological phenomena, it is not necessary to assume a cause, distinct in kind, to account for Diversity.

Two parties have long contended with each other, the one, that inflammation was the result of *diminished* action, the other, that action was *increased*. If we are correct in what we have now stated, it will appear that, as is usual in such cases, truth lies between; that the process is compounded of both; that it is dilatation *with* hypertrophy, the action being *diminished* by the dilatation, and *increased* by the hypertrophy.

To bring the whole subject clearly into view, we throw it into a form of the Syllogism; the validity of the argument as a whole, depending upon its establishing the truth of the Major Premiss.

All pathological phenomena are produced by pressure; dilatation, and di-



latation with hypertrophy of the heart, are pathological phenomena ; therefore they are produced by pressure.

"Dilatation of the heart is a purely mechanical effect of over-distention.—Blood, accumulated in its cavities, exerts a *pressure* from the centre towards the circumference, in every direction ; and when once it surmounts the resistance offered by the contractile and elastic power of the parietes, these necessarily yield and undergo dilatation."

"The reader must here again be reminded that the exciting causes of dilatation are equally those of hypertrophy ; and that, supposing no unknown agencies to interfere, as may sometimes possibly happen, it depends on the *proportion* which the cause bears to the reacting energy of the cavity exposed to its influence, whether that cavity become affected with dilatation, with hypertrophy, or with a combination of the two."—*Hope on the heart*, p. p., 293., 252.

"The causes of hypertrophy and dilatation are often the same, though acting upon different principles. Whatever stimulates the muscular action of the heart may produce the former affection ; whatever has a tendency to distend the walls, may produce the latter. Now no stimulus is greater probably to the muscular fibres than the *pressure of the blood* within the cavity they surround ; and no cause tends more strongly than this to produce distension."—*Wood's Practice*, vol. 2. p. 167.

We have seen that a relatively increased pressure of blood to the returning pressure of the heart or blood-vessel, was marked by the terms debility, dilatation, congestion, and obstruction. Increased action, increased pressure, is marked by the terms re-action, inflammation, fever and hypertrophy.

Dilatation, then, is congestion ; and hypertrophy, re-action ; and as dilatation and hypertrophy are produced by pressure, therefore, congestion and reaction, are produced by pressure.

As dilatation with reaction or hypertrophy, and congestion with reaction or inflammation, and debility with reaction or fever, have the same antecedents or cause ; and as dilatation with reaction or hypertrophy, is produced by pressure, therefore, congestion with reaction or inflammation, and debility with reaction or fever, are produced by pressure also.

In looking at the condition of the heart in Dilatation with Hypertrophy, then, we see the condition of the Capillary in Inflammation ; and in looking at the condition of the System in Dilatation with Hypertrophy of the Heart, we obtain a *full length likeness* of the condition of the System in Fever.

An appeal will now be made to individual facts and their minor generalizations in support of the proposition that all pathological phenomena are produced by pressure ; and in making this appeal it will at the same time appear that inflammation, fever, and hypertrophy, have the same antecedents or cause ; and that the terms debility, dilatation, congestion and obstruction, are used indiscriminately as marking the antecedents or cause ; while increased action will be seen to be marked by the terms reaction, inflamma-



tion, fever, and hypertrophy. To these points we solicit particular attention.

"It may be said, generally, that when *Congestion* is constant in a cavity, *dilatation* is more commonly the result; and that when there is only resistance to the expulsion of the blood without constant congestion of the cavity it is more common for hypertrophy to be produced. Contraction, for instance, of the aortic orifice causes hypertrophy of the left venticle in a greater degree than dilatation; whereas, patescence of that orifice, attended with regurgitation and constant engorgement of the cavity, causes dilatation in a greater degree than hypertrophy."—*Hope, on the heart, page, 252.*

"Retardation of the flow of blood in the small vessels, coincident with dilatation of their calibre, and accumulation, and at last stagnation of the blood corpuscles in the vessels, constitute the first phenomena constantly appreciable by the microscope in the inflammatory process as seen in the frog. The *macroscopical* phenomena of inflammation in man, being similar to those observed in the frog, seem to warrant the inference, that the *microscopical* ones also are essentially the same in him as in the frog. The explanation of these phenomena, therefore—their sequence and relations—is justly considered the key of the whole theory of inflammation.

That the dilatation of the small vessels is primary, and the retardation of the flow of blood in them is secondary,—the necessary physical result of the preceding *dilatation*—is the opinion of most recent authors."—*Jones' Ophthalmic Med. page 59.*

"If we wish to advance a step farther and tread in the regions of hypothesis, then it seems a reasonable doctrine, that the primary disturbance of the functions of the nervous system acts first on the capillaries or extreme vessels of the surface, as well as throughout the internal organs, and produces, not spasm, as was imagined by Hoffman and Cullen, but rather, according to modern views of the state of the capillaries in inflammation, a state of atony, relaxation, and distension, and consequently obstruction to the passage of the blood, that the disturbed state of the circulation is an effort excited by the stimulus of this *obstruction* for accomplishing its own removal."—*General Doctrines of Fever. Tweedies' Library of Practical Medicine, pp., 168-9.*

"In the same way, when, from mechanical obstruction or any other cause, blood is inordinately accumulated in the heart, the organ is provoked to extraordinary efforts; it struggles against the *obstacle*; it frets and labours to overcome it; the coronary arteries are excited to increased activity; augmented nutrition (hypertrophy) ensues."—*Hope on the Heart, page 244.*

"Whence it appears, that then (in the cold fit) the bloody humours do stagnate at the ends of the capillary vessels, and that there is, notwithstanding at the same time some cause that irritates the heart." "So that the too quick contraction of the heart, with an increased *resistance* at the ends of the capillary vessels, is sufficient to complete in us the idea of all acute fevers."—*Boerhaave's Aphorisms, 577. 581.*



"It is therefore evident that there are three states which always take place in fever; a state of *debility*, a state of cold, and a state of heat; and as these three states regularly and constantly succeed each other in the order we have mentioned them, it is presumed that they are in the series of cause and effect with respect to one another. This we hold a matter of fact, even although we should not be able to explain in what manner, or by what mechanical means these states severally produce each other."—*Cullen's first Lines*, 37.

"We have stated that absolute plethora was the parent of pure inflammation. Previously to the occurrence of febrile or inflammatory action, there is always a sensible interval of disease marked by evidences of diminished power in the arterial system, the oppressed and irregular actions of which evince its inadequacy to carry on the circulation with its wonted vigor. The pulse, if examined, will be found low, oppressed, irregular; which state passes progressively into one of permanently *increased action* or *fever*. Multiplied observations have satisfied us both that the stage of disease here mentioned precedes that of febrile action, and that the morbid actions indicated by the pulse succeed each other in the order here mentioned; the first being that of *feebleness* or over loaded power, the second of irregularity, and the third of permanently quickened action."—*Art. Plethora, Cyclopaedia Pract. Med.*

"The physical cause of (of hypertrophy,) in nineteen cases out of twenty, is some obstacle, mechanical or virtual, to the perfect accomplishment of the function of the chamber; some *obstruction* opposed to the free and thorough exit of the blood from it; or something which hinders the easy play of the organ: hence, in the first place, a gradual yielding, or tendency to yield, in the sides of the affected chamber, from the continual and unwonted pressure of the accumulated blood against them, and in the second place, a *striving* action (reaction) of the muscle to overcome the hindrance, or to counterbalance the obstacle; and consequently, according to the law formerly announced, an augmentation in the bulk of the muscle whereof the function is thus *increased*. If the hypertrophy, which is the result of a truly conservative process, keeps pace exactly with the amount of the obstacle and exactly balances it, no dilatation happens, or next to none. But this is comparatively seldom the case. According to the principles of mechanics, a little distension of the spheroidal cavity must require an increase of force to propel from it a given quantity of blood, in the same time, through a given discharging orifice. So that incipient *dilatation* becomes (in addition to the supposed obstacle) an efficient cause of hypertrophy: and the two, the dilatation and the hypertrophy, commonly make progress together."—*Watson's Practice*, p. 661.

"When the arm is tied for venesection, the parts beyond the ligature become congested. At first the hand feels rather warmer than usual, and somewhat tender, from the distension of its vessels with warm blood, but it soon becomes numb, cold, and weak, showing that the want of



circulation lowers its vital properties. In like manner, simple congestion generally impairs the vital properties of internal organs, although the undue distension of their textures by the increased mass of blood, may cause partial excitement. Natural contractility and sensibility are lowered, whilst pain, spasm, and morbid sympathies are often produced, but in a manner less distinct and constant than in inflammation or determination of blood. Thus congestion of the liver is sometimes accompanied by pain or tenderness; sometimes it is without either. Congestion of the stomach sometimes causes gastralgia, nausea, and vomiting, and altered appetite; but these symptoms are often absent when the amount of disease of the liver or heart, and the subsequent occurrence of hæmatemesis, leave no doubt that the stomach was congested. The same remark is applicable to the kidneys, the uterus, the brain, and other organs. We often see the tonsils and uvula congested without pain or soreness. Impaired nervous and muscular function is a more constant concomitant than pain or any symptom of irritation.

The natural *secretions* of congested parts are some times at first *augmented*, as in congestion of the conjunctiva and schneiderian membrane from cold; but more generally they are *diminished*, as in bronchial congestion, and congestion of the liver, kidneys, &c. But very commonly, congestion leads to an increased transudation from the whole distended capillaries, causing effusions of the watery and saline part of the blood, more or less impregnated with albumen, and sometimes even with fibrine, as exemplified in the fluids of fluxes and dropsies.

But the distention of the congested capillaries sometimes leads to a general exhalation of their more watery contents, which, mingling with the natural secretion, renders it watery and sometimes albuminous. Thus congestion of the bronchi sometimes ends with bronchorrhœa. Congestion of the intestines causes diarrhœa; congestion of the uterus, leucorrhœa; congestion of the lungs and pleura, hydrothorax; of the heart, hydropericardium; of the abdomen, ascites, &c.

The element of congestion chiefly concerned in the production of these effusions, is extreme distention of the vessels. They are less commonly found, therefore, in mere hypostatic or gravitative congestions, in which the distention is inconsiderable, but they more result from congestions from venous obstructions, especially when these occur suddenly, whilst the vigor of the circulation is not impaired. Thus the congestions connected with diseased heart or liver, produced by acute attacks or other additional causes of obstruction, especially in plethoric subjects, if not soon removed, are pretty sure to end with dropsy, flux, hæmorrhage, or inflammation. The circumstances which determine which of these results shall ensue, will be considered when we come to these proximate elements of disease; but it may be mentioned that besides distention of the vessels, the condition of the blood considerably influences the result; a watery state promoting the transudation, whilst a highly albuminous and fibrinous blood, requires more pressure to



make its watery parts pass through the coats of the congested vessels.

The same circumstances determine the character of the effused fluid. When the blood is poor, the watery parts easily pass from congested vessels, even without much distention, and contain but little albumen. But if the blood abounds in the protein compounds, more pressure is required before much effusion takes place: and then, when the pressure is great, the fluid effused often contains, not only albumen in large proportion, but self-coagulating fibrin also.

Fluxes arising from congestion of high tension exhibit an unusual amount of animal matter of an albuminous or mucous kind, as instanced in bronchorrhœa, mucous diarrhœa, and leucorrhœa. I have been induced to suppose that the polypous concretions and pseudo-membranous films occasionally effused on mucous surfaces, may result from long continued congestion, with a highly fibrinous state of the blood. I have seen these evacuated from the air-tubes in one case, and in several others from the intestines, from time to time, for months, and even for years, without symptoms of inflammation, but under circumstances rendering it probable that congestion was present. Extensive disease of the heart existed in the former case, and disease of the liver or amenorrhœa in the latter.

I have, for several years, referred albuminous urine to congestion of the kidney; and this view has been lately confirmed by some experiments by Mr. G. Robinson. The following considerations led me to entertain this opinion: 1. The urine often becomes albuminous, during great embarrassment of the circulation in cases of organic disease of the heart or lungs, when the kidneys are otherwise healthy. 2. I have, in many instances, observed temporary albuminuria during the cold stage of ague, and the congestive stage of eruptive fevers. 3. In granular degeneration of the kidney, the amount of albumen in the urine is augmented by circumstances causing congestion of the kidney, and is reduced by remedies suited to remove this. 4. The most common form of Bright's disease of the kidney in its earliest stage, presents the appearance of a highly congested structure, and is excited by causes calculated to produce congestion, such as frequent irritation of the kidneys by stimulating liquors—congestion from exhausted tone; continued exposure to cold, especially after the kidneys have been thus excited—congestion from intropulsion. 5. The albumen in the urine abounds most in the congestive (first) stage of Bright's disease—the vessels becoming more or less obstructed in the progress of the disease, by a deposit of fibrin with granular cells in the tubules, and in some instances around them, which deposit, at the same time, perpetuates some degree of congestion, whilst it supercedes the proper secreting structure.

From what has just been stated it may be inferred that congestion, if continued, may affect the nutrition and structure of textures. It generally tends to cause an increased deposit in them, constituting a variety of hypertrophy or over-flow of plastic matter. Thus with diseases of the heart which cause



congestion, there is an increase in the weight of the viscera generally, more particularly of the lungs and liver. The enlargement of the liver and spleen from long attacks of intermittent fever (called ague-cake) may probably be referred to the congestion which this disease is known to induce. I have known a similar enlargement of these organs to ensue, after long continued exposure to cold and damp.

When a congestion is extensive it has constitutional as well as local effects. In proportion as blood accumulates in excess in a part, it leaves the rest of the body with less than its proper share, and the limbs and surface generally may show various symptoms of weak circulation and want of blood. Thus with considerable congestion of the lungs, liver, or brain, the surface is pallid and chilly, the pulse weak and small, the extremities cold, there is a peculiar feeling of languor or weariness, and all the functions are indifferently performed. Such an effect on the system may be produced artificially, by applying a tight bandage around both thighs at once, or even both arms in a weak person: the limbs beyond the ligature become congested, leaving a deficiency of blood in the rest of the system. The extreme of this condition is the cold fit of an ague, in which extensive internal congestions are the most essential pathological change.

As in this example, so with other extensive congestions, more especially if suddenly induced, as by cold, a reaction may ensue, causing quickened pulse and circulation, hot skin, and other phenomena of *fever*. Where this reaction is vigorous, it may fulfil its object in sweeping back the congested blood into the circulation, and thus restoring the balance. Where the reaction is weak, it will fail to remove the congestion, but constitutes a low feverish excitement, often remittent in type, with depraved functions, foul tongue, impaired exertions, restless nights, &c., which may proceed for an indefinite period, until a critical evacuation by sweat, urine, or diarrhoea terminates it, and with it sometimes the congestion which has induced it."—*Williams' Principles of Medicine*, pp. 158, 160.

"I say the blood may undergo important alterations in its *quantity*. It may exist in too great abundance throughout the body; and it may exist in too great abundance in certain parts only of the body. These states have been recognised for ages. Sometimes they are called respectively general and partial *plethora*: Sometimes general and local *congestions* of blood; people speak also of irregular *determinations* of blood to different organs; and, of late, the term, *hyperæmia*, first invented by M. Andral, in France, has been imported into this country, and much adopted here. All these words and phrases mean in truth the same thing; and their frequent recurrence in medical works, is, of itself, sufficient evidence of the frequency and importance of the conditions which they express.

If we comprehend rightly this subject of plethora or congestion, we shall be prepared to understand some most important morbid states, of which it seems to be in many, if not in all cases, the earliest approach—the initial



step. Inflammation, hemorrhage, dropsy, all acknowledge and imply a previous condition of congestion. 'There is, probably,' says Dr. Alison, 'no kind of diseased action of which the body is susceptible which is not connected, sooner or later, with increased afflux of blood towards that part, either as its cause or its effect; and the immediate object of all our most powerful remedies is to act on these irregularities of the circulation.'—*Watson's Practice*, p. 41.

"The terminations and consequences of Debility are (a) impeded or interrupted secretion; (b) changes of the circulating fluids; (c) various states of irritation or inflammatory action in particular organs or tissues; (d) general reaction of the vascular system associated with various grades of vital power, from the lowest or most asthenic, to its highest or most sthenic form, with their modifications; (e) changes in the firmness, elasticity, nutrition, colour, form, and vital cohesion of the soft solids, and, in some instances, ultimately in the hard solids also; (f) effusion of fluids (aqueous, serous, sanguineous, &c.) from mucous or serous surfaces, or in cellular or parenchymatous structures; (g) The production of numerous forms of organic change; (h) The formation of new or adventitious tissues or productions, as tubercles, tumours, melanosis, cancer, hydatids, worms, gangrene, &c., and; (i) lastly, Death, which may occur directly from the intense action of the depressing cause, but more commonly through the medium of one or more of the changes now enumerated, the first and greater part of which often take place consecutively."—*Copland's Med. Dictionary*, Vol. 1, page 555.

"His (Brown's) theory differed, in no essential respect from that of Cullen's. 'Like his predecessor,' says Dr. Smith, 'Brown attributes all fevers to debility; and affirms that the distinctions which physicians have made about the differences of fever are without foundation; that they are all the same, differing only in degree; that the debility during the cold stage is the greatest; that of the hot less; that of the sweating stage, which ends in health for a time, is the least of all; hence, in a mild degree of the disease, as cold is the most hurtful power, its effect is gradually taken off by the agreeable heat of the bed or of the sun, and the strength thereby gradually drawn forth; that the heart and arteries gradually excited by the heat acquire vigor, and at last, having their perspiratory terminations excited by the same stimulus, the most hurtful symptom is thereby removed, the hot fit produced, and afterwards the same process carried on to the breaking out of sweat; that the cause of all these diseases, from the simplest and mildest intermittent to the gaol fever and the plague, is the same with that of diseases not febrile, to wit, debility; differing only in this that it is the greatest debility compatible with life, and not long compatible with it.'—*Treaties on Fevers*. Olymer, &c., page 48.

"The views entertained, and so long taught by our distinguished countryman, Dr. Benjamin Rush, may not inappropriately be noticed here. We shall borrow the excellent analysis of them by the learned editor of the American edition of Dr. Copland's Dictionary."



"As Dr. Rush confined the whole catalogue of diseases to a single class, and called the whole assemblage a *unit*, so also he reduced all fevers to one, maintaining that they differed only in *degree*, and that every form or variety of disease consists in *irregular action*, and that this irregular action, in its turn, is the approximate cause of every form or modification of disease. All the varieties of disease, according to his system, are owing to the difference in the state of predisposition, and in the difference in the force of the exciting or acting causes."

"Rejecting that part of Brown's doctrine which teaches that debility, carried to a certain degree, is disease, whether occasioned by the abstraction of natural or customary stimuli, or by their excessive action, exhausting and expending excitability—which, in the former case, Brown called direct debility, and in the latter, indirect debility, and which he supposed required the application of stimuli of very different powers to restore the deficient excitement to a healthy grade—Dr. Rush held that debility, whether induced by the abstraction of stimuli, or by the excess of their action, is the only predisposing cause of disease. In both cases he supposes the debility which gives the predisposition to disease, is occasioned either by causes that abstract the stimuli necessary to support the healthy action of the several functions of the body (and the debility from these causes he calls the debility of abstraction), or by such preternatural or unusual stimuli as, after first elevating the excitement of the system above its healthy grade, and thereby wasting part of its strength, afterwards reduces it down to that state of debility which he calls the debility of action. And he considers the debility to be the same, whether brought on by the former or the latter causes; for the effect is an increase and accumulation of excitability, or an increased disposition to motion in both cases, and disease, or irregular action, the necessary consequence of the action of stimuli upon the excitability thus generated and accumulated." —*Ibid*, pp. 48. 49.

