The elixir of life / Edited by N. Dunbar.

THE "ELIXIR OF LIFE."

Dr. Brown-Séquard's own account of his Famous Alleged Remedy for Debility and Old Age, Dr. Variot's Experiments, and Contemporaneous Comments of the Profession and the Press.

TO WHICH IS PREFIXED A SKETCH OF DR. BROWN-SÉQUARD'S LIFE, WITH PORTRAIT.

Edited by

NEWELL DUNBAR.

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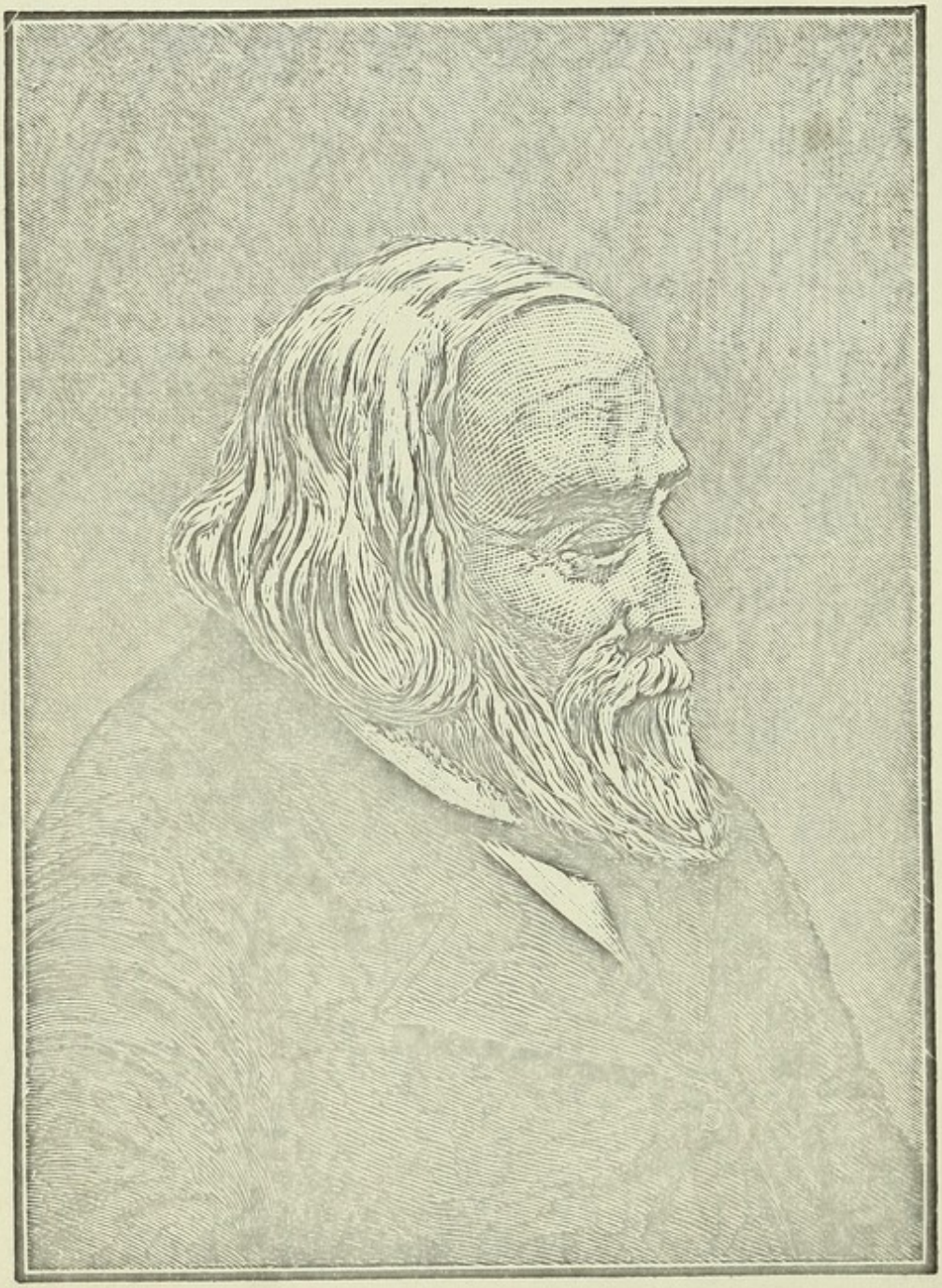

C. E. BROWN-SÉQUARD, M.D., F.R.S., ETC

BIOGRAPHY.

