compress the apex permanently, I have been using the method of turning up the periotemum of the second to the fourth ribs after resecting the ribs. It is well known that, in the production of pulmonary complications, hypoventilation or obstruction is nearly always essential. If the pneumococcus is present, pneumonia will develop. If mixed infection of staphylococci or anaerobes or sometimes streptococci are present, abscess or gangrene is apt to develop. In bronchiectasis, it is known that a good many cases are congenital, and the condition should be seen earlier if one expects to obtain good results surgically. The old chronic types are serious and require several operations, and sometimes operations are not beneficial. The stage operation in these conditions is essential. I have made it a practice, while sewing up the abdomen, to use 10 per cent carbon dioxide and 90 per cent oxygen for inhalation to procure increased ventilation. Since using this method I have reduced the number of cases with postoperative pulmonary complications. The lowered vital capacity is probably one of the main factors in the production of these conditions. Pulmonary complications following upper and lower abdominal operations are in about the same proportion as the difference in reduction of vital capacity in the upper and lower abdominal operations. In doing operations on the phrenic nerve, I have devised a stripper to use in certain cases. The open stripper is used when the nerve is crushed and I wish to tear off the accessory. The closed one can be used in phrenic exeresis. In doing operations on the chest with the patient on the side, I have devised an arm rest for taking care of the arm and forearm. The position of this rest can be changed to take care of the position of the patient on the table. The under rest is for the underarm when the physician wants it to come in front of the patient. Straps or towels should be placed around the arm to fix it in position.

THE USE OF MECHANICAL MEASURES IN THE TREATMENT OF OBSTINATE EDEMA *

EDWARD F. BLAND, M.D. 
AND 
PAUL D. WHITE, M.D. 
BOSTON

The treatment of severe and refractory edema of the lower extremities has occupied the attention of physicians for many centuries. The celebrated Roman philosopher Celsus,1 of the first century A.D., in a chapter on "De Hydropis," called attention to the beneficial effects of a low fluid intake as well as to the increased elimination of fluid by excessive sweating; but in addition to these measures it is of considerable interest to find the following recommendation given by him for the treatment of dropsy: "Above all an incision ought to be made, of almost four fingerbreadths, on the inner side [of the leg], from which much fluid may drain for several days." Although even today this original recommendation of Celsus is occasionally resorted to, more appropriate measures are now available.

Great progress has been made during the last fifty years in the direction of a better understanding of cardiac and renal disease. The realization of the importance and of the rational use of digitalis in patients with early congestive failure, the introduction of the diuretics, and more recently of merbaphen (novasurol) and mersalyl (salygran), have proved very efficacious in the prevention and control of anasarca. However, in spite of these measures, a case of extreme edema is occasionally encountered that resists all efforts at medical control. It is this type of case that we shall consider here, calling attention to the numerous procedures that have been employed for combating such a distressing situation, in particular one which, although introduced more than fifty years ago by Reginald Southey,2 has largely been forgotten. We believe that this measure proposed by Southey has a definite place in the treatment of patients with obstinate edema.

By the mechanical removal of considerable quantities of excessive edema fluid, one may hope to accomplish a threefold purpose: in the first place, by reducing the size of the distended parts, the patient is made more comfortable; secondly, the already overtaxed and failing circulatory system is relieved of an additional burden; and, finally, the partial removal of what has been called by Galli3 the "peripheral barrier" to the circula-

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* From the Cardiac Clinic of the Massachusetts General Hospital.
1. Celsus, Aurelius: De Re Medica, book III, chapter XXI.
and promote the absorption of the excess fluid. These measures, in addition to medical treatment, are usually sufficient to control the situation.

2. The application of hypertonic solutions, usually a dressing containing a solution of sodium chloride in glycerin, has been employed and recommended by Carnot, provided the skin is intact. Edematous legs are said to shrink several centimeters in twenty-four hours. We have not attempted this, as it has appeared impracticable to us.

