some years since, I had occasion to employ an ointment of stavesacre-seeds, as a means of therapeutically testing the accuracy of my conclusions as to the pathology of that disease. This remedy, as is well known, is a parasiticide, in the sense that it is fatal to all of those animal parasites, properly so called, with which the human skin is wont to be infested in this country: that is to say the pediculus capitis, the pediculus corporis, the pediculus pubis, and the acarus scabiei. However, I have found that an ointment of stavesacre-seeds is a very coarse and unsightly preparation. On inquiring of those wholesale firms who undertake the business of "drug-grinding" for the general body of pharmacists, I ascertained that it was impossible to grind the seeds to any finer condition than that of a coarse meal, on account of their excessively oily nature. It then occurred to me that I could obtain a much more finely pulverised condition of the seeds by first removing their oil from them. This, for the purposes of my experiment, was accomplished by percolating the bruised seeds with ether—a process which completely abstracted the oil. The seeds could then, as I found, be readily ground to a very fine powder, and a very smooth and excellent looking ointment was thus obtained; but, on making trial of it, I found that my ointment thus prepared had lost all its virtue as a parasiticide. It therefore became probable that the virtue of stavesacre-seeds was contained in their fixed oil. On making trial of ointment made with this oil, I found that such indeed was the case. Now this oil may be obtained much more cheaply than by the method I employed; namely, by simply expressing it from the seeds in the same manner that linseed-oil is commonly obtained from linseed. The fixed oil of stavesacre is quite colourless. It is also odourless, and so is a very unexceptionable remedy. Ointment of stavesacre-seeds has been obtained by digesting the bruised seeds in hot lard, and then straining the admixture; but this produces a strongly coloured brown ointment, whereas an ointment prepared with the fixed oil is perfectly colourless. The absence of smell and colour in an ointment so prepared gives it considerable advantages over sulphur-ointment in the treatment of scabies, if only its efficacy be the same; and I find it to be quite equally efficacious, but it possesses also another considerable advantage. It is well known that in the treatment of scabies by sulphur it is necessary to beware of the remedy as much as of the disease. The strongly stimulating action of sulphur-ointment sets up in many persons a persistent dermatitis of a very irritating kind, which is remarkably slow to subside, and which constitutes a condition rendering it very difficult for many practitioners to determine how far the persistent itching is due to the natural disease and how much to the artificial one. Now an ointment of the fixed oil of stavesacre, besides being colourless and odourless, is also non-irritant. By this I do not mean that it will not serve as an irritant to exceptionally sensitive skins, but that its irritating effects are vastly less in degree than those of sulphur-ointment, and that in the majority of cases it does not irritate in the least. I will adduce a case in illustration of my views.

A man, aged 21, recently admitted as an in-patient of the British Hospital for Diseases of the Skin, under my care, had been sent up by Dr. Moger of Carshalton, affected with a copious pustular eruption of his hands and upper limbs. His hands, forearms, and arms were so brawny and swollen with their inflamed condition that he could scarcely bend them, and was unable to take off his coat unassisted. He complained only of his hands and arms, and at first said that there was nothing else the matter with him; but, on stripping him, slight scratch marks were visible on different parts of the trunk and lower limbs, but no other notable kind of eruption; and on questioning him, he confessed to a general itchiness of a moderate kind. On close examination of his hands, several of the characteristic furrows of the acarus were discernible, and from one of these an acarus was extracted on the point of a pin, and placed under the microscope. He had been affected with his complaint for about six weeks. He was ordered to rub in over the whole of his skin excepting his scalp and face, an ointment containing one drachm of the fixed oil of stavesacre to an ounce of lard. This he continued to do every morning and evening for nine days. He was then dismissed completely cured. No other treatment of any kind was employed. On the third day of his treatment, he began to lose his itching. On the fourth day of treatment, there was no more itching. At the time of his dismissal, the pustular eruption, and the swelling and inflammation of his hands and upper limbs, had completely subsided, so that he could use his hands freely and with ease. Nothing more remained of the original condition beyond comparatively faint and slightly livid red stains, the traces of the considerable eruption which had recently existed.

