THE EFFECT OF PROLONGED MUSCULAR EXERTION ON THE CIRCULATORY SYSTEM.

By F. A. MAHOMED, M.D., Pathologist to St. Mary's Hospital.

MR. WESTON, with much enduring good nature and a deep interest in the work, submitted himself to a series of observations during his late 500 miles walk; and, through the kindness of Dr. Pavy, at whose disposal he had placed himself, and with Mr. Weston's consent, I have had opportunities of watching in him the effect of prolonged exertion on his circulatory system under circumstances but rarely attainable. The results obtained appear of some value, inasmuch as they not only prove the condition under which his excretion of urea is so much increased to be a physiological, and not a pathological one allied to fever, but especially as they indicate clearly, when taken in conjunction with a single observation on one of his competitors, a most important cause of exhaustion and its mode of production.

The observations which have heretofore been made on the effect produced on the circulation by muscular exertion have been more or less contradictory; and, without further and very much more extensive evidence, I do not think we are in a position to make any very positive statements concerning it; for it must necessarily vary much according to the condition of the person under observation. I propose, therefore, in the present note to confine myself to the observations made on Mr. Weston during his late great exploit, and to draw from them such conclusions as they appear to indicate. In all previous observations of this character, the most important phenomena connected with the circulatory system, namely, the variations in tension, appear to have been overlooked, or at least to have held a very secondary position, while the heart has been regarded as varying in the force and frequency of its contractions, independently of the general vascular condition. Herein lies the source of all the contradictions in the evidence hitherto obtained. For, apart from certain nervous influences, which are comparatively speaking but rarely to be taken into account, both the force and frequency of the cardiac movements are entirely governed by the amount of arterial resistance which they have to overcome, and to which they bear a strict relation. On the other hand, the general arterial tonus, or the relaxation or contraction of the arterial coats throughout the system, may usually be regarded as quite independent of the tension of the vessels or the action of the heart, and as varying chiefly with the general tone or state of nerve-force. A condition of increased arterial tension or fulness may be accompanied by either a contracted or a relaxed condition of the muscular coat of the arteries; a pulse, therefore, of arterial tension may be either large or small, these characters being chiefly governed by the tonus of the vessels, and under some circumstances, by their fulness or emptiness during the diastolic period.

Variations in arterial tension can be produced only in two, or at the most three, ways; namely, by causing in some way capillary obstruction, and thus diminishing the outflow, or by increasing the inflow by increased rapidity of the heart's action. To these chief reasons may perhaps be added one more; namely, contraction of the muscular coat of the arteries generally, as that produced by cold or digitalis; it is by no means certain, however, that this is really a cause of arterial tension. I am inclined to believe that it produces a greater rapidity of flow, but not of lateral tension or pressure; it certainly does not produce the same sphygmographic indications that arterial tension produced by other causes does, nor is there any prolongation of the systole, a condition invariably associated with high tension.

Increased action of the heart is only an occasional, and generally only a temporary cause of increased tension; it occurs in connection with some nervous conditions, accompanied by excitement.

Obstruction to the capillary flow is the most frequent cause of high arterial tension; this may be caused by one, or perhaps both, of two ways, either by the so-called stop-cock action of the arterioles, or by a disturbance of relation between blood and tissue, and the loss of what is termed chemico-vital or capillary power. Whilst discussing arterial tension, it may be as well to mention the characters by which we may recognise this condition as existing in a pulse. In this condition, the tidal wave is too much sustained, and the pulse lingers under the finger, instead of collapsing suddenly. If a line be drawn from the apex of the up-stroke to the bottom of the aortic notch, no part of the trace should come above this line; if it should do so, it may be counted abnormal, and an indication of high tension. The height of the aortic notch from the base line (*viz.*, a line connecting the lowest points of the up-strokes) is another gauge of tension: the nearer the notch approaches the line, the lower the arterial pressure. The

permanent distension of the artery giving a cord-like sensation to the finger, and the ability to feel the vessel during diastole, is a most important and valuable gauge—one which the sphygmograph does not afford, but which is easily detected by the educated finger. The amount of pressure required to develop, and especially to extinguish, the pulse, indicates the force of the heart's action, but not necessarily the degree of tension.