"Theories of Inflammation:—Two opposite opinions have of late divided pathologists. Both parties admit that the capillaries are *dilated*, and contain a larger amount of blood than in health; but they differ widely as to the state of action in the capillaries. By one party it is maintained, that these vessels are in a state of *increased* action, at least in the early stage of the inflammation and that the phenomena are the direct result of an excessive exercise of the vital properties of the part affected; by the other, that they are in a condition of *debility*, at least in relation to the larger vessels from which they are derived, and that their expansion is the result of a loss of balance between the resisting force of the capillaries and the *vis a tergo*."—*Wood's Practice*. Vol. 1, p. 42.

"The causes of dilatation, are, 1st., deficient power of the heart, whether congenital or acquired, in proportion to the system; 2d, in general terms, all obstructions to the circulation, whether situated in the orifices of the heart,



or in the aortic, or pulmonary system.\* The second class of causes is, in fact essentially the same as the exciting causes of hypertrophy, independent of inflammation. For, as stated under hypertrophy, it depends on the proportion which the resistance of the muscle bears to the distending force, whether the one affection or the other be produced. When, therefore, dilatation occurs in one of the cavities with naturally thick walls, in which we should more properly expect hypertrophy, it must be ascribed, either to a congenital disproportion of the heart, in consequence of which the cavity in question is thinner, and therefore more disposed to dilatation, than natural; or it must be attributed to the obstruction, from its nature or situation, bearing more in proportion on that particular cavity than on any other. It is from overlooking these considerations, respecting the *relations* of the resisting and distending forces to each other that some have excluded dilatation from the catalogue of mechanical diseases, and supposed that it takes its rise in any cavity of the heart either by chance, or by some vital predilection, some vague unintelligible predisposition."—*Hope on the Heart*, pp. 293-4.

"Now, what I have just stated is the distinction between hypertrophy and inflammation; their general pathology has much in common—their causes are often alike—their modes of production identical. But in hypertrophy, however large may be the supply of blood, it all goes to the true nourishment of the organ, goes to increase the number of its natural molecules; while in inflammation, all that is redundant goes to the formation of new products.—After what I have said of the pathological affinities of these two processes, it will not surprise you to be told that in many organs of the body hypertrophy and inflammation run into one another by almost insensible gradations—as, for instance, with secreting surfaces, where after a certain time, that which produced at first a mere excess of secreted material presently causes to be mixed with that secretion more or less albumen, fibrin, blood, pus, and the like."—*Simons' General Pathology*, p. 67.

"Apoplexy, long as this term has been familiar to the profession, still conveys a very indefinite meaning. Some authors use it to distinguish a particular class of symptoms and effects of disease; others to distinguish the pathological condition which gives rise to the symptoms. I think that it is applied too generally to the effects of disease, instead of the cause. The classification of diseases of the brain which I have adopted is founded on pathology, not on symptomatology. I propose using it to designate *pressure on the brain* or encephalon, produced by extravasation of blood or serum, or by distention of the vessels without extravasation, such extravasation not being the result of violence, as a blow upon the head. Wherever I employ

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\* "The causes of congestion, always mechanical, may be divided into two great classes, which we often find conjoined. 1st. Those causes that act by obstructing the return of the blood through the veins; 2d. Those that act by enfeebling the walls of the capillaries and veins so that they are no longer able to withstand the outward pressure of the contained blood."—*Erichsen's System of Surgery*, p. 44.



the term *apoplexy*, I use it as synonymous with *cerebral pressure*, and I believe that all its *varieties* depend on the *amount* of the effusion and the *part* of encephalon injured."

"In many cases it is extremely difficult to distinguish apoplexy from congestion and epilepsy at the period of the attack. Dr. Bright remarks on the 'difficulty of drawing a correct diagnosis between apoplexy from congestion and certain epileptic attacks. There is in truth scarcely any precise distinction to be recognised; the same state of vessels apparently inducing both, and the one passing imperceptibly into the other. The convulsive nature of the symptoms marks the chief difference, and this probably depends rather on some original irritability of the brain, or on the part which chiefly suffers from congestion, than on difference of the exciting cause.'—*Solly on the Brain*, pp. 363 387.

"The *connections* of apoplexy and palsy with epilepsy are more intimate than has usually been remarked, or even admitted by modern writers, who have generally been more prone to point out distinctions and to establish differences than to record intimate alliances, or even still more close connections, not only between the diseases just named, but also between others similarly circumstanced. These maladies, although not similar in many respects, are nevertheless so intimately related, as respects frequency of succession, and the nature of the organic changes, of which they are the outward manifestations during life, as to require some notice of their connections at this place:—1st. An attack, more or less sudden, may present the mixed characters of apoplexy and epilepsy. 2d. The epileptic seizure may pass into the apoplectic. 3d. The epileptic attack may be followed by paralysis, either directly or as a consequence of either of the two preceding forms of seizure; and 4th, the paralytic affection may be followed, although in rarer instances, by an epileptic attack, or by coma attend by convulsions, most frequently terminating in death. The lesions found in the brain in these several forms of disease may be the same, or may differ only in grade and in the *degree* of pressure or of interrupted circulation in the brain. But in cases which are attended with paralysis, especially by hemiplegia, extravasation of blood is more frequently found than any other lesion, of which however, a great diversity exists, as I have shown when treating of the morbid alterations of the Brain and of Epilepsy, in my work on Pathology and Practical Medicine, —where, indeed, I have stated that any organic lesion of the brain or of its membranes may be followed by convulsive epileptic attacks, and that these lesions, in a more advanced state of developement, may occasion either palsy or apoplexy,—often both in succession at very indefinite intervals.

When the *apoplectic* and *epileptic* seizures are associated, the distinctive features of either may precede those of the other. In several of the cases which I have seen the seizure was apoplectic at its commencement, the true epileptic convulsions not appearing until after some time; but more frequently the apoplectic phenomena supervene upon the epileptic fit. Partial or



general convulsions are not infrequent in the course of an epileptic attack.— But these do not constitute the complication now being considered; for in it the stages of the epileptic fit, with the characteristic phenomena— injury of the tongue, frothing at the mouth, priapism, &c., are clearly defined. In this kind of seizure one or more limbs, or one half of the body, may be paralysed; but as often this additional affection is not observed. The severe forms of convulsions which occur in the puerperal state sometimes very nearly approach, or are altogether identical with this complication. But they are rarely connected with paralysis. Notwithstanding the obvious relation between epilepsy and apoplexy, and their frequent complication, the subject has been unaccountably overlooked, even by practical writers; it having been incidentally noticed only by a few, until Dr. Bright directed attention to it. Hippocrates seems, however, to allude to it; and his commentator, Martianus, Morgagni, and Dr. Prichard, mention it more explicitly.”—*Copland on Palsy and Apoplexy*, pp. 143-4.

“Apoplexy may be the cause of insanity, or it may be the consequence of those intimate lesions of structure which either occasion or are connected with the mental disorder. Esquirol considers that apoplexy constitutes a sixth of the physical causes of mental alienation, and an eighth of the deaths. Dr. Burrows thinks that it is not so frequently a cause of insanity or of death in this country, as M. Esquirol states with reference to France. When apoplexy is connected with the production of insanity it is generally congestive or hemorrhagic; and, in the latter case, is generally followed by paralysis,— the mental disorder being complicated with hemiplegia, or with a more partial form of palsy. Apoplexy with effusion of blood generally occurs early in the mental disorder, and commonly in the maniacal form. When apoplexy precedes mania there is often a great change perceived in the moral and intellectual character for some time before the attack. Doctor Burrows justly remarks that this change in the character may usher in the apoplectic as well as the maniacal paroxysm; and hence the affinity between sanguineous apoplexy and mania is very evident.”—*Ibid*, p. 156.

“*Palsy* especially is more or less intimately related to several affections, from which nosologists have endeavored to distinguish it by adducing the most extreme points of difference to the neglect of those which serve, if not to connect, at least to approach each other. But the approximation does not consist alone of resemblances between the external characters or symptoms belonging to each complaint, but extends also to the pathological states producing them, as far as these are known to us; different grades or modifications merely of these states often producing these several diseases.

Although some relation may be traced between the maladies now being considered and others besides those which are about to be noticed, I shall confine myself to those which are more especially related to palsy and apoplexy; and to certain of these a very slight notice merely will be directed.

*Neuralgia* is so intimately related to *palsy* and *apoplexy*, as to entitle it to



have been viewed as the not infrequent antecedent and concomitant of these maladies, and to have been considered as one of their most important complications. But it is equally allied with other maladies as with *epilepsy*, *coma*, and *convulsions*; and it, in common with those and with the several states of palsy and apoplexy, depends upon a variety of organic lesions of the brain or of its envelopes, or of the spinal cord and its membranes, which lesions, according to their seat, grade, and nature, occasion either of these maladies—the same lesion, even according to its seat and developement, producing either or even all of them in succession, and after indefinite periods, or even intervals or intermissions. A tubercle or tumour of any kind, for instance, may first occasion neuralgia or epilepsy, or neuralgia following epilepsy, or convulsions, and successively partial palsy, hemiplegia, and ultimately apoplexy, or profound coma, or asphyxia.”—*Ibid*, 175-6.

“There is a manifest connection between hysteria, catalepsy, epilepsy, palsy, and apoplexy. Hysteria, especially when it appears in some of its less irregular and anomalous forms, or when produced by masturbation, sometimes assumes more or less of a cataleptic form, or approaches the character of *léipothymia*, or the ‘*petit mal*’—the occasionally incipient form of epilepsy; and this last is not unfrequently the intermediate state between hysteria and catalepsy, on the one hand, and palsy, coma, or apoplexy, on the other; neuralgic pains, or muscular pains resembling rheumatism, appearing, in some cases as contingent complications of either, or even as antecedents, especially of palsy, epilepsy, and apoplexy. Although the phenomena of these diseases are so different as to render them nosologically distinct; yet they all, with the addition of chorea, convulsions, and even insanity, comprising puerperal mania and convulsions, present a more or less intimate pathological relation, in respect both of their physiological pathology and of their organic changes.”—*Ibid*, 186.

“The lesions within the cranium or spine, or even in the cranial and spinal bones, which may, according to their nature, size, or seat, produce either of these allied maladies, are so numerous that I cannot notice them satisfactorily in this work. They are, however, fully described in my work on Pathology and Practical Medicine, (see vol. 1., pp. 439-440.) Frequently superadded to one or more of these lesions, or even independently of them, *hyperæmia* in any form, general or local, congestive or inflammatory, may, either at the origin or in the course of a nerve, occasion this affection. Evidence of this is to be found in the appearances observed in some cases after death, in the termination of several other cases of neuralgia in apoplexy or palsy, and in the symptoms and the effects of treatment in other cases.”—*Ibid*, p. 176.

“The most frequent and obvious cause of coma is pressure on the brain. A state of perfect coma can be produced artificially by applying pressure to the brain of an animal, and the coma is relieved the moment the pressure is taken off. The brain is exposed to pressure from a variety of causes. The principal of these are, congestion, inflammation, effusions of blood, pus, or serous



fluid, organic tumours seated in the brain, in its membranes, or on the parietes of the skull, fractures of the skull, with depression, &c."—*Cyclopaedia Pract. Med.*, Vol. 1., p. 467.

Having now seen that the terms debility, dilatation, congestion, and obstruction, are used as synonymous—are marks of each other and marks of Pressure—and that congestion precedes and co-exists with inflammation, fever, hypertrophy, and a multitude of pathological phenomena, attention will be more particularly directed in the remaining quotations under the present head to the point that Venous congestion or an increased retrograde pressure of venous blood, is *common* to all constitutional diseases.

In dilatation of the heart, which corresponds to Ague, and in dilatation with hypertrophy, which corresponds to Fever, there is Venous Congestion; and as there are no valves in the internal system of veins, including those of the head and spine, this venous congestion or increased retrograde pressure of venous blood, may extend to the organs of the abdomen, thorax, and head; thus furnishing an appreciable cause for the multitude of phenomena, as, flux, hemorrhage, vomiting, dyspnea, pain, stupor, delirium, convulsions, &c., &c., which attend these affections.

"The diseases of the heart exert a very marked influence over the whole economy; nor is it in a narrow or circumscribed circle that these morbid reactions are produced; on the contrary, how numerous are the sympathies which the central organ of the circulation creates in the rest of the organism! It is in consequence of their *multiplicity* and the difficulty of referring them to *one* perfectly settled cause, that we have decided to study the general symptoms in a purely analytical order. \* \* \* The *engorgement of the venous system* is one of the extraordinary phenomena pertaining to diseases of the heart."—*Aran on the Heart*, p. 100.

Now as venous congestion is *common* to all, and as we have seen, from experiment, that it is competent to the production of several pathological phenomena, the legitimate inference\* is that it is the *one* cause of the 'numerous sympathies,' or 'multiplicity' of phenomena, which M. Aran failed to resolve.

"\*When an effect is really producible by two or more causes, the process for detecting them is in no way different from that by which we discover single causes. They may (first) be discovered as separate sequences, by separate sets of instances. One set of observations or experiments shows that the sun is a cause of heat, another that friction is a source of it, another that percussion, another that electricity, another that chemical action is such a source. Or (secondly) the plurality may come to light in the course of collating a number of instances, when we attempt to find some circumstance in which they all agree, and fail in doing so. We find it impossible to trace, in all the cases in which the effect is met with, any common circumstance. We find that we can eliminate *all* the antecedents; that no one of them is present in all the instances, no one of them indispensable to the effect. On closer scrutiny, however, it appears, that though no one is always present, one or other of several always is. If, on further analysis, we can detect in these any *common* element, we may be able to ascend from them to some *one* cause



We repeat that the point more particularly under present consideration is, that venous congestion is *common* to hypertrophy, fever, dilatation, ague, flux, hemorrhage, dropsy, pain, convulsions, coma, &c., &c.

"As an obstacle to the circulation operates on the heart in a retrograde direction, the cavity situated immediately behind it is the first to suffer from its influence. Accordingly, all the impediments seated in the aorta, its mouth, or the arterial system, act primarily on the left ventricle, which being likewise exposed to the heaviest burden when the circulation is accelerated, has to conflict against a greater variety of exciting causes of hypertrophy, than any other cavity of the heart. On this account, therefore, as well as from the thickness of its parties, it is subject to hypertrophy in a greater degree than any other.

"So long as the left ventricle is capable of propelling its contents, the corresponding auricle, being protected by its valve, remains secure. Hence, in a large proportion of cases, the auricle is perfectly exempt from disease, while the ventricle is even enormously thickened and dilated. But when the distending pressure of the blood preponderates over the power of the ventricle, its contents, from not being duly expelled, constitute an obstacle to the transmission of the auricular blood. Hence the auricle becomes over-distended, and the obstruction may be propagated backwards through the lungs to the right side of the heart, and there occasion the same series of phenomena. When the obstruction thus becomes universal, as is frequently the case, it may either happen that all the cavities are thickened, or those in which, from their conformation, have the greatest predisposition to it.

"When the mitral orifice is contracted, especially if the aperture be very small, the left ventricle, being insufficiently supplied with blood, is not stimulated to its ordinary contractile action, and consequently becomes emaciated and occasionally flaccid or softened. Meanwhile, the left auricle, having to struggle against the contracted valve in front, and also to sustain the distending pressure of the blood flowing in from the lungs, invariably becomes thickened and dilated. The engorgement, extending backwards through the lungs to the right ventricle, often occasions its hypertrophy and dilatation; under which circumstances, namely, hypertrophy of the right ventricle and contraction of the mitral valve, the lungs suffer in a pre-eminent degree: for being exposed to the augmented impulsive power of the right ventricle behind, and incapable of unloading themselves on account of the straitened orifice in front, their delicate and ill-supported vessels are strained beyond the power of resistance. If, therefore, they cannot disgorge themselves sufficiently by the copious secretion of watery mucus, they effuse blood by transudation into the air-vesicles and tubes, and form the disease denominated

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which is the really operative circumstance in them all. Thus it might, and perhaps will be, discovered, that in the production of heat by friction, percussion, chemical action, &c., the ultimate source is one and the same."—*Mill's System of Logic*, p. 254.



*pulmonary apoplexy.* I have found this affection to occur more frequently under the circumstances described, namely, great contraction of the mitral valve, with, or even without, hypertrophy and dilatation of the right ventricle, than under any other.

"When the mitral orifice is permanently patescent, so that, at each ventricular contraction, blood regurgitates into the auricle, this cavity suffers in a remarkable degree: for it is not only gorged with the blood which it cannot transmit, but, in addition, sustains the pressure of the ventricular contraction. Permanent patescence of the mitral orifice, therefore, constitutes an obstruction on the left side of the heart; and the effect of this, as of contraction of the orifice, may be propagated backwards to the right side. The regurgitation is always considerable when it renders the pulse small and weak.

"When the impediment to the circulation is primitively seated in the lungs, the right ventricle, situated immediately behind them, is the first to experience its influence; and when the cavity is so far overpowered by the distending pressure of the blood as to be incapable of adequately expelling its contents, the obstruction extends to the auricle,—the process being exactly the same as that I have already described above, in reference to the left ventricle and auricle.

"Obstruction in the right auricle, whether from this or any other cause, presents an obstacle to the return of the venous blood, and therefore, causes retardation throughout the whole *venous system*. Nor is this all; for the retardation is propagated through the capillaries to the arterial system, and thus at length returns in a circle to the heart. In this way is explained what at first sight appears an anomaly; namely, that the left cavities are sometimes rendered hypertrophous by an obstruction in the heart situated behind them in the course of the circulation, as for instance, when the left ventricle is rendered hypertrophous by a contraction of the mitral orifice." —*Hope on the Heart*, pp. 250-252.

"And if the local inflammation, which can be ascertained to take place during fever, is inadequate to explain the characteristic typhoid symptoms, it is equally in vain to seek an explanation of these symptoms, as some have done, in the mere circumstances of irregular distribution and congestion of blood.

"Even the peculiarities of that form of fever which has been described under the name of *congestive*, are not to be explained by the mere circumstance of internal congestion, the existence of which, in the vessels, and especially in the *veins* of internal parts, in these circumstances, is admitted. For although congestion or stagnation of blood within the cranium may be held to be a sufficient cause of stupor, yet we are so far from regarding congestion in the great veins leading to the heart as a sufficient cause for deficient action there, and consequent feeble pulse and cold skin, that we have already stated the accumulation of blood in the great veins to be apparently the chief cause of the *increased* action of the heart, or the *reaction*, in the more usual form of



fever. In the cases, therefore, where the congestion in the great veins fails to excite this reaction in the heart, some peculiar cause must have operated to prevent the heart from being usually excited by the application of the unusual quantity of its natural stimulus; i. e., the circumstance of unusually great and permanent congestion of the great veins, in the commencement of fever, is in all probability the effect, not the cause, of a peculiar sedative influence affecting the vascular system in these cases; such an influence naturally leading to accumulation of blood in the great veins, for the same reason that determines the accumulation there after death.

