met with any cases which were followed by such intense symptoms of arsenical poisoning, and the only conclusion I can arrive at is that, though chemically the substitutes for salvarsan may be identical with the original preparations, from the clinical point of view they differ in a remarkable manner. Not only is their toxic effect, *qua* arsenic, much more intense, but their local effect on the veins is more irritating, as was manifested by several cases of thrombosis of the injected vessel following on the use of kharsivan, even when diluted with 200 c.c. of distilled water.

It is impossible to estimate the duration of the present war, but when it does come to a conclusion there will inevitably ensue a considerable increase in the incidence of venereal diseases, and in my opinion some measures should now be organised to ensure that adequate provision is made for their treatment. I am given to understand that Messrs. Burroughs, Wellcome and Co. at the present moment are experiencing some difficulty in meeting the demand for kharsivan, and if there is any great increase in the prevalence of syphilis a considerable proportion of the sufferers will be unable to obtain what is now universally acknowledged to be the best treatment for that disease—viz., salvarsan, or, failing that, one of its substitutes. Though all departments of the Government must now be working at high pressure, I venture to think that the inevitable increase in venereal diseases at the termination of the war is a subject worthy of the attention of those to whom the health of the nation is entrusted.

I am, Sir, yours faithfully,

J. ERNEST LANE, F.R.C.S. Eng.,
Surgeon to the London Lock Hospital.

Queen Anne-street, W., March 28th, 1915.

SHOULD MEN WORK SIX DAYS OR SEVEN?

To the Editor of THE LANCET.

SIR,—At the present time, when there is urgent necessity that munitions of war should be turned out with the greatest possible rapidity, it is very important that men engaged in their manufacture should be able to do the maximum amount of work with the minimum of harm to themselves. In relation to this question I think that an experiment made many years ago by my friend, the late Lindsay Russell, Surveyor General of Canada, is of great interest. Along with Professor Pearce, who represented the United States, he surveyed the boundary line between the United States and Canada so exactly that I believe its accuracy has never been called in question. On this expedition, or some of his other surveying journeys, he and his men had to pass over great spaces where there was neither game nor fishing, and were therefore obliged to take their provisions with them. The forts at which these could be replenished were generally placed about 40 days' march from each other, and as the surveying party, on account of the weight, only took sufficient provisions for the distance and no more, they were obliged to cover it in a given time for fear of starvation. On some occasions he had men and horses and on others men and dog trains. Necessity obliged him to work his men and animals as hard as they could for seven days a week and six weeks at a time. Under this strain the horses usually gave out about the twentieth day, but the men and dogs seemed to be uninjured and only to grow harder and harder.

On other occasions, however, when there was no necessity for such extreme exertion he worked his men only six days a week and allowed them to rest completely on the seventh. As he was engaged in surveying operations he knew exactly how many miles his party had travelled in a day; he knew how many pounds weight each man carried, and was thus able to calculate exactly in foot-pounds the amount of every man's daily work. On reckoning it up he found, to his astonishment, that the number of foot-pounds done by the men working six days a week was almost the same as when they worked seven days a week. Although the men were able to work seven days a week to their utmost capacity all day in the open air, and sleeping in the open air all night for seven days a week without harm, it is unlikely that men working under much less favourable conditions in a factory will stand continuous work in the same way as the surveying party. In all probability if the men work at their full capacity for six days it will be better both for them and the work they turn out that they should rest on the seventh.

I am, Sir, yours faithfully,

T. LAUDER BRUNTON.

De Walden Court, W., March 29th, 1915.

LOUIS DANIEL BEAUPERTHUY AND MOSQUITO-BORNE DISEASES.

To the Editor of THE LANCET.

SIR,—Regarding the discussion between Dr. Andrew Balfour, Dr. H. Seidelin, and myself on this subject in THE LANCET of March 6th and 27th, no one wishes to deprive Beauperthuy of all the "respect and reverence" due to him as a man and a physician, but whether he was "a very great and far-seeing physician" on the strength of his hypothesis on insect-borne diseases is the question at issue. We cannot deny that he was one of those who adhered to the idea that insects are in some way connected with diseases, but, as I have said, this old hypothesis dates from the time of the Romans. My point is that his explanation of this connexion was a wrong one—that is, he thought that diseases are caused by the venom of insects and not by their capacity to carry the virus from one person to another. Moreover, from what I have seen of his writings, he seems merely to have advanced the speculations in a non-scientific manner—that is, as so many prophets do, in the form of a categorical imperative. I much prefer King's work because, in Dr. Balfour's words, "he marshalled his theories in a more logical and careful fashion." That is the whole point. One appears to me to have been a dreamer (though more careful studies of his work may correct this impression of mine), while Dr. King appears to me to have been a man of science. Moreover, King did not think that mosquitoes cause disease merely by their venom, but evidently supposed (see p. 656 of his paper) that they transmit a *Bacillus malarie*—a much more rational hypothesis. Beauperthuy's hypothesis was, as I have said, contrary to reason. I am glad that Dr. Balfour agrees with what I maintained about the difference between speculation and careful research work, and that is why I mentioned the case of Beauperthuy. It has become quite a profitable art nowadays to confuse the two, though anyone can indulge in unlimited armchair speculation, while research means much toil.

Whether Beauperthuy's "zancudo bobo" was really the *Stegomyia fasciata* is another question, and I hope that Dr. Balfour will let us know what

he thinks on this point when he has read the original papers. I wish that someone could find the papers on the mosquito theory: (a) by John Crawford, called Mosquito Origin of Malarial Disease, *Baltimore Observer*, 1807; and (b) by J. C. Nott on the Origin of Yellow Fever, *New Orleans Medical and Surgical Journal*, 1848. I have not been able to obtain either of them. All these theories are of considerable psychological interest. They were all partly right and partly wrong, and the true story now known to us shows how much more clever nature is than the wisest of us.