The frequent and thorough applications of the ointment had throughout occasioned him no irritation or smarting in even the least degree, and on no part of the skin could any trace be perceived of any irritant action of the ointment.

THE GERM-THEORY OF ENTERIC FEVER.*

By ROBERT S. HUDSON, M.D., Redruth.

Few districts are more favourably situated for the study of infectious diseases than the peninsula corresponding to West Cornwall. The main lines of traffic, whether by road or rail, may be said to converge at Truro. There is little cross-country commerce, except in the neighbourhood of mines; and the sea, which surrounds the district to the greater part of its extent, forms an effectual barrier to the admission of any contagium, unless at Falmouth, Penzance, St. Ives, Hayle, and a few of the minor ports. The course of any infectious disease arising from without might, therefore, readily be traced by proper sanitary organisation; and, at little expense, the whole district might be as free from epidemic disease as were the Scilly Islands during the ten years 1851 to 1860, when not a single death was reported from small-pox, scarlet fever, measles, or diphtheria. The mortality is very low in the country districts, and I believe there is no part of England where the soil and climatic conditions are more conducive to health and longevity; but our towns and villages, with their dense populations, are so prejudicial to health as to make the total death-rate of the Truro, Redruth, Penzance, and Falmouth Unions higher than any districts in the five South-Western Counties, with the exception of Plymouth, Exeter, East Stonehouse, and Bath.

It is my purpose, however, to confine my remarks to the etiology of one of these infectious diseases: that fever variously named typhoid, enteric, or pythogenic; and to explain why I have been converted to a belief in the germ-theory of its causation.

When I was a student, preparing for examination and getting up the differences between typhus and typhoid, certain ideas were acquired, which I carried with me into practice; for example—typhus: highly contagious, doctors and nurses frequently catch it; typhoid: non-contagious; if two people are ill in the same house, there is a common cause. I was accustomed to look on Dr. Murchison as infallible on all questions appertaining to fever, and was convinced that the term pythogenic—begotten of filth—was a great step in the attainment of a correct nosology.

I should state that in Redruth typhoid is a rare visitor, and is never epidemic; most of the persons attacked have recently visited neighbouring towns. We have no common system of sewers with which our water-closets are attached; there is, therefore, little opportunity for the contagium to spread, if it exist in the discharges of the patient; whereas the country districts around the town, whose inhabitants obtain their drinking-water from shallow wells or adits, provide an annual supply of typhoid cases; but it is an interesting fact that these cases crop up in the same spots year after year, whereas other parts of the country are as free of typhoid as is Redruth itself.

I well remember a commercial traveller, whom I attended in 1873 for typhoid; he had been staying at various Cornish towns during the week preceding the initial shiver. His wife came from Birmingham to nurse him, and one of the housemaids at the hotel was appointed to wait solely on them. Every care was seemingly taken in the disinfection of stools and vessels, yet this housemaid contracted the disease, and had a genuine attack after his convalescence and return to Birmingham. I must say this case staggered me, and I could only explain it on the supposition that contagium from the discharges had not been deprived by the disinfectants of their vital power. This contagium was volatile, mixed with the air, and she had inhaled some when performing the necessary duties of cleansing. He consulted me on the day of his arrival at Redruth, so, unless the incubative period can be compressed into a few hours, it is clear that there could not have been a common cause at work. As a further proof that it did not originate in Redruth, I may add that no other person in the hotel was attacked.

In November and December 1874, Portreath—a village on the north coast, four miles from Redruth—was visited by an outbreak of typhoid fever. A girl named N. had been in service in Truro; after the death of her mistress from typhoid, she felt unwell, and wished to return home; becoming worse, she placed herself under the care of Mr. T. S. Reed of Pool. On the twentieth day after her return, her sister shivered and suffered in a similar way. A family named S. lived next door, and two daughters of the house were seized with fever; and Mr. Reed tells me that these four had gastric irritation, spots, ochre stools, and tardy convalescence. Next door to S., a boy named R. was then attacked; he was under the care of Mr. J. S. Hichens of Redruth, and had troublesome hæmorrhage from the bowels with delirium. S. had a married son, living on the other side of the village;

* Read before the South Devon and Cornwall Branch.