"That accumulation of blood in the great veins is not *per se* adequate to account for the phenomena of any form of fever, appears distinctly from the fact, that no form of fever follows the congestion there in cases of suspended animation in syncope, or from extreme cold, or submersion in water\*."—*Alison's Outlines of Pathology*.

"It may appear inconsistent to speak in the present department of complications, but it is intended that only such lesions of structure shall be noticed here as result from a long continuance of a mild disease, those dangerous organic changes which are almost essential to the nature of malignant intermittent being reserved for future notice. The tendency of the simplest kind of intermittent to effect the viscera of the abdomen is very great, as is shown by the following fact: if any cathartic be given to a patient immediately after even his first fit of ague, a quantity of dark bilious matter is discharged from his bowels. During the cold stage the blood seems to be large-

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\*In this extract it is admitted that venous congestion precedes and coexists with fever; that it may be the cause of *increased* action or *reaction*, but not of any of the attendant phenomena, except, perhaps, stupor. Our essay will abundantly show that venous congestion is competent to the production of all the phenomena (as flux, hemorrhage, pain, delirium, convulsion, &c. &c.,) which *attend* any form of fever *without* fever; and as venous congestion precedes and co-exists *with* fever, it is not necessary to go beyond it to account for any attendant phenomena; and if it be the cause of *increased* action, or *reaction*, then any remaining phenomenon must be the merest 'perturbation.' Venous congestion is not always followed by recognised flux, hemorrhage, or dropsy; but that it is the cause of these phenomena, can be unequivocally demonstrated. The phenomena in any given case depend upon the extent, degree, and duration of congestion. It is said that flux, hemorrhage, and dropsy, are produced by the same cause, for the reason that they are *convertible* into each other—that to *produce* a flux, is to *relieve* a dropsy. The same reasoning would include inflammation or fever; since inflammation or fever, as often results from a suppressed flux, as does dropsy; and is as often relieved by producing a flux, as is dropsy, or hemorrhage; and if all cases of fever are not relieved by producing a flux, alone, neither are all cases of dropsy. They are *parallel* in these respects. In short, the same reason which constitutes congestion or pressure of blood, the cause of flux, hemorrhage and dropsy, constitutes it the cause of inflammation, fever, and hypertrophy; namely, that it is the invariable antecedent and co-existent of each, of all.



ly accumulated in the *veins* of the viscera generally\*, and very much so in those of the portal system, so that we find the functions of the alimentary canal and the liver disturbed early in the disease; and merely by its long continuance, even should its general character be devoid of all malignancy, serious *organic* affections are occasionally produced. That the accumulation of blood in the viscera during the cold stage is considerably instrumental in engendering them, is shown not only by general reasoning of a very obvious nature, but by the fact that these morbid affections arise more frequently in the quartan, which has the longest cold stage, than in the other forms of intermittent. \* \* To this cause, *the remora of blood in the veins of the viscera during the cold stage, is superadded the arterial congestion of the same organs during the stage of excitement.*"—*Art. Intermittent Fever, Cyclopædia Pract. Med.*

"Fever runs a determinate course, a paroxysm consisting of several stages. There is, 1st. The formative or Precursory stage; 2d. That of Invasion; 3d. The period of excitement; 4th. The stage of crisis; 5th. That of Decrement, or decline; and 6th. That of Convalescence.

"A. The Formative, or Precursory Stage, the Latent Period, the Stage of Incubation of the French, the Dormant Period of the English writers, was accurately described by Celsus. It would appear to be the result of the exciting causes of fever on the animal frame. The earliest manifestations of the morbid impression are exhibited by the nervous system, and consist in general of languor and depression, with uneasy feelings; impairment or abolition of the natural appetites, and alteration of the secretions. The duration of this stage varies from twenty-four hours to several weeks. Its duration is said to be in inverse proportion to the severity and duration of the subsequent attack."

"The subsequent stages are thus described by Dr. Copland":

"B. Stage of invasion; (a) The cold stage of writers is attended by debility, painful uneasiness, or sinking at the epigastrium, a sensation resembling cold running down the back, with formication or chills extending over the limbs and general surface. The pulse is constricted, small, weak, or accelerated; the respiration is slow, irregular, or suspirous, and attended by anxiety at the precordia, and occasionally by a slight dry cough. On these supervene gaping, sighing, pandiculation; a sense of weight, pain, or constriction in the head; giddiness, moroseness, depression of spirits, and disorder of the senses; lividity of the lips and nails; pallor of the skin; the cutis anserina, and shudderings, rigors, or shiverings, followed by or alternating with, irregular

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\* Hence the *general symptoms* in ague, or dilatation; fever, or hypertrophy. It is usual to ascribe the phenomena (as pain, vomiting, dyspnea, convulsions, &c.,) in such cases to *sympathy*: but as venous congestion is *general*, (there being no valves in the internal system of veins, including those of the head and spine) we have an appreciable *general cause* for the general symptoms; while, at the same time, from local predisposition, some particular part, as the organs of the abdomen, or of the head, may most *prominently* suffer.



flushes. After the rigors cease, a sense of chilliness often continues for some time, although the skin has become hot. These symptoms present various grades and modifications in the different types of fever; in some the feeling of cold is actually attended by reduction of the temperature, and in others the heat is not materially, if at all, diminished, or it is even increased. The former is most commonly seen in the cold stage of periodic fevers, the latter in the invasion of continued fevers. In all, however, the cutaneous transpiration is altogether arrested, and the skin is harsh and dry. The pulmonary exhalation is also diminished, and the breath is cold. Copious discharges of pale urine often take place, evidently arising out of the arrest of the exhalation of the skin and lungs. Loss of the appetites, costiveness, thirst, and occasionally sickness and vomiting, are likewise present. (b) The *duration* of this period may be very short, or it may be for many hours alternating with slight flushes. The shorter and more intense it is, and the severer the rigors, the shorter and severer will be the consequent vascular reaction, and the more nearly approaching the inflammatory type; and the *longer its duration*, the more *prolonged will be the fever*. The imperfect evolution of this stage, or its slight occurrence, particularly when it is not attended by rigors, very generally indicates a severe malignant or typhoid state of disease. In some of the most dangerous cases of fever I have seen this stage so slight as to be confounded with the preceding one. (c). The pathological states of the first period are increased in this, particularly the general depression of vital endowment; the impeded functions of the lungs, liver, &c.; the interrupted exhalation and secretion, excepting the urinary secretion; and the imperfect depuration and arterialization of the blood. But the lowered vital powers become more centralized, and the congestion of the large vessels, especially those of the thoracic and abdominal viscera, greater; conditions which terminate themselves by inducing rigors, shivering, vomiting, and reaction of the vascular system, with the subordinate phenomena of the next stage.

"C. Period of Excitement.—(a) This stage commences with the *disappearance* of certain of the foregoing signs, with the *increase* of those that *remain*, and with the supervention of *others*.\* Fever, in its more literal sense, *now begins*, and manifests its specific form."—*Treaties on Fevers*. Clymer, &c., pp. 32-33.

To throw additional illustration upon the point that dilatation of the heart, corresponds to Ague, and dilatation with hypertrophy of the heart, to Fever, we make the five following quotations, showing that the same doctrines are held in relation to each in reference to its influence in producing, for instance, serous effusion; or, hemorrhage; as, apoplexy. In dilatation, or Ague, we have venous congestion, an increased retrograde pressure of venous blood in the

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\* *Reaction* may diminish or remove congestion in some parts, and thus mitigate or remove some of the antecedent symptoms; and it may *increase* the pressure in other parts, and thus develope new symptoms, or increase those that *remain*.



capillaries, to which the phenomenon is ascribed. In dilatation with hypertrophy, or fever, we have increased arterial action or pressure, co-operating with the antecedent retrograde pressure of venous blood, to produce the same effect. It is appreciable that the retrograde pressure of venous blood may not be sufficient in some cases to produce the effect; but that the co-operating arterial pressure of fever or hypertrophy, may determine its occurrence. It is not to the hypertrophy of the heart, apart from its increased force or pressure, that agency is attributed; and as we have increased force or pressure of the heart in fever, we shall of course see the same doctrines held in relation to each. It is the point of agreement—pressure—that is alone concerned. This is brought clearly into view in the following extract from Hope on the Heart, p. 255.

“It must be admitted, however, that hypertrophy does not produce serous infiltration so readily and promptly as a direct, primary obstacle to the return of the venous blood; a fact which admits of a rational and obvious explanation. When there is an obstacle to the return of the venous blood, suppose, for instance, contraction of the tricuspid, pulmonic, or mitral orifice, *two causes conspire to produce the capillary congestion; namely, the direct pressure of the arterial vis-a-tergo, and the retrograde pressure of the retarded venous blood.* But when the latter pressure does not exist, when the veins freely receive and transmit their natural proportion of blood, the force of the arterial circulation must be very greatly increased before it could so far overcome the elasticity of the capillaries as to give rise to engorgement and infiltration.”

Now, when we remember that according to Dr. Hope's explanation of the manner in which hypertrophy is produced, its existence implies an antecedent congestion or obstruction as its cause, we see that its agency is to co-operate with the antecedent retrograde pressure of venous blood to *increase* the pressure in the capillaries, thus converting what were before called *passive* into what are now called *active* diseases or phenomena, but adding nothing new, in kind, to the passive phenomena. The point of agreement is clearly seen in the *italicised* portion of the extract.

“There is an alleged exciting cause of cerebral hemorrhage, which I think it the more necessary to consider, because I believe that very erroneous notions prevail about it, even among pathologists of eminence. I allude to the imputed dependence of cerebral hemorrhage upon hypertrophy of the left ventricle of the heart. It has been supposed that the powerful contractions of a ventricle thus morbidly strong may drive forward the blood with such unusual force, as to strain and burst the cerebral arteries. Dr. Hope, in his very complete work upon Diseases of the Heart, uses these words:—“Instances of apoplexy supervening upon hypertrophy have been so frequently noticed, that the relation of the two, *as cause and effect*, is one of the best established doctrines of modern pathology.” Similar opinions are entertained by the most distinguished of the French writers on this subject;



Andral, Bouillaud, Cruveilhier. I think they are all wrong: or at least they state their propositions much too broadly and generally.

"I fully admit, no less from my own observation, than upon the testimony of others, the frequent coincidence of hemorrhage of the brain, and hypertrophy of the left ventricle of the heart; but I distrust the reasoning which would always connect these events with each other as cause and effect. They may sometimes have that relation: but I have long thought that in most cases, if not in all, the coincidence is capable of being explained upon other and more satisfactory principles.

"In the first place, hypertrophy of the left ventricle of the heart, is very frequently, far more frequently than not, accompanied by other structural changes in the organ: changes which imply some impediment to the circulation: changes which involve or influence its right chambers also. In fact, disease of the right heart is not very often seen, without disease of the left; and one of the commonest forms of alteration to which the left side is liable, is hypertrophy of its ventricle. Now I have already pointed out to you the connection which sometimes subsists between cerebral hemorrhage and such disease of the heart as obstructs the ready and regular descent of the blood from the head through the *veins*. Many of the cases of apoplexy occurring in persons who have previously had cardiac hypertrophy are, I really believe, cases of this kind. The brain affection is dependent, in part, upon disease of the heart, but not upon the preternatural strength of its left ventricle. The heart acts morbidly upon the brain *through the veins*, and not through the arteries."—*Watson's Practice*, p. 326.

"Although it is evident from the preceding observations, that accumulation of blood in the venous cavity\* produces this disease (apoplexy) in all those cases in which the pulse is weak, in which case it is certain that the blood is accumulated in that cavity, yet it may be doubted whether this can be the cause in those cases in which the pulse is strong. Increased action of the heart has been considered the immediate cause in these cases.

"In answer to this it may be observed that this disease appears generally at that time of life when there is a marked tendency to venous plethora, and rarely at that time of life when the action of the heart is most powerful.—Few cases occur so early as the fortieth, most over the fiftieth, many over the sixtieth year of life.

"It occurs also almost only in those persons who have been habitually exposed to the operation of the remote causes; particularly high living, free drinking, great exertion of mind in deep study, or intense application to momentous affairs, and great anxiety about the result. The inevitable consequence of these is accumulation of blood in the venous cavity.

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\*It will be seen, farther on, that what is meant by 'venous cavity,' is that system of internal veins which are without *valves*; namely: the vena cava, the internal and external jugular veins, the subclavian, the hepatic, the renal, and the hypogastric, and the external iliac and crural veins.



"The time of life, and the manner of life therefore, both concur in indicating the presence of accumulation of blood in that cavity, which is certainly present in all such cases.

"The strongest pulse in earlier life does not produce apoplexy. In the most violent fevers I have ever seen, there has been no instance of such an effect; and the only instance I have heard of from neighboring practitioners occurred in an old man.

"Strong pulse in apoplexy is generally produced by spirituous liquors, a hearty meal of rich food, or by some sudden exertion. But in these very persons, raising the pulse very high in any of these ways does not for many years produce this disease. It does not appear until, by continued indulgence and declining years, accumulation of blood in the venous cavity has been produced. Increased action of the heart therefore does not alone produce apoplexy; neither does apoplexy with strong pulse occur until such accumulation has been produced.

"The full habit of persons liable to this disease, the time of life when they are attacked, the known effect of the operation of the remote causes, and the weakness of the pulse in many cases, all point to the fact, that accumulation of blood in the venous cavity is the proximate cause. Increased action of the heart without such accumulation does not produce apoplexy; without increased action the latter does produce this disease."—*Cooke's Pathology and Therapeutics, Vol. 2, pp. 177-9.*

"According to M. Andral, simple hypertrophy of the heart is the lesion of this organ most apt to occasion cerebral hemorrhage by augmenting the force of the circulation in the brain; but unless as I have long ago contended, the hypertrophy of the heart be coexistent with disease of the vessels of the brain, as ossific, cretaceous, or atheromatous deposits in the coats of the vessels, cerebral hemorrhage would seldom occur from this form of cardiac disease. Palsy or apoplexy is probably as frequently the result of obstructed circulation through the right side of the heart, and through the lungs, and consequently of impeded return of blood from the brain, as of increased force of the circulation from simple hypertrophy of the left ventricle."—*Copland, on Palsy and Apoplexy, pp. 160-1.*

"In the uncomplicated form of intermittant fever, without malignant tendency, the prognosis is almost always favourable. I have never seen such a case eventuate fatally. It is possible that, when there is a disposition to cerebral disease, with the brain perhaps already softened, fatal apoplexy may be induced in the paroxysm, either from the venous congestion of the cold stage, or by the strong determination of blood in the stage of reaction."—*Wood's Practice, Vol. 1, pp. 236-237.*

"We hear much in medical consultations, and read much in medical works, of tendency of blood to the head. The event may be regarded as a fact, ascertained by experience. It is a fact of great importance too, for it is the precursor, and may be taken as the monitor, of many serious affections of the encephalon, not of an epileptic character only, but of the apoplectic.



"Yet has no one suggested the real nature of this affection. The heart and arteries are, I believe, vaguely supposed by the "mere practical men" to possess some power of effecting this marked and undue distribution of blood; but the physiologist knows that no such power exists, or can exist. The phrase, "the undue tendency of blood," is an erroneous one, originating in a false hypothesis, and leading to false conclusions. The word congestion, or impeded return, should be substituted for the term tendency; and the cause must be sought in excitants of spinal action, and in the condition of the veins of the neck, and not in the heart and arteries. It is this topical congestion, and not mere general plethora, that is the object of our study; for it may co-exist with a state of anemia of the general system."

"The power of the heart, by which the blood is propelled to the most distant parts of the animal frame, through the intermediate system of vessels, and returned by the veins, and runs through a second circulation through the liver, must be immense.

"This power is *seen*, if we watch its effect in moving the foot bodily at each systole, when the artery of the ham is laid over the knee, in sitting cross-legged.

"It is also seen in the degree of resistance offered by the erectile tissues—a resistance which may be viewed as measuring, as it were, the power of the heart; for the phenomenon consists of impediment to the return of venous blood merely, the power and action of the heart being normal—a fact full of physiological interest and instruction.

"Experiments which I made in 1830 illustrate the same principle. Let the circulation in the web of a large and vigorous frog be displayed under the microscope, and let a ligature be applied gently around a limb; the circulation, which was a uniform flow of blood before, now becomes pulsatory, with more or less retardation or interruption at each systole of the heart, the veins and the intermediate vessels being distended and the circulation in them more or less stagnant according to the degree of tightness of the ligature. Eventually the intermediate blood-channels become full, distended, irregular in diameter, ruptured even—the miniature living picture of the state of the cerebral tissue in apoplexy! The limb itself becomes livid and tumid.

"Beautiful is the scene when the lung of the toad is similarly placed under the microscope—it is like a flood of gold! And as it is difficult, if not impossible, to remove all impediments to the flow of blood, the flood is beautifully pulsatory, the entire lung being moved obviously at each systole of the heart—such is its power.

"In these experiments, as in sphagismus or impeded venous circulation in the neck and head, we trace the powerful effect of the systole of the heart in the throb of the enlarged artery, the veins and the intermediate vessels being distended by the rush of blood impeded in the former. The physician should contemplate this scene of living physiology and pathology. It represents the normal phenomena of the erectile tissues, and the abnormal condition in sphagismus and paroxysmal apoplexy.



"Now let us imagine the jugular and vertebral veins of the neck compressed by the platysma myoides, the cleido-mastoid, the omo-hyoid muscles, &c. The effect of emotion, or of reflex action, impeded circulation, distention of the veins, congestion of the intermediate blood-channels, tumefaction and venous lividity of the features, and of the conjunctiva, and a similar condition of the encephalic tissues take place, with the varied cerebral, visual, and auditory symptoms—paroxysmal apoplexy. How happy if it proceed no further !

"This compression of the neck is various, and quite special in different cases. Contraction of the platysma myoides, for example, effects the external jugular chiefly ; a more gentle, but more general action of the muscles of the neck leads to more general compression of the veins, and sleep ; a more specific action induces blushing, which may be limited to the cheeks, or diffused over the head, face, neck, and bosom ; a fit of anger is not only a "*furor brevis*," but it is a brief and violent sphagiasmus and cerebral action and congestion and all its formidable symptoms—loss of memory, or of consciousness, drowsiness, stupor, coma, &c. From this cause I have also observed, and most carefully observed, transient delirium, mania, spasm, paralysis, in cases which I propose to detail hereafter.

"Other causes of abnormal circulation in the head and neck exist. Diseases of the heart itself, of which *one*, hypertrophy, augments the flow of the arterial blood and of which *all* induce impeded circulation along the veins—a *fact of far greater moment*, have their influence in inducing the apoplectic state."

"The difference between augmented flow of blood along the arteries, and its impeded return by the veins, on the *intermediate* blood channels and organs, is extreme.

"The most violent *exercise*, as in running, the respiration being free and proportionally accelerated, only suffuses the face with florid blood freely circulating ; violent *effort*, on the contrary, as in lifting, in which respiration is arrested by closure of the larynx, induces a purple tumefaction of the tissues of the face and neck, from impeded flow and stagnation of venous blood.—It is the difference between *augmented* and *impeded* circulation.