3. In the presence of a large amount of fluid, several surgical measures for its evacuation are available:

(a) Acupuncture, in which multiple small needle pricks are made into the edematous parts, thereby permitting fluid to exude for several days, has been widely practiced during the past century, and striking relief has been noted in numerous patients following the drainage of considerable amounts of fluid. However, as has been pointed out by others, all who have used this method are acquainted with the serious drawbacks attending ordinary puncture of the distended limbs. The fluid that drains away is difficult to collect and to control. The patient's skin is constantly exposed to an irritating and decomposing body fluid, which promotes infection and ulceration; erysipelas sometimes follows, may accelerate the patient's death and greatly increase the sufferings of the last few days of life, while the constant wetting of the bedclothes keeps the patient damp and cold, and is an undesirable feature.

(b) Long, deep incisions have been employed by others and by this method as much as 30 liters of fluid is said to have been obtained in twenty-four hours. In 1927, Sétêp used this procedure on fourteen patients and reported excellent results in all cases with the evacuation of much fluid, regression of the edema, increased urination and improved cardiac action. It would seem, however, that except in rare cases this procedure is undesirable and that it may be attended by some danger to the patient. Rarely, in the past, even more heroic measures have been attempted, such as that recorded by Finch in 1823 in a "case of anasarca in which amputation was successfully employed, and the fluid discharged by it."

(c) Finally, what appears to us the simplest, safest and most desirable method of treating obstinate edema of considerable degree is the one originally recommended by Southey. Although it is frequently mentioned in textbooks and occasionally in the literature, we have reason to believe that its value is not generally appreciated, and certainly not in America.

In 1877, Reginald Southey, a physician of St. Bartholomew's Hospital in London, realizing the limitations and dangers of the procedures previously employed, perfected a method of subcutaneous drainage by means of small capillary tubes which are shown in figure 1 and which bear his name. The apparatus is simple in design and consists of a small metal trocar and cannula, the latter containing several lateral perforations permitting a free flow of fluid. In the handle of the trocar is a compartment in which additional cannulas are carried. The use of the instrument is not difficult. The skin at the sites selected for insertion; usually the outer and inner aspects of the lower parts of the legs, the dorsum of the feet, or the scrotum, is cleansed aseptically, a wheal is made with procaine hydrochloride, and a small amount of sterile ointment is applied to prevent local irritation. The trocar and cannula are inserted deeply into the swollen part; the cuff of the cannula is held firmly with a clamp while the trocar is withdrawn and a small rubber tube attached. Fluid wells up immediately and continues to flow in steady drops from the cannula until the rubber tube is in place; this, in turn, is led off to a suitable receptacle placed beneath the bed for the collection of the fluid. As many tubes may be used as seem desirable; we have found that two in each leg are usually adequate; they are left in place for one to several days and cause surprisingly little discomfort to the patient. There is ordinarily no leakage about the cannula; the skin and dressing remain dry. Since the flow is constantly away from the site of insertion, the chance of infection is greatly lessened, and with an ordinary amount of care we believe that it is relatively slight. Following the removal of the tubes, a moderate amount of fluid may continue to drain for a few days, but the wounds heal without difficulty. Curschmann has designed a larger trocar and cannula to be used in the same fashion as Southey's apparatus, but it appears that in the majority of cases, certainly, the latter is adequate.

During a recent visit of one of us to the clinic of Sir Thomas Lewis in London our attention was directed, by observation of a certain case, to the excellent results that occasionally may be obtained by the employment of this procedure; 6 liters of edema fluid were removed from the legs by Southey's tubes in three days with great symptomatic relief and objective evidence of improvement. The patient was a young woman with

