current will pass readily enough through the nerves of frozen muscles and through frozen muscles, it fails to exite contraction in the absence of a thermal current. Heat is thus the sustaining motion of the organism; it holds all the active parts in such motion, that without undue waste they shall be ready under excitation or communication of new motion to act at once according to their functions. Heat, in other words, sustains the equilibrium of motion in animal bodies; it does not in the same direct manner as in the steam engine do everything, for, if it did, the body would cease to be self-regulating; but it keeps the body up to a given standard of motion and prepared for action. This reading of the value of heat-motion in the organism is of primary importance in the physics of disease.

The body thus prepared for action requires only for work extra motion, or, as the old men called it, "stimulus." It receives this from without and from within; from without in those external impressions wrought by light, sound, touch (all of which are motion); and from within by motion communicated from the nervous centres and cords; motion, which is itself derived from the combustion of the blood, and is therefore thermal in its origin.

Thus every stimulus is motion; motion communicated to parts ready to be set in motion. Just as an engine when prepared to start, by being charged with heat, waits only for the engineer to put on the pressure for its wheels to revolve and its movement to commence, so the body equally and similarly prepared moves, locally or generally, when new motion is communicated.

It was in failing to recognise the action of added motion, stimulus, that the theory of the *vis insita* of Haller fell short of the truth: Haller saw that in every muscle there was a certain standard of motion independent of nerve-stimulus: but he did not see that when by pricking a muscle he caused contraction, he was doing what the nerve normally did, communicating motion; and that, in fact, the movement he saw was nothing more than the propagation, or it might be said, the echo of the movement of his own hand; and not seeing this, he stopped short at the *vis insita*. On the other hand, the vibratory theory of Hartley failed, because it recognised nothing except the stimulus, or the motion from without. We have now more light; in truth, however we may differ as to the specific kind of motion in the healthy body, we hold demonstrative evidence of motion always present through heat, always universally diffused, and always passing from the body so as to be properly equalised. We hold also demonstrative evidence of motion as a stimulus, as derived from without and from within the organism.

OF THE PHYSICAL ORIGIN OF ANIMAL MOTION.

To endeavour to go back to the origin of animal motion would be to attempt the definition of a first cause. We might say that animal motion is derived from the motion of the earth, because, if the earth were to lose its two motions for the most infinitesimal period of time, all motion upon it would cease; or if its motions were quickened, all motion upon it would be proportionately increased. But admit so much, and thence the further argument: the earth derives its motion from the sun. But the sun has motion; and whence is that derived? Whence motion throughout all space? We must stop at the question. Without thinking, then, of the first cause of motion, we come to secondary causes—to those means by which the universal motion is conveyed through special parts, by which it developes itself through matter, or by which it is expended on matter; and in this field we have certain facts which are, I had nearly said, sufficient for all that we would reasonably know. We find motion coming to us directly, as in light from the sun; we find motion coming to us indirectly, as in heat derived from the sun, but elicited through the earth; and we find motion that proceeds from combination of opposing conditions on a vast scale, as in electrical storms. But more: we have illustrations of secondary causes of motion in smaller details, as in the mechanical friction of bodies, and in chemical combinations. In the animal organism, we trace the origin of the motion by which its mere mechanism is animated, in the chemical union of oxygen with carbon. The union of the air and blood is precisely to the body what the mainspring is to the watch. From the union, motion results, and is universally communicated to the organic parts; nor can there be any inertia or death while that communication continues. In addition to this—the force of evolution—the body receives motion from without, and by that means it takes impressions and assumes reason. The first is essential to any manifestation of life; the second is supplementary to the higher development of life. Without the first, an animal could not be constructed; but without appreciating the second directly, the animal may live: it may neither take in light by the eye, sound by the ear, nor sensation by the touch, and yet it may live.

The perfect organism constituted for motion from its own centre, and influenced by motion from without, remains in health so long as the forces, internal or external, are in due relation to the matter of the organism. Let the internal force be unduly raised or depressed, and the body is diseased; it is overactive, or it is inactive. Withdraw from the body the external forces, and it sinks into a machine; stun it with some overwhelming external force, and its mechanism is deranged or destroyed; it is made ill, or it is killed.

In the physics of disease, all our knowledge must rest on our correct appreciation of animal motion, and mainly of that motion which is derived from the oxygenation of blood. I shall direct attention in the next chapter to this last named point.