I have referred to the contradictory results hitherto obtained as to the effect of exercise upon the pulse; we shall find in the present series of observations an explanation of these contradictions. The first effect produced by exertion on the circulation appears to be of a twofold character. It increases the frequency of the contractions of the heart, while the demand of the muscles for an increased supply of blood dilates the arterioles and increases the flow through the capillaries; hence the arterial system is more rapidly filled, and at the same time more rapidly emptied. As long, therefore, as a certain definite relation exists between these two opposing conditions, they will neutralise each other, and the arterial tension will remain unaltered. But let the rapidity of the capillary flow be too much increased, or the heart's action become too slow, and the arterial tension must be diminished; or, on the other hand, let the capillary flow be by any means decreased, or the rapidity of the heart's contractions be too greatly increased, and the arterial tension must necessarily rise.

Since, then, the maintenance of the normal standard of arterial pressure depends on a perfect balance being maintained between these opposing forces, it is easy to conceive that a slight deviation in either direction will produce a corresponding alteration in the arterial tension. This alteration is practically found not unfrequently to occur. If the muscles are eager for a greatly increased supply of blood, as in persons not accustomed to severe exertion, the vessels will necessarily dilate excessively, and, if the action of the heart be not correspondingly increased in rapidity, the tension will fall and the pulse become dicrotic. If, on the other hand, a heart be working excitedly or be previously hypertrophied, while the well-trained muscles do not require a supply of blood much greater than that to which they are accustomed, the tension may be raised and the heart-work increased. Clinically we often see high tension produced by mental strain and worry; possibly an exhausted and irritable brain during prolonged effort may also give rise to it. Or, again, the increased amount of effete material in the blood, or an alteration in nutrition, during prolonged efforts, may cause capillary obstruction in either, or, perhaps, in both of the two ways previously mentioned, and may thus raise the arterial tension.

Variations in tension in either of these two directions produce ill results to the subject of them. In extremely low tension, indicated by the dicrotism of the pulse, the damage probably lies in the increased requirements of the muscles robbing the brain of its normal supply, and thus producing vertigo or syncope, both of which are well known causes of failure during prolonged or severe exertion. This condition appears to be associated with an elevation of temperature; such, probably, were Wunderlich's cases. On the other hand, if the variation be in the opposite direction, and the arterial tension be increased, the strain will fall upon the heart; that organ, being overtaxed, will become dilated, and failure will then occur in one of two ways: either by over-distension, causing paralysis and sudden death, or by gradually increasing signs of dilatation, producing collapse. Symptoms of this condition must be well known to all by personal experience, and should be easily recognised; they consist in gradually increasing breathlessness, an oppressive feeling of weight, and discomfort in the præcordia; a sensation of lightness in the head or vertigo, coldness of the extremities, pallor of the face, an anxious expression of countenance, dilated pupils, and turgescence of veins; the temperature of the body falls below normal, the pulse being very small, perhaps scarcely perceptible to the finger, and giving a sensation of softness, though by the sphygmograph it is generally found to require a considerable pressure to develop it, on account of the fulness of the artery; it is, moreover, frequently irregular, and will probably vary in tension or rhythm with the respiratory acts. The respirations are generally shallow, irregular, and rapid. Vomiting not unfrequently occurs; and cough, with increased secretion of bronchial mucus, is always present.

A good example of failure from this cause was seen in Taylor, one of Weston's competitors, during the late match. A tracing of his pulse is represented by No. X; it clearly indicates a dilated and failing heart; the systole is prolonged, the tidal wave being too much sustained, while the impulse is feeble, the up-stroke being short and somewhat oblique. Although it felt to the finger extremely small and feeble, nevertheless it required four-and-a-half ounces of pressure to develop the tracing completely. At the time when this was taken, he was cold and much distressed. Early on the third day, after completing

122 miles, he was compelled to desist; his pulse was then described as being almost imperceptible. This, then, was an evident case of

failure from dilatation of the heart, and must inevitably have been preceded by high arterial tension. Unfortunately, he was not under regular observation, and his urine was not examined; it would most probably have been found albuminous. On one occasion during the walk, tension was found to have increased in Mr. Weston's pulse—Nos. VI and VII; this will be referred to hereafter.

