

was reddish-gray in appearance. There were a large number of tracheal and bronchial glands which, on section, were slight gray in appearance. The stomach was also removed, as many of the patients suffer more or less from digestive disturbances, but nothing was found save a slight congested appearance and post-mortem changes. The liver was of normal size and consistency, the spleen not enlarged, the kidneys not affected.

For the chemical analyses I am indebted to F. A. Bishop, assayer and chemist, Salt Lake City, and from these I have prepared the following table:

Weight in grams.	Moist.	Dry.	Silica.	Per cent. deposit.	Dry.	Moisture.
A Bronchial glands	5.52	1.57	.14	2.561	8.9	
B Dry lung		2.4	1.65		6.8	
C Superior lobe, R. L	10.		.16	1.6		
D Inferior and middle lobe, R. L	14.95		20.	1.334		
E Superior lobe, L. L	10.97		.23	2		
F Inferior lobe, L. L	19.22		32.	1.65		
G Average from either lung	26.35	5.73	36.	1.56	6.28	74.5
Average of C, D, E, F, G				1.588		

The weight of the lung when the specimens were taken, Oct. 10, 1899, was 90 ounces.; average per cent. silica, 1.588—1.43 ounces., or about 3.375 cubic inches of Delamar dust in the entire lung. A fractional per cent. of iron is also found in the silicious residue.

In the acute stages of the disease the diagnosis becomes important as the condition has been mistaken for typhoid fever, typhoid pneumonia, acute miliary tuberculosis and bilious remittent fever and tuberculosis. While pneumonokoniosis is the generic name given to the various affections of the lungs produced by the inhalation of dust-like particles, chalicosis pulmonum is given to the pulmonary changes induced by the inhalation of stone dust. Niemeyer, Flint, Osler and others agree that the irritation from dust lights up a bronchitis and is conveyed through the lymph spaces and lymph vessels into the interlobular and perilobular connective tissue; and some of the particles reach the bronchial glands. The chemical¹ examination of the lung shows the presence of silica, 2.8 per cent., in the lung tissue and 3.8 per cent. in the glands. There is a great disposition to the formation of nodules and diffused masses of fibrous tissue. The cases are, therefore, more properly regarded as chronic interstitial pneumonia, which consists in the gradual substitution, to a greater or less extent, of connective tissue for normal lung, by the gradual process of organization of the fibrous plugs in the air-cells, while the alveolar wall becomes greatly thickened by the new growth, and the whole lung may undergo a fibrous transformation. The different conditions under which these changes occur are so varied that a proper classification is difficult, but the interstitial changes play a very important rôle in all chronic lung troubles. There is no sharp line of demarcation between fibrous phthisis and other forms of chronic pulmonary phthisis, and there are instances of fibrous phthisis which can not be distinguished from cirrhosis of the lung from other causes. But in the light of the clinical history of these cases, the revelation by autopsy, microscope and chemical analysis, I have no hesitancy in speaking of them as chalicosis pulmonum, or chronic interstitial pneumonia.

In regard to treatment, nothing therapeutically is of any avail, though much can be done to prolong life by improving the hygienic conditions and stimulating the general nutrition.

¹ St. George's cases, dry specimens, though not enough for a fair test.

Among the cases coming under our observation there are none where "an ounce of prevention is worth a pound of cure" more emphatically applies than in the diseases induced by the inhalation of irritating dust. No one can study the industrial hygiene and carefully note the relations of occupation to life and health without fully recognizing that from the gentleman of leisure to the mechanical operative, the soldier and mill-hand, all have their dangers incident to the various occupations; but it should not follow that no effort should be made to minimize them. I believe it is our duty as scientific physicians not only to point out the danger from contagion, and to render innocuous the germs lurking in our food and water-supply, but also to call attention to the causes of disease induced by the industrial occupations, suggest proper sanitary and hygienic measures, and force, by our teachings, a wholesome regard for the comfort, health and life of the employees, thus reducing the dangers to a minimum. I do not believe any organization, however influential, should presume to dictate to the medical profession or embarrass the physician in his work; much less endanger the health and life of men who are lured by the wages offered—\$2 to \$5 a day—into what may prove a death-trap, and feel they have discharged their obligations to the men, their families and the public by producing revenues for a "soulless" corporation, regardless of the sacrifice of human life. Notwithstanding the obstruction and criticism I have encountered in the preparation of this paper, no man, nor association of men, is on trial. This is one of the cases in which truth is stranger than fiction, and I have simply stated facts. If I have succeeded in attracting the attention of the profession, and through it the public, to the necessity of reform in the field of so-called preventive medicine, I will feel repaid for my time and labor.

