that it be accepted had been proposed and seconded, some discussion took place on the subject, and finally it was resolved, *nem. con.*, that the letter should be allowed to lie on the table until the next meeting.

THE ROYAL COLLEGE OF PHYSICIANS.

A LECTURE was delivered in this College on the 29th ult., by Dr. Burdon-Sanderson, "On the Mode and Duration of the Contraction of the Heart in Health and Disease."

The main purpose of the lecture was to elucidate the relation between the form of the arterial pulse as revealed by the sphygmograph and the movements of the heart in health and disease.

In every arterial pulsation four events may be distinguished.

I. *The sudden or primary expansion of the artery.*—It was shown that the primary expansion does not express an increase in the quantity of blood contained in the artery, but is due to a sudden jerking forwards of the particles of liquid, and is, therefore, of the nature of a commotion or shock in which each particle communicates its movement to its neighbour.

II. *The more gradual distension of the artery by impletion.*—The moment of greatest impletion occurs at a variable interval never exceeding a fifth of a second after the primary expansion. The time at which it occurs, and the degree in which it is marked, depend on the quantity of blood transmitted by the contracting heart to the artery.

III. *The sudden collapse of the arterial wall.*—This is a movement of the same nature and produced in the same way as the primary expansion—that is to say, by a sudden impulse of the particles of liquid contained in the arterial system in a direction towards the heart, the effect of which depends, not on its extent, but its velocity.

IV. The fourth event constitutes *the diastolic expansion or second beat*, the distinctness of which in certain morbid states gives to the pulse the character known as dicrotism. The explanation given by the lecturer of this phenomenon may be shortly stated as follows:—The injection of blood into an artery during the systole of the heart produces two effects therein, both of which are limited to the period of contraction—viz., (*a*) distension of the walls of the arteries, and (*b*) increase of the pressure of the blood against its internal surface. Of these two effects the former is directly proportionate to the *elastic yieldingness* of the artery, the latter inversely proportionate to this property—that is, the more elastic the artery the more is its area increased during the ventricular systole, and the less the augmentation of blood-pressure. According as the one or the other of these effects is in excess the pulse assumes different forms. If *a* predominates, the collapse of the artery at the close of systole is complete, and is followed by no appreciable reaction. If *b*, the pulse is dicrotous. If the two are balanced, the pulse is normal. This implies that in the normal state of the circulation the force of the heart is only partly expended (as regards the arteries) in carrying on the circulation during the period of systole, the remainder of the force being thrown into reserve to be used in maintaining the flow of blood after the heart itself has ceased to act.

In accordance with this principle diseased pulses may be classified on either side of the normal as follows:—

1. Pulses of which the characters indicate that the arterial blood-tension produced during systole is less than natural, and consequently that the resistance is diminished and the duration of the systole shortened. These effects may be due either to diminution of the quantity of blood discharged by the heart at each stroke (mitral disease, spanæmia), or to an increased susceptibility of the heart to stimuli, whereby the ventricle contracts *too soon*, that is before it has received a sufficient supply of blood from the veins. This state of the heart characterises what may be properly designated as the nervous pulse, or the pulse of emotion. Here, as before, the quantity discharged is unnaturally small.

2. Pulses of which the characters indicate that the blood-pressure produced in the arteries during the contraction of the heart is excessive; and that in consequence of increased arterial resistance the ventricular systole is prolonged.

Under this head three distinct forms of pulse are comprised—viz.:

1st. The hyperdynamic pulse. This form, which arises from increased resistance dependent on structural changes in the arteries or their capillary terminations, indicates that during the contraction of the heart the arterial system is *over-distended*. In such a pulse the curve which indicates the systolic distension is boldly projected, while the diastolic reaction is comparatively feeble.

2nd. The senile pulse, or pulse of inelastic arteries, which differs from the preceding mainly in the complete absence of diastolic reaction.

3rd. Adynamic pulse of continued fever. Here the systole is prolonged, not because the resistance is too great, but because the heart is too weak for its work. The arteries are comparatively empty, and, consequently, their elastic yieldingness is in excess. Hence the diastolic reaction is unnaturally great, and the pulse becomes sensibly double, the second beat being often quite as distinct as the first.

