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ON THE PROTECTION ACQUIRED BY THE HUMAN SKIN AND OTHER TISSUES AGAINST THE ACTION OF CERTAIN ANIMAL POISONS AFTER REPEATED INOCULATION.

Read before the Boston Society of Medical Sciences, Oct. 3, 1871.* By JAMES C. WHITE, M.D.

THE law of more or less permanent and perfect protection against the subsequent action of many morbid agencies after primary inoculation is well recognized, although in no degree satisfactorily understood. The infrequent recurrence of the exanthemata in the same individual; the great immunity of variolized persons from a repetition of the process; the still rarer repetition of syphilis, so rare that its possibility was long denied; the accepted theory of the influence of acclimatization, so called, over the action of miasmata; are sufficiently obvious illustrations of it. Perhaps, too, the protection against the toxic action of many of the mineral and vegetable poisons, gained by long-continued and gradually increasing doses, may be mentioned as a pertinent example of the same law, though less permanent in effect than in the instances first mentioned.

The tissues and fluids of venomous snakes, as far as can be estimated by our capabilities of discernment, are identical with those of harmless species; yet a small glandular arrangement of their tissues can make from these innocuous fluids a poison in swiftness and intensity of action equalling the most deadly of those produced by the chemistry of the laboratory or vegetable kingdom. Now, strange to say, experiments conducted by most careful observers have demonstrated that this poison, so universally fatal to warm-blooded animals and all harmless serpents, when injected naturally and directly by the fangs, or artificially by the syringe, into the blood and

tissues of the serpents producing it, or other individuals of the same or even allied species, produces but slight or no poisonous effect whatever. [See Dr. Fayrer's experiments, in *Edinburgh Med. Journal*. "It is fairly to be concluded," he writes, "that the cobra is not affected by the poison either of the daboia or of its own species"; and with regard to our own native poisonous serpent, the rattlesnake, Dr. S. Weir Mitchell, in the *N. Y. Medical Journal* of January, 1868, records experiments proving that it "is not susceptible of being injured by the venom of its own species."] How can we explain this immunity except by reference to this mysterious law of protection through self-inoculation, accomplished by the gradual absorption through life of minute quantities of virus. To the toxic action of all other poisons the same tissues are most delicately susceptible, as much so as those of the non-venomous serpents.

Whether man or other animals can be protected against injury from them by inoculation with their virus in quantities too small to produce serious results, or whether a person once bitten and escaping death is no longer susceptible of injury from them, are questions of great interest in this connection; but I can find no reliable data, founded on experiment, upon which they can be answered. I am permitted, however, to give an extract from a note by Prof. Wyman pertaining to the subject. * * * "I have just received your note with reference to poisonous snakes: I know of no good evidence that man is rendered less susceptible to their poisons by inoculation. When in Surinam I was assured by Dr. Craigin, a very intelligent and careful observer, that the negroes there practised inoculation, and were rendered safe thereby. He stated that such persons were employed to hunt venomous snakes that had found their way into houses, and that they handled the snakes with impunity. I always felt, however, that there was a defect in the evidence, and did not consider the assertion *bien constate*." This assertion of Dr. Craigin at least indicates the existence of

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a popular belief in the effective protection of inoculation.

But the animal poisons of which I would more particularly speak are not of this grave kind, and their action upon the human tissues is limited to the immediate vicinity of the point of its insertion in most cases. It is only by the multiplication of these individual points, and over considerable areas of surface, that effects in any way serious are produced. We have all had ample opportunity for personal study of the ordinary appearances produced upon the skin by the bite of a mosquito, flea, or that other and vile insect which shares with them their love of human blood. The prick of a lancet or needle, which draws the same quantity of fluid that they extract, produces but a momentary sensation of pain, and the minute wound closes by the elasticity of the tissues, or by the plastic elements which exude, and there the process ends. Not so with the lesion produced by these insects. There is first perceived a sensation of heat or itching in the part, and the hand is half-involuntarily directed to the relief of the tell-tale nerve, although not always referred to the centre of sensation at once, so that a large portion of the contiguous skin is often rubbed or scratched before the right spot is reached and temporary ease thus obtained. On looking, we see somewhere about the middle of the region we have been at work upon, and standing up in bold contrast to the reddened surface around it, a white and flattened prominence of irregularly circular outline and hard, brawny feel, which increases in size according to the amount of original irritation, external friction, and individual temperament, and finally flattens down and disappears, leaving behind only in some cases a minute spot or depression, indicating the point of insertion of the poison. This is the ordinary effect of its introduction, although there are persons fortunate enough to be possessed of envelopes either so much like leather, or so blunted in sensibility, or so little to the taste of these insects, as to be uninjured by their attacks. There are those, on the other hand, on whom these appearances are greatly exaggerated, or who exhibit in the course of twenty-four hours a repetition of the same process, as if the poison had renewed its activity, or in whom the effects are not confined to the immediate locality of the bite, but extend to large portions of the neighboring tissues, and cause great oedema and inflammation. The subjective symptoms need no description.