Besides the now well known results ascribed to high tension, such as atheroma of the vessels, hypertrophy or dilatation of the heart, chronic Bright's disease, apoplexy, aneurism, etc., to which we know athletes are liable, I was much surprised to hear lately, on very excellent, although not medical, authority, that madness is a frequent termination of their career; that, if any psychologist will take the trouble to trace out the history of each of our eminent pedestrians, he will discover that a very large proportion of them have been subject to some form of madness. I do not know whether this fact is a well known one; it was new to me, and the observation appeared worthy of record. Probably this may be ascribed to the intense brain-exhaustion accompanying prolonged muscular exertion; possibly combined with imperfect nutrition of the brain, the muscles receiving an increased blood-supply at its expense.

Before proceeding to the consideration of my nightly observations, I should first state that Mr. Weston is a determined, excitable, somewhat delicately made, and finely formed man. His limbs are cleanly cut and well shaped, though not presenting strongly marked muscular development. He is of the nervous temperament; his age is 37; height, 5 feet 7½ inches; and his weight, when stripped previous to the commencement of the present walk, was 8 st. 11¾ lbs. His skin is soft and fair; muscles are not hard and knotty, but feel rather soft on manipulation; hair iron grey and rather thin; expression of face determined; digestion good; bowels regular; urine normal in quantity and quality; chest well formed; resonance normal; respiratory murmur normal; area of cardiac dullness normal; impulse very slight, about 1½ inches internal to nipple; sounds clear, perfectly normal in character; pulse regular and soft; arteries normal to the touch, not thickened, nor permanently distended; no arcus senilis; pupils mobile.

The first observation was made on the night of March 5th, a little before twelve o'clock, just previously to the commencement of his task. It will be seen from the plate that the temperature, which in every instance was taken in the mouth, was a little raised, the thermometer registering 99.6 deg.; but, from the previous observations that have been made upon him by Dr. Austin Flint, jun., it appears that his temperature in health is usually rather above the normal standard, averaging about 99 deg. The pulse and respirations were normal in frequency; and the pulse tracing was healthy in character, with the exception of a slight irregularity in the volume of the beats from time to time. This, however, is frequently observable in normal tracings, especially when the subject has been unwell and has scarcely recovered, which was at the time the case with Mr. Weston. The most remarkable feature in the tracing is the absence of all indications of excitement of the heart's action. It required only two ounces of pressure to develop the trace, but a good deal more to extinguish the pulse.

On this occasion, and on several others during the walk, an attempt was made to obtain simultaneous cardiographic and stethographic tracings, by means of Marey's cardiograph for the heart and an India-rubber bag for the respiratory movements, connected with two tympana, the levers of which, placed in the same vertical line, inscribed their movements simultaneously on a revolving cylinder. Unfortunately, the impulse of Mr. Weston's heart is only just perceptible to palpation, and not of sufficient force to give a satisfactory tracing—producing, indeed, only the smallest movements of the lever. The respiratory movements on this and all other occasions were perfectly normal in character and regular in rhythm.

At the end of the first day's walking—that is, at 12.20 A.M. on the 7th instant—the second observation was made. Mr. Weston had walked ninety-six miles. He had lost two pounds in weight; he appeared considerably exhausted; his pulse was increased in frequency; and it will be observed in the tracing that arterial tension had been reduced, while the force of the heart was increased. The former character is indicated by the aortic notch occupying a lower position in the down stroke, and being more closely approximated to the base-line (a line drawn through the bottom of the up-strokes). The increased force of the heart's action is demonstrated by the increase of pressure required to develop the tracing, this being two ounces on the previous night, and four and a-half ounces on the present occasion. Unfortunately, by some misunderstanding, his temperature was not obtained; but his extremities were warm, and body glowing. This may, therefore, be assumed to be the same as on the days preceding and following.

