by a system which develops every muscle of the body, while the mental powers, so far as they affect alertness and presence of mind, are trained to a degree that could not be attained under the old system. Other physical displays also took place, including one by the Egyptian fellaheen under Sergeant-Major De Vere. The Royal visit was brought to a close by a review of the troops on Laffan's Plain on the following Saturday.

A PORTABLE COOKING APPARATUS.

According to the *Army and Navy Gazette*, Staff-sergeant Fowler of the Medical Staff Corps has invented a portable cooking apparatus which presents some new features. The object is to furnish the army medical service with the means of providing patients under all circumstances with the same varieties of diet that are obtainable in station hospitals. It is claimed that the apparatus will cook with half the camp allowance of fuel and is capable of supplying large quantities of boiled or distilled water.

HOSPITAL FOR INFECTIOUS DISEASES AT PESHAWAR.

The Government of India have sanctioned the estimates for the erection of a special hospital for contagious diseases for all native troops at Peshawar.

Surgeon-Lieutenant-Colonel Coates, A.M.S., Surgeon-Captain Russell, A.M.S., and Surgeon-Captain Key, Volunteer Medical Staff, have been selected as medical officers at the Camp of Instruction of the National Artillery Association at Shoeburyness on Aug. 3rd.

The examination at the end of the seventieth or summer session of the Army Medical School will commence on July 23rd and terminate on July 29th. The session will be brought to a close on July 31st, when the prizes will be presented to the successful candidates by Surgeon-General Sir Joseph Fayrer, K.C.S.I.

It is stated that the Government of India has sanctioned an estimate of Rs. 11,964 for building a special hospital for contagious diseases for all native troops at Peshawar.

Correspondence.

"Audi alteram partem."

"THE PHYSICS OF CARDIAC SOUNDS AND MURMURS."

To the Editors of THE LANCET.

SIRS,—Under the above heading there is in THE LANCET of June 15th and 22nd a long article by Dr. J. T. R. Davison which ought not to be allowed to pass without comment. We may agree with Dr. Davison that the closure of the aortic valves is due to the increase of tension in the aorta caused by the incoming current of blood. By the laws of fluid pressure, and in consequence of the existence of the pouches of Valsalva, the sigmoid valves will close as soon as the pressure on their aortic aspect exceeds that on their ventricular aspect. But his theory that the second sound "is directly produced by the latter part of the ventricular contraction, owing to the semilunar valves being thrown into sonorous vibrations by the latter part of the ventricular stream impinging against the ventricular surface of these valves in the act of their closing in," is at once condemned by the observations of Roy and Adami with the myocardiograph.¹ For the tracings obtained by means of this instrument from the hearts of mammals by these skilled and careful experimenters prove conclusively that the second sound does not occur until the ventricular contraction has ceased, at the end of an interval, measuring two-thirteenths of the whole cardiac cycle, subsequent to the closure of the sigmoid valves and synchronously with the sudden diastolic expansion of the ventricle. Again, we may agree with Dr. Davison that the mitral valve closes as soon as the ventricular tension has been raised so as to exceed the auricular. But his theory that "the first sound is the direct result of the auricular contraction," being caused by the impact of the stream from the auricle on

the closed mitral valve, is easily disproved by the myocardiograph. For the commencement of the first sound is precisely synchronous with the sudden systolic rise of the ventricular tracing, and it continues during nearly the whole period of the ventricular contraction. And this extraordinary theory involves the astounding proposition that while the mere tail-end of the contraction of the thin-walled auricle is capable of producing the loud first sound, the contraction of the thick-walled ventricle, which must cause great strain of the mitral segments (as is proved by the very existence of the chordæ tendineæ), is incapable of producing any sound at all. Dr. Davison even maintains that the cardiac impulse is due to the auricular and not to the ventricular contraction, and he offers as proof the observation that it occasionally distinctly precedes the carotid pulsation. As if the blood-current took no time at all to pass from the ventricle to the carotid, and as if the time required might not be, by various circumstances, occasionally prolonged.

Dr. Davison attempts to explain cardiac murmurs by observations of the sounds heard on auscultating "a small piece of fresh intestine" filled with water and ligatured at both extremities, when an oblique stream of water is suddenly introduced into it through a tube fastened into one of its ends, quite regardless of the dissimilarity between the continuous wall of such an intestine and the damaged valves of heart disease, and of the obvious fact that "a small piece" of intestine full of stagnant fluid and with its ends ligatured can in no way represent the physical conditions either of the empty ventricle at the instant of diastolic expansion or of the aorta through which the blood stream is flowing.

I am, Sirs, yours truly,

DAVID B. LEES, M.D., F.R.C.P.

