immunity; not only should those possessing no virulence when isolated be avoided, but also those in which the virulence has been reduced by continuous existence on artificial media.

SUMMARY OF RESULTS AND CONCLUSIONS

1. A marked increase in both the opsonic and agglutinative elements can be induced in the animal economy by the injection of vaccine as well as living organisms. Therefore, employment of vaccine in treatment of local pyocyanus infections would appear rational.

2. However, there is also a toxin produced by the organism under consideration, the action of which manifestly cannot be counteracted by the use of the vaccine.

3. Should one decide to employ vaccine in treating these infections, such vaccine must be prepared from the organism concerned in the individual infection under treatment, and never from strains that have been cultivated on artificial media for a number of generations. These organisms soon lose their virulence under artificial cultivation and at the same time, at least to a great extent, their power of conferring immunity.

4. Bacteriolytic elements could not be demonstrated *in vitro* under either aerobic or anaerobic conditions.

5. The phenomena appearing in the peritoneal cavity of guinea-pigs and rabbits, following the injection of the organisms, are apparently essentially agglutinative and opsonic (phagocytic); but little evidence presented to confirm the statement to the effect that there is an active bacteriolysis.

6. Old toxic filtrates or extracts from the cells produce little or no increase in the agglutinative and opsonic functions; but the toxic filtrates do produce a high degree of immunity against such filtrates.

A CASE OF RAYNAUD'S DISEASE

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It is estimated that there is about one case of Raynaud's disease among every thousand patients sick from all causes. The disease is, therefore, somewhat rare, and the following case is especially interesting because of its unusual severity, both with respect to the gangrene and the accompanying nervous symptoms.

Patient.—E. J. C., a white man, was a farmer, aged 30, with good habits and no history of syphilis. His father is an alcoholic and his mother a syphilitic. About two years ago, while in good health, patient had a sudden dry gangrene of the tips of his right fingers, developing in a few hours. No exciting cause, as cold or emotional disturbance, was noticed, neither were any preliminary stages of pallor and cyanosis, but the patient was a poor observer, ignorant and unreliable. The attack was followed by sloughing of the necrotic tissue, but before the fingers were healed the gangrene reappeared, attacking the fingers higher up, so that two or three had to be amputated. Then patches of gangrene appeared on the hand, and after a time it was amputated. Gangrene and amputation followed each other up the arm until, after five or six operations, only the upper third of the upper arm remained. Then two finger-tips of the left hand became gangrenous but healed spontaneously, leaving scars. About this time three gangrenous areas, each about the size of one's little finger, appeared on the front of the chest, below the right nipple; these healed, leaving red, angry-looking scars. The left great toe was also affected and a slight sear produced. Then, last of all, the posterior surface of the left hand was attacked. At bed-time, April 13, 1911, he felt a burning, stinging sensation of this region, and, from previous experience, knew what to expect. He went to bed and to sleep but was awakened at

3 a. m. by terrible pain in his hand, which he found necrotic and black over part of the posterior surface. He hurried to a hospital, where we saw him for the first time.

Physical Examination.—The patient appeared to be a well-developed, muscular young man with a florid face. The scars noted above were seen. Thoracic and abdominal organs were negative; arteries normal. One undescended testicle had been removed; the other testicle was in the scrotum but undeveloped. The mental state was one of extreme depression; the patient wept freely and begged that his hand be saved. But at the same time he rather overacted and seemed to court sympathy and interest in his case. The gangrenous patch was on the inner half of the posterior surface of the left hand. It covered about four square inches, was irregular in outline with sharply defined borders, was black and dry, and reached down the dorsum of the three inner fingers. On the middle and ring fingers it was limited to the proximal phalanx, but on the little finger extended to the nail. The tips of all the fingers were healthy. The healthy skin on the back of the hand was of a dusky hue. The urine was normal, except for the presence of uric acid crystals; blood was also normal.

Course.—Twelve hours later the gangrene had extended an inch toward the wrist, but there it stopped and never spread further. The necrotic tissue after a few days was dissected off (it was very superficial and still dry), and the wound began to heal by granulation with unusual rapidity. The nervous symptoms from the date of entrance, April 14, until the date of death, May 26, were spectacular. Six times the patient was suddenly seized with a total motor and sensory paralysis, at which times he was wholly insensible to painful stimuli. During the attacks he could not speak above a whisper. The average duration of these attacks was about twenty minutes, and they always left as suddenly as they had come. Twice he became totally blind; he remained so once for twenty-four hours and once for forty-eight hours. Ptosis was present most of the time. His commonest symptom was epileptoid attacks. These were not attended by loss of consciousness, were very painful and consisted of spasm of all the flexor muscles, drawing him forward into a bow. Retention of urine was present for three days. Several times he became delirious, but each time the delirium, after several hours, left him suddenly and completely. Much of the time a coarse tremor of the legs was present. Motor aphasia came and went several times, independent of the paralytic attacks. The face was usually flushed, the appetite poor, the bowels constipated. Pain was present most of the time and was excruciating. It was referred to the occiput, the spine, the stomach, the bladder and the gangrenous little finger. These pains were only partially controllable by large doses of morphin. Mentally, the patient remained depressed, even in despair. He was, nevertheless, fond of talking about himself and his disease, boasted of the operations he had been through, hinted that he ought to be exhibited to the medical society and seemed generally inclined to play for sympathy. He was very suggestible; the epileptoid attacks could sometimes be brought on by talking of them, and hypodermic injections of sterile water often relieved his pains. But his pain was frequently genuine, and finally, after several days of great suffering, the pain being in the head and bladder, the patient died, presumably from exhaustion.

Only a partial autopsy could be obtained. The organs of the chest and abdomen were found normal, but the brain and cord were not examined.

Most of the above symptoms may be found in the books as occurring in severe cases of Raynaud's disease, and they may be explained on the grounds of localized, temporary anemia occurring in various regions of the brain or in other parts of the body. For instance, angiospasm of the skin causes gangrene; angiospasm of the retina, transitory blindness; angiospasm of the walls of the intestine, colic. The relation of hysteria to Raynaud's disease is discussed by the neurologists; there certainly was in this case, as in most others of this disease, a hysterical element, and without the gangrene the clinical picture would have been one of hysteria major.