quite to her lover's satisfaction. To heighten still further the effects, she imprudently augmented her dose of arsenic, and fell a victim to her vanity: she died a painful death, from the action of the poison.

"The number of deaths in consequence of taking arsenic in too large or frequent doses is by no means trifling, more particularly among young people. Every curate in the districts where this abuse prevails is often made acquainted with such cases; and the inquests which I have attended have furnished me with similar results. Whether from fear of the law, which forbids the unrestricted sale of arsenic, or whether it be the voice of conscience that reproaches them with the wrongfulness of the practice, the poison-eaters keep their use of such dangerous substance a profound secret. For the most part, it is only the confessional or the deathbed that lifts the veil of secrecy.

"The second object which the poison-eaters have in view is to render themselves, as they express it, more airy (*leifter*) or lighter—to facilitate respiration in ascending mountains. When they have to undertake a long journey up the mountains' sides, they put a crumb of arsenic into their mouths, and allow it gradually to dissolve. The operation is surprising, and they will ascend with facility heights which previously they could only climb with great difficulty in breathing.*

"According to their own confessions, the dose with which the poison-eaters begin is a portion about the size of a lentil seed, which would in weight be about half a grain. This dose is taken a few times weekly, in the morning, fasting, and is continued a long time, until they get used to it; this is cautiously increased, in proportion as the accustomed operation subsides. A peasant, R—, of the parish of A—g, a vigorous man of 60 years of age, who had always enjoyed good health, is at the present time taking about four grains for each dose. For more than forty years he has followed this habit, which he inherited from his father, and has transmitted to his son.

"It is to be borne in mind that neither in this case nor in many others has the slightest trace of arsenical poisoning been remarked; that the symptoms of chronic arsenical poisoning do not appear in those who adapt the dose to their constitutions, and to the degree to which they have become accustomed to its action. It must not be omitted to be mentioned, that if, from accidental want of arsenic, or from any other cause, an individual is obliged to abstain, symptoms of illness supervene, having the closest resemblance to those of arsenical poisoning. There is seen especially a great dislike and indifference to those around; anxiety as regards some persons; indigestion in its various forms; loss of appetite; a constant feeling of the stomach being overloaded; vomiting of mucus in the morning, with increased secretion of saliva; a sense of burning, extending from the pylorus to the throat; spasmodic contraction of the pharynx; griping pains; constipation; and difficulty of breathing. The only means of relieving all these symptoms consists in a speedy return to the practice of arsenic-eating.

"According to the latest inquiries among the inhabitants of this district, the arsenic-eater becomes such only through indulgence, like the oriental opium-eater, the Indian and Polynesian betel-chewer, and the Peruvian cocoa-chewer; but, once having established the habit, it becomes a necessity.

"Similar with that of arsenic-eating is the practice of eating corrosive sublimate. I remember one case, stated to be authentic by the English ambassador in Turkey, of a confirmed opium-eater in Brussa, who also daily took the enormous quantity of forty grains of corrosive sublimate with his opium. I have often met with sublimate-eaters in the mountainous regions of Peru; the practice is still more common in Bolivia, where the corrosive sublimate is openly sold in the markets to the Indians.

"I need scarcely here state that the use of arsenic is very extensive in Vienna, particularly among grooms and

coachmen. They sprinkle a full pinch of the powder upon the oats, or a piece the size of a pea is tied up in a linen bag, and fastened to the bit when the horse is bridled, and so is gradually dissolved by the animal's saliva. The shining, round, and good look of most fine carriage-horses, and more particularly the approved foaming at the mouth, is the result of the action of arsenic, one of the effects of which is to promote salivation. It is a very general custom in the mountain districts, that, when a horse must draw a heavy load up a steep hill, the servant mixes a dose of arsenic with his latest feed.* This practice is pursued through many years without harm to the horse; but, in the event of his passing into the hands of a master who does not permit the use of arsenic, he loses flesh, activity, becomes dull, and the richest fodder will no longer suffice to give its former appearance."†

The preceding is the whole of the much quoted statements of Dr. Von Tschudi. In a following communication, I propose to examine the English versions of the same story, and to notice the reception it has met with at the hands of those scientific men who are best qualified to judge of its credibility.