his wife visited her father-in-law's house, and she was next attacked ; then her four children. These five were typical cases of typhoid. A man named T., who used the privy in common with S., also suffered from a feverish attack, which lasted four weeks ; he ascribes his illness to a visit to the privy where the dejections were emptied ; he is most positive in stating that he felt sick immediately, and went into his house ; that evening, he shivered ; and next morning remained in bed. A sewing-girl named B., whose residence was two miles distant, but was employed by Mrs. T. in dressmaking during the day, was next attacked ; her symptoms were like those of T. ; no pain in right iliac fossa ; no diarrhoea ; merely loss of appetite, wasting, and elevation of temperature to 102 deg. Fahr., these symptoms lasting in T. twenty-nine days, in B. twenty-five days. A boy named H., living in another part of the village, worked with the father of R. in repairing an open sewer near the house of N. ; he was also seized, but his symptoms were more like typhus than typhoid : delirium of a furious character on the sixth day, and temperature as high as 106.5 deg. Fahr. His mother nursed him most assiduously, and could not be induced to go to bed ; she next sickened, absolutely declined nourishment in any form, and died in four days. Thus, from that single imported case, thirteen people suffered from the symptoms of continued fever. The boy H. died from syncope when getting out of bed in the ninth week of his illness. His death greatly surprised me, as the skeleton form, with its ghastly features, was being clothed with muscle, and he promised a fair convalescence.

The conditions of filth which existed previously to and during the outbreak were no worse than they had been for years. If filth in a state of decomposition could of itself generate the specific poison which produces such a definite train of symptoms, is it not strange that Portreath should have been free ever since, and that its appearance in the village should have been coincident with the arrival of a girl from a fever-stricken house twelve miles distant ?

The alarming increase of typhoid of late years in our well-drained towns is a matter of the greatest importance. Those who look on it as caused by sewer-gas in a state of decomposition, cry "Ventilate, ventilate". To this advice we cannot take objection ; it is admirable in its way, but does not go far enough. The germs or active principles of this disease should not be allowed to enter the sewers, amidst the foul air of which they hold high revelry and become intensified in energy.

The medical men practising in those towns where typhoid is practically endemic cannot help much in the study of this question. The network of drains prohibits successful search ; but those living in country places, among scattered populations, or in towns where it appears at intervals, can do much, by careful observation and exact notetaking, to unravel the mystery which at present surrounds the origin of typhoid and its relationship with typhus and simple continued fever. If these thirteen cases had been sporadic, or if there had been any difficulty in tracing the contagion, I should have classified them as follows : typhoid, nine cases ; typhus, two ; simple continued, two.

According to the census of 1871, Redruth parish had a population of 10,685 ; about 2,000 in the country, and the rest in town. The records of the Miners' Convalescent Hospital—generously built and to a great extent maintained by Lord Robartes—confirm my statement as to the practical immunity of Redruth town from typhoid fever. During the past six years, forty-one convalescents from typhoid have been admitted ; and although Redruth sends one-fifth of the total convalescents, only three of the forty-one typhoid cases came from Redruth, and even these were from the country—not a single case from town. They also support my statement as to typhoid lurking in certain spots to break out into virulence every autumn, as, of these forty-one cases, thirty-eight are chargeable to six hamlets, miles away from one another, and without any apparent bond of connection. A polluted water-supply and overcrowding in bedrooms may have something to do with it ; but from the data at present before me, I am of opinion that these conditions are only powerful in the spread of the disease, but they do not in any sense originate it, as precisely similar conditions exist in other parts of the country to an equal extent, yet no typhoid. The wells and pumps of Redruth have been drained, since 1853, by a mine called Pednandrea, situated on the eastern of the two hills on which the town is built. The pure but insufficient water-supply comes from an adit in the same hill, but above any source of animal contamination ; and to the purity of our drinking-water, coupled with the absence of any system of deep drains of the old type, we attribute our freedom from typhoid.

Correct ideas must be held on the etiology of this disease, if we desire to be successful in its prevention. The pythogenic theory would induce us to recommend the utmost cleanliness, and the removal of all filth before it decomposes. The germ-theory would, in addition, pre-

scribe disinfection of the excreta, and the application of the same principles which guide our recommendations when we have to deal with small-pox or scarlet fever.