In a subsequent paper now being prepared for a mining and scientific journal, I will speak of the hygiene of mines, mills and smelters, but suffice it here to state that there are no mechanical difficulties to prevent the scientific ventilation of mills and free them from dust by a proper distribution of hoods, fans and dust-collectors, thus improving the hygienic conditions and making them comparatively safe.

Some weeks ago I visited the mill at Delamar, Nev., and in justice to the company let me say that the present superintendent is sparing no expense to improve the hygienic conditions, which in a measure will remove the cause of trouble.

NOTES ON CATELECTROLYSIS (ELECTROLYSIS) IN THE TREATMENT OF SKIN DISEASES.

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There is such a radical difference between an operation performed with instruments connected with the positive pole of a galvanic battery and one performed with instruments connected with the negative pole, that both should not be designated by the one common name "electrolysis." I would like to suggest that we call the operation performed with instruments connected with the negative pole—cathode, catelectrode—"catelectrolysis," and that with the positive pole—anode—"anelectrolysis." The development of oxygen at the positive pole, when the current is closed, makes it impossible to use a steel needle, or jeweler's broach, in anelectrolysis,

nor can there be made such a fine, strong and springy instrument out of gold, platinum, iridium or silver. This is a mechanical disadvantage only, but anelectrolysis has little intrinsic value—in fact, it acts like a simple cauterization by heat. It is entirely different with catelectrolysis. What we can accomplish here is this: We can charge, as it were, a steel needle with caustic alkali, after having inserted it into the tissues, let it act in position, stop its action at will, and finally withdraw it

plexity and unstability of medico-electric apparatus in general. The modern tendency to draw electricity from one common source for a variety of medical purposes—faradization, galvanization, cauterization, electrolysis and illumination—is much to blame for this condition. The first step, therefore, to popularize electrolysis was to simplify the apparatus. This has now been accomplished. The battery, the rheostat and the milliamperemeter are all contained in one comparatively small portable box. The portability is a great advantage, because electrolytic operations require a good light, and it is frequently necessary to shift the position of the patient in relation to the window, etc. It is also desirable that a good light strikes the dial of the milliamperemeter, which must be watched constantly by the operator. The deflection of the needle not only indicates the strength of the current, but the moment of its closure and the beginning and the end of the electrolytic action.

For connection with the positive pole I devised a special sponge electrode a number of years ago, and have continually used it since with great benefit. It is a hard-rubber cylinder with a metal-lined cavity, fitted

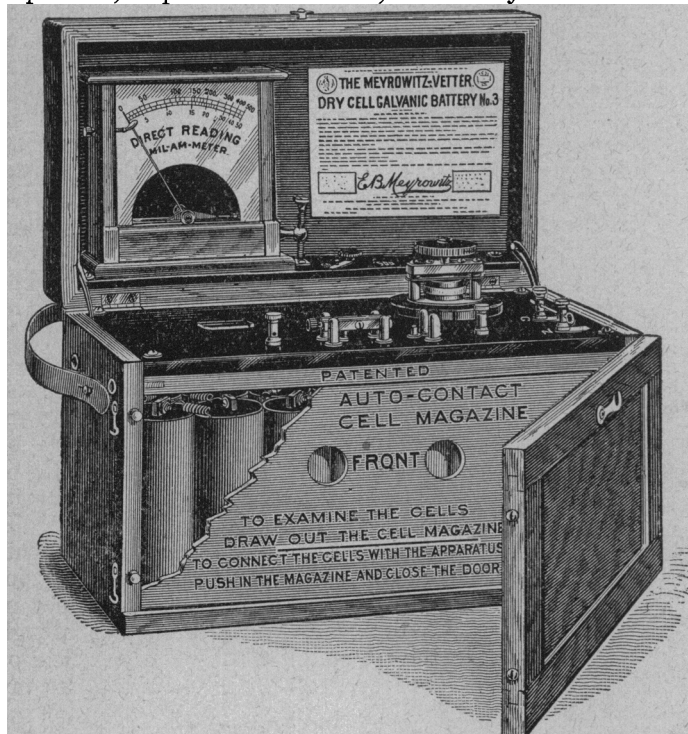


Fig. 1.—Battery containing 32 dry Leclanche cells, carbon current controller, pole changer and direct reading milliamperemeter. Electromotive force, 45 volts.

in as inert a condition as it was before. This is not cauterization, to be sure; it is rather a most delicate and accurate injection of a caustic into the tissues. At the same time, this injection—if I may call it such—allows of an accurate dosage, both by measuring the strength of the current and the time of exposure.