In conclusion, the lecturer remarked that the form of pulse to which he attributed the most practical significance was that to which he had ventured to assign the term "hyperdynamic;" for the structural changes in the arteries and arterial capillaries, of which it afforded unquestionably the earliest indication, were of the gravest importance, not only with respect to prognosis, but in their bearing on the estimation of the expectation of life.

The lecture was illustrated by sphygmographic tracings on glass, which were exhibited by means of the oxycalcium light.

GREAT INTERNATIONAL EXHIBITION OF PARIS.

(FROM OUR OWN CORRESPONDENT.)

A General View of the Palace; its Interior Arrangements and Appearance; its Sanitary Conditions.

Before I commence the technical description of such portions of the Exhibition as may be of special interest to the profession, it may be well to enter into some details, written under the impression of a first visit to the place, and which may not only prove of interest to such of your readers as may not cross the Channel, but may be of use to those whom the innumerable attractions of this great display may bring over to this city. These details may furthermore be necessary to make my future communications better understood.

Whereas the Exhibition of 1862 occupied an area of only 95,000 metres, the present one stretches over a space of 144,000 metres, thus having an advantage of 50,000 metres over its predecessor. Its *quasi*-circular form gives it a *bizarre* appearance, and has caused it to be compared to an immense gasometer. We must confess that there is nothing imposing or peculiarly beautiful in its general aspect. Built mostly of glass and iron, it has yet nothing of the grace and airiness of the Crystal Palace; nor does it present in its *ensemble* any of those grand architectural lines which strike one with wonder or pleasure. Whilst giving all due credit to the architects, who have admirably embodied in the present edifice the most ingenious plan which has yet been conceived for a most complete exhibition of international products, we cannot but regret that they should not have endeavoured to adorn it with some outward signs of grace and beauty, combining thus the *utile cum dulce*. The only detail, in fact, which adds some liveliness to the too manufactorial and uniform aspect of the iron-ribbed building, with its coating of grey and its brown roof, consists in tall masts which go round the dome, bearing at their centres the escutcheons of the principal manufacturing towns of all countries, and at their tops the flags of the different nations whose products they cover. Around the palace, however, extends a fine park, drawn out in the English style, and in which a thousand things may be found to charm the sight and awaken the curiosity of the visitors.

As we enter the Exhibition, and before we proceed on our round, it becomes necessary to describe in a few lines the general idea which has presided over its construction, and which reflects the highest credit on its author—M. le Play. It will at once explain the peculiar form adopted for the edifice, and serve as a key to the whole of its interior arrangements. It consists of a system of classification very methodical, simple, and complete, and which may well be assumed to bring together the products of a similar nature contributed by different countries, so as to enable us to compare them at a glance, and thus realise one of the principal benefits of a universal exhibition, and at the same time preserve to the productions

of each country their national character. The present Exhibition has been entirely erected on this principle; and if we have criticised the want of architectural splendour in its external aspect, and may yet have occasion to disapprove of some of its interior arrangements, we must at once give unlimited praise to the engineers and architects—Messrs. Krantz, Duval, and Hardy—for the most ingenious way in which they have worked out and embodied this presiding idea. Pursuing this plan, they have drawn out immense continuous galleries, one within another, and calculated to contain groups of similar products. These galleries are in turn intersected by other lines or roadways, which radiate from the centre, or at least from the innermost circle to the outermost one, thus dividing the whole space into so many sections. So that a visitor who entered one of the galleries and walked round it would return to his starting-point after having seen all the products of a similar nature exhibited by the different nations of the world (for instance, clothing, or machinery, &c., according to the particular group); whereas if he betake himself to one of the radiating roadways, and follow it from one end to the other, he will pass through fragments of the collective display of one and the same country. Not only is this plan most simple and convenient, but at the same time, had it been strictly and simply followed out, it would have given to the interior arrangements a very grand and lofty aspect. Unfortunately, this has been marred here and there, and particularly in the French and German departments, by other arrangements adopted by particular committees. Instead of allowing their full sweep of view to the galleries, at least in height, and of simply placing on either side the exhibited products belonging to the same class, the committees have allowed contributors or groups of contributors to construct, with a view to individual convenience or to elegance of effect, so many courts or halls, varying in size and form, and the partitionings of which go more or less up to the ceiling; so that the general effect is entirely destroyed, and in some places we fall on an assemblage of shops. The appearance of the great gallery, consecrated to the processes of the useful arts, as well as of the English department, shows what a magnificent aspect the whole of the interior arrangements would have assumed but for the particular interference I have mentioned. If I insist on this point it is not merely in an æsthetical point of view, and for the sake of the general convenience, but because the construction of these courts has created unfavourable hygienic conditions, as we shall presently see.