[To be continued.]

CONSIDERATIONS RESPECTING THE OPERATION OF MALARIA ON THE HUMAN BODY.

By C. HANDFIELD JONES, M.B., F.R.S., Assistant-Physician to St. Mary's Hospital.

[Continued from page 701.]

7. I will now attempt to inquire whether there be anything common to these disorders I have reviewed—whether there can be discerned any pathological feature of family resemblance among them. Such I believe may be found, exclusive of the efficient cause which I have supposed them all to possess. It appears to me that the diseases above enumerated fall naturally into four classes; viz., *fevers*; *affections of the nerves or nervous centres*; *inflammations*; and *secretion-fluxes*. These certainly, taking well marked typical instances, appear to differ widely enough from each other; yet I believe it will be very possible to prove a close degree of connexion between them.

a. Fevers. It is undeniable that the chief and most constant phenomena met with in fevers are the prostration of strength and of the mental faculties, and the alteration of the temperature of the body. Galen defined fever as *calor præter naturam*; and Dr. Parkes considers that the accuracy of this phrase is now fully recognised. Virchow also remarks, that this preternatural heat is the substance of fevers. This opinion rests on observations made with the thermometer, which show that the temperature of the blood is rapidly rising even during the existence of the rigor, as in the cold stage of an ague. Indeed, the skin, which is emptied of blood by the constriction of its vessels, is colder than usual; but the state of the internal organs is different.

It will be observed that I have spoken above of the *alteration* of the temperature as a capital febrile phenomenon, not merely of its increase. No doubt the latter is the more generally marked and striking, and suggested the terms *pyrexia*, and *καύρος*, and *febris*; but I think the occasional *lowering of the temperature* should not be left out of view altogether. No doubt its chief cause is the absence of blood from the part; but some doubt may exist whether there may not be another cause also, especially in the algid conditions, as of pernicious ague and cholera,

* "Horsedealers frequently administer from a quarter of a pound to half a pound of shot to broken-winded horses before taking them to the horse-market. They do this to obtain the action of arsenic on the breathing—arsenic being mixed with lead, to enable it more readily to assume the form of drops." (Tschudi.)

† "The quantity of arsenic given by servants is often too large, and the carelessness with which it is kept culpable. As much as three quarters of a pound has been found in the possession of a peasant. In another instance, a peasant mixed a portion of the bulk of a pear, in water, swallowed it, and died in half an hour afterwards."

* Dr. Tschudi has observed a similar result in cases of asthma, when the patient has been taking Fowler's solution.

when the coldness of the surface, and even of the tongue and the breath, is so remarkable. Dr. Copland states that the thermometer introduced below the tongue indicated frequently a diminution of ten or twelve degrees below the standard of health. In a case of pernicious algide intermittent, Torti describes the patient to have been as cold as marble all over, with leaden coloured face and livid extremities.

The *prostration*, which I have mentioned as the other capital febrile phenomenon, can only result from a poisonous depressing influence affecting the nervous system, the cerebro-spinal department very notably, as well as the sympathetic. How sudden, immediate, and violent, may be the operation of this poisonous influence, is shown by the worst cases of cholera, in some of which the patients are struck down almost lifeless, with a dark or livid state of the surface. Although in many fevers, all approaching to the ardent inflammatory kind, there are very marked phenomena of so called increased action, yet not the less are evidences of lowered nervous power perceptible. They are manifest at the onset and close of the disease; and we shall presently see what is the true import of the phenomena of apparently increased action.