But under peculiar conditions quite different and much more serious lesions of the skin are produced by the bites of all these insects.

On the 28th August, a family consisting of parents and four children, the latter between 6 and 18 years of age, came to the Skin Department of the Mass. Gen. Hospital for advice. The father and mother presented upon their faces, necks, forearms and hands a very abundant outbreak of large and small papules, more or less prominent and mostly excoriated, among which were a few wheals and large vesicles. In the children, in addition to these forms of efflorescence, the whole skin of these parts was in an erythematous condition, and in the older two there were numerous pustular and furuncular, almost ecthymatous lesions. It was in the youngest two children, however, that the climax of the disturbance was developed; for upon them the process of free exudation was carried to its extreme limit in the form of very large bullæ, which were so generally distributed upon the regions above named as to give a predominant character to the whole efflorescence and constitute an apparent pemphigus of extreme grade. Some of these blebs upon the arm of the boy were more than three inches long and contained more than half an ounce of fluid. No better illustrations of the progressive passage of one form of well-defined efflorescence into another, from erythematous spot, through papule, vesicle, pustule, to furuncle, or from wheal to bleb, and of the insufficient basis their halting stages alone afford for the establishment of distinct titles in nosology could be desired. Yet this great diversity of appearances, embracing nearly every form of acute cutaneous lesion recognized, was produced by one and the same exciting cause in all the cases, viz., the bites of mosquitoes. The differences presented by the various individuals of the family were such as are consistent with the well-known greater tendency to exudation in inflammatory processes of the skin in childhood than in the same affections in adult life. The subjective symptoms in all were only slight itching, and the soreness necessarily consequent upon the gravity of the lesions. There was no constitutional disturbance.

How now shall we explain the serious and unusual effects of so simple and common a disturbing cause as mosquito bites in this instance? Similar manifestations and of as varied a type, although of much milder degree, I have often seen in indi-

vidual cases before; but the fact of six persons of one family simultaneously exhibiting such extraordinary results, shows the existence of some unusual element in the case. That element I believe to have been a want of protection against the poison of these insects through prior inoculation. The family, leaving their home in England, had arrived in Boston well and clean two weeks previous to my seeing them, and had spent that interval in lodgings in a street at the North End, where there were many mosquitoes, insects they had never seen before. Although the appearances were confined to parts exposed to their bites, they were quite unsuspecting of the cause of trouble.

Here was then a new virus inserted through hundreds of points into tissues and fluids never before impressed by its presence; unprotected, as I assume, by this mysterious influence of past contact or mixture. I am justified in my conclusion moreover, I think, from observation in many other instances. The worst cases of mosquito bites that I have been called upon to treat, serious enough to require medical advice I mean, have been in foreigners newly arrived in Boston from Europe, or in persons from other parts of the country, where our city mosquito of late summer and fall is not found.

From my own experience, I can testify as to the protection which acquaintance affords against the bites of the other two insects named. I was never bitten by a bedbug until I left my home for life at Cambridge. For some time their attacks upon me there were productive of large swellings in appearance like those of erythema nodosum, and in parts of loose texture, as the eyelids, of considerable œdema, not unlike erysipelas of those parts. Gradually, as I got used to them, as we say, an expression highly suggestive in this connection, the effects were less and less severe, and since that time the extended acquaintance with them which travel and our system of frequent change of servants in domestic life makes unavoidable, has reduced the severity of their action upon me to a mild urticarial lesion of a few hours' duration. This personal experience I know to be that of several of my friends, with whom I have spoken on the subject. Classes of persons, on the other hand, who are brought up with them as bed companions, and whose homes swarm with them, will almost always say that they don't mind them much, or are unconscious of their presence, although their young children present at first all the cha-

racteristic appearances of being severely bitten. Yet they prey upon old and young alike.

With fleas, too, my experience warrants a similar conclusion. This insect, as you know, is by no means so abundant here as in warmer regions of our own country, or in the districts of the old world most frequented by travellers. The majority of the residents of our New England villages and towns very probably have never seen or been bitten by a flea, except possibly by those of the dog or cat. To such the plague of fleas met with when they travel abroad is, perhaps, the most acute and longest remembered impression of their foreign trip. It by far outbalances the exemption from the annoyance of the bugs and mosquitoes incident to their home travel.

My first nights in the Vienna Gebärhaus under those long-wooled blankets, so well adapted to flea-breeding, were hours of torment, and after each of them my body for the next thirty-six hours was the thickly covered seat of an urticarial efflorescence of a phoenix-like type. But after a month or two I got used to the fleas, so that their bites were borne with some degree of equanimity, and the irritation caused was confined more strictly to the immediate proximity of the point of insertion and with no tendency to recur after the shortened primary sensation had passed. Those, on the other hand, brought up in daily contact with them, generally pay little heed to their attacks; and the terms *custom* or *use* applied in explanation of this latter fact, when we think to interpret them, are but the unconscious recognition of the operation of the law in question.