On March 8th, at 1.30 A.M., he had walked 180 miles, and lost

another three quarters of a pound in weight. He was exhausted as before; his pulse was 108 per minute, the tension had still further decreased, and the aortic notch had almost reached the base line; the force of the heart had also diminished, and it required only two ounces to develop the trace. His temperature was the same as at the commencement.

On the 9th, at 12.30 A.M., he had walked 244 miles, had eaten more than usual during the day, and had gained since yesterday half a pound in weight. His temperature was 99.7 deg.; the tension of the pulse had decidedly increased, and there was more fullness about the first part of the downstroke than had been previously seen.

On the 10th, at 1.50 A.M., he had walked 323 miles, and had lost 1 lb. 17 oz. since last night; his temperature was about the same, and the character of the pulse was as yesterday.

On the 11th, at 1.0 A.M., 390 miles had been walked; he had lost thirteen ounces in weight. During the day, he had felt intensely sleepy, and had experienced great difficulty in keeping himself awake. On this occasion, a marked alteration was discernible in the pulse. The tension was now very considerably increased; this is indicated by the prolonged sustention of the tidal wave and the height of the aortic notch from the base line. Coincidentally with this, his temperature had fallen to 98.8 deg. His hands felt cold, instead of glowing as heretofore; he complained of feeling chilly, and required more bedclothes. The second sound of his heart was accentuated, and the first a little prolonged. I waited while he slept; and, at 4.45 A.M., made another observation. His pulse had fallen in frequency from 110 to 80; but it presented the same characters as before, though the heart appeared to be acting not quite so vigorously, it requiring one ounce less pressure to develop it, while the dirotic wave was not so sharp and well defined. On these two occasions, the pressure required to extinguish the pulse was more than on any other. His temperature had fallen still lower, being 98.4 deg. With the exception of this alteration in the sphygmographic trace and the reduction of temperature, there were no indications that his general condition was not so good as usual; but there was sufficient to give rise to some anxiety, and to indicate a possible cause of failure if they increased. The falls of temperature which had been previously observed during his walks by Dr. Austin Flint, jun., and also by Mr. Thompson, were most probably due to a similar alteration in his arterial tension. The thermometer, if this be ascertained to hold good on other occasions, may prove to be of considerable value to the pedestrian as being a ready and easy way of giving information as to his condition and a warning to desist.

On March 12th, at 12.10 A.M., at the termination of his sixth day of walking, and after 450 miles had been covered, his weight was 8 st. 6 lbs., showing a total loss of 5½ lbs. The pulse tracing showed a great diminution of tension, which had again become low. His pulse was 134 when brought up into his room; it fell to 108 after twenty minutes' rest. His temperature had gone up again to 99.6 deg., and his extremities were warm. During the first part of the day, he had been tired and very sleepy; this had compelled him to take a further sleep of over two hours' duration at 1 o'clock P.M. After this, he awoke much refreshed, and continued to walk well and easily to the end of the match. This probably was coincident with the change in arterial tension.

The next observation was made on Monday, March 13th, at 12.30 P.M. During the past thirty-six hours, Mr. Weston had had good rest, and lived freely. The previous night, he weighed 8 st. 11 lbs., being only ¾ lb. less than he started with, and having gained 5 lbs. in twenty-four hours. His temperature was 97.8 deg.; pulse 88, and respirations 20. The tracing was large and full, and the heart was acting with considerably more power than when he started. The action being somewhat excited, it apparently could not yet become accustomed to its lessened work, and was still pumping more forcibly than it need have done.

The urine throughout, Dr. Pavy informs me, has continued free from albumen; nor, at the time of high tension, did it give any reaction with the guaiacum test for blood.

THE COCA-LEAF.

MR. ASHBURTON THOMPSON, who has been in attendance on E. P. Weston during his late walking feats in London, writes to us as follows.