<table>
<thead>
<tr>
<th>Patient and Age</th>
<th>Diagnosis</th>
<th>Amount of Fluid in Dura Reducing Size of Legs or Fluid During Which Fluid Was Removed</th>
<th>Result of Withdrawal of Fluid in Days</th>
<th>Condition of Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. M. O.</td>
<td>Hypertensive heart disease</td>
<td>6 mo. ++</td>
<td>36,000</td>
<td>Died of broncho-pneumonia one month later</td>
</tr>
<tr>
<td>2. F. J.</td>
<td>Hypertensive and rheumatic heart disease</td>
<td>3 mo. ++</td>
<td>9,000</td>
<td>Died of broncho-pneumonia one month later</td>
</tr>
<tr>
<td>2. E. C.</td>
<td>Hypertensive and rheumatic heart disease</td>
<td>12 mo. +</td>
<td>2,000</td>
<td>Living six months later</td>
</tr>
<tr>
<td>4. M. L.</td>
<td>Hypertensive heart disease</td>
<td>3 mo. +</td>
<td>2,000</td>
<td>Left hospital against advice not traced</td>
</tr>
<tr>
<td>5. M. W.</td>
<td>Rheumatic heart disease</td>
<td>30 mo. ++</td>
<td>5,000</td>
<td>Died of heart failure two weeks later</td>
</tr>
<tr>
<td>5. H. C.</td>
<td>Hypertensive heart disease</td>
<td>4 mo. +</td>
<td>1,000</td>
<td>Died of broncho-pneumonia two weeks later</td>
</tr>
<tr>
<td>7. N. G.</td>
<td>Hypertensive and coronary heart disease</td>
<td>2 mo. 0</td>
<td>500</td>
<td>Died of congestive heart failure two weeks later</td>
</tr>
<tr>
<td>8. H. A.</td>
<td>Abdominal carcinomatosis</td>
<td>2 mo.</td>
<td>500</td>
<td>Died four hours later</td>
</tr>
</tbody>
</table>

Table 1.—Cases in Which Southey's Tubes Were Used

5. Delhoy, cited by Carnot (footnote 4).
8. Southey suggested first passing the trocar and cannula through a small slit near the end of the rubber tube. After insertion into the subcutaneous tissue, the rubber tube is readily slipped over the end of the cannula.
severe rheumatic heart disease, normal rhythm, and congestive failure with extensive anasarca.

We have encountered in the course of the past ten months in Boston eight cases of extensive edema, several of which failed to respond adequately to medical treatment, and in these cases we have employed Southey's tubes in an attempt to relieve the anasarca. In seven of the cases the edema was the result of congestive failure, and in one case it was secondary to an extensive abdominal carcinomatosis. The results are shown in Table 1.

REPORT OF CASES

CASE 1.—M. C. (private patient), a man, aged 63, a foreman seen in consultation, had had cardiac asthma for the previous four years; he had been much worse during the last year. For six months he had had edema of the legs which responded to digitalis and merbaphen, but for the past two and one-half months the edema had been reaccumulating, involving the lower extremities, the genitalia and the abdominal wall. Urination had been difficult because of an enlarged prostate and enormous swelling of the scrotum and penis, and frequent catheterization had to be resorted to. On physical examination his heart was found to be very large, auricular fibrillation was present, but the rate was well controlled by digitalis. The blood pressure was 175 mm. of mercury systolic and 100 mm. diastolic. Massive edema of the lower extremities and of the genitalia was present. A diagnosis of hypertensive heart disease with auricular fibrillation and congestive failure was made. Southey's tubes were inserted, two in the dorsum of the right foot, two in the left foot; later, one of these in the right foot was transflected to the scrotum. They were allowed to remain in place two days, and at the end of that time 16 liters of fluid had been collected; of this amount 1 liter had been removed from the scrotum. The patient was greatly relieved and was able to lie flat in bed with considerable comfort, a position which had been impossible before this time. During the course of the next two weeks the edema slowly reappeared; the tubes were again inserted and in twelve hours 2 liters of fluid was drained from the legs; at the end of this time the patient fell from a chair and the tubes were pulled out; the legs were quite soft and therefore the tubes were not replaced. The patient lived a month longer and up to the time of his death there had been very little reaccumulation of the fluid. The relief afforded in this case by the mechanical removal of the fluid (36 pounds, or 16.3 Kgs.) was the most striking in our series and almost certainly postponed the fatal termination by several weeks.