Weymouth-street, W., July 14th, 1895.

IRISH WORKHOUSE REFORM.

To the Editors of THE LANCET.

SIRS,—In a communication addressed to you on May 31st by Sir Philip Smyly and Mr. Hepburn on behalf of The Irish Medical Association it was stated that "on carefully examining in detail the replies from seventy-nine (medical officers of workhouses who had furnished information), we find that forty-three infirmaries have no trained nursing, the nursing being entirely in the hands of pauper women." It has since been pointed out to this council that the latter part of this sentence is inaccurate. We are informed, and believe, that in forty-three out of the seventy-nine infirmaries no trained nurse is employed, but that, in many instances, the nursing is under the supervision of untrained nurses, many of whom are as competent as an untrained nurse can be expected to be. As regards these infirmaries it is not correct to say that "the nursing is entirely in the hands of pauper women," and the council therefore begs to withdraw that statement and to express its regret that a statement capable of such an interpretation should have been made. The presence of a single untrained nurse in a workhouse infirmary containing (on average) sixty-three patients cannot however materially modify the assertion that the nursing arrangements of such a hospital are totally insufficient, especially when the multifarious duties devolving upon this untrained nurse are considered. She is practically the porter of the infirmary, must keep all doors leading to the house and to the female wards locked, and must open them herself when egress or ingress are needed; must serve out all food and keep an account of it, be responsible for all clothes received from the laundry and sent to it, and generally oversee all the pauper women employed. Manifestly an official charged with those duties is more of a matron than a nurse, and can contribute very little to the care and comfort of the sick inmates.

The council has learned with much satisfaction that the Local Government Board has addressed to the guardians of each union a circular note requesting them to obtain from the medical officer a specific report as to the nursing, sanitation, and diet in the workhouse hospital, and suggesting that the visiting committee of the guardians might with advantage confer with the medical officer respecting any changes which would conduce to the comfort of the sick inmates. The council, while highly approving of the course suggested, submits that the reports and conferences indicated would prove much more effective if the visiting committees and the medical officers were supplied with some brief suggestions as to the requirements of a well-ordered workhouse.

¹ Roy and Adami: Heart-beat and Pulse-wave, Practitioner, vol. lxiv.; Roy and Adami: Physiology and Pathology of the Mammalian Heart, Philosophical Transactions of the Royal Society, 1892, B.

infirmary, and with a series of definite questions as to whether such requirements are or are not fulfilled. It is scarcely to be expected that all visiting committees and their officers are *au courant* with the conditions as to air, space, ventilation, sanitary accommodation, &c., which are regarded by modern sanitarians as an indispensable minimum for a workhouse infirmary, and the council, therefore, apprehends that unless some guidance in this direction is afforded to the administrators of workhouses, the efforts of the Local Government Board to arrive at the truth may prove to some extent abortive. It is, unfortunately, quite unnecessary to exaggerate the deficiencies of the workhouse infirmary system, and the association has no other object than to elicit the truth, the whole truth, and nothing but the truth, respecting the accommodation for the sick poor throughout the country.—We are, Sirs, yours truly,

AUSTIN MELDON, J.P., D.L.,

Past President R.C.S.

Dublin, July 15th, 1895.

ARTHUR H. BENSON, F.R.C.S.I.

"IS METEOROLOGY A SCIENCE?"

To the Editors of THE LANCET.

SIRS,—Dr. Gowers invites me to define the word "science." I should be sorry to attempt to do what he finds so difficult, but I agree with him that the term turns much upon the use of words. I also agree that the expression may be applied in a very general sense to all regions of knowledge where observations are made and inferences drawn. I have already said that in this large sense as a branch of knowledge meteorology may be classed amongst the sciences. At the same time, it seems to me to stand quite alone and is not amenable to the usual methods of scientific inquiry. Observation does not make a science. The ancients were good observers, but it was left to the moderns to adopt altogether new methods of investigation and experimentation. At the present time if we wish to discover the nature of any object we do so in connexion with its surroundings. If these are changed the qualities of the object itself change, so that under different conditions the same thing may be solid or liquid; it may freeze or scorch the hand which touches it. Its qualities could not spontaneously change in this manner; they must be due to an external force. Man can have no existence outside the atmosphere any more than a fish out of water. In astronomy all the laws have reference to the relation of the heavenly bodies to one another. Newton first showed us how all their movements are dependent on the forces of attraction between them. The slanting axis of the earth, causing the rays of the sun to fall upon the earth with different obliquities, determines the characters of the animal and vegetable world. Even in astronomy we have a counterpart of the experimental method, for should the sun be eclipsed men of the greatest eminence will traverse the globe to study its light under the new conditions, or to observe a transit of Venus to enable them to calculate the sun's distance. Moreover, should any irregularity appear in the celestial world we seek for a cause, for it was considered impossible for Uranus to display perturbations in its orbit without the existence of a Neptune. I cannot, therefore, agree that meteorology is as much a science as astronomy. It seems to me that in all branches of inquiry which are called scientific we are investigating the relation of different bodies to one another. We alter the surroundings, and the phenomena or character of the object also alter. If we discover that a change has taken place in an object in nature we ask what is the external force which has been acting upon it. Now, as regards the earth and its satellite we know enough to understand why the seasons and the tides occur, but we know nothing of the altered conditions which produce the daily changes styled "weather." We know nothing of the earth's environments except the sun. All we do at present is to make use of the telegraph to inform us as to what is going on at a distance, but we predict nothing. No one foresees whether we shall have a cold or hot winter and a dry or wet summer. It seems to me that we have no data whatever to guide us. In all other branches of science we study the effects of the surroundings on objects, or the relation of things to one another, since every object is conditioned or depends in an unknown measure on its environments. In meteorology no method of this kind is or can be pursued, for we know nothing of the earth's environments but the sun and moon, and the latter has long been put out of court. It was