I stated last week, in positive terms, that Mr. Weston was in the habit of chewing the leaf of the erythroxylon coca during his exertions. I based that statement upon observations which I made, not during the first walk alone, but during every one of the four walks. I am now

informed by Mr. Weston that my inference from those observations is correct with regard to the first walk, but that it is not correct so far as the second, third, and fourth walks are concerned. By what others as well as I myself had observed, by questions put to me at various times by various persons, and, lastly, by a chance remark dropped by a fellow-townsmen of Mr. Weston's in the course of conversation, I was led to speak to the latter upon the subject on the mornings of the 7th and 11th instant; yet it was not until the morning of the 12th instant that, before going to bed, Mr. Weston formally stated, in answer to a categorical question put to him by Dr. Pavy in my presence, that "he had not seen a coca-leaf since his first walk". My statement of last week must now, therefore, submit to qualification. I modify it with pleasure; but I regret the occasion. Had those most interested in knowing what articles entered into Mr. Weston's dietary been informed exactly from the first, it would not have been necessary to draw inferences from a number of minute incidents of which no one alone was of much weight. Having found coca serviceable during a short journey, the presumption was that, *multo majore*, Mr. Weston would take advantage of it during longer journeys. His asseveration puts it beyond doubt that that evidence which was valid at one time was invalid at another.

Mr. Weston seems to think that even a qualified statement upon this point would prove detrimental to his interests. He requested me, on the morning of the 11th instant, to say nothing about coca in connection with his performances "outside". Although no one who has been brought into contact with him could be willing to do anything contrary to his wishes, I must yet be allowed to hold myself excused if I say that I felt glad that I was relieved of the necessity of considering what answer it would be my duty to give to such a request, by the fact of my remarks being (as I then informed him) already published. There is no obvious reason, however, why Mr. Weston should not take advantage of every aid which his superior knowledge places at his disposal. Already he is clothed, fed, and tended in such a scientific manner as leaves but little room for improvement. His dietary, so far as our knowledge of the plant goes, has been perfected, when (as during the first walk) that has been added to it. There is nothing nefarious, so far as I know, about the use of coca under such as the present circumstances; nor, I presume, would any person attribute all Mr. Weston's powers to the use of some drug suddenly introduced to his system from without. Could they persuade themselves to do so, his mental powers—his foresight, his energy, and his perseverance—to which he owes so much, would still remain to be accounted for. These are natural qualities of Mr. Weston's mind, which he not only knows himself to possess, but which he has cultivated to the best advantage.

A much more important consideration—as Mr. Weston himself, with his keen appreciation of his value as a means of physiological experiment, will allow—is involved in the discovery I have made. So, I regret, it must be called. The experiments which Dr. Pavy is making with Mr. Weston's willing co-operation are of great scientific, and may prove to be of public, interest. No one appreciates them more fully, nor is anyone more careful to see that they are accurately carried out (on his side) than Mr. Weston himself. He was probably not aware that the erythroxylon coca is said to exercise a marked influence over those very excretions from the analysis of which it is proposed to draw conclusions. At all events, for some reason or other, he thought it inadvisable to advertise his use of the plant; and this (under the circumstances) most probable source of error was not guarded against by those who are gravely responsible to the profession for their accuracy. It would have been most unfortunate if, at some future period, it should have appeared that this plant had been used during these four walks at times which could not then be accurately fixed. Although, as a matter of fact, it does not appear in this case that the results of analyses conducted upon excreta influenced by the erythroxylon differ materially from those obtained later, I feel happy to have been able, in the course of duty, to afford Dr. Pavy the opportunity of obtaining essential information (with which, I believe, he is perfectly satisfied) upon this important point.

I believe that I may add the following information, which I gathered during conversation with Mr. Weston upon the subject, without running the risk of offending any person's susceptibilities. He does not find it necessary to follow the Indian habit of using lime or an alkali, with the erythroxylon, in order to derive advantage from it. The native custom alluded to has led some to suppose the contrary. Secondly, he thinks that "the plant" disposes to sleep too heavily at the next opportunity of repose for convenience; he finds that the task in aid of which coca is used must (in his case) be accomplished at once. Of course, if coca act in this way upon Mr. Weston, he cannot take it during those feats which extend over more than one day. But this effect is possibly the result of some idiosyncrasy of Mr. Weston's. Coca, used in the manner