OBSCURE CASE OF CANCER OF THE STOMACH.

By William Date, Esq., Ilkeston, Derbyshire.

H. M., aged 55, was an unmarried woman, of small independent means, which she eked out by winding thread for the manufacture of gloves. She came of a healthy family, none of whom had had cancer. She had always enjoyed good health, with the exception of an attack which she had when about thirty-five years of age, and which lasted about a fortnight. During that time she had a feeling of weight at the epigastrium; no pain; persistent vomiting, the vomit occasionally consisting of altered blood. She menstruated with regularity until forty-three years of age. She never suffered from shortness of breath, and, in short, since the attack mentioned, her health had been good. About the beginning of August 1864, she began to have a sensation of weight and fulness at the epigastrium, coming on about half an hour after meals, which never, however, amounted to pain, and generally passed off in about an hour. Since that date, she had been gradually and slowly losing flesh. About October 15th, she began occasionally to vomit her food mixed with acid mucus. She was of rather a penurious disposition, and therefore, although she was much distressed by the vomiting (which for the last few days had been persistent), she did not seek medical assistance until Oct. 21.

I then found her still tolerably fat, but very weak and prostrate; pulse 110, very small and thready. The complexion was sallow, but not cachectic. She could not retain on her stomach the smallest quantity even of fluid nourishment. The matter vomited had an acid taste, was of a dark grumous character, and evidently consisted of mucus and altered blood (which character it had retained for the two previous days). Pressure over epigastrium gave very slight pain. No distinct tumour could be felt, although there seemed to be some fulness. There was no apparent enlargement nor tenderness of the liver. On applying the hand to the epigastric region, the aorta could be felt pulsating very distinctly; but there was no fremitus. Auscultation over heart revealed a soft systolic apex murmur. The first sound could be heard all along the aorta, thoracic and abdominal; along the iliacs, and even as far as the femorals. The bowels had not acted for two days.

October 22. The vomiting continued in spite of remedies. In answer to an enema, she had passed a quantity of dark pasty fæces, containing blood. She was free from pain. The urine was not albuminous.

October 26th. She continued in much the same state until to-day. I saw her in the morning, and found that the pulsations of the aorta were distinctly visible at the scrobiculus cordis. In the evening, she had taken a tablespoonful of beef-tea, and was vomiting after it, when she suddenly threw her head back, and ejected about a pint of bright-scarlet blood. I was fetched hurriedly to her, as the attendants thought she was dying. I found her very weak, cold, and pallid; pulse 130; skin cold and clammy. The pulsations of the aorta were become more visible, and were now apparent from the ensiform cartilage to below the umbilicus.

October 27th. She continued very prostrate. The violent pulsations continued, as also the vomiting. She passed by stool this morning a considerable quantity of black blood.

October 28th. Dr. Robertson of Nottingham saw her with me in consultation to-day. On examination, he found things pretty much as above described. There was no enlargement of liver; no distinct tumour; very slight tenderness on pressure over stomach; mitral systolic murmur; pulsation of abdominal aorta to be seen and felt; no fremitus. On listening over the spine opposite the cæliac axis, he detected a single rough bruit, heard only during inspiration, and disappearing during expiration. Vomiting continued, but there was now no blood. It consisted chiefly of food swallowed, and of acid mucus.

October 29th. She gradually sank, and died this morning, exhausted.

I omitted to mention a single soft murmur heard all along the abdominal aorta.

Autopsy 48 hours after death. The body was from the first not much emaciated, the belly being covered with fat half an inch thick, and the omentum also being tolerably fatty. All the abdominal organs appeared to be *in situ*. On trying to remove the stomach, it was found firmly adherent to the liver. In breaking down the adhesions, the stomach was opened, and a quantity of dark grumous fluid escaped. The smaller curvature and the upper part of the posterior wall were occupied by an irregular, nodulated scirrhous mass, about two and a half inches in length, one and a half in greatest depth, and about half an inch in thickness. About the centre of it was a small ragged ulcer, not larger than a threepenny bit. The part attached to the liver was inflamed, and felt soft and pulpy. The liver itself was not enlarged, and appeared to be quite healthy in structure. The left ventricle of the heart was slightly hypertrophied and dilated. On the free edge of one of the flaps of the mitral valve was a little, roundish, soft, shaggy nodule. The substance of the heart was rather soft, so that the finger penetrated it with ease. The aorta appeared to be perfectly healthy, as did also the cæliac axis and its branches. There was no atheromatous deposit in any of them, and no aneurism.