"There is a great difference, too, between the *degrees* of impediment to the return of venous blood—the violent muscular efforts in ordinary vomiting, fits of coughing, &c., fill the tissues of the face with venous blood ; but still more violent acts of vomiting, the efforts of parturition, the convulsions of epilepsy, actually cause the thin parietes of the blood-channels of the face to yield, and induce minute *ecchymosis*, seen in the eyelids and on the temples.

"Let the impediment to the reflux of the venous blood be greater still, and especially more specifically of the veins of the neck, and we cannot be surprised at the occurrence of loss of consciousness—cerebral epilepsy, if transient, apoplexy, if more permanent, with or without cerebral *ecchymosis*.—



A tumor, a ligature, or spasmodic action of the muscles, compressing the veins of the neck, produces this effect.

"Much, too, depends on the *degree of suddenness* of this compression.—In diseases of the heart, we observe the features tumid with venous blood without apoplexy, which may, however, occur eventually gradually. But the sudden compression of the veins of the neck, from the action of the platysmamyoid and omo-hyoid, induces the apoplectic state instantly.

"This apoplectic state may consist of mere congestion, and is then transient; or of ecchymosis or rupture, with laceration of the brain, and is then persistent and hemiplegic; or if the attack of mere congestion be often repeated, effusion of serum may take place from the internal surfaces of the cerebrum.

"A further difference may consist in the difference of the vein or veins affected: the jugular seems to be in more immediate connection with the cerebrum; the vertebral with the medulla oblongata; at least I think this probable.

"It is extremely interesting to observe the influence of *impeded* or *arrested* flow of blood in the *veins* upon the *arteries*. I have already alluded to the experiment of applying a ligature on the inferior extremity of the frog in which this is *seen* under the microscope.\* The phenomenon deserves to be noticed more particularly.

"If we tie a ligature around the frogs leg, the web being spread under the microscope, we instantly see the whole circulation, which was equable, or nearly so before, become pulsatory. If we tie the ligature a little more

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"\* This experiment furnishes a good illustration of the influence of the venous congestion in Ague or dilatation, in producing the increased action of the heart—the increased resistance or throb of the arteries—in fever, or hypertrophy. The ligature produces venous congestion, an increased retrograde pressure of venous blood in the capillaries, thus obstructing the arterial circulation. It does not matter how this venous congestion is produced, whether by a ligature, or by debility, or dilatation—other things being equal, as the rapidity of its occurrence, its degree, and duration—the effect will be the same. It is the point of agreement—venous congestion—an increased retrograde pressure of venous blood in the capillaries, which is the proximate cause.

Additional confirmation of this view may be found in the following extract. "Boerhaave proposed a theory of inflammation, which, if it was not altogether original, was, at least, an important modification of that of Pitcairn, and of the mathematical school. He supposed that the blood itself became more viscid, causing a *lensor* in its circulation through the several orders of capillary vessels, and an excessive engorgement of them; an increased action of the larger vessels, and flow of blood in them, taking place to overcome the resistance and congestion. The close resemblance of this hypothesis to others much more recently proposed is very obvious. That the *action* of the larger *arteries* should be *increased*, when an *obstruction* to the circulation *through the capillaries* exists, may readily be conceded; but that the afflux of blood can be increased, and obstruction at the same time exist, is a contradiction in terms."—*Copland's Dictionary*, Vol. 2, p. 458.



tightly, the globules of blood are observed to oscillate even in the arteries, and to proceed and to retrograde, at each systole and diastole of the heart. The intermediate vessels, meantime, become distended with blood, and even dilated in their diameter. So, in sphagiasmus, the temporal and carotids *throb*, whilst the tissues of the face and neck, and even the chest, become tumid, and purple with venous blood; the patient complaining that his cravat is tight; that he is giddy, and in danger of falling; or oblivious; or incapable of mental effort or attention; or dozy, falling asleep over his book, and even over his writing.

"It seems probable that the mere pressure of the veins of the neck may sometimes be partial—greater on one side of the neck, or on one vessel, than the other, or others; and that in this manner partial congestion may occur, and induce, more or less, temporary hemiplegic paralysis. One patient, the subject of epilepsy, had, in the first instance, attacks of transient hemiplegia! In like manner, the epileptic seizure frequently effects on one side more than the other; and the apoplectic is frequently conjoined with more or less of partial convulsive affection—so *allied* are these diseases.

"The influence of indigestible, and therefore irritating food, of constipation, as causing of sleep especially, and of posture, and of repletion of the stomach and bowels as augmenting this venous congestion, will be obvious to every one.

"As to efforts unattended by closure of the larynx, as the rapid ascent of a hill, they have no tendency to produce apoplexy, or extremely little. It is not accelerated arterial circulation, *but impeded venous circulation*, which is the source of danger." On the Theory of Convulsive Diseases, and On the threatnings of Apoplexy and Paralysis, by Marshall Hall, M. D., &c.—*London Lancet*, for January and August, 1848.

"From these experiments it is easy to understand, how any deficiency of tone in the Venous system will tend to prevent the ascent of the blood from the depending parts of the body, and will consequently occasion an increased pressure on the walls of the vessels, and an augmentation in the quantity of blood they contain. All these conditions are peculiarly favorable to the escape of the watery part of the blood from the small vessels; and this may either infiltrate into the areolar tissue, or it may be poured into some neighboring serous cavity, producing dropsy. Thus it happens, that such effusions may often be traced to that state of deficient vigour of the system, which peculiarly manifests itself in want of tone of the blood-vessels; and that it is *relieved* by remedies which *restore* this. In many young females of leuco-phlegmatic temperament, for example, there is a tendency to swelling of the feet, by œdematous effusion into the areolar tissue, in consequence of the depending position of the limbs; the œdema disappears during the night, but returns during the day, and is at its maximum in the evening.—And the congestion which frequently manifests itself in the posterior parts of the body, towards the close of exhausting diseases, in which the patient



has lain much upon his back, is attributable to a similar cause; of such congestion, effusions into the various serous cavities are frequent results; and such effusions, taking place during the last hours of life, are often erroneously regarded as the cause of death. To the same cause we are to attribute the varicose state of the veins of the legs, which is so common amongst persons of relaxed fibre, and especially in those whose habits require them to be much in the erect posture; and this distension occasionally proceeds to complete rupture, the causes of which are fully elucidated by the experiments just cited."—*Carpenter's Human Physiology*, p. 568.

"When the areolar tissue of a limited part of the body becomes filled and distended by serous liquid, we call the swelling œdema; but this is exactly the same, in its nature, as anasarca. Now œdema is often the consequence of some mechanical obstruction to the venous circulation. We can produce it whenever we will. Our countryman, Dr. Lower, 170 years ago, tied the jugular vein of a living dog. When a few hours had elapsed, he observed that all the parts beyond the ligature, reckoning from the heart, were much swollen: and upon dissecting the animal after death, he found that the areolar tissues of the head and face were filled, not with red blood, as he had expected it might be, but with clear and limpid serum. On another occasion he placed a ligature upon the vena cava, just above the diaphragm: death soon ensued, and a large quantity of water was discovered in the cavity of the peritoneum.

"Precisely similar phenomena succeed the compression or obliteration of a large vein in various parts of the body. In operating for popliteal aneurism, Mr. Travers was obliged to tie the femoral vein; the areolar tissue of the limb was speedily infiltrated with serous fluid. Long-abiding œdema of one foot and ankle has been cured at once by the reduction of a crural hernia, which had been pressing for the same length of time upon the femoral vessels. You have heard, most probably, of the disease called *phlegmasia dolens*; a disease that is very common in women soon after childbirth, although it is not peculiar to them, nor to the female sex. The foot, leg, and thigh, become enormously œdematous. The essence of this disorder is inflammation of the femoral vein; blocking up that vessel near the groin, and retarding or precluding the return of the venous blood from the limb. One arm often swells in the same way, and from a similar cause, in women who are afflicted with cancer of the breast. In pregnancy, the gravid uterus sometimes presses upon the iliac veins, and obstructs the current of blood within them: the consequence is, anasarca of the lower extremities, which disappears as soon as the pressure is removed by the delivery of the woman. The flow of blood through the vena porte is frequently hindered, by disease of the liver, or by other causes; and serous liquid accumulates in the peritoneum, constituting ascites. A French physician, M. Tonnelle, narrates several cases in which serosity was found in the cavity of the arachnoid, in conjunction with obliteration of the venous sinuses of the dura mater. In all these instances we



have retardation of the venous current, undue plenitude of the veins, and dropsy of the part from which they proceed. The natural exhalation goes on, and the exhaled fluid collects and stagnates because the channel through which it ought to be drained away is choked up. The larger the vein, and the nearer we approach the heart, the more extensive is the dropsical accumulation: and if we could plant an obstacle at the very termination of the venous stream, we should dam up the blood in the whole system of veins, and produce a general dropsy. Such an obstacle is frequently placed there by disease. The returning blood is checked at its entrance into the heart; at the confluence of all the veins of the body, where they unite to empty themselves into the right chambers of that organ: and then anasarca of the universal areolar tissue comes on, and water collects in all or most of the great serous cavities.

"It is no part of my present purpose to inquire how such disease of the heart as is productive of dropsy, arises. Commonly we find the right auricle and ventricle enlarged in capacity, the opening between them unnaturally wide, and the tricuspid valve unequal to its office of closing that aperture. Such a morbid state of the right heart may be occasioned by any cause which impedes the flow of blood *out* of its cavities. The diseased condition of those cavities may be primary; but it is oftener, perhaps, consecutive to other disease. It may be produced by disease of the lungs, preventing the right ventricle from freely delivering its contents into the pulmonary blood vessels. Or the retarding cause may be still more distant, in the left side of the heart, keeping the pulmonary blood-vessels unduly full, and thereby hindering indirectly the escape of the blood from the right ventricle. The dropsy may ultimately depend, therefore, upon some bar to the circulation, placed even at the mouth of the aorta. Obstacles situated anywhere in the circuit formed by the right heart, the lungs, and the left heart, have the effect of producing secondary changes in the parts *behind* them. But disease, thus propagated in a direction *retrograde* to the course of the blood, is propagated gradually, and sometimes very slowly. These are points of much interest, which we shall investigate together by and by. I allude to them now, that you may not be perplexed by a knowledge of the fact, that disease of the heart often exists for a long time without inducing dropsy. It is with disease of the right side of the heart, whether primary or secondary, that passive dropsy is especially associated.

"As if to furnish the *experimentum crucis* in respect to this doctrine, disease does sometimes, with a curious precision, dam up one only of the two great venous trunks, at the junction of which the right auricle is placed: and then the dropsy is as curiously limited to that half of the body in which the tributary veins of the obstructed trunk originate. The first example of this which I ever saw was a most remarkable one. The patient was dropsical in his upper half only. His arms were so hugely anasarcaous that he could not bring his elbows near his sides; his neck and face was hideously bloated and exaggerated, and his eyes prominent and staring; while his lower limbs



were of their natural size, and appeared preposterously small and out of proportion. The poor man looked as if the upper part of his body had been stuffed, for acting some ridiculous part upon the stage. The cause of this strange and distressful state was found to be the obliteration of the vena cava superior, close to the auricle. Its sides had been pressed together, by a large aneurism of the aorta; and a portion of the vein was fairly sealed up. I have seen two similar cases since.

"Objections have, however, been taken to the accuracy of the conclusions drawn from such cases as I have related; and it is fit that you should be aware of them. Thus it has been stated that veins have been found obliterated, and yet there was no dropsy. Now to this objection it may be answered, in the first place, that it is not every vein, the obliteration of which would cause *manifest* dropsy. It must be the principal venous trunk of the part concerned. When some of the secondary and smaller veins alone become impervious, the blood may reach, and return by, the primary branches, with sufficient readiness to relieve the turgid capillaries, and prevent any serous accumulation.

"But (it may be said) the principal vein itself has been found converted into a solid cord, and still there was no dropsy. Granted: but it does not follow that there never *had been* dropsy. You know that when a large artery is tied, the circulation is carried on in the corresponding limb, by means of collateral arterial branches: imperfectly, indeed, at first; but, at length, as the supplemental channels become more numerous and free, the supply of blood to the limb is as copious as ever. It is precisely the same, *mutatis mutandis*, with the veins; only that the anastomosing venous tubes are not, (perhaps) so readily developed as the arterial. Now I am not aware of any instance in which it has been shown that the principal vein was obliterated, and yet there neither was, or had been, any œdema of the limb. The recorded cases have been met with in dissecting-rooms, and the previous history of the subject has been unknown or unregistered. Mr. Kiernan has told me that he once examined the body of a woman who had excited much curiosity among the medical men by whom she had been seen during life, on account of a remarkable and enormous dilatation of the superficial veins of the abdomen. She was not dropsical, and the cause of the huge varix was sought for with great interest after her death. The inferior cava was obliterated. Here the compensating result was obvious to the sight; the new channels had answered their purpose, and performed the functions of the original channel. The history of this case was incomplete; it was not ascertained whether the woman had always been free from dropsy.

"I hold this objection therefore to be invalid, until some authentic instance shall be brought forward of the obliteration of a large venous trunk, without a corresponding accumulation of serous fluid, either at the time when the observation is made, or at some previous time in the life of that individual. It is, besides, possible enough, that the obstruction of a large vein may be effected gradually, by the slow encroachment, for instance, of a growing tu-



mour; and the collateral circulation may begin to be enlarged with the first impediment in the vein, and may keep pace with and counterbalance that increasing impediment, till the closure of the vessel is complete; so that, from first to last, there may be no noticeable dropsy.

"Again, it is affirmed, and truly affirmed, that anasarca often occurs, without any obliteration of veins, and independent of any discoverable organic disease in the heart or any where else. We see this every day, in weak chlorotic girls, with bloodless cheeks, and pale lips. Some of you saw a case of this kind which was lately under my care in the hospital; besides the anasarca, the systolic sound of the heart was accompanied by a loud, unmistakeable bellows sound. This girl got quite well, and left the hospital without bellows sound, or any other trace of disease. There could not have been an organic change: in fact there was not. Yet was there, virtually, a *retardation of the venous circulation*; not by any mechanical obstacle opposed to its course, but in consequence of the *debility*\* of that hollow muscle, the office of which is to propel onwards, with a certain degree of force, the blood that reaches it.

Girls of this description have weak and flabby voluntary muscles; and it is reasonable to presume that the involuntary muscle, the heart, partakes of the general debility of the muscular system, and becomes incapable of sending the blood forwards with the requisite energy. Nay, I believe that a heart thus feeble may yield a little and dilate under the resisting pressure of the blood that enters its chambers; and that so an occasional but temporary bellows sound may arise, from the altered relation between the cavities of the heart and their outlets. Certainly this view of the matter is strengthened by the *juvantia* and *lædientia*. If you are tempted, by the pain complained of by your patient, or by the violence with which her heart is throbbing, to take away blood, you find that she is ultimately made worse by the bleeding; on the other hand, if you give her steel, feed her well, keep her bowels free, and place her every morning under a cold shower-bath, you find that she recovers her lost strength, that colour returns to her lips and cheeks, that her palpitations cease, and her dropsy vanishes. In proportion as the muscular system in general receives fresh tone and vigor, does that particular muscle, the heart, also regain the degree of power necessary for the effectual discharge of its proper function, which is very much that of a forcing-pump. Such is the way in which I should explain both the cause of the dropsy, and the cause of its cessation. In such cases our patients do not simply recover; they are *cured*. I should apply a similar explanation to some other forms of dropsy. Andral describes a certain *cachectic* disposition of the body as being a cause of dropsy; persons may be bled into a dropsy, or starved or weakened into a dropsy. These are genuine instances of dropsy from debility, which

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\*The bearing of this on other cases, as hysteria, epilepsy, &c., where no *organic* change is found after death, is *direct*; and when we consider that the state marked by the terms debility, congestion, &c., is all that is *essential* to these phenomena, or to *death*, the obscurity vanishes.



is what the *ancients* conceived *all* dropsies to proceed from. It may be that the thin and watery quality of the blood induced by frequent bleedings, by insufficient nourishment, by certain poisons, or by other causes, may facilitate its passage through the coats of the veins. But admitting this as a concurrent cause, I am disposed to the belief that all passive dropsies occurring under the circumstances just adverted to, and without any apparent organic disease or change, are mainly to be ascribed to debility of the heart; and viewed in this way, they are all brought under the same general principle, viz: the *retardation of the blood in the veins*."—*Watson's Practice*, pp. 171-4.

"*Active* dropsies are sometimes spoken of as belonging to the *left* side of the heart; *passive* dropsies to the *right*. What *connects* all these forms of dropsy is a *preternatural fulness*, in some part, or the whole of the hydraulic machine. And this seems to be the grand key to the entire pathology, as well as to the remedial management of the disease."—*Ibid* 176.

"I noticed before the close analogy that obtains between *dropsies* and *fluxes*. Dropsy is a flux into a closed cavity. Fluxes would be dropsies if the fluid poured forth did not escape. And you are to observe that we frequently try to cure a dropsy by producing a flux."—*Ibid* 179.

"The most impressive illustration of the debility connected with internal congestion, and of the effect of copious blood-letting in relieving it, is, perhaps, that which is furnished by the epidemic, or, as it is commonly termed, spasmodic cholera. In the pamphlet published by the London General Board of Health, by authority of the Privy Council, the following passage occurs: "But the remedy which is described to have been most uniformly successful, when it could be used, is bleeding, and this even in cases where the pulse was scarcely perceptible at the wrist. This practice seemed to apply itself to the root of the disease, by relieving the congestion of the venous system, which was *invariably* found loaded on examination after death, and which congestion (though only an effect of the first impression made by the attack of the disease on the constitution,) appeared to be the immediate cause of death. In the lighter cases, or in those of a severe nature which came under medical treatment before the pulse at the wrist was lost, or had become fluttering, bleeding was attended with the most decided advantage. The oppression of the chest, the burning heat of the præcordia, the spasms, the vomiting and purging, are stated in some instances to have ceased at once; in others, on a repetition of bleeding. In such as allowed a free abstraction of blood, these effects very uniformly occurred; but even in some, when the pulse was indistinct, bleeding was successful, if it could be carried to the extent of eighteen, twenty-four, or thirty ounces, the pulse rising in power and becoming more distinguishable in proportion to the flow of blood. If the pulse in this state of feebleness was distinct enough to give the finger the feeling of oppression, bleeding was almost always successful. The blood drawn was black, whether procured from a vein or an artery, and flowed with great difficulty, commonly first coming from the vein in drops,



and gradually in a stream; but before it could be induced to flow with freedom the patient often required warm paths, frictions, external and internal stimuli, to produce a sufficient quantity for his relief. If a small quantity only could be procured, the heart seemed to feel the loss without being relieved, the bulk of the blood actually circulating being reduced, while the great mass of it, congested in the inferior and superior vena cava, did not make its way to the heart. The effect of bleeding was mechanical, and acted only as removing an *obstruction* to the passage of the blood from the distended venous system; and if not carried far enough to remove this impediment and allow the large veins to empty themselves into the heart, such weakness was produced as is occasioned by the loss of blood in a constitution worn out by disease."—*Art. Plethora, Cyclopaedia Pract. Med.*

"It is reasonable to believe that the remote causes of phthisis however variously they may appear to operate, do so by inducing some peculiar or determinate derangement of the system—some positive pathological condition, which, being *constantly* present wherever tuberculous disease is found, may be regarded as necessary to its production. Although we hesitate not to say, that, in the actual state of our physiological and pathological knowledge, we are unable to define with certainty all the conditions in which tuberculous disease has its origin; we think that it would not be difficult to point out some of the more important links of the chain which connects special functional disorder with the formation of tuberculous cachexia. On some future occasion we may take an opportunity to enter more fully upon the subject; our limits at present merely permit us to call the attention of the reader to that morbid condition which, in our minds constitutes the most obvious and important in a practical point of view.