I am, Sir, yours faithfully,

Cavendish-square, W., March 27th, 1915.

RONALD ROSS.

STOMACH V. HEART IN RELATION TO PRÆCORDIAL PAIN AND SUDDEN DEATH.

To the Editor of THE LANCET.

SIR,—Certain persons suffer from discomfort and pain in the præcordial region when they walk, especially uphill and soon after eating, but the moment they throw off gas from their chests or stand still their discomfort vanishes. Persons thus affected are prone to sudden death. The pain and the sudden death, when it occurs, are commonly, but erroneously, ascribed to functional or organic disease of the heart. The following case is a typical example of the class:—

The patient, aged 48 years, had always had good health except in the matter of his digestion. Sweet foods turned sour on his stomach and distended it with gas. He was a "windy" subject, but looked robust and in good flesh. A few weeks before visiting me he became conscious of a disability which seemed likely to prevent him from following his occupation, for when he walked, particularly if soon after eating, he was seized with a most disagreeable sensation in the chest, merging into pain. No evidence of cardiac disease was detected. There was no increase in the area of cardiac dulness, no abnormal cardiac sounds, dyspnoea, or œdema, no abnormality in pulse-rate or rhythm. About five weeks after this examination, after a hearty afternoon meal, the patient left the house. When about 200 yards from his own door he fell down and was picked up dead. No lesion accounting for death was found at the necropsy. All his organs were healthy. The cardiac valves were normal and the myocardium thick and free from disease. The coronary arteries were sound, save for one or two small foci of commencing ossification. Their pathological condition was such as might be expected in persons dying at the same age from indifferent complaints.¹

The manner in which seizures affected this patient is thus described in his own words:—

When I leave home in the morning I usually feel quite well, but after walking 100 paces or more I am conscious of an uncomfortable sensation at the stomach and a desire to expel gas from the chest. I have also a feeling as if a piece of crust had become lodged in my gullet, pain creeps up from the pit of the stomach to the chest and spreads all over it, sometimes reaching the armpits, shoulders, and back, and even extending to the neck and jaws. Water gathers in my mouth and runs out upon my chin; it is neither retched nor coughed up, but comes into my mouth on its own. My eyes fill with tears; sometimes urine dribbles away from the bladder in spite of my efforts to prevent its escape. If at this time I can break wind from the chest all this discomfort vanishes in a second. So every now and then I stop and retch and throw gas from my chest, and when all is thrown off I can walk as well and as far as I ever did before. But sometimes the gas is hard and will not come up, and then a dreadful feeling comes over me; it is as if my head swims

and my chest is gripped and held tight, and all strength is going from my limbs, but even when no gas comes up, if I stop walking and remain for a few seconds standing still the seizure passes off.

When asked what distance he had walked upon any occasion just after the occurrence of seizures, the patient said:

On Bank Holiday, soon after starting from home in the morning, I was taken with a seizure which was followed by two others, but after I had stood still for a few seconds and broken up wind I walked on without having to stop again and visited a friend living five miles away. That morning I walked ten miles, counting the journey there and back again, without being troubled with any pain whatsoever; indeed, I never felt better in all my life than during that walk.²

The fact that the patient walked ten miles just after three seizures indicates that exhaustion of reserve power of the function of contractibility is not the causal agency of these seizures.

From a consideration of the description of this seizure, and seizures of a similar kind which have occurred in other patients under my notice, it is to be remarked that segments of the medulla and cord, secretory glands, and parietal, visceral and cardio-arterial layers of muscle, take part in the manifestations of the seizure. Consequently symptoms constituting the syndrome are divisible into five groups: (1) The central nervous group comprises referred pain felt in the distributory areas of the brachial plexus and the second, ninth, and intermediate intercostal nerves, and algæa affecting scattered patches of the integuments and deeper structures of the thoracic wall and adjacent parts; (2) the secretory group comprises a voluminous flow of watery saliva and increased secretion of lacrymal glands with probably also increased urinary secretion; (3) the parietal muscular group comprises contractions of facial, intercostal and abdominal muscle, the latter contractions producing a sensation of pressure over the thoracic wall described by some as fixation or tightness of the chest walls; (4) the visceral muscular group comprises nausea, retchings, and eructations resulting from contractions of the gastro-oesophageal sheet and diaphragm; and (5) the cardio-arterial muscular group comprises vaso-constrictions, elevation of blood pressure, abnormal deviations in pulse-rate and disturbances of rhythm and sometimes total inhibition of cardiac function.

The seizure consists of the associated manifestations of these several groups of symptoms. The muscles and secretory glands which produce groups 2 to 5 inclusive are not in functional communication with one another except through the central nervous system. Hence the central nervous system furnishes the link that connects in a unity of expression the several activities that produce the seizure. The central nervous system must therefore be regarded as the seat of the predisposing cause, otherwise the activities producing the seizure would fail to combine in unitary expression. For if the heart be the seat of the predisposing cause, how are symptoms witnessed during seizures to be accounted for? If segmentary centres be healthy can impressions from the myocardium cause cramp in the recti abdominis muscles or agonising pain in the distributory regions of intercostal nerves? Can impressions generated in the myocardium cause nausea, overflow of saliva,

¹ At the necropsy made upon the "unknown" by John Hunter and described by Heberden the vessels were found healthy and the heart sound and vigorous.—*Medical Transactions of the Royal College of Physicians*.

² Cases in which long walks are taken after seizures are not infrequent. Dr. Mackenzie refers to cases of this kind in the Oliver-Sharpey lectures.