We will now consider whether there be any essential connexion between the two leading febrile phenomena above referred to—the prostration and the altered temperature. For this purpose, we must have recourse to physiology. From hence we receive the all-important fact, that destruction or division of the sympathetic nerve induces most remarkable and immediate changes in the part to which it is distributed. The vessels become considerably dilated; the arteries pulsate more; and the temperature is elevated—in one of my own experiments, as much as 10° or 15° . The hyperæmia occurs immediately, but does not persist (at least, in the rabbit) as the elevation of temperature does. When the sympathetic is divided in the neck, the heat is increased, not only in the skin, but in the deeper parts, as the substance of the brain, and the blood returning by the jugular vein. Another most important observation is, that in *weakly* animals, severe conjunctivitis, with muco-purulent secretion, occurs. This does not happen in stronger ones, and it disappears if the weakly animal regain strength and health. If the upper end of the divided sympathetic cord be galvanised, the phenomena now described disappear, and even opposite ones are produced. The pupil, which was contracted after division, becomes wider than natural; the eye, which had sunk in the socket, projects; the hyperæmic parts become pale; and the temperature sinks below the normal figure. No increase of heat follows the division of sensory or motor nerves, according to Bernard. I have, however, observed in one case of hemiplegia, where the power of motion was quite lost, or nearly so, but where sensibility remained, that the temperature of the paralysed hand was constantly above that of the other. The sound hand, on one occasion, marked 92.5° ; the other, 95° . Such instances are, however, exceptional; the usual result in hemiplegia being, that the palsied parts are colder than others.

Now, it must be at once clear that the facts above stated have a most important bearing on the production of fever and inflammation. Suppose a general weakness or semi-paralysis of the whole sympathetic system; there would then be a general dilatation of the arteries, and unusually free flow of blood everywhere, as well as increased heat. Pyrexia would be established. If the paralysis were limited to one portion of the sympathetic, and if the system at the same time were in a weakly state, its vital power diminished, then actual inflammation and exudation would occur in the region to which the paralysed nerve was distributed. Whoever has watched a case of remittent or intermittent fever, or seen a sudden complication of dysentery arise, with its evacuations of bloody mucus, can fully appreciate the exact correspondence of the actual phenomena with the supposed condition. The same explanation will, of course, apply to all the inflammatory complications of fever.

But the objection may well be made—that, as the arteries become paralysed and dilated, in consequence of loss or weakening of the nervous influence they normally receive, so also the heart should be in a like condition. This would seem the more reasonable to expect, since it is known that the action of the heart is capable of being very materially influenced through the sympathetic. “When the galvanic stimulus is applied to the cardiac branches of an animal in which the heart has not yet ceased pulsating, the effect is to augment the number of beats, and, at the same time, to increase their strength.” The same result is produced by stimulating the cervical region of the spinal cord, after separation of the medulla oblongata. However, since the heart’s movements continue after it has been removed from the body, it seems certain that its contractile tissue is not paralysed like that of the arteries by division of the nerves it receives from the sympathetic. Moreover, the heart receives nerves from another source, viz., from the pneumogastric; and through these it is as unequivocally capable of being influenced as it is through the sympathetic. If the pneumogastric nerve be divided, the heart beats rapidly; if the lower extremity of the divided nerve be stimulated, the heart again beats slowly. If the pneumogastric (undivided) be stimulated by galvanism, or the medulla oblongata from whence the nerve arises, the contractions of the heart become much retarded or altogether arrested. It thus seems probable that the pneumogastric is the main regulator and controller of the cardiac movements. If, then, these nerves partake, as it is most reasonable to suppose they do, in the general nervous prostration, we shall at once have an explanation of the increased cardiac action which mostly occurs in fevers. It is, however, well known that this is not essential; that there are cases of fever in which the circulation is not quickened, and in these probably the vagi nerves are not more affected than may suffice to counteract the paralysis of the sympathetic. A case has lately been mentioned to me, in which, during pyrexia, the pulse becomes slow, and recovery is marked by acceleration. May the differences which are known to prevail in the number and arrangement of the cardiac nerves account for these peculiarities?