"A congestive state of the venous system of the abdomen is the condition to which we refer; it is one which was familiar to the pathologists of the last century, and, although it has not been quite overlooked, it has been too much neglected by the moderns. Such of our readers as are familiar with the writings of the German physicians of the middle of the last century, particularly Stahl, Hoffman, and above all Kaempfer, and his disciples, will be aware of the extensive influence and importance attached to this state of the abdominal circulation, at that time. Referring to those works where the facts upon which the doctrine rests are fully exposed, we shall restrict ourselves here to a few observations more particularly bearing upon the subject of this article, and which it is but justice to ourselves to say were established in our mind as the result of practical observation, before we were aware of the existence of the German doctrines of abdominal infarctus.

"In children originally of a strumous habit, we observe a constant disposition to this congestive state of the abdominal circulation; and unless we succeed in obviating it, they become tuberculous and die early in life. In youth we find the same state of congestion as a precursor of tuberculous cachexia; but it is during the middle period of life, from thirty-five to forty,



that it is accompanied with more marked symptoms, such as dyspepsia with its various concomitants, which exist often for a very considerable time, and not unfrequently obscure the pulmonary affection till tuberculous disease has made considerable progress. This is the form of the affection which has been denominated *dyspeptic phthisis*; and if the term referred merely to the cause of the pulmonary disease, there would be little harm in retaining it—but if used to designate a species of phthisis differing from the tubercular, we consider it decidedly objectionable; because however prominent the dyspeptic symptoms may be, tubercular disease of the lungs is the cause of death. While we admit to the fullest extent the necessity of attention to the state of the digestive organs, we must object to the pathological view which limits the attention of the practitioner to the dyspeptic affection, neglecting other and equally essential parts of the treatment. We do not know such a disease as dyspeptic phthisis as constituting a particular species; but we are well acquainted with that form of tubercular phthisis which is long preceded and accompanied in its progress by dyspepsia. Indeed, tubercular phthisis rarely occurs in the middle period of life without this complication; but it cannot be doubted that the deranged condition of the digestive organs is, in these cases, very often a mere consequence of a long pre-existing state of congestion of the venous system of the abdomen; and which, if not corrected by more efficient measures than those generally applied to relieve the dyspeptic symptoms, may soon terminate in pulmonary consumption. The profession are highly indebted to Dr. Wilson Philip, for calling their attention to the congestive state of the hepatic system, and pointing out some of the most effectual means of obviating it; but we cannot admit that this dyspeptic phthisis differs in its nature from common tubercular phthisis.

“The effects of congestion and derangement of the abdominal viscera have long been remarked as causes of phthisis: they were regarded by Kaempfer and his disciples as giving rise to most of the chronic diseases of the chest. Portal observes, that it is certain that engorgement of the liver and other affections which derange the secretion and even excretion of bile, may become a cause of pulmonary phthisis; and several other authors have remarked the connection of phthisis with abdominal disease, but in a manner so vague and undefined as to attract little attention.

“Abdominal plethora, when once established, gives rise to a series of deranged functions in the digestive organs, the lungs, skin, &c., which by impeding digestion and assimilation affect the whole animal economy. These are manifested in imperfect biliary secretion, constipated bowels, and irritated mucous surfaces, in congestion of the lungs, and a dry and harsh state of the skin. In consequence of the overloaded condition of the venous system, the heart, generally feeble in the tuberculous constitution, is oppressed, and the arterial circulation impeded and enfeebled. In this state of the system, very slight exciting causes induce disease, inflammation and hemorrhage; hence arises the constant liability of strumous subjects to inflammatory diseases of a sub-acute or chronic character, and hence also we derive an ex-



planation of the hemorrhages to which they are peculiarly liable even at a very early age. The same pathological state of the abdominal circulation forms the remote cause of the various congestive and chronic diseases so common in the strumous subject; such as glandular swellings, cutaneous eruptions, &c. &c.,—*Art. Tubercular Phthisis, by Sir James Clark. Cyclopaedia, Pract. Med.*

The remaining quotation under the present head, will be taken from that Great Work—the greatest, in our estimation, of Ancient or Modern times—the “Pathology and Therapeutics,” of the late Professor John Esten Cooke.

“In the preceding pages we have seen that weakened action of the heart is one link of the chain of causes and effects extending from the remote causes to the symptoms of fever. The next question in the prosecution of this inquiry is, what is the effect of this cause, weakened action of the heart.

“One consequence immediately flowing from weakened action of the heart, is the diminution of the quantity of blood sent into the arteries; whence follows, 1st. weakness of the pulse, a very obvious consequence of the diminution of the power which distends the arteries; 2d. paleness and coldness of the surface, consequences as certain, of the failure of the usual supply of blood to the surface; 3. diminished bulk of the external parts, shrinking of the features, and shriveling of the skin, all necessarily following deficient fulness of the cutaneous and sub-cutaneous vessels. Weakness of the pulse, paleness and coldness of the surface, and shriveling of the skin, are, therefore, immediate consequences of diminished action of the heart”

“Early in life, the balance of the circulation is maintained by the activity of the heart; but as soon as it begins to flag, the scale is turned against the veins. As age creeps on, venous plethora becomes more and more apparent; and when the action of the heart ceases in death, the veins are found full, the arteries empty.

“This is not the effect of age alone. In every period of our existence, when disease puts an end to the action of the heart, the effect is the same. The cava is found full.

“Nor is it the effect of disease. In all the vigor of life, if by any operation the action of the heart be stopped, the immediate consequence is the same.

“When the breast of a living dog is opened by taking away the sternum with the cartilaginous appendices of the ribs, the lungs are observed suddenly to sink, and afterwards the circulation of the blood and the motion of the heart to cease. In a little time after that, the right ventricle of the heart and the vena cava are swelled as if they were ready to burst.\*”

“The effect of weakened action of the heart, therefore, is accumulation of blood in the great veins entering into it.

“As the latter is the consequence of the former, that which indicates the former indicates also the latter. We have before seen that a pulse smaller

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\* “Bell’s Anatomy, Vol. 1, p. 350.



and weaker, and a surface paler and cooler than usual, indicate weakened action of the heart: these symptoms therefore also indicate accumulation of blood in the vena cava and its branches.

"As this accumulation necessarily extends to the great branches of the cava, let us enquire how far it extends, and what branches are readily filled.

"The veins having but little action, they derive assistance from various sources to enable them to pass on their contents. As in different parts of the system this is more or less effectual, or as they are more or less disposed to yield, accumulation of blood to a greater or less extent must take place.

"The veins of the fleshy parts having the benefit of almost perpetual action of the muscles, and of the aid of valves, to prevent regurgitation and to give the more complete effect to the muscular pressure, the blood has but little opportunity to accumulate in them, but is incessantly driven to the interior of the body.

"The vena cava, and its branches between the last valves and the heart, being destitute of those aids which in other parts help the blood along, must be the chief seat of venous plethora.

"This great cavity consists of the vena cava, the external iliac and the crural veins, the hypogastric or internal iliac veins and their branches, the hepatic veins and their branches, the vena portæ and its branches, the renal veins, the subclavian veins, and the internal and external jugular veins.

"The veins of the arms escape from among the muscles near the head of the humerus, and, joining with others from the neighbouring parts, form the subclavian. This point is the limit of the cavity in this direction.

"The veins of the head internal and external, including the sinuses of the brain, have no valves; and therefore the cavity in this direction extends to the origin of the veins, and includes those passing from the glands about the head. These all have free communication with one another, and with the cava through the subclavian vein.

"The cavity is limited by strong valves at the mouth of the azygos, the next considerable vein entering the cava.

"The coronary veins of the heart are in like manner strongly guarded.

"The hepatic branch of the venous cavity is very extensive. The vena portæ, which, ramifying in the liver, by the reunion of its numberless branches forms the venæ hepaticæ, is composed of three large veins; besides some minor ones from the stomach, the duodenum, and the gall bladder. These are the greater mesenteric, the splenic, and the internal hemorrhoidal or smaller mesenteric veins.

"The greater mesenteric vein is formed of the numerous vessels which return the blood from the small intestines, the cœcum, the right portion of the colon, the pancreas, and the omentum. By the convergence of all these is formed an immense assemblage of veins of very large size in the mesentery,



which anastomose in the freest manner. It is difficult to realize their number and their size without examining a good preparation.

"The splenic vein carries into the vena portæ the blood sent to the spleen, a very considerable quantity. The size of this vein in comparison with the artery is peculiar; its trunk is to that of the splenic artery, in the proportion of five to one, and consequently there is a proportionate slow motion of the blood in the vein.

"The internal hemorrhoidal or smaller mesenteric, is formed of the veins which return the blood from the upper part of the arch and the left portion of the colon, and from the whole of the rectum. Even these remote branches are a part of the venous cavity. When the smaller mesenteric vein of a subject having piles is dissected, the ramifications terminate in these pouches of blood. Hence the mortal hemorrhages from these small tumours which have occasioned so much surprise.

"The structure of this extensive system renders it in a remarkable degree liable to suffer accumulation of blood. The coats of the veins, especially those of the spleen and liver, are weak, and exert little force on the fluid contained in them; they are little assisted by muscular action; they have no valves; their great peculiarity, the subdivision of the vena portæ in the substance of the liver, and the re-union of its small branches into the large veins, called hepatic, promotes accumulation of blood in them. In every other part of the system, this fluid, after having passed through one set of veins, receives anew the impulse of the heart. Here it passes through two additional sets before it has that advantage. Hence the blood is, in these vessels, extremely sluggish in its motion.

"The large but short renal veins also form a part of the venous cavity.

"The hypogastric or internal iliac veins are very large branches of the cava; the internal iliac artery carrying into the pelvis nearly as much blood as the external iliac does to the lower extremities.

"The uterine branches of these veins are large and capable of extraordinary dilatation. Wister says, the veins of the uterus, during gestation, are in some places more than half an inch in diameter.

"Other branches of these veins return the blood from the whole substance of the back part of the pelvis, viz the parts within and without, and from the cavity of the bone itself.

"The external hemorrhoidal veins are branches of these, and when distended constitute the external piles. They inosculate with the internal hemorrhoidal veins. Thus the piles whether internal or external, are portions of the venous cavity.

"This branch of the great venous cavity lies lower than any other part of it, except the lower extremity of the external iliac vein; and is therefore pressed by a greater weight, the pressure of a column of fluid being in proportion to its height. Freely communicating with the cava, it partakes of its fulness whenever the blood accumulates in that great vein.



"A short distance without the abdomen, a considerable number of veins from the large muscles of the leg and thigh uniting, form the crural vein, which, in proportion to any of the rest, is quite large; and after entering the abdomen takes the name of external iliac vein.

"The smaller branches which form the crural vein, being exposed to the constant action of the muscles of the thigh, and having the aid of valves, are not liable to partake of any ordinary degree of fulness of the vena cava. Here, then, is the limit of the venous cavity in this direction.

"These branches of the cavity vary much in their disposition to yield, and in their sensibility to venous plethora. The hepatic is the weakest in its structure and most apt to yield. The veins constituting the bulk of the liver and spleen, have been so excessively distended, and thereby weakened, that these viscera, on being taken out of the body immediately after death, have been found unable to bear the weight of their contents, and have fallen in pieces from the hands of the operator.

"The uterine branch of the hypogastric vein is capable of great dilatation; but the head is most sensible to fulness of its veins.

"This is not always found to be the relative disposition in the different branches of the venous cavity, to yield to the accumulation of blood. In some instances the veins of the head give way more readily than usual. In others, the uterine veins, though ordinarily much disposed to yield, are extremely rigid. In a third set, you may find the liver or spleen habitually tumid, and, when reduced to the ordinary size, prone to become large again.

"In order to have a distinct idea of this cavity, let us suppose the action of the heart suddenly to cease. The check given to the blood would instantly produce distension of the cava, which would, in every successive moment, dilate successive portions of that vein and its branches till the valves were raised. It is evident that at this moment the regurgitated blood would distend the cava, the internal and external jugular veins, the subclavian, the hepatic, the renal, and the hypogastric veins, and the external iliac and crural veins; and that access would be denied to it into the veins of the limbs, and into the azygos, and the coronary veins of the heart.

"The following dissection of a child five or six months old, was made with a view to this subject. The ribs, sternum and clavicles, the integuments and muscles of the arms and legs, the lungs, the diaphragm, the mediastinum, the stomach, were all cut away, so as to show the whole of the veins from the calf of the leg and the upper part of the arm into the cava, and the whole course of the ascendens and descendens, with the subclavian veins.

"It was, when thus laid open to view, at a single glance apparent, that the right side of the heart, the cava, the subclavian veins, the iliac, the crural and the deep vein running along with the femoral artery down as far as the calf, were very full of black blood. The veins were so full as to preserve the round shape, and were stuffed full to the valves near the head of the humerus, at which point the stuffed appearance ceased suddenly; and immediately at the termination, the vein returning from the arm was empty, flaccid, and



transparent, so as scarcely to be perceived at candle light. On pressing the blood of the full venous cavity towards the stuffed end at the head of the humerus, it would not pass into the vein beyond the valves; but on increasing the pressure, it was forced out of the minute veins, entering into the subclavian from the skin and other neighbouring parts, which had been cut across in laying bare the subclavian vein, and which were so minute as not to let the blood pass till pressure was made. The venous cavity was here shown in its exact shape. The azygos had blood in it, but it was quite small.

"Though this cavity be the special seat of venous plethora, there are cases in which the gradual accumulation of blood is such, that all the veins of the body are distended. In some of these cases the veins even on the back of the hand are singularly prominent, and so distended as to be quite round.

"In some cases too, when, in consequence of general plethora and great inaction, pregnancy or other obstruction, the column of blood in the saphena so distends that vessel that its valves are no longer capable of meeting and closing the passage, this venous trunk has no barrier between it and the venous cavity, and becomes a part of it.

"It is evident that repeated distensions of the venous cavity must lessen its tone, and render it more liable to yield in future, and even to remain permanently enlarged; and that this enlargement must especially affect those parts that are particularly lax in their structure; as the vessels of the liver, the spleen, and the uterus."

"Accumulation of blood in the venous cavity being the effect of weakened action of the heart, is another link of the chain of causes extending from the remote causes to the symptoms. The next question is, what are the effects of this cause, accumulation of blood in the venous cavity."

"Before we proceed, however, some things must be noticed, which produce this link of the chain of causes, and are therefore remote causes of fever.

"The suppression of customary evacuations is an obvious cause of fullness of the vessels, which, if the action of the heart continue the same, must centre in the venous cavity.

"The suppression of the secretion of the bile increases, in the most direct manner, the fullness of the venous cavity; the bile passing directly from a branch of that cavity through the biliary ducts into the intestines.

"The menstrual discharge is another regular vent from a branch of the venous cavity, the suppression of which directly increases the fullness of that cavity.

"The suppression of the white discharge from the same vessels has a similar effect.

"Suppression of the hemorrhoidal discharge has the same effect of filling the venous cavity.

"The suppression of the secretion of urine rapidly fills the vessels in gen-



eral, and therefore the venous cavity, if the action of the heart continue the same.

"Suppressed perspiration has the effect, like that of urine, of filling the vessels generally. This fullness necessarily centres in the venous cavity, if the action of the heart continue the same.

"Suppressing eruptions on the external surface produces the same effect. The fluids repelled from the exterior accumulate in the interior, and, if the action of the heart be not increased, in the venous cavity.

"When in these disorders a fluid is discharged, its suppression is the more dangerous; as not only the fluid forming the tumour is repelled, as in the last case, but the habitual evacuation is suppressed.

"The suppression of the discharge from a habitual issue has the same effect."

"We now proceed to inquire into the effects of the accumulation of blood in the venous cavity."

"Accumulation of blood in the venous cavity produces different effects, as it takes place suddenly or not.

"It is only by the gradual and continued operation of the causes, that habitual accumulation of blood in the venous cavity is produced.

"The most obvious consequence of great accumulation of blood in the venous cavity, is distension of all the veins constituting it; and the consequent enlargement of those parts, as the liver and spleen, principally made up of veins which are portions of it."

"Great fullness of the small vessels of the venous cavity must enlarge those parts, which are chiefly composed of them and their contents; as the liver and spleen. The bulk of these viscera chiefly depends on the quantity of blood accumulated in those veins. As they are very yielding, the liver and spleen are sometimes of enormous size, and of very little more consistence than an immense coagulum; the great weight of blood in them, and the exceeding weakness of the veins, from great distension, causing them to fall in pieces on being handled.

"In the same way, the softness or broken-down state of the brain, sometimes observed in cases of great fullness of the vessels of the head, may readily be produced.

"This increase of bulk affects also the membranes constituting the stomach, intestines, mesentery, and omentum. In the mesentery of the small intestines, there is an immense assemblage of vessels of very large size, freely anastomosing. The distension of this assemblage of blood vessels, when a very large proportion of the blood is in the interior, must be very great. The same is true of all these parts; and accordingly we frequently find with a feeble pulse and pale cold skin, notwithstanding great emaciation, a tumid hard abdomen.

"Stretching the fibres of which the soft parts of the body are composed, produces uneasiness or pain. Unusual distention stretches the fibres of



which a tube or cavity is formed, and produces sensation according to its degree, pleasant, disagreeable, or painful.

"Pain is produced by excessive distension of the bladder, of the common bile duct by a gall-stone, of the intestines by wind or fæces, of the ureters by a calculus; but these causes are of comparatively rare occurrence, and multitudes suffer severe pain in every autumnal epidemic, and in various chronic affections, who are not effected by any of those causes.

"In these, pain evidently depends upon the varying state of the action of the heart.

"In epidemic diseases, the pain returns at particular periods of the day, sometimes when the action of the heart is strongest, often when it is weakest; and disappears when the state of the action of the heart is changed: thus, pain often occurs when the action of the heart is very high in fever, and goes off when that action moderates; and often when it is very low, as in the cold fit of an ague, and goes off when that is passed.

"In chronic affections, pain almost always occurs when the action of the heart is weakest, and is great in proportion to the weakness; and is relieved by producing increased action of the heart.

"In the most severe cases of pain in the head, the stomach, or bowels, that I have ever witnessed, the action of the heart has been exceedingly weak, evinced by very feeble pulse and extreme paleness of the countenance; and the pain has increased in proportion to the decrease of the action of the heart. In these cases effectual relief is obtained at once by raising the pulse.

"Except in few instances, therefore, pain depends upon the varying state of the action of the heart; and as this varying state produces a varying state of distension of the arteries and veins; (strong action throwing an unusual quantity of blood into the arteries, and weak action leaving a proportionate quantity in the veins;) it is evident that pain depends upon the varying state of distension of the arteries and veins. When we consider further, that the pain which occurs with weakened action of the heart, increases as that action becomes weaker, and therefore as the distension of the venous cavity increases, it is evident that this distension is the immediate cause of the pain.