Another advantage, to which I have called attention in my previous contributions on this subject, is that a

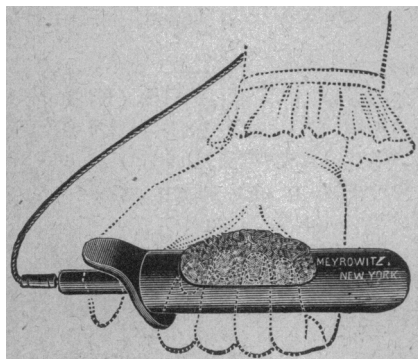


Fig. 2.—Author's sponge electrode to be connected with the positive pole.

certain degree of local anesthesia can be produced by properly managing it. Thus the operation becomes an almost painless one. That, in spite of these points in its favor, catelectrolysis has not become more popular than it actually is at present is largely due to the fact that there exists in the minds of many physicians a somewhat pardonable prejudice concerning the com-

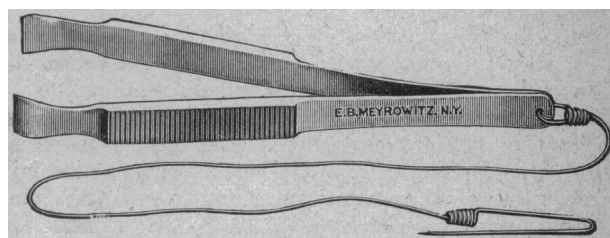


Fig. 3.—Forceps with square jaws and new attachment for cord by which it can be suspended on the coat of the operator.

with a sponge which can be easily removed, moistened and replaced. The electrode is placed in the patient's hand, sponge upward. By closing the hand, i. e., moving

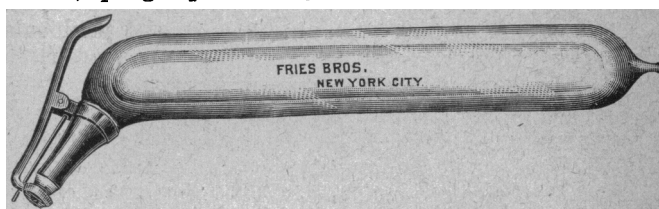


Fig. 4.—Spraying tube of Kelene (chlorid of ethyl) for local anesthesia. The cap adjusts itself automatically.

the fingers toward the center of the palm, while the thumb remains quiet in flexed position, contact is effected and the current closed. The strength of the current may then be gradually increased by pressing the sponge farther down into the cavity of the electrode.

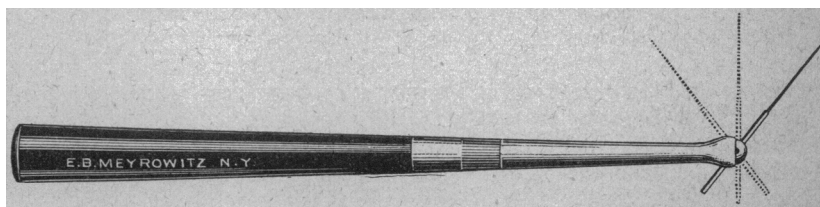


Fig. 5.—Author's needle holders with ball and socket joint, the former perforated in three directions. Needle is firmly secured in place, or loosened by rotating the rubber part of handle.

The instrument is operated by the patient without looking and moving the head, which is very important, because a great many electrolytic operations affect the face.

The needle-holder for connection with the negative pole should be so constructed as to hold the needle at an angle of about 45 degrees. The operator, standing or sitting at the patient's side, should carry the instrument

in his hand like a pen. Almost all catelectrolytic operations can be performed with a so-called jeweler's broach. In exceptional cases a sewing needle of very fine caliber may be substituted. The broach or needle is made to pierce into the tissue, or is introduced into a follicle, and then the patient is directed to close the hand, and start the current by gradually touching the wet sponge of the electrode. A current strength of from two to five milliamperes, with an average exposure of twenty to thirty seconds, is sufficient for all cases. A weak current with longer exposure is naturally less painful than a stronger with short exposure. The local anesthesia, which I mentioned above, is best produced by a weak current with an exposure of half a minute. Later on the strength of the current may be increased and the time of exposure shortened. About two minutes pass before anesthesia appears at the site of the puncture. By the coalescence of a number of punctures a considerably large focus of anesthesia may be produced. If the field of operation be previously frozen by aid of the ethyl-chlorid spray, catelectrolysis will be entirely painless.

The list of diseases of the skin in the treatment of which catelectrolysis is recommended is quite extensive and still continually increasing. It includes: hirsuties—superfluous hair—nevi pigmentosi, papillomatosi and verrucosi, verrucae molles and duræ, xanthoma planum and tuberosum, keloid, angioma simplex, cavernosum, plexiforme and seripiginosum, acne rosacea, trichophytosis barbæ, lupus vulgaris and erythematosus, adenoma sebaceum, angiokeratoma, milium, elephantiasis and scleroderma circumscripta.