CASE 2.—F. J. (Massachusetts General Hospital), an American housewife, aged 48, who was known to have had hypertension and rheumatic heart disease for sixteen years, entered the hospital because of edema, dyspnea and attacks of precordial pain, anginal in character, for the preceding two months. She also had mild diabetes, which was easily controlled by diet. On examination she showed evidence of rheumatic and hypertensive heart disease with mitral stenosis and regurgitation and congestive failure with normal rhythm. During the course of several weeks of bed rest, digitalization and administration of diuretics she improved considerably, but slight edema persisted. She was permitted to go to a convalescent home, where in spite of daily digitalis and bed rest the edema gradually returned, so that in a few weeks she returned to the hospital with marked congestive failure, massive edema of the legs, edema of the abdominal wall and slight ascites. After a week's trial with diuretics there was no improvement of the edema in the feet; Southey's tubes were inserted and in three and one-half days 9 liters of fluid was withdrawn, which resulted in considerable improvement, subjectively and objectively, with the loss of most of the edema of the body wall and legs. It is of some interest that during the first twenty-four hours there was no change in the size of the legs, but the edema of the body wall decreased considerably. After three and one-half days the tubes were removed, with mersyral intravenously the anasarca was partially controlled, but it slowly returned during the next three weeks. Although the edema was of only moderate degree, the patient asked that the tubes be reinserted because of the relief obtained from them in the first instance. This was done and 3 liters of fluid was withdrawn, with considerable decrease in the size of the legs. One week later the patient died of bronchopneumonia.

CASE 3.—E. C. (private patient of Dr. L. M. Hurxthal), a man, aged 49, entered the Deaconess hospital, Boston, in June, 1928, because of dyspnea, gaseous distention and edema of the legs of about six weeks' duration. He had had rheumatic fever at 21. Physical examination revealed fluid in the chest, considerable edema of the lower legs, and abdominal distention. The heart was very large; the rhythm was absolutely irregular at a rate of about 120. At the apex was a rough systolic murmur. The blood pressure was 200 mm. of mercury systolic and 120 mm. diastolic. A diagnosis was made of hypertensive and rheumatic heart disease with auricular fibrillation and congestive failure.

![Fig. 2.—Southey's tubes in use.](https://jamanetwork.com/)

The patient had been overdigitalized and on withdrawal of the drug and the administration of theophylline (thecin) considerable improvement followed. He was readmitted to the hospital in November, 1928, and again in January, 1929, because of recurring and extensive edema. On each occasion the edema subsided following the administration of mersyral. In December, 1929, he again entered the hospital with moderate edema of the lower legs, a tremendously swollen scrotum (size of a football) and ascites. After the removal of 4 liters of fluid from the abdomen, a single Southey's tube was inserted into the scrotum and at the end of twelve hours 1,200 cc. of fluid had been drained away with marked symptomatic relief to the patient. A Curshmann tube was then inserted also and 800 cc. of additional fluid was removed, so that at the end of twenty-four hours 2 liters of fluid had been collected and the size of the scrotum had receded almost to normal. The edema of the legs subsided following the use of mersyral and theophylline. In March, 1930, the patient entered the hospital for the fourth time because of tremendous anasarca. The veins in his arms had become thrombosed as the result of numerous previous injections and the response to mersyral administered intra-muscularly was inadequate, so that an incision was made in one thigh from 3 to 4 cm. in length and down to the deep.

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10. One of these patients (case 3 of the table), in the practice of Dr. L. M. Hurxthal, was treated by him with the insertion of Southey's tubes. We are indebted to him for permission to include this case in our series.
fascia, from which 30 pounds (13.6 Kg.) of edema fluid drained away during the following two weeks. Although still alive, the patient is in poor condition and the anasarca is returning.