"If we consider how large a portion of the whole structure of the body the arteries and veins are; how large a proportion of the whole weight of of the body the blood constitutes, about a third of the soft parts; with what force and rapidity this immense mass is unceasingly driven; how great an effect *the sudden change of the direction* of such a mass must have on vessels already full, and only capable of yielding gradually; and how completely this change of direction is instantly effected by sudden diminution of the action of the heart, sometimes as great as sudden; we cannot doubt that the magnitude of the cause and the suddenness with which it operates, corresponds with the magnitude of the effect and the suddenness with which it is produced.

"Unusual distension of the arteries or veins, therefore, produces pain;



but as that of the arteries proceeds from increased action of the heart, if that action be weak, it is certain that the pain does not proceed from the unusual distension of those vessels: and, as in proportion to the weakness of the action of the heart is the fulness, and therefore the distension of the venous cavity; when that action is weak, the pain must, if it arise from unusual fulness of blood in the part, proceed from accumulation of that fluid in the venous cavity.

“Even when pain is accompanied by increased action of the heart, there must be an unusual fulness of the veins of the part. From the superior capacity of the veins, from their laxity and disposition to yield, and from the comparative straitness of the arteries, and their elasticity and disposition to contract, the distension of the latter vessels cannot take place in a part without the previous distension of the veins into which they pour the blood. Fulness of the venous cavity, therefore, is the cause of pain in those parts in which the *branches* of this cavity are situated, when the action of the heart is weak; and it is necessary to the production of pain even when the action of the heart is increased.

“An increase of the quantity of blood in the vessels of a part, increases the redness and heat of that part, and renders it more sensible.

“If the quantity of blood sent to the external surface be greatly diminished, its colour, temperature, and sensibility are lessened. If an increased quantity be sent, the colour, temperature, and sensibility are increased. If an increased quantity of blood be left in the vessels of an external part, the same result is observed in that part; thus, when the vessels of the *adnata* are distended with blood, the eye is red, hot, and extremely sensible. There can be no doubt that the same cause produces the same effects in internal parts.

“Accumulation of blood in either arteries or veins produces these effects. We have shown that such accumulation cannot exist in the former without previous fulness of the latter; and it is evident that when redness, heat, and increased sensibility occur with very weak pulse, they cannot be the effect of distension of the arteries; and as they increase with the increasing weakness of the pulse, and consequent increasing fullness of the venous cavity, it is evident that they are produced by accumulation of blood in that cavity.

“Tumour, pain, heat, redness, and increased sensibility, are, therefore, produced by an accumulation of blood in the venous cavity. In the cases above mentioned of distension of the *cava*, pressure of that part produced considerable pain. If distension of a large vein make it so sensible, that pressure produces pain, the distension of a congeries of small veins, as in the liver, the spleen, the membranous viscera of the abdomen, or in the head, producing enlargement of all, by mutual pressure must produce pain.

“The head is in general the part first disordered by accumulation of blood in the venous cavity. This arises, 1st, from the immediate and free communication between its large veins and sinuses, and the *cava*; 2d, from its



having so great a proportion of blood continually passing through it, on which account a check must leave a proportional quantity of blood in it: if, for instance, there be, as has been calculated, four times as much blood circulated through the head as through any other part; by a total obstruction to its return, as by ligature, four times as much would accumulate in the head in a given time, as long as it could receive it, or as much in a fourth part of the time; and the result from a partial check would be proportional; 3d, from its being so near the heart, and the course to it so direct, that it receives the very first jet of blood when sudden accumulation produces increased action of the heart: 4th, from its unyielding covering, which gives greater effect to the pressure: we find that bearing on a distended part, as the liver, or the distended cava, produces pain; so the permanent pressure of the skull on the distended parts within must have the same effect.

"When pain in the head approaches gradually and moderately, it is preceded by a sensation of fullness in the middle of the fore part of the forehead, and extends gradually to the top of it, and to the sides of the head.—This is more perceptible on shaking the head suddenly, or on making a slight false step; and sometimes in these circumstances a slight pain is felt that had not before been perceived. It is evidently produced by the same cause that produces the pain; because, as the uneasiness becomes more and more considerable, it evidently runs into, and is lost in the sensation of pain. It however frequently does not amount to pain, but lingers a considerable time without being sufficiently striking to induce the sufferer to think of medical aid.

"This fullness is accompanied by a want of recollection, an unusual difficulty in connecting ideas and perceiving the relations of things, a wandering of mind which disables the person from pursuing an argument, and finally a total confusion of intellect, and a vertiginous sensation, which after a time spent in fruitless efforts compels him to give up the attempt.

"When the affection is so considerable as this, the fullness often extends to the integuments of the forehead. The skin feels full and tight drawn, and there is a disposition to rub it hard, as if thereby we could get rid of it.

"Vertigo sometimes accompanies this affection of the head, and sometimes, in high degrees of it, double vision, so that a man at the distance of an hundred yards, or less, appears like two. The patient is in these cases pale and sallow, his pulse weak, and some of the effects of accumulation of blood in the venous cavity, already mentioned, are present, as well as some to be mentioned.

"That vertigo is produced by distension of the vessels of the head is evident from the effect of stooping with the head down in producing redness of the face; and the weakness of the pulse common in those who are affected with vertigo, and particularly when most affected, shows that the blood is accumulated in the veins.

"A disposition to sleep proceeds from the same fullness of the vessels of



the head; it often precedes pain, and often exists without it. The different degrees of these comatose affections have received different names.—They are all one, are often seen in aged people who are particularly liable to accumulation of blood in the interior veins, and frequently end in sudden death.

“False perception and delirium are also effects of accumulation of blood in the venous cavity. They very often occur with great coolness and paleness of the skin, and sometimes with very cold surface, and with feeble pulse. These affections are very common, indeed almost universal as the pulse sinks, when the heart is about ceasing forever.

“The severest cases of pain in the head I have ever met with, have been accompanied by strong marks of extreme fullness of the venous cavity, viz very pale countenance and very weak pulse. Frequently, however, pain in the head is first felt on some increase of the action of the heart. But it is evident from the great size of the the veins of the head, and their free communication with the cava, that unless there is some obstruction in them, increased action of the heart cannot produce much distension of the arteries of the head. It is certain, also, that in those cases in which pain in the head is felt in consequence of the increased action of the heart, there is accumulation of blood in the venous cavity; as in the cases above mentioned, and *also in the rise of the hot fit of a fever*. It is moreover certain, without such previous distension of the veins, so small an addition as can be made by a slight increase of the action of the heart, could not produce pain, or pain would be produced by walking rapidly a short distance. It is therefore by the *co-operation* of distension of the arteries with *previous* distension of the veins, that the effect is produced in these cases.”

#### “EFFUSIONS.

“When the principal artery is tied after amputating a limb, the blood issues with great force from the smaller branches; and it frequently happens, when every one that can be observed is tied, that in a short time there is a considerable discharge from some minute vessel, dilated by the distending force. If an artery be tied, without amputating the limb, the blood is forced into the smaller branches above; and they are so enlarged as to maintain the circulation, by anastomising with the smaller branches which go off from the artery below the ligature.

“So, if there be obstruction to the passage of blood through a vein, the minute arteries which pour their contents into it, are distended; and the fluid they contain is pressed with great force into the branches above; and through the small vessels which carry serous fluid, a great additional quantity now passes.

“Thus, œdematous swellings of the legs are very common symptoms when the pregnant uterus, or any tumour, presses on the external iliac veins: so also, an enlarged and obstructed liver produces a serous effusion



into the peritoneal cavity. Indeed nothing can be plainer than if a fluid be passing through a vessel branching into two others, stopping its course through one will accelerate it through the other, and increase the quantity that passes.

"As serous effusion takes place in consequence of obstruction to the free course of the blood through the veins, and the distension, thence arising, of those veins and their branches above the obstruction, it is evident that the same effect must flow from a similar distension proceeding from accumulation of blood in the whole venous cavity. It is not material whether the obstruction to the free course of the blood from the minute branches into the venous cavity, proceeds from the pressure of a tumor, or from such fulness of the venous cavity as forbids its free entrance. Such fulness of the venous cavity therefore produces serous effusion; and operating on the exhalents in the neighborhood of all the minute branches of the venous cavity, the effused fluid passes at one part or another, in proportion to the fitness of their state at the time for the purpose.

"The passage by the kidneys is the readiest; because, originally adapted to the purpose of carrying off the extra fluids and saline parts of the blood, they easily permit an additional quantity of serous fluid to pass; and when they are in a healthy state, or when not themselves deranged by the pressure of accumulated blood, they are generally sufficient for the purpose. If the diminution of the action of the heart be not only sudden but great, there frequently occurs a very large discharge of pale urine in a very short time.

"When the kidneys do not readily permit the passage, the pressure falls on the exhalents in the neighborhood of the minute branches of some other branch of the venous cavity.

"As from the structure of the hepatic branch, it is peculiarly liable to distension and to suffer accumulation of blood, effusion is very common from the exhalents near its minute branches into the peritoneal cavity.

"As the whole substance of the intestines, including the peritoneal coat, is so thin, and the arteries running through it supply moisture to both surfaces, viz: that belonging to the peritoneal cavity, and that belonging to the cavity of the intestines; it is plain that the same obstruction which produces effusion into the former cavity, may likewise into the latter; and hence the discharge of serous fluid in diarrhæa, and likewise the water-brash.

"The same effect is produced by great accumulation of blood in the venous cavity, obstructing the different small veins that issue from the different parts of the throax, viz: effusion into the different thoracic cavities: and as they are all very closely connected, effusion into one alone is not common; and hydrothorax and hydrops pericardii very often occur together.

"The same obstruction also produces an increased effusion from the vessels constituting the bronchial glands, and this fluid having its thinner parts carried off by the passing and repassing of the air, becomes thick and is thrown up by coughing. The thicker consistence of this discharge may



proceed from its being poured out more consistent than usual, as well as in greater quantity.

"This discharge is habitual in many people as they grow old; that is, as accumulation of blood in the venous cavity increases.

"In high degrees of accumulation of blood in the venous cavity, the passage of the blood from the bronchial veins being obstructed, the fulness of those veins make the bronchi more sensible to impressions and more irritable. Accordingly we find these high degrees, as when the respiration is very difficult or when there are considerable pain and soreness of the epigastrium, often accompanied by an irritable state of the lungs, evinced by a slight cough, at first and for a considerable time dry. The same fulness of the veins which produces an irritable state of a part, increases the natural discharge of that part; and consequently, the cough which for a time is dry, is at length accompanied by a mucous discharge, at first small, but gradually, and sometimes rapidly increasing, it becomes large.

"Effusion on the skin of the head and face arises from the same cause, when the action of the heart is diminished. Hence it is we so often see cold clammy sweats confined to the head and face, when the pulse is feeble and the surface pale and cool; the veins of these parts being, alone of all the external parts, branches of the venous cavity. These effusions on the head and face increase as the action of the heart sinks in death, and the veins fill. They occur also on partial suspension of the action of the heart, as in fainting.

"There is yet another branch of the venous cavity greatly affected by the accumulation of blood. The vessels of the uterus pour out continually a fluid similar to that which lubricates all the interior surfaces. The same obstruction which increases effusion into the peritoneal and intestinal cavities, causes an increase of that into the uterus. This may be considerable before it is much noticed; and, it is evident, may like all the others occasionally be excessive, and put on different appearances more or less opaque."

#### HEMORRHAGES.

"It needs no argument to prove that these exhalent vessels, so capable of enlargement, may occasionally, under great pressure pour out red blood. The nature of the effused fluid must depend on the state of the vessels through which it is forced. Those vessels which ordinarily pour out a pure lymph, are capable of pouring out a thick mucous, or even blood itself; just as the small vessels in different parts of the body, which do not ordinarily carry a visible fluid, are occasionally so dilated as to carry red blood. Thus the vessels of the adnata, usually invisible, are sometime so filled with blood as to make the whole ball of the eye red. Even the delicate vessels of the cornea become opaque, and sometimes contain red blood.

"So the vessels of the kidneys, which ordinarily pour out a limpid fluid frequently pour out blood.

"I have seen a woman one of whose breasts discharged blood and the other milk, without anything else remarkable in the case.



"So blood is sometimes discharged from the stomach and bowels. It may be poured out by the vessels of the liver through the bile ducts, or may proceed from the vessels of the stomach or bowels. In these hemorrhages the blood is often quite black, and its texture so broken, that it has sometimes very much the appearance of coffee grounds.

"In ulcers of the legs, with varicose state of the saphena, the granulations while the patient is lying down, are florid and healthy; but if he stand up a few minutes, they acquire a dark red colour and frequently bleed. This is nothing more or less than a hemorrhage from the minute vessels opening on the surface of the ulcer, in consequence of the difficulty of passing the blood into the saphena, in opposition to the pressure of the whole column of blood in the venous cavity bearing upon them in the erect posture. By lying down this is taken off and the bleeding stops, and the healthy colour returns.

"Hemorrhage from the same cause occurs sometimes in the head and produces apoplexy. I have seen patients die in this disease without any marks of febrile action whatever, and with so small and weak a pulse as to excite surprise.

"Alarming hemorrhages from the gums occur with pulse perfectly moderate or weak, with cool skin, head-ache, and most of the preceding effects of fullness of the venous cavity. In one case it was preceded by a discharge of blood from the kidneys.

"It was accompanied by hemorrhage under the skin in many different parts of the body, forming petechiæ. They were of different sizes. This was not the first, though it was the most violent attack. It was usual for the spots to turn very black and be a week going off. The smaller ones on the arms came through the cuticle by degrees, and several of them I scratched off like minute black scabs. In another case, on opening the petechiæ, dark blood flowed out for some time, showing that this effection was a true hemorrhage.

"The discharge of blood from the hemorrhoidal vessels often occurs with symptoms proceeding from the same fullness. Cullen states that "it frequently happens, even before the tumours are formed, *and more especially before the blood flows*, that various disorders are felt in different parts of the body, as head-ache, vertigo, stupor, difficulty of breathing, sickness, colic pains, pains of the back and loins, and *often*, together with more or fewer of these symptoms, there occurs a considerable degree of *pyrexia*."\*

From these vessels being the lowest part of the venous cavity, this hemorrhage is more frequent than almost any other. It becomes more frequent and more free as the patient becomes old and feeble, that is, as venous plethora increases.

"Menorrhagia is another hemorrhage, which never occurs without symp-

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\* Cullen's First Lines, DCCCCXXVIII.



toms or effects of accumulation of blood in the venous cavity; such as pain in the head, and the several symptoms mentioned in the preceding passage; and when these symptoms are in highest degree, the discharge is greatest.

"It is to be observed that all these hemorrhages have occurred with the whole surface pale and very cold, with pulse weak or even imperceptible, and all the effects of accumulation of blood in the venous cavity that have been stated; and that in some instances, with unusually weak pulse, hemorrhages from various parts alternate with one another.

"Some of these hemorrhages however are accompanied by strong pulse, and have been called *active* hemorrhages, in contradistinction to those called *passive*, which are the subject of the preceding observations.

"These active hemorrhages are however universally preceded by strong marks of the same fullness, as in the hemorrhoidal discharge, and in epistaxis; and increased action is itself an effect of suddenly increased fullness of the venous cavity.

"This view of the manner in which hemorrhage occurs, is strengthened and confirmed by the following considerations.

"The sum of the capacities of the small arteries is greater than that of the large; the veins are of greater capacity than the corresponding arteries; they do not receive the whole of the contents of the arteries, a considerable portion going off by the exhalents; they are yielding and would easily receive an additional quantity; and the communication between the arteries and veins is perfectly free, the blood often springing in jets from an orifice in a vein of the arm or leg, particularly if the ligature be near the wrist or ankle. It is not then conceivable that the arteries should force through their minute exhalent branches, a part of the red blood, as long as the veins continue in the above unobstructed state. Such an occurrence can only take place from the freedom of entrance into the veins being destroyed, which, excepting the few instance in which a tumour may exist in such circumstances as to press upon a large branch of the cava, can only be the effect of excessive fullness of the venous cavity; a state very frequently occurring, and marks of which accompanied every case of hemorrhage I ever met with.

"The manner in which the hemorrhage commences, and the colour of the discharge in the first instance, also confirm the view given. The discharge commences very moderately, and gradually becomes considerable in quality: at first it is a serous or mucous fluid with a bloody tinge, and the colour by degrees becomes more and more red. This is what we observe in hemoptysis, in hematuria, and what we know occurs in menorrhagia, and likewise in the hemorrhoidal discharge. So likewise when these hemorrhages are declining they gradually diminish in quantity and in colour until they cease entirely.

"Hemorrhages are very apt to be periodical. There must consequently be, after the cessation of each hemorrhage, a gradual renewal of the superfluous blood. That superfluous blood must centre in the venous cavity, be-



cause being more than the system requires, or the heart can continue to circulate, it is necessarily left in the cava and its branches.

"A fourth consideration is, that if there were not a store of blood in the system more than necessary for its purposes, it would be impossible for the pulse to keep up as it often does in hemorrhages. A discharge from an artery, or from a vein between the valves and the arteries, (which is an immediate drain from the arteries,) equal to that which sometimes occurs from the different branches of the venous cavity, would excessively debilitate the patient, would sink him at once into the grave; particularly when we consider the extreme weakness of the pulse in many of these cases, even before the hemorrhage commences. But there being in the venous cavity more than the heart is in a situation to send on, a discharge from that cavity, a remote branch of it particularly, is not injurious, until it affects the supply called for by the heart.

"Hemorrhage, therefore, active or passive, is the effect of accumulation of blood in the venous cavity."

Additional authority and illustration might be adduced, but as we have the opportunity of putting the whole to the test of Experiment, we here close our quotations under the present head. A few general considerations, and we pass to our next sub-division.

If we take from inflammation, fever, and hypertrophy, the conditions which they have in common,—increased action, increased heat,—nothing will remain to which these terms are applicable. These common conditions must have a common cause; therefore, they are illustrative of each other.

In congestion, ague, or dilatation, the surface is at, or below, the natural temperature; in inflammation, fever, or hypertrophy, it is at, or above, the natural temperature.

Sometimes we have no reaction. Sometimes we have no hypertrophy.—Sometimes we have a low form of inflammation, of fever; this is represented in dilatation with hypertrophy, *dilatation* predominating; sometimes we have active inflammation, active fever; this is represented in hypertrophy with dilatation, *hypertrophy* predominating.

As dilatation with reaction or hypertrophy, and ague with reaction or fever, are produced by the same cause, and involve the system at large. it follows that the symptoms in each should be the same; and by reference to dilatation and dilatation with hypertrophy of the heart, the list of symptoms which occur in ague and fever—the list of symptoms which occur in *all* fevers—will be seen to be exhausted.

As dilatation, and dilatation with hypertrophy of the heart, illustrate all passive and active diseases, it follows that the treatment for dilatation and dilatation with hypertrophy of the heart, should illustrate the treatment for all; and by reference to the treatment for these affections of the heart, this will be seen to be true.

One more illustration which creeps to the verge of the Record, and we



pass to our Verification. From the earliest records of Medicine, inflammation and fever, have been considered, Conservative. Hypertrophy, which has only been understood since the discovery of the circulation, has been considered Conservative, also! And all for the same reason, viz, that without reaction, the congestion, ague, or dilatation, invariably terminated in death; that *with* reaction, whether it amounted to inflammation, fever, or hypertrophy, or not, a large majority recovered; or life was protracted. Hence it was very natural to look upon inflammation, fever, and hypertrophy, as Conservative.

