

## Original Communications.

### ON EPITHELIAL CELLS CONVEYING CHOLERA.

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THE invaluable researches of Snow and Dr. W. Budd, showing that the contagion of cholera is conveyed in the secretions from the intestines, give a new interest to the microscopical examination of these secretions, for in them must the morbid poison be found. And, though it was well known that these rice-water secretions contained epithelium, the recent careful examination of these epithelial cells by so practised a microscopical pathologist as Dr. L. Beale renews attention to their importance.

In another contagious disease, epithelial cells are cast off in large quantities, and are believed to convey the contagion of that disease. In scarlatina, the epithelial cells are cast off from the whole surface of the skin; in cholera, from the intestinal mucous membrane; and the question presents itself, Are not these epithelial cells, in cholera as well as in scarlatina, the vehicles of contagion?

The common belief is, that the most contagious period in scarlatina is when the desquamation of the cuticle begins, and that the patient continues to be in a condition to infect others as long as this state of the skin lasts. According to our present pathology, this signifies that the epithelial cells of the skin from one person suffering from scarlatina, when introduced into the body of another who has not had the disease, will produce it, and that epithelial cells can be so introduced by inhaling or swallowing them.

The researches of microscopists, and especially the recent researches of Dr. L. Beale still in progress, show that so abundant is the desquamation from the intestinal mucous membrane of the columnar epithelium in cholera, that (as Dr. Beale observes) the whole of the villi, from the cardia to the ileo-cæcal valve, may be deprived of their outer coating, like the skin after a burn. This columnar epithelium is found in the rice-water stools, and more abundantly (as Dr. Parkes described many years ago) in the intestines themselves after death.

The evidence that these rice-water stools will produce cholera, if they contaminate the water which is drunk, is so strong as to have obtained general credence. By direct experiments, also, "Lauder Lindsay, Marshall, Thiersch, and Meyer, have succeeded in communicating cholera to dogs and cats, chiefly through the rice-water evacuations of cholera patients" (Aitken).

The analogy of scarlatina, and our present knowledge of cell physiology and pathology, point to the epithelial cells in the rice-water stools as the active agents in conveying cholera.

That the poison of scarlatina was conveyed by the epithelium of the skin, was a practical fact known and acted up to long before the true structure and physiology of cells were understood.

We now know that an epithelial cell consists of a cell, a nucleus, and granules; that such a cell is the simplest form of gland; and that cells so organised are the real agents in secretion. Besides secretion, such a cell has the power of producing other cells, and thus is a perfectly fit organ for containing a

morbid secretion; for secreting it, for indefinitely multiplying it, and, from its minuteness and numbers, for conveying it. The whole surface of the body is covered by epithelial cells. The whole interior surfaces are lined with them; and they are incessantly desquamating. New cells are incessantly generated beneath the old ones, which are thus pushed to the surface and removed in the air and in the various fluid excretions. In this way, our bodies are always moulting and incessantly renewed. The dry epithelial cells of the skin are got rid of in the air in such multitudes, that they may be caught in numbers in all close rooms where human beings congregate. "Epithelial cells" (writes Dr. Parkes) "are found in all ill-ventilated rooms. They were first detected by Dundas Thomson in the air of a cholera ward in 1849 and 1854. I have examined the air of various barracks and military hospitals, and have detected large quantities of epithelium from the skin." (*Manual of Hygiene*, p. 70.)

We know that morbid poisons, as variola and the vaccine virus, may, in a dry state, be preserved for months, and, when moistened, regain their active power. Scarlatina seems to prove that its dry epithelial scales, retained in clothes in cupboards for weeks, preserve their vitality, and when received into a living body reproduce the disease. And there are cases of cholera of a similar kind. The last fatal case of cholera in Malta in the epidemic last year occurred some weeks after the disease had wholly ceased. The woman who died of it had secreted the clothes of a cholera patient for some weeks and had then worn them, and was attacked by cholera, which killed her.

The recent experiments of Dr. Bence Jones show how readily and rapidly the whole body is permeated with a single dose of some medicines. He finds quinine in cataracts removed by Mr. Bowman an hour after a small dose of quinine had been swallowed. It is no marvel, then, that every epithelial cell may be permeated with the scarlatina-poison, or any morbid poison affecting the whole system, and be the means, from its structure and powers, of conveying and multiplying the disease.

The poison of cholera is conveyed by the air as well as by water. The fact which struck Dr. Alison is very conclusive. A division of healthy troops going up the Ganges in boats were attacked by cholera as they passed to leeward of a village suffering from cholera without communicating with the shore. And another wing of the same regiment following them suffered in the same way. (Aitken.)

Two instances have been related to me proving the same. Mr. W. B. Shorto was acting surgeon to a passenger steam-ship when cholera was epidemic at Alexandria last year. The vessel arrived off Alexandria at five in the morning. There was no communication with the shore; but by nine o'clock there were twenty-five cases of choleraic diarrhoea among the crew, who were previously quite free from it. Col. Rigby, who was Her Majesty's Consul at Zanzibar, informed me that, when the cholera was very fatal there, several slave-ships at sea were attacked with it at the same point sixty miles south, when the north-east monsoon was blowing. This has been explained by the dry secretions from the bowels, or cholera-dust, being conveyed by the air. Is not cholera-dust epithelium?

The double vehicle of contagion of cholera, air and water, explains many phenomena. It is well ascertained that, when cholera is epidemic in an ill-drained town, few escape diarrhoea—which has been well called cholera. As two circumstances, at least, must meet to produce cholera—the seed and the soil—the germ and the nidus—the cholera-poison

and the previous contamination of the blood by bad air, bad water, bad food—this general “choleric” may be owing to the diffusion of the epithelial cells in the air, and the mildness of the majority of cases to the smallness of the dose.

