surface of the plates and hence any direct action due to it would only take place in a very thin layer next to the plates, so that a small portion of the liquid would be affected.

An illustration of the efficacy of the electric current in the destruction of bacteria is found in some tests made some time ago by Dr. C. B. Morrey, of the Ohio State University, and the author, on the electrolytic sterilization of milk. In a sample of market milk containing 19,480,000 bacteria per cubic centimeter, an application of 2.5 amp. at 2,000 volts alternating current for 15 seconds reduced this number 99.97 per cent. Another similar test showed a reduction 98.7 per cent. and a third, in which the milk was inoculated with diphtheria bacteria in very large numbers, showed their practically complete destruction. Chemical examination of the milk showed no changes which would account for the sterilization nor could this be accounted for by the heating which took place.

The evidence seems quite conclusive that where the sewage has received suitable disintegrating and digesting or purifying action previous to the electrolytic treatment the effluent, immediately after each treatment, is practically odorless and free from bacteria. The question which does not seem to be satisfactorily answered is "Has organic matter been so far oxidized that it can be relied upon not to again putrify and thus develop a nuisance in the stream through which it flows?"

The experience at Santa Monica where the effluent, in comparatively small amount, is deposited in the ocean over a quarter of a mile from shore cannot be taken as indicative of the results which would follow where a comparatively small stream were made use of. . The case of Oklahoma City, where the effluent is run into a dry gulch, is perhaps more instructive, though even here the conditions are so different from those usually met with in this part of the country that they should not be given too much weight. There being presumably no other water in the gulch through most of the year, there might be no such supply of putrifying bacteria as would be found in most streams. Again, if the soil is sandy the effluent may sink in before it has had time to develop further putrification. The effluent as it comes from the plant may be somewhat antiseptic, which would discourage the growth of putrifying bacteria for a considerable period. This condition, however, might soon cease if the unoxidized sewage were diluted in a relative small stream.

On the other hand, the advocates of the system claim that the organic material is actually oxidized or rendered non-putrescible and most of the evidence given in the published accounts is to the effect that whatever the sewage seemingly ought to do, it practically does not purify after being subject to the electrolytic treatment, and after all "the proof of the pudding is in the eating," though we might not go so far as to say that the proof of the sewage is in the drinking.

Unfortunately the available data is not sufficiently definite to enable one to apply with great confidence the results obtained at the plants already in operation to the other and different conditions elsewhere. The evidence, however, is certainly strong enough to warrant an interested observation of the plants already installed, even if one prefer that the other man be the next one to try the experiment.

So far the operative side of the problem alone has been considered. The economic aspects are even more difficult to pass judgment upon with the available data.

While great claims are made for the economy of the system the accounting upon which they are based does not seem sufficiently definite to be convincing. This is unfortunate since it should be entirely possible for a competent and experienced sanitary engineer to make a conclusive report based on the experience of the two plants now in operation. Such report would at least apply to conditions similar to those under which these plants are operating, though of course any new proposition would have to be considered on its own merits.

The experimental plant established at Crossness, a suburb of London, by the original inventor, W. Webster, in 1889, and which was identical in principle with those of today, though different in certain details, seems never to have led to any further application of the principle, though all the obtainable evidence is to the effect that it was successful in its operation. The further fact that during the twenty years following in which so many and such costly experiments were made in sewage purification, the process was never further developed by sanitary engineers is significant.

On the other hand, weight must be given to statements that the Santa Monica plant has been enlarged and that Oklahoma City is constructing a second plant with a capacity of 2,250,000 gallons. It is also to be noted that present-day purification methods are much more costly both in fixed and operating charges than those of 20 years ago and hence this system would be in a better position to compete with them. Again, the fact that sanitary engineers are not usually electrical engineers may have induced them in the past to favor methods which were more familiar to them.

The following cost data are taken from the reports published in the electrical press.

First cost of Santa Monica plant (2 flumes, 550,000 gal.) including pumps, buildings, and forebay, $18,000. Monthly expenses of operating, including pumping, $400. Cost of energy for the year 1909, $159.95, at three cents per kilowatt-hour. Two men are employed at $85 per month but they do other work for the city. The proposal for a filtration plant to do the same work was:

First cost of Oklahoma City plant, $16,000 (cut about 20 per cent. below this figure in order to introduce the plants).

Operating Costs.

	Per annum.	Per mil. gals.
Current (at 5 cents)	$709.50	$ 2.59
Attendant	660.00	2.41
Lights	40.00	.15
Renewal of plates	200.00	.73
Depreciation	100.00	.37
Interest, 5 per cent.	800.00	2.92
	$2,509.50	$ 9.17
Sinking fund, (5%, 20 year)	1,000.00	3.64
	$3,509.50	$12.81

Another process, also invented by Webster, which employs electricity and was extensively exploited in 1894, makes use of an antiseptic solution produced electrolytically from sea water or salt solution. It seems to have been conclusively demonstrated that such solution has no advantage over antiseptics bought from manufacturing chemists and is more costly for ordinary conditions. Improvements in this method recently suggested by W. B. Ball, but still in an experimental stage may alter this situation.

Another interesting development is the use of ozone electrically produced for sewage purification. It is claimed that 215 grams of ozone can now be produced per kilowatt hour by the Meeker ozonizer and that a contract for a complete sewage treatment plant has been entered into with the city of Trenton, N.J. No data are at present available.

In conclusion it appears that the verdict for the electrolytic purification of sewage must be at the present time "Not proven, but very interesting."