proper for this purpose, is not said to dispose to sleep; travellers do not ascribe this property to it in their works, nor has any person with whom I have conversed upon the subject, who has had the opportunity, observed it to have this effect upon the Indians themselves. It is true that the *coquero*, or confirmed chewer of coca—he who uses it to excess and becomes a slave to the feeling of necessity for it which itself engenders—retires to solitude in order to enjoy his “quid”, just as the Chinaman retires to a quiet place to enjoy his opium, or the Briton his tobacco. But it is not said that he sleeps. On the contrary, the most striking power ascribed to it is that of enabling a man to work for many days continuously not only without food, but with little sleep.

Dr. PAVY writes to us on the same subject.

The otherwise accurate description bearing upon Weston's pedestrian performances, given in your JOURNAL by Mr. Ashburton Thompson, is incorrect with regard to one circumstance; and, as this is of vital importance from a physiological point of view, I must ask you to be good enough to afford me the earliest opportunity of rectifying the error by inserting this letter in your next issue.

Mr. Thompson, referring to the last, or six days' walk, says: “In the notes which I have made, no observations of temperature are recorded. There is a particular reason for that, which applies equally to all the other observations which are being carried out upon Weston under Dr. Pavy's direction; but most especially, perhaps, to what has been regarded as the most important—the estimation of urea.” The “particular reason” assigned, is the mastication by Weston of the dried leaves of the *crythroxylon coca*, one of the effects of which is asserted to be the diminution of tissue waste, and thence a reduction in the amount of eliminated urea.

I am sorry Mr. Thompson has committed himself to an erroneous assumption from too hastily drawn a conclusion. The fact is, that Mr. Weston chewed the leaves in question during his first, or twenty-four hours' walk, but has not done so since. He positively asserted, on Friday night last, in the presence of Mr. Thompson, and the statement is confirmed by his attendants, that not a single leaf has entered his mouth during either walk subsequent to the first. The elaborate superstructure, therefore, comprising the “coca-leaf theory”, which implied the vitiation of the results of the investigations I have been conducting, and occupied a considerable space in your columns, and attained extensive notoriety by being copied into the public journals, completely falls to the ground, inasmuch as it is only since the first walk that my investigations have assumed a systematic shape.

SPECIAL CORRESPONDENCE.

PARIS.

[FROM OUR OWN CORRESPONDENT.]

M. Panas on the Ophthalmoscope in Brain-Diseases.—M. Tollet on the Dwellings of Man and Animals.—M. Chevreul on the Action of Coloured Light.—M. Dumas on the Antiseptic Properties of Borate of Soda.—Medical Members of the Senate and Chamber of Deputies.—The School of Medicine.

M. PANAS, surgeon to the Lariboisière Hospital and a distinguished ophthalmologist, in presenting himself as a candidate for the membership of the Academy of Medicine, submitted a paper on the Circulatory Disorders visible with the Ophthalmoscope in Traumatic Lesions of the Brain, of which the following is a *résumé*. 1. Papillary stasis is often seen as the result of the various injuries of the brain (commotion, compression, wounds, fractures of the skull, etc.) 2. The stasis in question is not always accompanied by disorders of vision; it is, therefore, necessary that the eye be examined in all cases of injuries of the head, whether or not the patient complains of his sight being affected. 3. This stasis, as has been proved by autopsies, and as first brought to notice by Schwalbe, is the result of infiltration of blood or serum in the sheath of the optic nerve, and not of the cerebral lesion itself. 4. Papillary stasis cannot be considered as belonging more particularly to one lesion of the brain than to another, nor is it any criterion of the gravity of the lesion. 5. All that can be asserted in the present state of our knowledge is, that the papillary stasis simply indicates the presence of fluid extravasated on the meninges.