It is full of interest to compare these zymotic diseases with fermentation, from which the class derives its name. The yeast-plant, living and growing before your eyes under a microscope, buds and divides, but still multiplies with rapidity so long as there is any sugar in the liquid on which it may feed. May it not be that the typhoid virus is similar to the yeast-fungus, multiplying in the blood or tissues with astonishing rapidity, and producing the train of symptoms we call typhoid ? I fear Dr. Klein's description and the accompanying drawings may, in virtue of Dr. Creighton's recent communication to the Royal Society, be considered "not proven". The power of reproduction possessed by the members of the fungus family is simply surprising. If you examine a little mildew under a microscope, you will see the field covered with the mycelium and spores. In the case of one variety, the spores seem to be in threads of hundreds or clusters of thousands, but all possess the property of specificity, they produce their like. You can grow them in Pasteur's fluid, and be as sure of a certain result as is the farmer when he sows wheat in his field, and knows that the crop will be wheat and not oats or other grain. Is there no analogy between this fact and what we know of the specific poisons of these diseases ? If filth, in a decomposing state, originated typhoid, or scarlet fever, or measles, why do these diseases appear at certain times, and follow certain tracks of communication, travelling as surely in certain directions as an engine on a railway ?

To conclude, there are two views regarding the origin of typhoid or enteric fever : the contagionist or germ theory, represented by the older school, Alison, Christison, Hughes Bennett, Stokes of Dublin, and William Budd of Clifton ; the non-contagionist or pythogenic, represented by Murchison, A. P. Stewart, Niemeyer, Liebermeister, and Hudson of Dublin. According to the contagionists, a specific poison or germ (if you like so to call it) is conveyed from the body of the patient mainly by the intestinal discharges ; it lodges in cesspools or sewers, polluting air, water, and soil, and so spreading the disease. According to the non-contagionists, typhoid stools, however concentrated, do not poison the air, but must be mixed with decomposing sewage to acquire their virulence ; and decomposing sewage—animal matter in a state of putridity—is sufficient to develop the poison *de novo*, and produce the fever.

The latter theory was that of my text-books, and in it I concurred ; but it fails to explain the facts coming within my own experience. I do not deny the possibility of the independent origin of typhoid from faecal fermentation ; no case of such has, however, come before me, and faecal fermentation in the cesspits of Redruth is of everyday occurrence. Adopt the germ view, and you have something definite to guide you in sanitary precautions. Adopt the pythogenic view, and you have scepticism and silent, if not avowed, opposition on the part of the public, who well know that the biggest stinks in a parish have not their invariable complement of fever-cases. I trust that my remarks will not have the tendency to induce laxity in dealing with filth as the great propagator of typhoid fever. I merely wish to advise further action. Destroy the specific germs before they mix with the filth ; look on filth as the agent for the dissemination of the poison, not the poison itself, and you are more likely to be rewarded by success.

My attention was directed to the germ-theory by a perusal in the JOURNAL of a lecture, by Professor Tyndall, on Dust and Disease. It has since been published in his *Fragments of Science*, and will well repay perusal by any member of the medical profession.

RURAL DISTRICT OF ASTON.—This district comprises thirteen parishes and hamlets, and has an estimated population of 19,310. There were 646 births and 403 deaths registered during the year, so that the births were 32.4 and the deaths 20.88 per 1,000 population. The zymotic death-rate was as low as 2.42 per 1,000 inhabitants, which is less than usual. Two cases of small-pox occurred at Minworth, one of which died ; but the disease was prevented from spreading by isolation of the sick. Vaccination is very well carried out in the district, as only twelve of the births were unaccounted for. Dr. Hickinbotham complains of the bad management of infants, both as regards food and dress, from which many deaths had resulted. There were 174 sanitary notices served and 168 nuisances abated. The rainfall during the year 1876 was unusually large, having been nearly 33 inches, which is more than 3½ inches above the average of the previous twenty years. The highest temperature recorded in the shade was 83.6 deg. Fahr., and the lowest 24.3 deg., giving a range of nearly sixty degrees in the year.