I have said that the great circular galleries were designed to contain groups of similar products. The classification of these groups is founded on a philosophical plan, which is at the same time extremely practical, and will constitute one of the best features of this Exhibition. It rests on the idea of the fundamental and progressive wants of man, physical and intellectual: food, clothing, dwelling, the fine arts, &c., embodied in the ten following groups:—1. Fine arts. 2. Materials and application of the liberal arts. 3. Furniture and other objects in connexion with dwelling. 4. Clothing and other articles carried about the person. 5. Raw products belonging to different kinds of industry, in their different stages of elaboration. 6. Instruments belonging to, and processes of, the useful arts. 7. Substances used for food (natural or preserved), exhibited in different stages of elaboration or cooking. 8. Living products and specimens of agricultural establishments. 9. Living products and specimens of horticultural establishments. 10. Objects exhibited with a view to ameliorate the physical and moral condition of the working man. I have followed, in this enumeration, the material order in which the various products are arranged in the different galleries as we proceed from the innermost gallery—that of the fine arts—to the others, which gradually increase in size. The 8th and 9th groups, and many objects in connexion with the 6th and 10th groups, are exhibited in the park.

Moreover, the central space, which is encircled by the picture gallery, has been converted into a garden, planted out with shrubs and embellished with fountains, where the tired visitor may go and breathe a purer and more genial atmosphere. A large awning has been spread under the glass roof, and this, joined to the play of the waters, will mitigate the heat of the summer sun. Around this garden is a portico devoted to the exhibition of the history of labour. This part of the exhibition (which is, I believe, a novelty) therefore bears an archæological character, and contain tools, ornaments, &c., of all descriptions, from the remotest ages, and destined to constitute in themselves a history of handicraft.

In the general *coup d'œil* of a first visit to this immense industrial palace I must of course content myself with noticing the most striking points and mentioning anything curious or novel, leaving out all details for future letters. Thus, the second gallery, in which we meet with the chief display of our art, contains numerous ambulances, both civil and military, destined to exemplify the progress which has been made in this particular line, and exhibited by the International Association, which has been recently formed for administering to the necessities of the wounded on the field of battle. Passing rapidly through the intervening galleries we come to the sixth, which is remarkable amongst other things for its magnitude: whereas the other galleries measure in height an average of only seven metres, the one in which we stand and which strikes us with its splendid appearance, measures twenty-five metres in height and thirty-five in breadth. It will be one of the most frequented of the Exhibition, on account of the very interesting nature of its display. Here will be seen in full play a whole world of machinery. Beside those machines, formidable or ingenious, so varied in form and nature, which have given such power and activity to modern industry, the Imperial commissioners have been happily inspired with the idea of exhibiting, as it were in contrast, industrial processes the minuteness or delicacy of which still requires the hand of man. In the midst of the gallery, and extending along its whole length, arises a platform or *promenoir*, from which the visitor is enabled to obtain a complete view of this most interesting spectacle.

The seventh gallery, devoted to "Food exhibited in its different degrees of preparation or cooking," also presents a peculiarity which is worthy to be noticed. Built against the palace and facing the park, it forms a marquee which affords a sheltered walk all round the Exhibition. It is occupied especially by restaurants, coffee-houses, beer-houses, &c., which, by a happy innovation, are considered as forming part of the Exhibition, and where the alimentary products of all countries may be sold. The difficulty of preserving certain articles of food, or of testing them while in a fresh state, constituted a great inconvenience in the alimentary departments of former Exhibitions. By the present ingenious plan this difficulty has been overcome, at least in a great measure. Articles of food will be daily tasted and judged of at the Exhibition, not only by the jurors, but by the public, and such of the exhibitors as have not a shop or restaurant can easily come to an understanding with the retailers for the degustation of their products. Thus, not only in a gastronomic but also in a hygienic point of view, one may pass in review the different modes of cookery and the favourite national dishes of various countries, and, without any disturbance, unless possibly to his stomach, breakfast in Spain, lunch in England, dine in Russia, and sup in France, without leaving the Exhibition.