**Case 4.**—M. L. (Massachusetts General Hospital), a Polish housewife, aged 44, entered the hospital because of intermittent aching precordial pain, dyspnea, and orthopnea for the preceding five months. For the past three months she had been confined to bed because of the symptoms mentioned and because of edema of the lower extremities. In spite of digitalis she became progressively worse, until at the time of entry she was orthopneic and cyanotic. The heart was very large with normal rhythm and a rate of 100. The sounds were of poor quality. The blood pressure was 150 mm. of mercury systolic and 110 mm. diastolic. There was evidence of marked congestive failure with ascites, massive pitting edema of the legs, and moderate edema of the hands and arms. The electrocardiogram showed right bundle branch block. A diagnosis of hypertensive heart disease with congestive failure was made. An abdominal paracentesis yielded 1,200 cc. of ascitic fluid. Southey's tubes were inserted, two in each leg, and 3 liters of fluid was collected in twenty-four hours, with a definite decrease in the size of the legs. The patient spoke little English, was difficult to manage, and because she repeatedly pulled out the tubes it was decided at the end of the first twenty-four hours not to replace them. The foregoing treatment was followed by a administration of ammonium chloride, mersalyl, and theobromine. During her three weeks' stay in the hospital she lost 27 pounds (12.2 Kg.), largely as a result of the subsidence of edema. The patient was considerably improved, but left the hospital against advice, and we have no further information concerning her. In this case, because of her critical condition and acute discomfort on admission, it was thought best to attempt relief of the edema by mechanical methods immediately, rather than to await the slower results to be expected from the use of diuretics; the rapid improvement was gratifying.

**Case 5.**—M. W. (Massachusetts General Hospital), a housewife, aged 29, entered the hospital with rheumatic heart disease, mitral stenosis and regurgitation, and auricular fibrillation with marked congestive failure. In spite of digitalis and diuretics she had been bedridden for two and one-half years with the development of generalized edema of the extremities, chest wall and face, together with ascites. Because of the slowly increasing edema she was recommended for admission to the hospital. Digitalis and mersalyl had little effect on the anasarca. Southey's tubes were inserted in the thigh and at the end of twenty-four hours 3 liters of edema fluid had been collected, and at the end of three days 5 liters had drained away and the extremities had shrunk to almost normal size, although considerable edema of the body wall remained. The tubes were removed. The edema of the legs did not reaccumulate up to the time of the patient's death from cardiac failure two weeks after the therapy outlined.

**Case 6.**—R. C. (Massachusetts General Hospital), an Italian housewife, aged 52, entered the hospital with severe congestive heart failure. Five years previously she had been told that she had high blood pressure and heart disease, and because of dyspnea on exertion she was started on digitalis therapy, which had been continued to the present time. Her reserve was greatly diminished, so that one year prior to entry she had to stop work because of symptoms of dyspnea and mild subternal oppression. Four months before entry edema of the ankles appeared which became progressively worse. On admission to the hospital she was dyspneic, orthopneic, and slightly cyanotic. The heart was markedly enlarged in all diameters; a well marked gallop rhythm was present at a rate of 110. The blood pressure was 230 mm. of mercury systolic and 160 mm. diastolic. There was moisture at both lung bases, the abdomen was distended with fluid, and there was marked edema of the lower extremities, penile, and optic discs. The urine showed a slight trace of albumin. A diagnosis of hypertensive heart disease and congestive failure was made. Digitalis was increased to 4½ grains (0.3 Gm.) a day. The removal of 1,250 cc. of fluid from the abdomen gave considerable relief to respiration. Southey's tubes were inserted and during the course of two and one-half days 1,600 cc. of fluid was withdrawn; the skin of the legs was considerably less tense and the patient was more comfortable. The anasarca was well controlled by digitalis and diuretics, but the patient went slowly downhill and died at the end of two weeks of bronchopneumonia.

**Case 7.**—N. G. (private patient), a grocer, aged 56, seen in consultation, had had severe angina pectoris for three years and for the past two months attacks of cardiac asthma, dyspnea on slight exertion, and increasing edema of the extremities in spite of digitalis and mersalyl. On physical examination he was found to have a very large heart, normal rhythm, pulsus alternans, and evidence of marked congestive failure. The blood pressure was 185 mm. of mercury systolic and 120 mm. diastolic. The edema was extensive. Southey's tubes were inserted but were kept in place with difficulty. A superficial infection developed and it was thought best to discontinue the use of the tubes; only 500 cc. of fluid was obtained. The patient was not relieved, went progressively downhill, and died a few weeks later with marked congestive failure.