7th. Verification by Experiment;\* as in producing general congestion, and thereby producing all pathological phenomena.

Debility, or dilatation, being an *obstruction* to the circulation, whenever an organ through which all the blood of the body passes, as the heart, becomes affected, it must obstruct the return of blood from all parts of the system, thus producing general venous congestion—increasing the retrograde pressure of blood upon all parts of the system—and, therefore, according to the major premis of our Syllogism, should produce all pathological phenomena—hypertrophy, which is increased action, increased pressure, giving prominence, *activity*, to those phenomena.

*Hope on the Heart*, pp. 300-2.—“In the preceding section I have shown that the effect of dilatation is, to enfeeble the heart, and thereby occasion the phenomena of an obstructed circulation. We have now to examine those phenomena as signs of dilatation.

“*General Signs*.—The heart, when weakened by dilatation, is subject to

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\* The object of this experiment being to produce general venous congestion, it is evident that as dilatation or valvular disease of the heart, is an *obstruction* to the passage of blood through that organ, it is equivalent to the application of a ligature to the great veins emptying into it; and therefore furnishes as direct an *experiment* as though a ligature was thus applied.

One reason why the experiments detailed under our 5th division have not thrown more light upon pathology is, that they were *limited* to *particular* veins; but in dilatation, or valvular disease of the heart, nature has made the grand Experiment of producing *general* venous congestion, and there all pathological phenomena may be found.

If, as has been stated, Dilatation of the Heart, corresponds to Ague, and to all Passive diseases, it follows that in dilatation of the heart we should see all the symptoms of Ague; see all passive diseases. It does not follow that there must be the same phenomena in every respect in every case of Ague, or dilatation, unless *all* the conditions are the same; unless there be the same extent, degree, and duration, of congestion; since these are elements in their production: and as these elements may *vary* in different cases, we have an appreciable cause of the *diversity*. A certain *degree* of Congestion or pressure on the brain, produces pain; a greater degree, convulsion; and greater still, Coma.

Hypertrophy, supervening upon dilatation, converts what were before called *passive*, into what are now called *active* diseases or phenomena.



palpitations of a feeble, oppressed kind, and more or less distressing, frequent, and prolonged, according to the extent of the malady. In general, they are protracted. The attacks are provoked by any over-exertion or mental excitement.

"The pulse is soft and *feeble*, and, if the debility of the heart be very considerable, it is small. Irregularity and intermittence are rare, except during protracted and distressing paroxysms of dyspnœa, or when the vital powers are much exhausted, as in the advanced stage of the disease. When, however, softening accompanies the dilatation, I have found that the pulse is apt to be as small, weak, intermittent, irregular and unequal, as in the worst cases of disease of the mitral valve, with which, for this reason, softening is frequently confounded.

"The languor of the arterial circulation in dilatation causes the extremities and surface to be *chilly*, the disposition to be melancholy, and the character to be deficient in energy.

"The blood, not being freely transmitted by the left ventricle, accumulates in the lungs by retardation: whence difficulty of respiration; cough, sooner or later attended, in many cases, with copious expectoration of thin, serous mucus; œdema of the cellular tissue of the lungs greatly aggravating the dyspnœa; terrific dreams with starting from sleep; and passive pulmonary hemorrhage of dark, grumous blood in small quantities, forming sanious sputa, and generally the precursor of death in individuals affected with great difficulty of respiration. After death, I have found this hemorrhage connected with pulmonary apoplexy, and always with great engorgement.

"The lungs being obstructed, the engorgement is propagated backwards to the right side of the heart, to the great veins, and finally to *all their ramifications*. From this venous engorgement arises a series of striking phenomena, which we shall review successively, premising that the hemorrhage, and dropsy do not generally come on till a late stage of the disease.

"1. Serous infiltration.—This generally makes its appearance first in the lower extremities, because it is in them that the circulation is most languid, the return of blood being opposed by its gravity, while it is little promoted by the action of superincumbent muscles. The œdema gradually ascends, and, under the name of anasarca, may eventually attain the utmost degree over the whole surface of the body. Increased serous exhalation takes place from the serous membranes also: whence, hydrothorax, dydro-pericardium, and ascites: one or other of which is almost invariably present when there is much external dropsy.

"2. Disoloration of the face.—If the complexion was originally florid, it becomes purple or deep violet, on the centre of the cheeks, the end of the nose, and the lips, with intumescence of the latter, while the intermediate parts are pallid and sallow. If originally pale, it becomes cadaverously sanguine, and has a dusky, leaden or venous cast, especially around the eyes.



The lips are either livid, or very pale. Lividity sometimes shows itself in the extremities as well as in the face.

"3. Congestion of the brain.—This produces the usual symptoms of passive cerebral congestion, and of the corresponding form of apoplexy; namely dull headache, felt principally along the course of the great sinuses; hebetude of the mental faculties; stupor, convulsions, and eventually complete coma. It is not unusual for these symptoms to supervene a few days before the fatal termination. Sometimes they depend, not on congestion alone, but partly also on serous effusion into the ventricles, or on the surface, resulting from the congestion; sometimes, again, the congestion ends in sanguineous apoplexy, of which I have seen several instances. Whence it is incorrect to suppose that this catastrophe is peculiar to hypertrophy of the heart.

"4. Injection of the mucous membranes.—It is common to find them after death so vascular as to present the appearance of inflammation. This is especially the case in the stomach and intestines, and it is necessary to be aware of the circumstance, in order to guard against the error of attributing the redness to inflammation.

"5. Passive hemorrhage.—This takes place from the lungs, as already stated, also from the nose, the stomach, the intestines, the uterus, and more rarely from the bladder. It results from engorgement of the mucous membranes. The effusion consists of dark blood exuding in small quantities.—When from the stomach, and not immediately ejected, it has occasionally the appearance of Coffee grounds, in consequence of being exposed to the coagulating action of the gastric juice. In the intestines, it is often blackened by the intestinal acids—the carbonic, acetic, and sulphureted hydrogen.

"6. Congestion and enlargement of the liver.—This is so common a consequence of retardation of the blood on the right side of the heart, that few persons so afflicted in any considerable degree, are exempt from it. This has, I believe, been almost entirely overlooked by authors on the diseases of the heart, and is still very little known. By the obstruction which it occasions in the system of the vena porta, it leads to ascites and jaundice; also eminently favours hemetemeses, intestinal hemorrhage, piles, and, though indirectly, uterine hemorrhage—many cases of which I have found to be obstinate till the hepatic enlargement was reduced by mercury and aperients.—This latter fact has been noticed by Dr. Locock.

"7. Angina of the heart may occur as an adventitious complication of dilatation, no less than of hypertrophy.

"Such are the *general* signs of dilatation of the ventricles."

To the above list, Dr. Wood, (Wood's Practice, Vol. 2, p. 162,) adds, dyspepsia, nausea and vomiting, constipation, diarrhea, melena, albuminuria, and delirium. Dr. Carswell and others add ulceration and mortification; and so on to the end of the chapter—Dr. Hope adding (pp. 251-2,) increased action, reaction, inflammation, fever, that is, Hypertrophy.



### 8th. Elimination of the cause through Treatment.—Another Experiment.

If A, B, and C, are said to be the cause of a given effect, we put the matter to the test of Experiment by eliminating C; and then if the effect continues, we say that C was not essential, was not the cause, or a condition of the effect: and so of B, or A. In the same way, Treatment eliminates the cause or a condition of disease; and if all pathological phenomena are produced by pressure—Congestion—it follows that the treatment for congestion should illustrate the treatment of all special diseases, whether called 'common,' or 'specific.'

As this is a very important point in our argument, we wish to direct special attention to the consideration, that if the treatment now about to be detailed for congestion, is not completely *exhaustive* of the treatment of all special diseases, it is so nearly so, that any remainder cannot disturb the validity of the general argument. It is proper to mention in this connection, that Dr. Williams—from whose admirable 'Principles' our elimination will be taken—was not attempting to support any General Theory.

#### " REMEDIES FOR CONGESTION."

"The most important means in the removal of congestions are those which contribute to the removal of their causes. Thus the loosening of a ligature, or the reduction of a tumor, compressing veins; the moderating the inordinate and inefficient action of a diseased heart; the restoration of the secretion of the liver, will severally tend to diminish the congestions resulting from these different causes of venous obstruction.

So, also, in the treatment of congestion from atony or weakness of the capillaries, it is important to remove the circumstances which have caused this atony. In many cases it is over-distention from gravitation; here change of posture gives relief. Thus, in congestive fevers, and other states of continued weakness, it is useful to change from time to time the position of the patient from supine to prone, or lying on either side. With congestion of the head, this part should be supported high. The recumbent posture gives much relief to congested hemorrhoidal or uterine vessels; as we see it reduce the swelling of varicose limbs.

"*Pressure* is sometimes a remedy for congestion, by supporting the weak vessels, and promoting their contraction. This forms a chief part of the useful operation of bandages, adhesive plasters, and even of poultices, in various external congestions. It probably might be more extensively applied to these, and even to some internal congestions, in the modes suggested by Dr. Arnott, by mercury, or by the soft slack air-cushion pad.

"Friction is a modification of pressure especially suitable to some forms of congestion, being calculated to give the motion that is defective, as well as to support the weak vessels. It is obviously useful in external congestions, from cold; and sometimes in visceral congestions, as those of the liver



and abdomen generally. Exercise operates somewhat in the same way.

"Another class of remedies for congestion comprehends those which promote the contraction of the dilated vessels by augmenting their contractility or tone. In this way, astringents and cold operate; as in the use of solutions of alum, sulphates of zinc or copper, acetates of zinc or lead, and infusion or decoction of oak bark, catechu, kino, nutgalls, &c., in various congestions, particularly of the conjunctiva, throat, rectum, and vagina. The most obvious part of the action of bark, quinine, and arsenic, in the cure of ague, is in their reducing the great visceral congestions, which form their most remarkable, and perhaps their most important, pathological element.

"The utility of astringents in congestion is limited by the fact, visible under the microscope, that they commonly contract the arteries more in proportion than the capillaries and veins, which are most distended. Hence they may still further impair the motion of the blood, and increase the congestion. A reaction, however, sometimes occurs, which converts the operation of the astringent into that of a stimulant, which is another kind of remedy for congestion. The same remark is applicable to cold; and even more so, inasmuch as it also causes a physical obstruction to the flow of blood, in the manner formerly described.

"Stimulants sometimes are remarkably affectual in removing congestions. Thus diluted spirit lotion to a congested conjunctiva, capsicum gargle to a congested throat, a stimulating wash or ointment to a purple sore or surface, will often signally reduce the congestion. Other congestions are removed by exciting the circulation generally; a stimulant draught, or even one of any hot liquid, relieves the pulmonary congestion which has induced a fit of asthma; a congestive headache is sometimes mitigated by similar means. Well regulated exercise tends to disperse congestions in various parts. Various agents which specifically excite particular organs or parts, are often useful in removing congestions from them. Thus mercury is, in some cases, a remedy for a congested liver; some diuretics, as digitalis and catharides, for congested kidneys; squill, benzoin, and other expectorants, for bronchial congestion.

"The influence of stimulants on congestion may be illustrated by the microscope. A solution of capsicum applied to a frog's web, congested after previous irritation, causes an enlargement of the arteries, and an increased flow of blood to and through the congested vessels. This flow restores motion where it was deficient, sweeps away the accumulated blood, and, in some instances, causes the vessels to contract afterwards to their natural size; so that the congestion is completely removed; in that case, the cure is complete. In other instances, however, the stimulants fail to clear the congested vessels; the enlarged arteries pour in more blood; but this not overcoming the obstruction, increases the hyperæmia, and, as we shall afterwards see, may convert it into inflammation. Thus it appears that stimulants as well as astringents, although occasionally proving remedies for congestion, some-



times tend to increase it; and this they are most likely to do when the congestion is *extensive*, or of *long continuance*, or when its causes are *still in operation*.

"Under such circumstances, congestion is better relieved by another class of remedies, *depletion*, and various *evacuents*. Blood-letting, by puncture or incision in the congested parts, enables the distended vessels to unload themselves, and they may recover their size; and the utility of this expedient is shown in scarifications of congested conjunctiva, and tonsils, and leeches to a congested os uteri. But the blood is more usually drawn from the vicinity of the congested part, as by cupping, or leeches to the chest or side for congested lungs or liver; to the sacrum for congested uterus; or leeches to the anus for congested intestines. Or, without actually shedding blood, it may be drawn away from the congested part by derivation; that is, by agents which cause determination of blood or congestion in other parts; as dry cupping, mustard poultices, and other stimulating applications to the surface, and by purgatives and other evacuants from the interior. A still more powerful agency of the class of derivants is that of removing atmospheric pressure from a limb by enclosing it in an air-tight vessel and partially exhausting the air. This was invented by Dr. Arnott, and has been lately employed by Sir James Murray and several French practitioners. These act by inducing determination of blood, or even inflammation in another part, and thereby drawing away from the congested parts. Some means, however, may be employed which prevent or remove congestion by damming up the blood in other parts, and thus inducing a counter-congestion. It has long been practiced with success to stop a fit of ague by applying a tourniquet to the thigh; and Dr. Buckler of Baltimore, following a popular practice of a similar kind, has called the attention of the profession to the general utility of the remedial measures which he terms *hæmotase*; which consists in the temporary application of ligatures to one or more limbs, which are thereby so much congested, that there is not blood left in the circulation sufficient to supply the congested vessels, and these, relieved of pressure, may contract and expel the accumulated blood. I have employed this plan in several cases in which temporary congestions were produced in the liver and lungs, and sometimes with a very remarkable preventive effect; but it has little influence on congestions which have long been formed, and acts chiefly on the distribution of blood in the larger blood-vessels.

"The operation of several of the foregoing agents, in combination or succession, is generally more effectual than that of single ones in the cure of congestions. Thus congestion of the liver may resist the action of mercury, and may even be aggravated by it, until the vascular distention has been partially reduced by local blood-letting or derivants; then the mercury, by increasing the secretion, reduces the remaining congestion. Congestion of the kidneys is augmented rather than diminished by diuretics, which then fail to increase the secretion of urine, but may only render it more albuminous. But

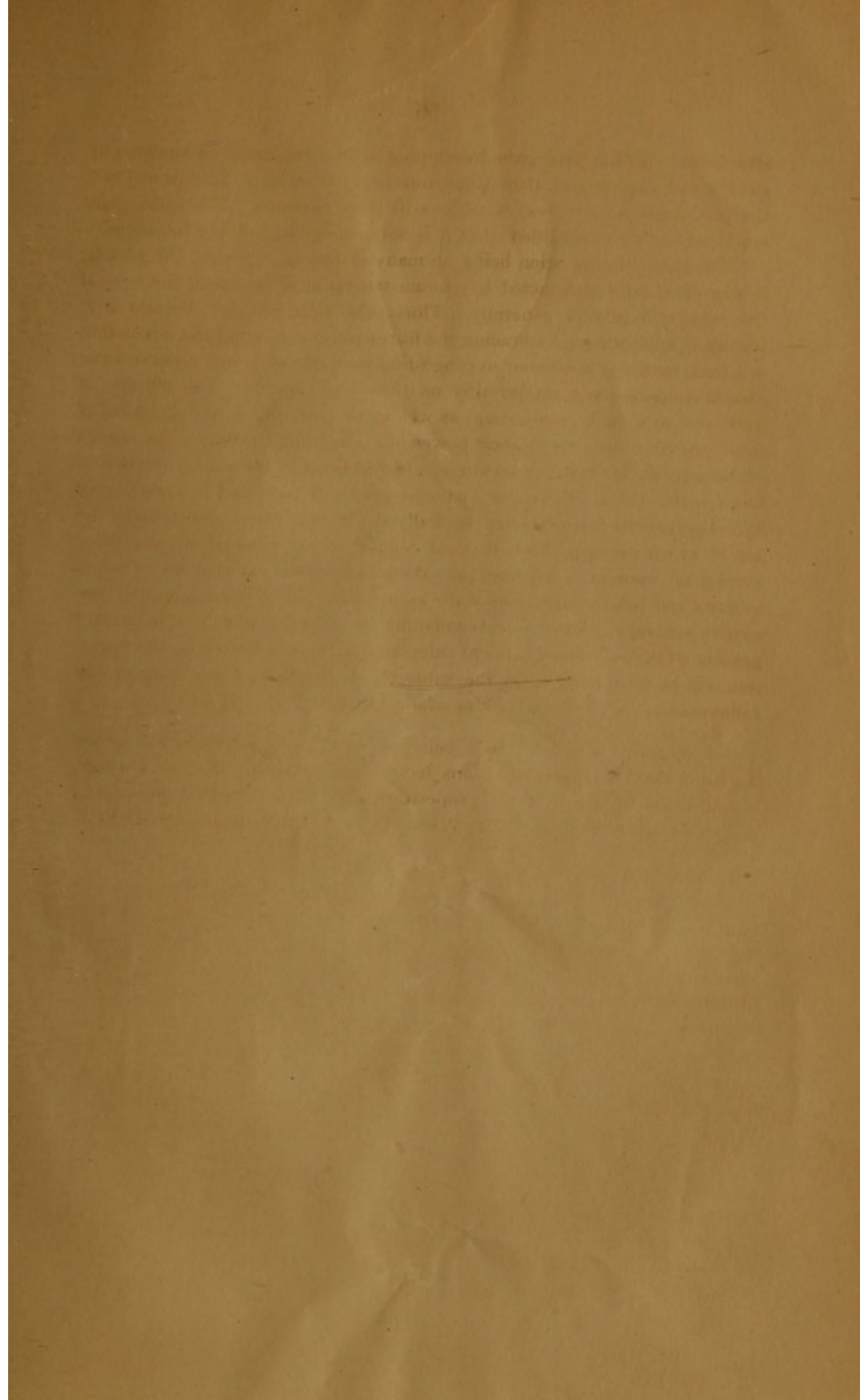


after some relief has been given by cupping to the loins, and hydragogue purgatives and diaphoretics, then some diuretics, particularly digitalis and cantharides, cause a freer flow of urine with less albumen. The same point might be further exemplified; but it is unnecessary to multiply instances.