The 10th group—an addition, I believe, to former Exhibitions—will be worthy of our best attention. It denotes a most liberal and philanthropic spirit on the part of its promoters, and will constitute, I believe, one of the most remarkable and lasting features of the present Exhibition. It affects the individual, the working man, in his moral and physical existence; and unites all the elements, theoretical and practical, of this twofold problem. Establishment of schools; models of schools; systems of education; libraries for the people, in schools, or in workshops, or at home; food, clothing, furniture, and dwellings, remarkable for combining advantages of cheapness and solidity with good hygienic conditions and comfort, &c. Besides this, and in a different order, but bearing out the same idea, there is "a methodical collection of products manufactured by artisans working on their own account, either alone or with the help of their family or an apprentice, and remarkable for novelty, perfection, or for the useful influence which this work exercises on the moral and physical condition of the people;" also of "instruments and processes habitually employed by mechanics working on their own account, or specially adapted to the convenience of work executed by the family, at home:" an attempt, as it were, to avert the evil consequences which result from the system of factories and the dispersion of families. In a word, this group involves all the great social questions of the day. At the same time it calls forth the most important applications of hygiene; and the part of the medical man here becomes pre-eminent. This portion of the Exhibition will therefore be of peculiar interest to the profession, and will furnish much matter for my future communications.

So far as I could see on a first visit, necessarily very rapid, I may venture to say that England's industrial display bids fair to be worthy of the high position which she occupies amongst nations. In the 6th gallery particularly, she already

manifests all her industrial genius, and her peculiar aptitude for mechanical invention. The space which is here allotted to her is so crammed with machinery that I literally found it impossible to get through it. There is one thing also, to which I have already alluded, which speaks strongly for the good taste and good sense of those who have been entrusted with the organisation of this department, and that is, that they have not adopted the system of dividing it into so many ungainly courts and halls. The general aspect has not therefore been spoiled; the whole effect is very grand: and, what is more, this arrangement must place the whole English department in excellent sanitary condition. In going through this portion, I looked curiously about me in the hope of obtaining a glimpse of something more especially connected with the medical art, but could only light on one case containing some surgical appliances, another covering osteological preparations, and further on some alimentary specimens sent from the colonies. I cannot compliment Brother Jonathan (our next-door neighbour) on the general style of decoration which he has adopted for his department; it is rather flimsy, and looks more like a village theatre or a paper-hanger's warehouse than anything else. Russia, on the contrary, makes a very fine and picturesque appearance; it consists simply of varnished wood, but very daintily carved and prettily arranged. Persia, China, Turkey, &c., make a picturesque corner, got up in Oriental style, and with quite a *couleur locale*. The French occupy half of the entire edifice, and I need not say that their display will be very brilliant. Austria, Prussia, Germany, and Switzerland have penned themselves up in a thousand little courts; so *passons*—we have not time enough just now to venture into this labyrinth.

I shall now conclude with some details concerning the sanitary arrangements of the buildings, mentioning beforehand that I have drawn my principal information on the subject from an able article published in the *Figaro* by M. de l'Aunay, who seems to be admirably *au courant* of everything connected with the Exhibition. In order to ventilate so considerable a surface it was necessary to have recourse to artificial means. Beneath the radiating roadways which I have described, and which are sixteen in number, are situated sixteen ventilating galleries. Beneath the three circular galleries, consecrated to clothing, furniture, and the liberal arts, are also as many subterranean galleries. The vaults of these latter present numerous openings, closed by means of wood gratings. The air, introduced into eight of the subterranean radiating roadways by means of powerful ventilators, spreads into the circular galleries and thence through the gratings into the Palace. The vitiated air escapes through the skylights as the pure and fresh air issues from the vaults. It has been calculated that 25,000 persons will constantly occupy the central part of the palace, and the ventilators are made to propel 250,000 metres of respirable air. This plan was very simple, and would have answered all the purposes of good ventilation, but the engineers could not, or did not, reckon upon the mode of construction of the innumerable courts, which I have already criticized, and the walls of which, going more or less up to the ceiling, disturb the equal distribution of air; so that in some places the fresh air will issue forth from the vaults with a power altogether disproportionate to the room, whilst in others the vitiated air will never be renewed at all. According to this system of division into enclosed courts, there should exist in the centre of each one an opening for the entrance of fresh air. But it is too late to put this into practice, and as a necessary consequence, the whole building is, in this respect, in bad sanitary condition.