Remarks. This case presents many interesting features. Taking the symptoms as they appeared during life, what diagnosis was to be formed? The *malaise* after food, the loss of flesh, the obstinate vomiting, the hæmatemesis, and the age of the patient, would seem to indicate ulcer or cancer of the stomach. But then, on the other hand, the short duration of the attack, the almost complete absence of tenderness, the violent pulsation of the aorta, the aortic murmur, and the profuse *arterial* hæmorrhage, seem to speak of aneurism. And this view was supported by the presence of heart-affection; by the absence of any family history of cancer; and by the fact that the patient, although sallow, had not the peculiar cachectic appearance which cancer bestows upon its victims. Moreover, the first attack, twenty years before death, was said to have come on suddenly after lifting a heavy weight; and although, in the presence of perfect health for twenty years, it could hardly be suspected that an aneurism was all the time in existence, yet it might well be supposed that one of the coats of the artery had given way during the exertion, and that the part of the artery thus weakened had at last succumbed to the pressure of the column of blood. Then, again, the presence of scirrhus of the stomach being proved by the autopsy, it becomes interesting to inquire the significance of the former attack, so similar in its train of symptoms. It can hardly be supposed that any cancerous deposit then took place, and remained in abeyance for twenty years. What, then, could it have been? Was it due to a simple ulcer of the stomach, which afterwards healed? Altogether, the case was very interesting and difficult of diagnosis; and it was not until a *post mortem* examination revealed the true cause of the mischief that we could come to a definite conclusion. Before death, our opinion wavered between cancer of the stomach and aneurism of the aorta.

[The following letter, written to me by Dr. Robertson, in reply to my report of the *post mortem* examination, forms an excellent commentary on the case.]

Nottingham, November 7th, 1864.

My dear Sir,—Many thanks for your kind note, and very interesting description of the necropsy of our poor patient.

The physical signs I noticed were these: slight dulness over the right margin of the epigastrium; *no* swelling nor hardness on the most careful examination; visible pulsation in the epigastrium; no fremitus felt there; a soft blowing single murmur, continuous down the course of the vessel, much rougher in the back, but only heard during inspiration there; normal and symmetrical percussion over the whole chest; soft systolic apex bruit; no abnormal respiratory sound, except slight mucous râle in both posterior bases; the complexion sallow, but not the aspect usual in malignant disease; the pulse 108, soft, jerking. The history, especially as to absence of pain, freedom until a late period from sickness, and other symptoms, etc., were exactly those so well described in your report.

I find (after looking over numerous authorities on these subjects) the following description of—

A. *Malignant disease in the stomach*, by Dr. Brinton. "Its symptoms rarely date from more than twelve or eighteen months prior to the death of the patient." (Here they dated only three months.) "It is asso-

ciated with the cancerous cachexia, often with cancerous disease of other organs." (Here neither of these existed.) "In many cases, it forms a hard but moveable tumour in the epigastrium." (Here was absolutely none.) "Its pain has generally a lancinating character, and a time of appearance that belongs rather to the later stage of gastric digestion than that which succeeds deglutition." (Here was *no* pain, and vomiting came on immediately after the food.) "Its hæmorrhage is more scanty, viz., than that of gastric ulcer." (Here it was very profuse and *arterial*.)

B. *Abdominal aneurism*, by Dr. J. H. Bennett. "A swelling more or less defined." (This was not present.) "An expansive impulse on applying the hand." (This was very marked in your case.) "A bellows murmur synchronous with or immediately following the heart's systole." (Also very distinct in your case.) "Generally loudest over the tumour, and propagated down the aorta." "The other symptoms are very various, consisting of dragging, or other pain more or less prolonged, owing to pressure, together with functional disturbance." (Dragging sensation was present, with vomiting, which might have been due to pressure.)

On reviewing the whole case with the light which the *post mortem* examination has thrown upon it, I still feel that the diagnosis between malignant ulceration and abdominal aneurism was a difficult one: and though a case which I mentioned to you as having a short time since occurred to Mr. Daniell of Kegworth and myself, where malignant disease of the stomach produced not only pulsation and murmur, but even epigastric swelling, tended very much to point my suspicions to some stomach ulceration as the disease in this instance, yet the occurrence of former hæmorrhage and apparent recovery, the date and progression of the general symptoms; the absence of hardness, pain, cancerous cachexia, or family history; the presence of concurrent cardiac disease, and the profuse arterial hæmorrhage, all went to negative this supposition, and (with the one exception of absence of tumour, which was equally an absent symptom in the other theory) seemed to favour the idea of aneurism.