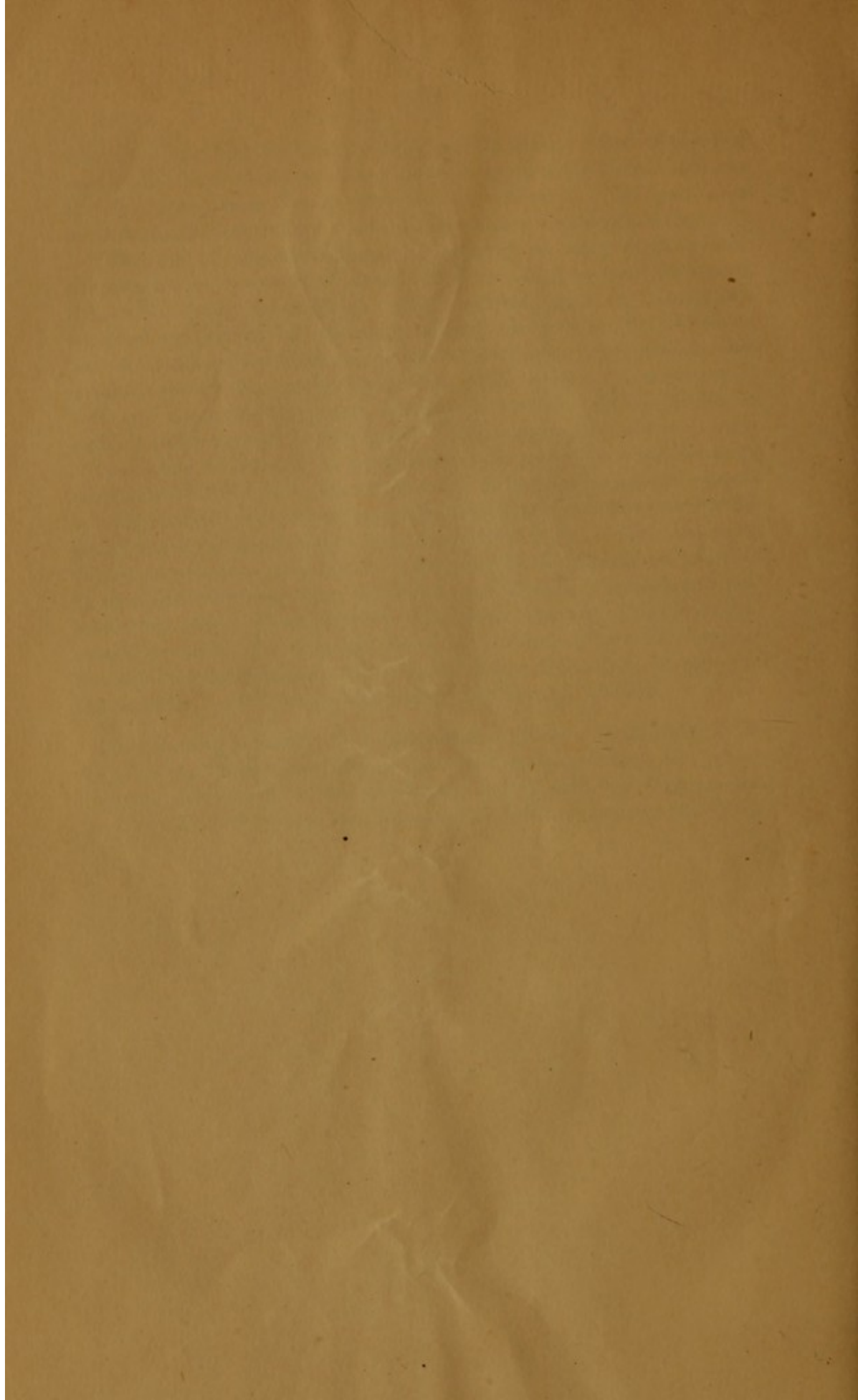
"The cause of congestion being, in many instances, atony of the vessels, it may often be counteracted by circumstances which augment the tone of the vessels, locally or generally. Thus cold, astringent, or, occasionally, stimulant applications, by bracing the fibres and invigorating the circulation in a part, render it less liable to congestion from disease; and general tonic measures operate in a similar way on the whole system. The efficacy of bark and arsenic in preventing, as well as in removing the congestions of ague, probably depends on their power of augmenting the tone of the vessels of these parts, so that they no longer yield to the distensive accumulation of blood within them. A similar virtue seems to be possessed in some degree by iodine and its preparations, especially the iodide of potassium; under the use of which the disposition to local congestions is diminished, and those formed are sometimes dispersed, as exemplified by the external use of iodine in lepra and other congestions of the skin, and of iodide of potassium in congestive headache. Mineral acids and other tonics have a like effect in cases of general weakness. The treatment calculated to remove the results of congestion will be considered under the subjects, Hemorrhage, Flux, Dropsy, and Inflammation."—*Williams' Principles of Medicine*, pp. 162-165.

Our argument is ended. It is believed that careful attention will satisfy the mind that its separate divisions have been sustained; that, as a whole, it establishes the truth of the proposition that All pathological phenomena are produced by Pressure; that Disease is a UNIT—Medicine, a SCIENCE.

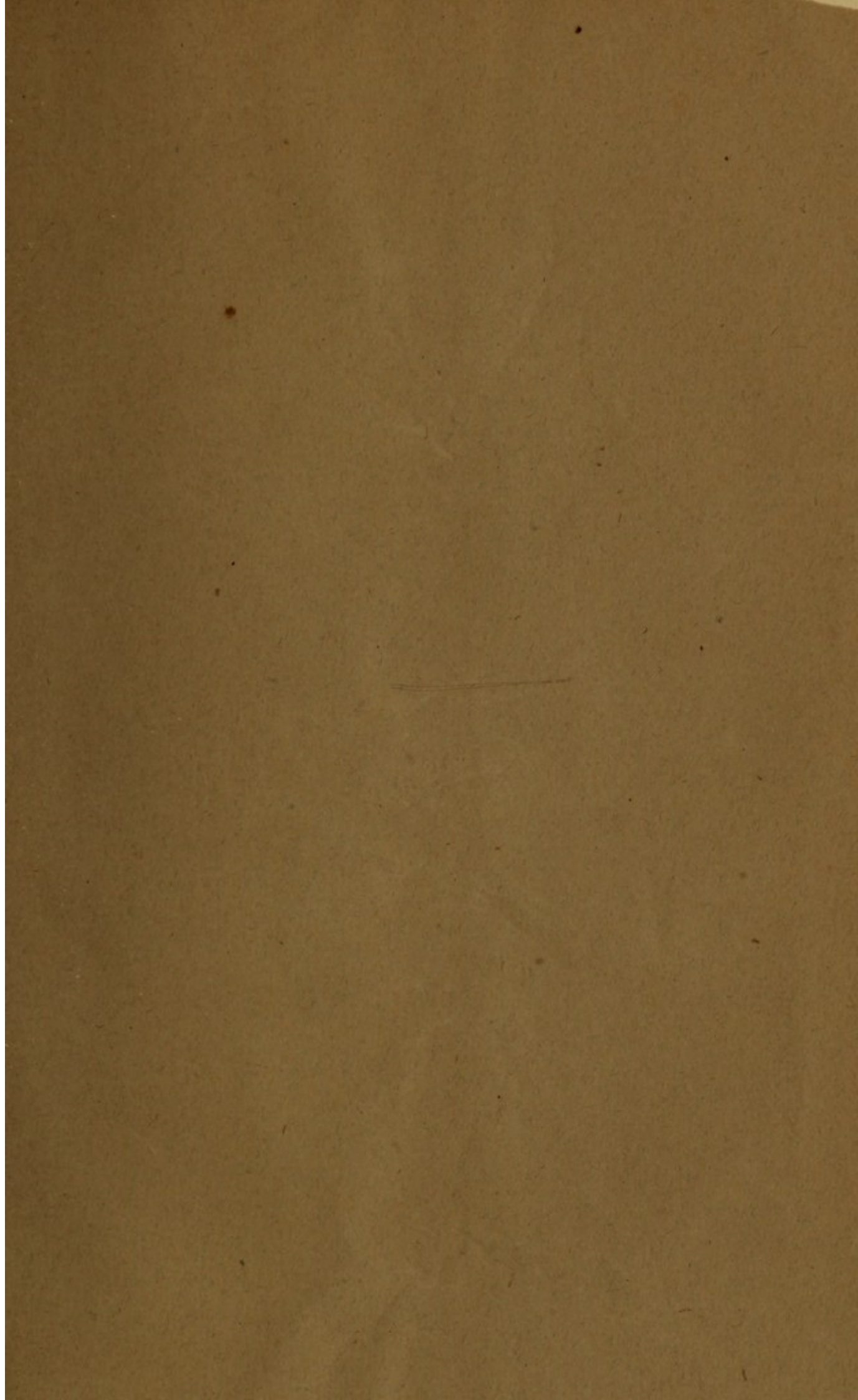




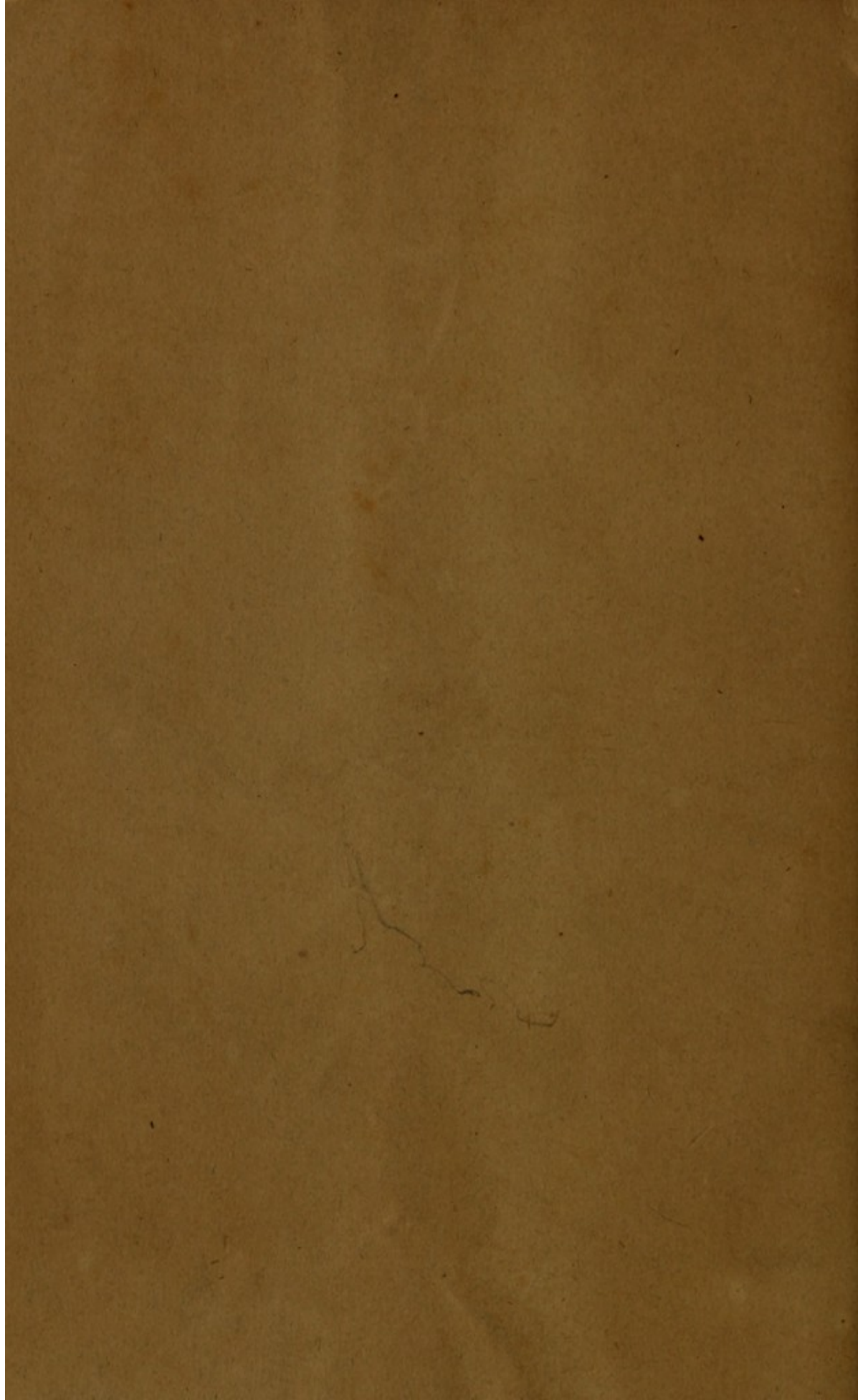




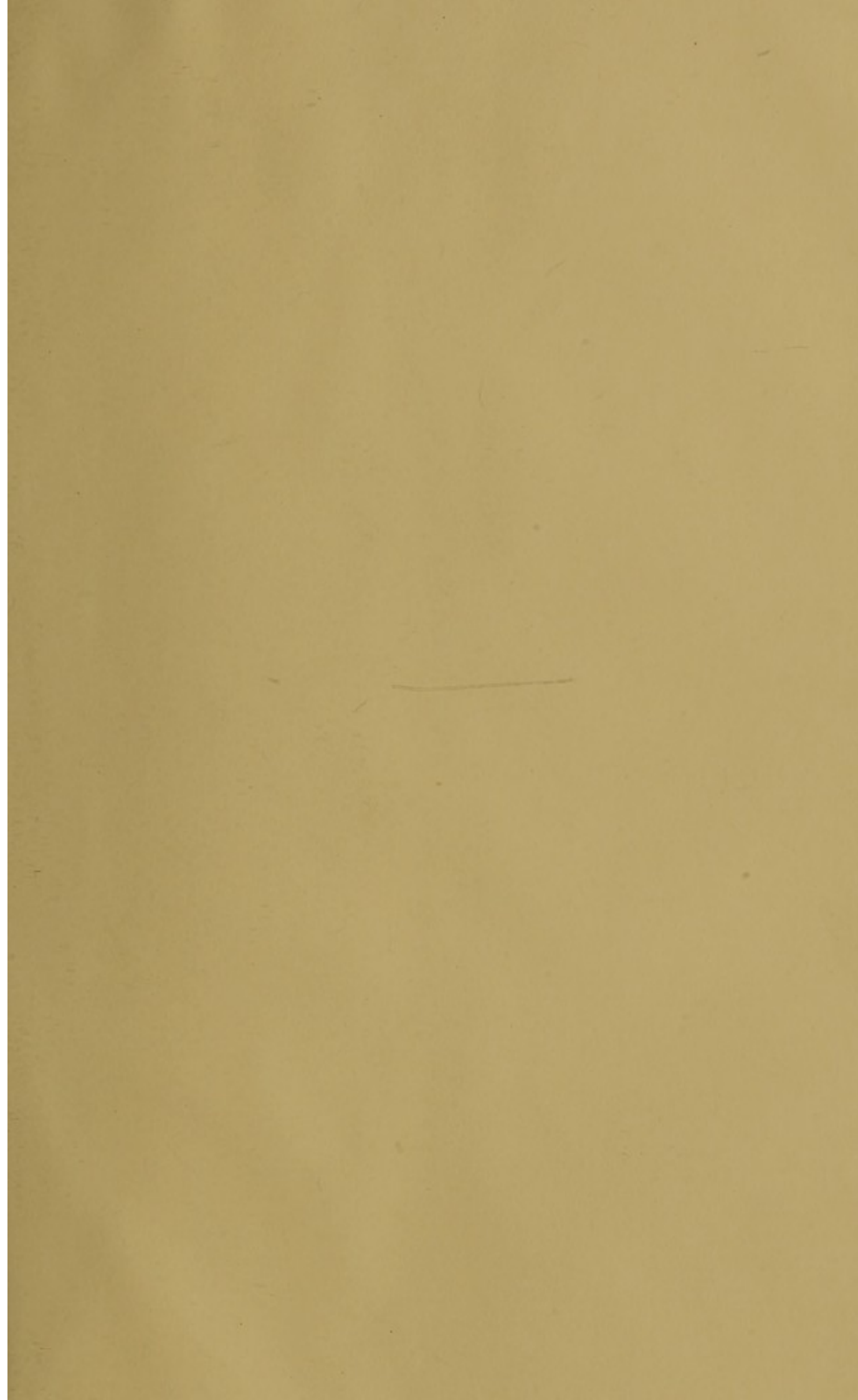








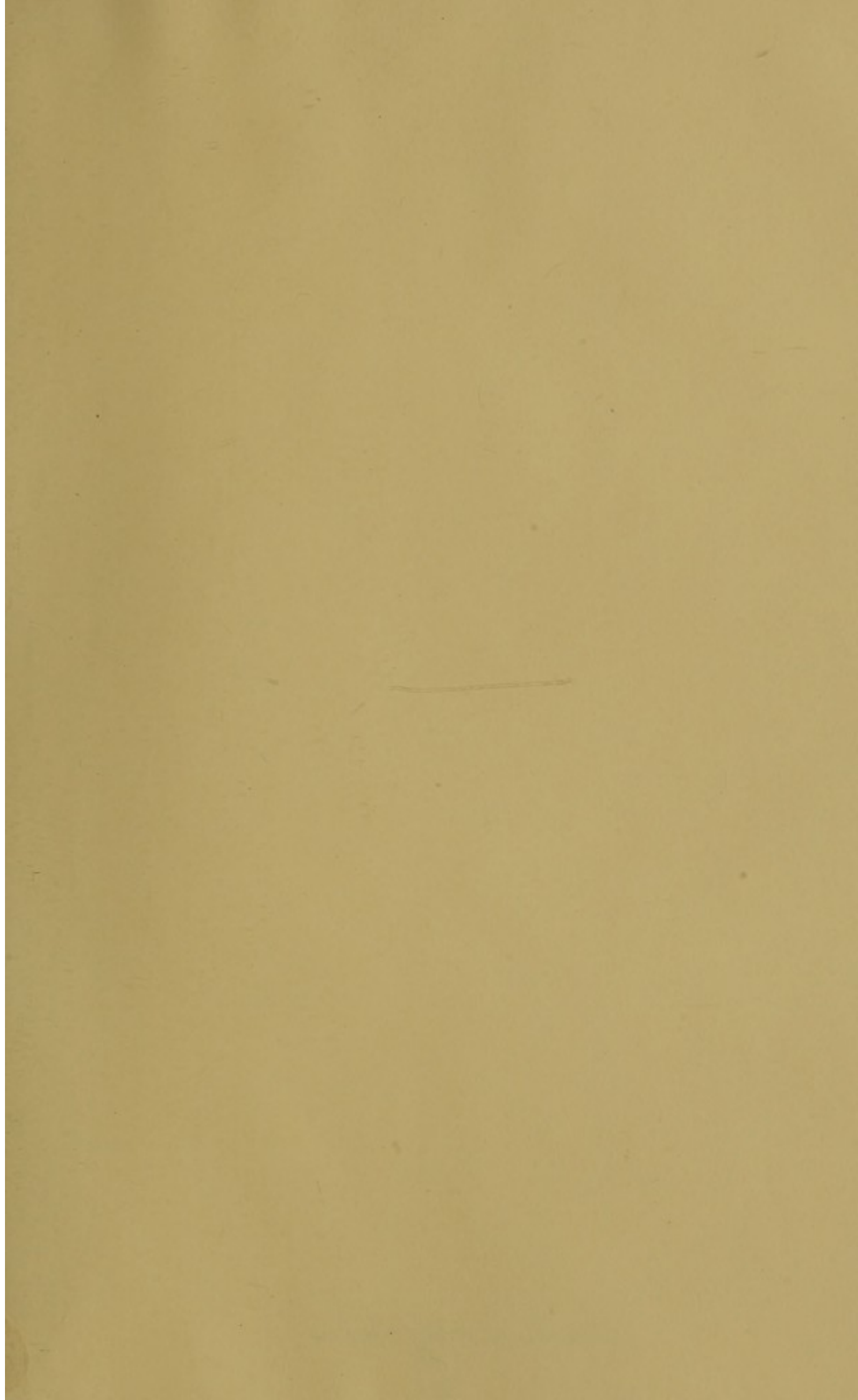


















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