These data may seem insufficient to establish a theory, not, so far as I know, generally adopted hitherto; but I mainly cite my own case alone, because it has afforded me the best opportunity for close and long-continued observation, while it is fully sustained by my general experience in special practice. I offer them for the purpose of drawing from the observations of members additional facts which may confirm or refute them.

The application of this law to the insects above named assumes, of course, the power on their part to irritate the skin in some way other than mechanically; and although a study of their anatomy fails to reveal anything to explain the nature of this function, and they are not recognized as secreting a poison, the peculiar effects of their bites can be accounted for in no other way. It is a property no doubt conferred upon

them for the purpose of stimulating the circulation of the part injured and of thus bringing to them a freer flow of their desired food, which the skin resents. The prurigo-like papule, the purpuric macule, the livid and lichenoid efflorescence and the wheal, the œdematous nodule, which give an unmistakable individuality to the bite of the louse, flea, mosquito and bedbug respectively, cannot possibly be reproduced, or in any way imitated, by the puncture or laceration of the cutaneous tissues with a clean metallic instrument. They are the result of contact with some peculiar and distinct virus or irritating substance in each case, and are to be considered in this connection quite apart from the secondary and general lesions which follow upon and are caused by the subsequent scratching they excite.

If there be sufficient evidence in what I have adduced to show the possibility of adding this as another instance to the list of illustrations first mentioned of the mysterious law of protection by inoculation, it will strengthen still more the conviction that an ever-increasing number of foreign elements is engrafted upon man's normal essence as he progresses in life, which are more or less lasting and transmissible in their effects, and which essentially modify his primitive nature.

A SKETCH OF THE CASE OF THE LATE DR. LOUIS E. PARTRIDGE, OF NATICK.

By G. J. TOWNSEND, M.D., South Natick.

DR. PARTRIDGE, in health, was about six feet in height, of a florid complexion, light hair, inclined to grow fat, and weighed 210 lbs.; æt. 36. In early manhood he grew up tall and thin, and his friends, fearing a tendency to phthisis, took him out of school for two years, keeping him constantly in the open air during that period. He then regained his health and strength, and always seemed to be vigorous above the average. His habits were invariably good, with the single exception that he was a great smoker.

About ten years ago, he attended an autopsy of a syphilitic patient, and soon after a case of abortion, undoubtedly from syphilitic taint, as the patient had nodes, after that, substernal tenderness and aberration of intellect, &c. From one of these two cases, probably the latter, he contracted a peculiar ulcer upon his right thumb. Finding that simple means would not relieve it, and that I could not induce him to give up

work, I sent him to Dr. H. J. Bigelow, who at once put him under active constitutional treatment, and sent him to the sea-shore. In two or three months, he seemed quite well again, though he had a pretty severe constitutional infection, and lost all his hair, and ever after, his hand seemed unsteady, as if he had not perfect control over any of the muscles of the forearm.

His practice increased rapidly in numbers and extent, involving long rides and much night work. In the fall of 1866, four years before his death, his friends began to notice that his manner was peculiar, he was very boastful, offensively so, at times, and was also very easily excited over a trivial matter. At the dedication of the new Masonic Temple in June, he walked with his Lodge over the whole route of the procession, and his friends then saw something strange about him, ascribing it to the heat of the sun. I was often asked if he had not had a sunstroke.

Early in July he came to me, and complained of feeling dull and inclined to somnolence, falling asleep in his carriage. Knowing that he had had a great deal of night work, I urged upon him the necessity of curtailing his practice, and of giving up his out-of-town patients, at any rate. To this he would not listen.

About the middle of July, he complained of dull headache in the forehead and at the vertex, and said that he could not sleep night or day. His prescriptions at this time were occasionally very peculiar and even unreasonable, doing some mischief and alarming his patients, while at other times his judgment seemed as good as ever.

Deeming these symptoms very serious, I gave him full doses of bromide of potash, which made him sleep, and finally persuaded him to take a vacation. He went to the White Mountains for a week or two, enjoyed himself highly, and returned apparently improved, though not fit for work. He then went to the sea-shore, and there the more formidable symptoms of his disease developed. On his return, he consulted Dr. Walker, who gave a very grave prognosis, and, I understood, considered his symptoms as indicative of softening of the brain.

His condition at that time was as follows:

His gait, very early affected in his disease, was unsteady, staggering, like an intoxicated man, and he was constantly inclined to pitch forward. He finally lost all power over his lower extremities, though at no time was one side more paralyzed than the other. His articulation was difficult and indistinct, his tongue rolling about