"Various cases on record," says Dr. Bennett, "have presented a train of very anomalous symptoms, and at various times been considered as different diseases by medical practitioners." Dr. Gairdner gives a striking illustration in his *Clinical Medicine*, p. 495. The case was one of aneurism of the superior mesenteric, and in relation to it Dr. Gairdner remarks:—"The whole of the phenomena under observation at the time of the first attack of hæmatemesis (these were briefly: sickness and vomiting after food, dull pain with tightness and oppression at the epigastrium, anæmia from loss of blood and tendency to syncope, slight epigastric pulsation unaccompanied by any appreciable tumour) were such as to lead directly to the supposition of a chronic ulcer of the stomach."

According to Stokes, the affections which simulate abdominal aneurisms may be divided into two classes, viz., those in which belly tumours receive a communicated pulsation, and those in which there is simply an increased action of the abdominal aorta.

By the absence of tumour in the case before us, one main diagnostic symptom was denied; the murmur was not jerking, but pretty continuous, and therefore like; but it was systolic, and therefore unlike that of an abdominal aneurism. Both the throbbing and the murmur which existed did not depend probably so much upon the anæmia from loss of blood (as they were noticed before this had occurred to any great extent) as upon the irritation of the stomach disease, analogous, as was pointed out by Dr. Stokes, and confirmed by Dr. Hope, to that form of carotid throbbing which occurs in cerebritis, or of the radials in whitlow.

The case is also interesting, as it bears somewhat upon the discussion between Dr. Gairdner and Dr. Ormerod on the significance of mitral murmur. The murmur here was exactly correspondent with the apex of the left ventricle. It *commenced* with the first sound when this was at its maximum of intensity, and shaded down into and almost through the pause. After death, there was found a nodule of lymph on the free edge of one flap of the mitral valve. I make no deduction here, but simply mention the facts as they stand.

Yours truly,

WM. TINDAL ROBERTSON.

William Date, Esq.

IS SIMPLE ACUTE ERYSIPELAS A LOCAL OR A CONSTITUTIONAL DISEASE?

By JOHN HIGGINBOTTOM, F.R.S., Nottingham.

IN March 1853, I read a paper before the Midland Counties Branch of the Provincial Medical and Surgical Association at Nottingham, with the following queries.

1. Is simple acute erysipelas a purely local or a constitutional disease?

2. Is it sometimes a local, and sometimes a constituional disease?

3. Is it simultaneously, both a local and a constitutional disease?

Not having had any answers to the above queries, I repeated them in this JOURNAL on October 10th, 1864, with another query.

Why is erysipelas classed with the exanthemata?

Not having yet been favoured with an opinion from any of my medical brethren, I proceed to give my own from the following facts.

1. I have attended a number of cases of erysipelas on the face and elsewhere, at an early stage of the disease, where there have been no constitutional symptoms; in these, the disease has been directly arrested and subdued by the application of the nitrate of silver. If the erysipelas had been allowed to proceed without the local application, constitutional disturbance would have been the result.

2. If from exposure to wet or cold, etc., a feverish attack takes place, and in several days erysipelatous inflammation supervenes, on a prompt application of the nitrate of silver, along with the usual remedies for the cold, the patient becomes convalescent in a few days; but if the local application be neglected, the inflammation runs its usual course, the constitutional symptoms become more aggravated, and the illness is much prolonged.

3. If the erysipelas and constitutional symptoms appear simultaneously, a prompt application of the nitrate of silver at an early stage of the complaint, and the use of active constitutional remedies, cut short the disease; the patient is soon convalescent; but if the local application have not been used, the disease runs its usual and often destructive course, setting at defiance the most active constitutional treatment.

For many years past I have considered that simple acute erysipelas is a purely local disease, and ought not to be classed with the exanthemata, or constitutional diseases; and that the constitutional derangement alone arises from the local disturbance. I believe the application of the nitrate of silver in erysipelas fully attests it to be a local and not a constitutional disease, as it can be always arrested and subdued by its application.