But this is not the only evil consequence which the faulty construction of these courts is destined to entail. As they all vary in size, so will the temperature vary in each. And we may even now foresee the whole tribe of pathological phenomena dependent on too sudden and frequent changes of temperature. The galleries themselves (save the sixth) seem to me to be rather low; and although awnings have been spread beneath the ceiling to temper both the glare and the heat of the day, it is to be feared that the rays of a summer sun striking on the glass roof will make very warm work of it to the crowds of visitors below.

The committee have taken all necessary precautions in case of accident or illness amongst the *personnel* of the Exhibition or the visitors. A medical service has been organised, consisting of thirty-six medical men, and at the head of which is M. Gosselin, the distinguished clinical professor of La Pitié.

A veterinary service has also been organised on account of the cattle which will figure in the agricultural establishments.

I intended to conclude this letter with a sketch of the park, which is well worth a description, on account of the numerous attractions which have there been accumulated, but through want of space must postpone this subject to my next letter.

Paris, April 9th, 1867.

LONDON FEVER HOSPITAL.

THE Report of the Committee of Management on the medical history of this hospital during the year 1866, states that 3577 patients were admitted, of whom 2897 were suffering from true specific fevers, and 90 from cholera, while in the remaining 590 cases the febrile symptoms were the result of local disease. The total number of admissions since the establishment of the hospital in 1802 has reached the large aggregate of 47,601, and nearly one-third of these have taken place in the last five years, in consequence of the great prevalence of typhus and enteric fevers in London. The Registrar-General's Return shows that the metropolitan deaths from typhus and infantile fever rose from 1754 in 1861, to 3635 in 1862, falling to 2892 in 1863, then rising again in 1864 to 3689, and declining in 1865 and 1866 to 3232 and 2681. From both these kinds of fever the admissions to the Fever Hospital were falling off last autumn, but the record of localities whence the patients were brought shows that the epidemic was then more generally distributed throughout the metropolis than it was at its commencement. Unless any unfavourable climatic conditions arise it may be hoped that the effect of the sanitary measures which the late cholera epidemic induced will be apparent in the decline of fevers and other diseases favoured by proximity to dirt and unwholesomeness. Overcrowding and destitution fill the fever wards of our hospitals, and it would be true philanthropy as well as sound economy to remove as far as possible causes which work so much mischief among the masses of the labouring population.

The hospital mortality rate from all causes was 17·98 per cent.; but deducting cholera cases and others moribund on admission, the mortality among patients fairly under treatment was only 14·01 per cent.—a favourable result as compared with previous years. Of the fever cases under treatment the mortality was 14·8 per cent.; from typhus alone the mortality was 16·37 per cent., from enteric fever 16·9 per cent., from scarlet fever 7·59 per cent.—the moribund cases being excluded from the calculation.

In dealing with so large an amount of contagious disease, immunity to those engaged in the service of the hospital could hardly be expected. Out of the 112 persons so occupied during the year 30 contracted fever, and 5 of these died. In deploring the loss of Dr. Wyber—the resident medical officer, who was one of the victims—the committee observe that of some thirty medical men who have been from time to time in charge of the wards, they have not had the misfortune to lose any one from typhus during the past thirty-four years, though several have been attacked. The last previous death of a medical officer from typhus contracted in the hospital was that of Dr. Dill, in 1832. An excess in the number of nurses attacked with typhus in 1866 is attributed to more than ordinary changes in the nursing staff, no fewer than fifty-six new nurses having been engaged during the year. It is admitted that this state of things is very undesirable, and the committee have sought by improving the pay and position of the nurses to prevent its recurrence.

The statistics of the Fever Hospital are brought into comparison with those relating to fever patients in the general metropolitan hospitals to prove that a given number of typhus patients can be treated on the plan of isolation in a fever hospital with equal advantage to themselves and with far less danger to other patients than in the wards of a general hospital.

THE VENEREAL COMMITTEE OF THE HARVEIAN SOCIETY.

THE attendance at the meeting of the above Committee for considering the subject of the prevention of venereal disease, held on Wednesday last, was a very full one, seventeen members being present: Dr. Pollock in the chair. Returns have been received from various quarters in reference to the average