As Nature’s operations are simple and uniform, we should expect her to act by the same means in the same class of diseases; and that those contagious diseases in which the skin is affected, and those in which the mucous membranes of the lungs and of the intestines are the diseased tracts, would convey their contagion also by the epithelial cells of the skin or of the mucous membranes—that measles, small-pox, erysipelas—in all of which the vital properties of the inflamed skin are highly excited, and consequently the growth of the epithelial cells largely increased—would convey their contagion by the epithelial cells of the skin; whilst influenza, pertussis, catarrh, would be propagated by the epithelial cells of the respiratory tract, and typhoid fever by those of the digestive tract. The analogies between typhoid fever and cholera, the poison of both being conveyed by the secretions from the bowels, have been proved by Dr. W. Budd. Another striking analogy would be the conveyance of the poison in both cases by the epithelial cells of the intestines.\*

Thus morbid epithelial cells of the skin would produce contagious skin-diseases; of the lungs, bronchial affections; of the intestines, diseases of the intestinal mucous membrane, like cholera and typhoid fever.

To sum up. It is admitted that the poison of scarlatina is conveyed by the epithelial cells of the skin, which desquamates freely, and that these dry cells retain their active power for some time, and when introduced into the body may propagate the same disease. In cholera, as in scarlatina, a similarly abundant desquamation of epithelial cells takes place, not from the skin, but from the intestines; and as it is by the excreta loaded with these cells from the intestines that the poison of cholera is chiefly conveyed, the inference is fair that, in cholera as in scarlatina, the poison is conveyed by epithelial cells.

I am not unaware of the deficiency of this view in proof sufficient to establish a fact relating to matter; and also of the difficulties in bringing such evidence in vital processes. It is an hypothesis explaining the several facts of contagion, and in accordance with our more advanced knowledge of cell pathology. But Lord Bacon said “Prudens questio dimidium scientiæ”; or, as Coleridge rendered it, “the forethoughtful query is the *prior* half of the knowledge sought.”

### PARALYTIC ECTROPIUM SUCCESSFULLY TREATED BY OPERATION.

By HAYNES WALTON, Esq., Surgeon to the Central London Ophthalmic Hospital, and to St. Mary’s Hospital.

ECTROPIUM, or the turning out of an eyelid, is certainly one of the serious affections of the ocular appendages; but it is by no means so common as the opposite state, entropium, or the turning in of the lid. In aggravated cases, and especially when both eyelids are everted, the eyeball may suffer from exposure and want of necessary moisture. In the ordinary, or less severe states, and where only one

eyelid is everted, disfiguration and flowing of the lacrymal secretion over the cheek are the immediate evils. But in every degree there is a remote risk of injurious effects of inflammation of the eyeball, from inability of the eyelids to wipe off or brush aside intruding particles. The exposed palpebral conjunctiva is always unnaturally and highly vascular, and so is frequently the ocular also.

The causes of ectropium may be referred to three classes. The first class includes abscesses about the orbit, usually at the circumference; burns, scalds, chemical injuries, ulcerations, either simple or specific, as from syphilis, lupus, sloughing after erysipelas, wounds, contusions, and surgical operations.

The second class includes eversion from disease, and thickening of the conjunctiva without tarsal disease.

The third class is ectropium from palsy of the portio dura—hemiplegia fascialis, by which the orbicularis palpebrarum muscle, among those that are palsied, no longer acts, and the power of closing the eye is lost; the upper eyelid cannot be depressed, while the lower falls down and turns outwards, becoming more everted in process of time. There are degrees of the paralysis here, just in fact as is witnessed in paralytic affections in other parts of the body.

The paralytic ectropium, the only one of which I shall treat, is the rarest of all. I am induced to make it the subject of a short communication, because I have lately treated a marked example most successfully by operative surgery; and I am not aware of any recorded instance of similar practice; nor do I know of any case having been so treated.

A gentleman, aged 24, was sent to me by Mr. R. Reid, in January of this year, on account of a distressing and increasing ectropium of the left lower eyelid from facial paralysis on that side, which occurred in childhood. It is unnecessary to speak of the condition of the face. The ectropium produced much deformity, as the margin of the eyelid was very much depressed, and the conjunctiva was thickened and projecting, and very vascular. But a more annoying result was the constant flow of tears and mucous secretion over the cheek, roughness of the skin, and some excoriation.

After a short examination I was convinced that I could render essential benefit, and my patient readily assented to my proposal of treatment.

Chloroform having been given, I removed a strip of the diseased conjunctiva along the entire length of the eversion; and I may mention that I effected this by making two incisions with a scalpel, in the form of an ellipse, and dissecting away the isolated bit. It is by the contraction that ensues from this loss of substance that the eyelid is braced up, and in ordinary cases of ectropium I generally excise as much of the conjunctiva as is permanently exposed, and that effects the desired end. But here the lengthening of the tarsus, and the total loss of muscular support to it, required something more to be done; and also, the undue raising of the upper eyelid was another obstacle to success. To overcome these complications, I shortened both tarsi by removing a portion of each at the outer canthus, taking away conjunctiva as well, and brought the wound together by stitches.

It is not necessary to give a detailed account of the progress. It will answer every purpose merely to tell that the repair was rapid, and as effectual as it was possible. The eyelids are nicely bound up, and the stare arising from the prominence of the eyeball, and the exposure of it is almost overcome; so little indeed remains, as not to be noticed by a casual observer. The punctum lacrymale in each

\* In the loose secretions from the bowels of a patient in advanced typhoid fever, which I examined to-day, there were nucleated cells in abundance, with columnar epithelium. For the sake of science, may I express the hope that Dr. L. Beale will extend his searching examinations to the intestinal secretions in typhoid fever.