this view of the matter that made me say it was a fair question to ask, Is meteorology a science? Dr. Gowers asks, What is the difference between science and knowledge? I should answer, They run into each other. Science is systematised knowledge—as, for example, in the case of the rotundity of the earth. At the time when people believed the earth was flat the arguments for its being round might be called scientific, but now that the shape of the earth is accepted by everyone it becomes common knowledge and ceases to be science. I must trespass no more on your space with a subject foreign to the designs of THE LANCET.

I am, Sirs, your obedient servant,

Grosvenor-street, W., July 15th, 1895.

SAMUEL WILKS.

To the Editors of THE LANCET.

SIRS,—In reference to the leading article in THE LANCET of June 29th last, on the scientific position of meteorology, I beg to offer a few comments on the position taken up by the writer in the *Edinburgh Review*. He suggests that "it is not a science" if it consists merely in observing and recording temperatures and pressures, but he may be referred in confutation of this opinion to a paragraph further on on astronomy. He there says "that thousands of years had passed in patient observation before the motion of the heavenly bodies was understood." Astronomy has usually been considered a sublime and respected science for ages past; yet it chiefly consists in observing the heavens daily and hourly by instruments and recording the matters seen. Meteorology really should be considered a kindred and allied science to astronomy, of equal calibre and scientific position, as both are founded on the observations of natural phenomena and require the use of instruments of precision. Further on, forecasting of weather is considered derogatory to the scientific position of meteorology, but the laws of probabilities are included in the science of mathematics, and prognosis is part of the science and art of medicine.

A serious view of the character of meteorological science has not yet, however, been entertained by the British public, and the results of its labours and aspirations are still tabooed and neglected officially. We have seen the consequences of this abnegation in the disasters that befall water companies in winter by frozen pipes, and in summer by dried-up reservoirs, by ignoring past meteorological investigations and results. We have seen it neglected in warlike operations, when John Bull could not believe that the Crimea would be visited by such an Arctic winter (in 1854-55), as he estimated that it would only be like such as he was accustomed to see in Hyde Park. The authorities fifty years further back (in August, 1809) had not the means of knowing what the climate of Walcheren was like, or that it was any different from that of the Thames; and so they saw thousands of our soldiers die and perish under a broiling sun and the paludal mists of the Polders. It is scarcely credible that the War Office of the time had not provided our medical officers with meteorological instruments for use in the expedition in 1801-2, and so they came and went knowing nothing of the climate they lived in. Both the French and Indian armies had seen to this provision having been made in 1801-2 for ascertaining the features of the weather and atmosphere of Egypt during their marches through the country and in stationary camp quarters. If meteorology, then, is to be of any good it must be acknowledged as a science fit to minister to the wants and life of the nation, by its professors and workers being recognised as investigators and accumulators of valuable information.

I am, Sirs, yours faithfully,

July 16th, 1895.

OBSERVER.

P.S.—In a lecture by Mr. Clement Wragge before the Royal Society of Tasmania, reported by the *Hobart Mercury*, May 22nd, 1895, the following words occur:—"Mr. Wragge, who was received with applause, referred to the distinction between the sciences of astronomy and meteorology. The study of the latter enabled forecasts to be made which were of infinite value to all kinds and conditions of men."

THE SOCIETY OF MEDICAL PHONOGRAPHERS.

To the Editors of THE LANCET.

SIRS,—Will you kindly grant me space to express a hope that any members of the profession who use shorthand, and may be intending to join our society, will do so at once by