The phenomena of an ague attack, taking this as the most general type of fever, may be explained as follows. In the cold stage, when all the symptoms announce prostration of the nervous system, we may be sure that there exists paralysis of the sympathetic. This weakens the action of the heart, sometimes to such a degree as to cause even fatal syncope—more often to a less extent. The same state causes elevation of the animal temperature, and congestion, which will, of course, be greater in those parts which are chiefly supplied from the sympathetic. The abdominal viscera will, therefore, suffer first and most in this stage. The nervous plexuses of the carotids and vertebrals (which are very considerable) will, however, also feel the paralysing influence, and the tonicity of these vessels will be impaired. Cerebral congestion may, therefore, occur in this stage, but is more considerable in the next. The rigors are to be regarded as the expression of a morbid impression made on the cerebro-spinal nerves, not as at all necessarily indicative of cold. In the algide fevers, including cholera, there would appear to be a peculiar depressing action exerted on the cerebro-spinal nerves, and, through them, on the integument, to which the icy coldness is due. The elevation of temperature *after death*, which has been observed both in pernicious fever and in cholera, seems almost to require this supposition. The occurrence of cold clammy sweats in apoplectic attacks shows that a special modification of the nutrition of the cutaneous surface may be effected through the medium of the nerves; and I should regard the above mentioned phenomenon, as well as the cold sweats of some varieties of pernicious fever, to be produced in this way. Some remarkable facts I have heard of seem to indicate that the peculiar depressing action affects rather the cutaneous terminations of a number of nerves than all the filaments of any particular one. The case has been related to me of a medical man

who suffers at night with attacks of this kind. His feet remain warm, but all the rest of his body is icy cold, and afterwards becomes covered with profuse sweat. The cold sensation awakes him. His wife cannot feel his heart beat. Anxiety seems to bring on these attacks, and travelling and recreation remove them. M. Bailly (Case xi) states that the patient had an icy coldness of the hands, extending half way up the forearm, of which he was not conscious, though his mind was quite unaffected. When he placed his hands on his belly, he was at once sensible of their coldness. These phenomena cannot be ascribed to any single nerve, or set of nerves, being affected: they rather point to the conclusion that, under a certain nerve-influence, nutrition is specially modified in definite tracts of the cutaneous surface. They indicate that the quality of the tissue, as well as the nerve-power, is concerned in the result.

When the hot stage has set in, the well known symptoms strongly indicate excitement. The heart's action is increased, and a full tide of blood is poured through the still paralysed and dilated arteries. Cerebral congestion now becomes considerable, and, in extreme cases, may give rise to hæmorrhagic or serous effusion. The dry, hot skin, and the scanty, high coloured urine, show that the cutaneous and renal glands are overmastered by the hyperæmia; their vital power is inadequate to deal with the supply of blood they receive. The lungs and liver may suffer from the same hyperæmic state, induced in the same way. The increase of the heart's action is due to the withdrawal or weakening of the influence of the vagus, in consequence of which, as above stated, its contractions become accelerated. The increased heat of the blood is probably also a further cause of the stimulation of the heart; and on this ground we can account readily for the beneficial effects produced by venesection at the commencement of the period of reaction. This state continues until the nervous system and the organs regain their power. Then the febrile heat and hyperæmia yields; the skin secretes; the kidneys eliminate; the arteries resume their normal calibre; the heart ceases its excited action; and presently the due order of healthy life is again restored. In all this we see, in skin, glands, nerves, and contractile tissue, the regaining of natural power which had been impaired. (See p. 81 of the *Manual of Pathol. Anat.*, relative to the predominance of hyperæmia over tissue-power.) The appearance of increased action was illusory; it was really failure. In one respect, indeed, and that an important one, it may be said that there exists increased action in fever. The quantity of excreta is increased, and the body loses weight; there is undue metamorphosis (destructive) of tissue. I must refer to Dr. Parkes's excellent lectures on *Pyrexia*, to which I have been indebted already for several statements, for a full exposition of this highly important part of the subject.