**Case 8.**—H. A. (Massachusetts General Hospital), a factory worker, aged 77, entered the hospital because of abdominal pain, loss of appetite, frequency of urination, and swelling of the legs for two months, becoming progressively worse. On admission he was found to be emaciated and uncomfortable.

<table>
<thead>
<tr>
<th>Blood</th>
<th>Edema Fluid</th>
<th>Normal Values for Cerebrospinal Fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium, mg. per 100 cc.</td>
<td>328</td>
<td>311</td>
</tr>
<tr>
<td>Chloride (as NaCl), mg. per 100 cc.</td>
<td>544</td>
<td>510</td>
</tr>
<tr>
<td>Total protein, Gm. per 100 cc.</td>
<td>6.37</td>
<td>0.10-0.45</td>
</tr>
<tr>
<td>Total solids, Gm. per 100 cc.</td>
<td>8.64</td>
<td>1.35</td>
</tr>
<tr>
<td>Sugar, mg. per 100 cc.</td>
<td>56</td>
<td>56.75</td>
</tr>
</tbody>
</table>

Table 2.—Analysis of Edema Fluid and Comparison With That of Blood Serum and Normal Cerebrospinal Fluid

in all positions. There was no edema of the scrotum, and no abdominal fluid could be demonstrated. There was a questionable mass in the epigastrium, thought to be the stomach. The heart was considered normal for a man of his age. His condition was critical; although a definite diagnosis was not possible, abdominal carcinomatosis was felt to be most likely. Because of the marked edema, Southey's tubes were inserted and 500 cc. of fluid was obtained in three hours, without noticeable relief of the tension of the legs. The patient being practically moribund, the tubes were removed, and he died one hour later. Carcinoma of the pancreas, with metastases to the liver and peritoneum, was found at postmortem examination.

**COMMENT.**

The fluid from two of our patients has been analyzed and compared with an analysis of the patients' blood serum by Dr. Frank Fremont-Smith, who finds that it resembles fairly closely cerebrospinal fluid, except for the higher protein content and the lower chloride content which go hand in hand (table 2).

It will be seen from these cases that one patient did not live a sufficient length of time to give the method an adequate trial. Of the remaining seven patients, one was not relieved and the use of the tubes resulted in a superficial infection which made the patient even more uncomfortable for several days but did not affect the ultimate prognosis. One patient was slightly improved until death two weeks later from bronchopneumonia; five patients were definitely relieved so far as the edema could be demonstrated. There was a questionable mass in the epigastrium, thought to be the stomach. The heart was considered normal for a man of his age. His condition was critical; although a definite diagnosis was not possible, abdominal carcinomatosis was felt to be most likely. Because of the marked edema, Southey's tubes were inserted and 500 cc. of fluid was obtained in three hours, without noticeable relief of the tension of the legs. The patient being practically moribund, the tubes were removed, and he died one hour later. Carcinoma of the pancreas, with metastases to the liver and peritoneum, was found at postmortem examination.
was concerned, and the results in two of these cases were striking. From the nature of the cases selected for this procedure ultimate recovery is anticipated in only a small percentage; however, the mechanical removal of the excessive fluid may be a means of sparing the patient great discomfort, and occasionally it may even postpone indefinitely a fatal termination.

Others have used somewhat similar methods with successful results. DeStáno\(^1\) has employed direct drainage by means of small platinum needles under the skin, and in his hands, this method has proved effective and harmless in 100 cases. In one of his patients 27 liters was evacuated in forty-eight hours; in only one case was there a slight superficial infection, which subsided in the course of twenty-four hours.

**SUMMARY AND CONCLUSIONS**

1. In eight cases of extensive edema, mostly the result of congestive heart failure and resistant to medical therapeutic measures, we have employed Southey's tubes inserted into the edematous subcutaneous tissue of the legs or scrotum. In two of our patients the results were strikingly beneficial, following the removal of 16 liters in the course of two days in one case, and of 9 liters in three and one-half days in another. In three patients there was moderate relief; in one case slight improvement was noted; the remaining two patients were not relieved.