The exigencies of civilised society often necessitate the hoarding together of man in common with animals; it is, therefore, incumbent on the powers that be to reduce the inconveniences arising therefrom to a minimum, and to render the habitations as salubrious as possible. To solve this most difficult problem, M. Tollet, a civil engineer, has embodied his ideas in a memoir which he has just submitted to the

Academy of Sciences, and entitled, “*Sur les principes qui doivent présider à la construction des logements en commun (hommes et animaux)*”. To carry out these principles, M. Tollet suggests that, as far as concerns barracks, hospitals, and stables, these should, as much as possible, be built outside the city, on permeable soil, and abundantly supplied with water. The buildings ought to be separated, and their inhabitants scattered over the largest surface possible; each building not containing more than fifty soldiers in barracks, and not more than thirty patients in hospitals, these latter being divided between two wards at least. The distance of the buildings from one another ought to be equal to twice their height; a condition necessary to render them accessible on all sides to the air and the direct rays of the sun. They should be of only a single storey, as all hygienists agree that the lower storeys infect the upper ones, and increase the mortality in the latter; moreover, the climbing to the upper storeys is most fatiguing to patients. The mechanical work of going up a staircase ten *mètres* high is equal to that required to walk a distance of 125 *mètres*; besides which, staircases are expensive to erect and keep in order. The suppression of storeys is a question of great economy, as it would be necessary to have the walls of those on which they are superposed considerably thicker than would otherwise be required. In buildings with several storeys, it will not take less than ten or twelve cubic *mètres* of material to lodge a man, whereas two or three *mètres* suffice in a building of a single storey. In Paris, it often happens that in a barrack the sick and healthy are lodged in the same building, if not under the same roof. This objectionable practice is very properly condemned by M. Tollet, and he suggests that these should be housed in entirely separate buildings, and that even the kitchen, canteen, etc., should be built at a distance from those inhabited. The interior of the building should be rounded off and not at angles, so as to prevent any accumulation of dirt; the walls being lined with such material as will admit of their being washed occasionally. There should be no lofts or attics between the roof and ceiling, as they generally form receptacles for vitiated air. The floor should be at least three steps above the level of the ground, and covered with some waterproof material, such as hydraulic asphalt, etc. The openings for the admission of light should be numerous, and those for letting out the foul air should be placed at the top and kept constantly open. The windows should be arranged in such a way that they may be opened at the top and thus avoid draughts on the occupants, which can be scarcely avoided under the present system—I mean, of course, as it exists in France.

At the last meeting of the Academy of Sciences, M. Chevreul, the Dean of the Academy, gave an account of some interesting experiments in connection with an oleaginous substance obtained from the “*Elæococca*”, a plant of Chinese origin. When this oily substance is exposed to the action of light in a violet-coloured bottle, it becomes solidified; but, when placed in a yellow one, the oil remains liquid. From this, M. Chevreul attempted to explain the various effects produced on the brain by the transmission of light through frames of glasses of different colours, and suggested its application to the treatment of mental and other cerebral affections.

At the same meeting, M. Dumas, the celebrated chemist, read a very interesting report on the antiseptic properties of the borate of soda. The paper was forwarded by a traveller in America, and the author simply confirms what was advanced by M. Dumas some years ago. He states, that in a layer of borate of soda and lime in California, he found the carcass of a horse, that had lain there for upwards of four months, in a perfect state of preservation, notwithstanding the intense heat of the weather. From this the conclusion was drawn, that the borate of soda might be used in preference to the other substances hitherto employed for the preservation of meat and other alimentary substances, such as milk, etc., owing to its great cheapness.

The number of medical men that have been elected Members of the Senate and Chamber of Deputies at the late elections has caused some surprise, for there are thirty on the list, and various are the comments as to the propriety or otherwise of their accepting such a mission. Whatever may be the motives by which the medical deputies have been actuated, I cannot help thinking that some of them at least will be a loss to science as well as to the profession, for I have only to mention the names of Robin and Littré, who have attained the high position of Senators; Bert, Cornil, Liouville, Naquet, who have been elected Deputies, to give you an idea whether my apprehensions are founded or not. M. Raspail, an old *Pharmacien*, who has rendered himself famous as an empiric in politics as in medicine, had, owing to his being the senior deputy by age, the honour of being elected *ad interim* President of the Chamber of Deputies, which post, however, he held for only a few days, when the regular President was nominated. M. Raspail is eighty-two years of age.