It is easy to formulate the indications for catelectrolysis from a general point of view. The operation is indicated wherever the avoidance of the formation of scars is of importance. In this regard it is superior to the galvano-cautery, the Paquelin, the micro burner, and all the chemical caustics; furthermore, wherever a strictly limited local action is desired. Particularly well adapted for treatment with catelectrolysis are small, solid and soft cutaneous tumors which protrude above the level of the normal skin or are pedunculated. No other operation equals catelectrolysis for the destruction of hair follicles and sebaceous glands. It is not of great value, on the other hand, in the treatment of either malignant new growths, or of those benign tumors, which have a tendency to spread very rapidly.

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CASE HISTORY AND PHOTOGRAPH.*

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Walter S., white, 31 years old, gave a negative tubercular and syphilitic history. He had a small, congenital dark mole two inches below the right nipple, which began to increase in size about December, 1896. During October, 1898, it had increased to 3x4 inches in size. Dr. G. S. Hancock, of Campbellsburg, Ind., then had the new growth excised.

There was no recurrence until about Jan. 1, 1899, when a nodule appeared in the line of incision. Since this time the growth has rapidly encroached on the adjacent tissues until it is now about 14x18 inches, extending from the axillary space to within three inches of the umbilicus.

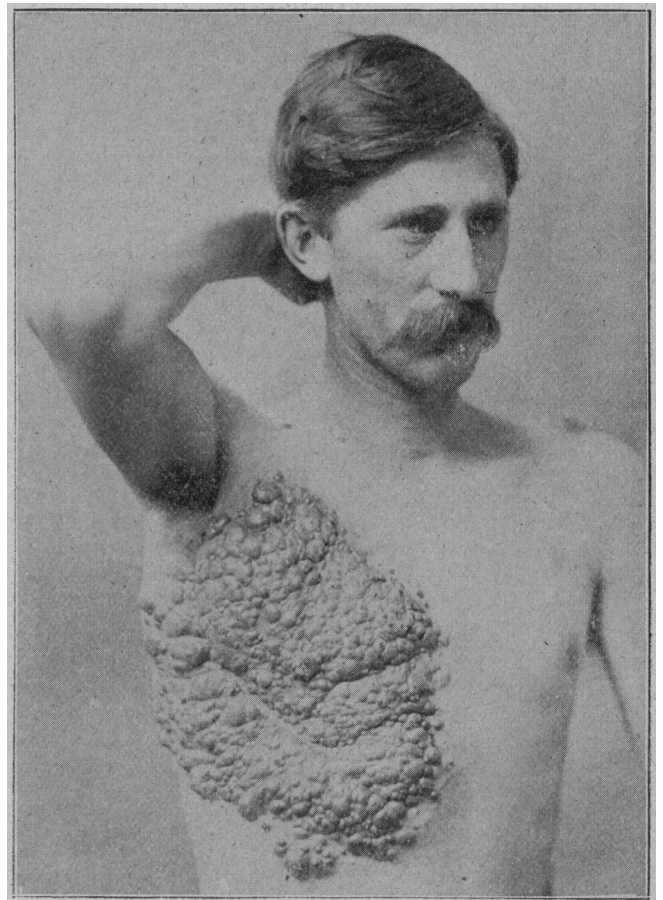
The growth resembles a large bunch of red grapes,

the mass of nodules being elevated and red, some more so than others; a few could be taken between the fingers, thus showing how separate and distinct they were, and yet conglomerated. The entire mass was movable and did not seem to be adherent to the periosteum.

The axillary space was occupied by the new growth, but its glands and those of the cervical region did not appear enlarged.

The white line in the mass is the line of the old incision.

There are numerous minute red elevations scattered here and there over the body, while none appear on the extremities. There is one on the left shoulder, half the size of a guinea egg, perfectly round, scarlet on its center, and gradually becoming the color of normal skin at its base. Another one is to be seen about midway between the left nipple and the nodule just described. All of these nodules are confined to the integument alone. The patient will not consent to having a nodule excised for microscopic examination.



Dr. J. T. Knox invited me to see the case with him on April 12, 1899, at which time the accompanying photograph was taken. I expressed the opinion that the growth was some form of sarcoma, and that a surgical operation would be of no avail; the injection of erysipelas toxin was advised, but not accepted.

The patient insisted on being exposed to the X-ray, which was done for seven days with two daily exposures of thirty minutes each. The pain, which had required the use of various narcotics for its subjection, disappeared after the third application. There was slightly increased redness of the nodules after the fourth exposure. The top surfaces of a few of the larger and

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