2. In suitable cases the use of Southey's tubes is a valuable therapeutic procedure, and we believe that the employment of this method as recommended many years ago by Reginald Southey should be revived.

**ABSTRACT OF DISCUSSION**

**Dr. F. JAMNEY SMITH, Detroit:** There is unanimity of opinion that hydrothorax, if extensive, should be tapped as the opening move in the treatment of myocardial insufficiency; likewise that ascites, if responsible for a tense abdomen, elevated diaphragm and respiratory embarrassment, should be drained in a similar manner. But the mechanical removal of fluid from the lower extremities by means of Southey's tubes has, for the most part, been placed on the medical museum shelf. In part, this has been done because of the increased incidence of edema of cardiac origin, to the development of newer and efficient diuretic drugs, to the increasing use of the high carbohydrate diet in treating the waterlogged cardiac patient, and to the general improvement in our knowledge of how to treat congestive cardiac failures as a whole. Again, the management of surgical incisions or punctures in the edematous lower extremities requires the utmost aseptic precautions and after-care; and the practitioner prefers not to risk the development of a cellulitis with its obvious association with such punctures or incisions. And now Dr. White is taking these medical antiques down from the shelf and putting them rightly back into practical use again. However, in the introduction of Southey's tubes or a suitable trocar into the subcutaneous tissue of the leg and in the treatment of such tubes in situ, although, owing largely to the steady outflow of edema, secondary infection does not often occur, it is a real danger whenever a foreign body is left in the tissues and is continuous with the outside world. I would therefore suggest that, in those cases in which marked and obstinate edema of the lower extremities and genitalia indicates mechanical removal of fluid from the lower extremities, acupuncture may be tried before resorting to such tubes or by local massage to the steady outflow of edema, secondary infection does not often occur, it is a real danger whenever a foreign body is left in the tissues and is continuous with the outside world. I would therefore suggest that, in those cases in which marked and obstinate edema of the lower extremities and genitalia indicates mechanical removal of fluid from the lower extremities, acupuncture may be tried before resorting to such tubes or by local massage, which aids the absorption of the edema, and if the incontinence of the fluid is not reduced, a surgical procedure may be indicated.

**Dr. F. B. BLAND, Boston:** We have felt that these tubes have a distinct advantage over the usual methods; namely, that the patient is able to lie in bed with relative comfort without being inundated by the fluid necessarily drained into the bed from other methods of attack. The ease with which infection may occur is greatly lessened since the capillary flow is constantly away from the point at which the needles are inserted. A slight infection occurred in one case, a patient who was irradiated and who was in the process of developing our resources in the hospital. In the case of the tubes the case came on several occasions, and were replaced by the attendant. In none of our other cases have we had a case of infection. In the series of 100 cases reported by DeStáno treated in this manner in only one was there a slight superficial infection.

**Lavoisier.**—The modern era of the science of nutrition was opened by Lavoisier in 1780. He was the first to apply the balance and the thermometer to the investigation of the phenomena of life, and he declared "La vie est une fonction chimique." The work of today is but the continuation of that done a century and more ago. Lavoisier and Laplace made experiments on animal heat and respiration. The great German chemist Liebig removed his early training in Paris, residing there in 1822. Liebig's conception of the processes of nutrition fired the genius of Voit to the painstaking researches which laid the foundation of his Munich school. These have been repeated and extended by his pupils, of whom Rubner is chief, and by others the world over. Thus the knowledge often transferred personally from the master to the pupil to be in turn elaborated, had its seed in the intellect of Lavoisier. It was he who first discovered the true importance of oxygen gas, to which he gave its present name. He declared that life processes were those of oxidation, with the resulting elimination of heat. He believed that oxygen was the cause of decomposition of a fluid brought to the lungs, and that hydrocarbons were introduced in this fluid and then united with oxygen to form water and carbon dioxide.—Lusk, Graham: Elements of the Science of Nutrition, Philadelphia, W. B. Saunders Company, 1928.

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