The conclusion which I am inclined to adopt, that the phenomena of fever are essentially of nerve origin, receives much support from a consideration of those of the second group of malarious disorders above mentioned. When a motor nerve becomes less able to influence its muscles, or a part supplied with sensory nerves gets numb, we have clear evidence of the power of these nerves being impaired. The occurrence of fatuity authorises the same conclusion with respect to the brain. Thus far, then, we find malarious affections of cerebro-spinal nerves having the same general features as those of the sympathetic system. In both there are indications of a palsy, or paresis. But the state of neuralgia, or mania, or convulsions, implies, or seems to imply, irritation. Sensibility, in some cases, is exalted in the part supplied by the suffering nerve. This is observed as well in parts supplied by the sympathetic as in those to which cerebro-spinal nerves are distributed. Patients with abdominal neuralgia complain of an abiding soreness of their bowels, which is increased on coughing or pressure. Now, as this neuralgia may be exceedingly intense when there is a perfect absence of hyperæmia, or exudation, and, therefore, of any approach to the condition of sympathetic paralysis, we seem obliged to conclude that

the neuralgic state is altogether dissimilar from that of paralysis, and is rather one of unhealthy excitement. It is, however, certain that the neuralgic state is very prone to be associated with vascular paralysis, and hyperæmia, and exudation, as evidenced by instances of intermittent ophthalmia, and nasal and salivary fluxes accompanying paroxysms of neuralgia of the fifth pair. It is probable that in such cases the pure neuralgia is complicated by paralysis of the ganglionic nerves ramifying on the vessels. In the case of the nervous centres, it seems even more certain that malaria must act in two manners, sometimes paralytically, sometimes irritatively. Of the former mode, I have already adduced sufficient examples; respecting the latter, I must refer to Dr. McCulloch, who states (p. 332, vol. i), that he has seen four cases at least of absolute and pure mania, of most distinct tertian and quotidian forms. In the two former, the interval was a period of the most entire sanity of mind, while in the paroxysm there existed no fever, but a pure mania. One of these commenced as a common tertian fever, and underwent the change to mania subsequently. From all this I conclude that the pain-causing action in neuralgia is peculiar, and has not an exact analogue in anything that occurs in fever. In fact, when fever sets in, it, for the most part, terminates the neuralgia; *ὑπερὸς λύει σπασμὸν*, says Hippocrates. However, if it be remembered that irritation implies no increase of power; that, on the other hand, debility and paralysis are common effects of neuralgia; if its special site be considered, and its interchangeableness with fever, it will be conceded, I think, that its fundamental character accords, on the whole, very closely with that of fever.*

[To be continued.]

Association Medical Journal.

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THE COLLEGES ALARMED.

THE Colleges have at length taken the alarm in earnest with respect to the advent of Medical Reform, and are determined, if possible, to take the wind out of the sails of the movement originated and pursued by this Association, which will in all probability be carried to a successful issue in the ensuing Parliament. No greater testimony could have been given by these "close corporations" to the fact that reform, and that of a sweeping nature, is really at hand, than the activity they have been displaying within these few weeks, each to "do something" in order to propitiate the public opinion of the profession. These slow moving bodies, which are, in fact, the select vestries of the profession, and which act with a sublime independence of the feelings of their licentiates generally, have, under the pressure of the present agitation, at length thought fit to arouse themselves like so many of Dickens' fat boys, in

* It appears not incorrect to say, that a cerebro-spinal nerve expresses its *resentment* of malaria chiefly by neuralgic suffering, while a sympathetic does so by paralysis. The former has a more highly organised structure, and is probably more sensitive to minute molecular changes than the latter. Indeed, it can scarcely be considered quite certain that the degree of sensibility possessed by the sympathetic nerves does not depend on the cerebro-spinal fibres which accompany them. Valentin finds that the very gray branches which have passed through several ganglia do not, under a slight stimulus, give rise to any signs indicative of pain. It is clear that the function of the sympathetic is chiefly to regulate the contraction of involuntary muscular fibre (as of the intestines and arterial coats), by a reflex action normally carried on through its own ganglia. It is, therefore, a priori likely that any cause of disease operating on these nerves would especially interfere with this function, and produce paralysis rather than pain. The different action of malaria, therefore, in the two cases might in great part be referred to a difference of structure. That function which is most highly developed in each part is specially deranged by disease.