Sketch of Dr. Brown-Séquard's Life.[1]

"He led me on to mightiest deeds
Above the *nerve* of mortal arm." — *Milton.*

Dr. Brown-Séquard's father, Captain Edward Brown, was born in Philadelphia, Penn., and married Mlle. C. P. Séquard, a native of the island of Mauritius, of French extraction. He lost his life while endeavoring to carry provisions to that place, during a severe famine. The vessel proved unseaworthy, and though a sailor of much experience, he was lost.

Charles Édouard Brown-Séquard, M.D., F.R.S.,

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[1] *See* Biographical Sketches of Distinguished Living New York Physicians. By Samuel Ward Francis, A.M., M.D. New York, 1867. 228 pp. 12mo.

Men of The Time. Cassell's Celebrities of the Century. Appleton's Cyc. of Am. Biography.

Dictionnaire Universel des Contemporains. Par G. Vapereau. Paris, 1880.

Dictionnaire Universel Illustré Biographique et Bibliographique de la France Contemporaine. J. Lermina. Paris.

etc., physician and physiologist, was born April 8th, 1817, at Port Louis, Mauritius. The foundation of his extensive education, he received there at a private school. When quite young, he took charge of two circulating libraries and reading rooms for about two years.

In 1838, he went to Paris to pursue his medical studies, under such men as Martin Magron, P. Bérard, Cruveilhier, Trousseau, Orfila, and others, all men of wide experience, much thought, and the representatives of an important medical epoch. In November, 1838, he received the diploma of "Bachelor of Letters," and that of "Bachelor of Sciences," the following year, from the Faculty of Letters of Paris, and the Faculty of Sciences of Paris, respectively, both of them forming a part of the University of France. In 1839, he taught natural history, chemistry, and natural philosophy. In 1845, he began to lecture on physiology. In natural history, chemistry, natural philosophy, and physiology, he has kept up the deepest interest ever since. That which has from the

first rendered his didactic philosophy peculiarly interesting, has been the number of practical experiments elucidating the topic in hand. At the start, his vivisections were conclusive as to success.

On the 3rd of January, 1846, he received his degree of Doctor of Medicine from the Faculty of Medicine of Paris, which is a part of the University of France. His Inaugural Dissertation was a printed thesis on the "Vital Properties and Functions of the Spinal Cord," 4to., pp. 26. One cannot read this production without being charmed by the fascinating treatment so peculiarly his own.

Since graduating, he has devoted his time mainly to extended experimental investigations on important physiological topics; among which may be enumerated, the conditions and functions of the different constituents of the blood, animal heat, the spinal column and its diseases, the muscular system, the sympathetic nerves and ganglions, the effect of the removal of the supra-renal capsules, etc. Not a few of his

valuable discoveries have been made while he has been resident in France. The peculiar facilities which that country offers men of science seem to have been in his case both attractive and prolific.

Dr. Brown-Séquard has visited England and the United States many times, delivering in both countries short courses of lectures, and instructing private classes of physicians in his discoveries. He has practised medicine successfully in the principal centres of medical science of the world, in each place leaving traces of his original mind and wise suggestions. He has carried out his professional career in Paris, for many years, at various intervals, from 1847 to 1850, also in 1855, from 1857 to 1859, in 1865, from 1869 to 1873, and since 1878. In 1854, he resided at Port Louis, Mauritius, and not only practised, but acquired much that sowed the seed of future theories. In London, England, he attended the sick, and particularly prescribed for those nervously affected, from March, 1860, to September, 1863, and at Cam-

bridge and Boston, Mass., 1864, lectured and treated those who applied for his services. In 1864, he was appointed Professor of the Physiology and Pathology of the Nervous System at Harvard University, where he remained four years. In 1869, he returned to France, and was made professor of Experimental and Comparative Pathology in the *Ecole de Médicine*; he held the chair till 1871. In 1858, he established in Paris the *Journal de la Physiologie de l'Homme et des Animaux*, which he conducted till 1863. After his return in 1869, he founded another journal called *Archives de la Physiologie Normale et Pathologique.* In 1873, he again came to the United States, practising in New York City, and beginning with Dr. Seguin the publication of the *Archives of Scientific and Practical Medicine.* August 3, 1878, he succeeded Claude Bernard in the chair of Experimental Medicine in the College of France.

In March, 1853, at Boston, Mass., Dr. Brown-Séquard married Miss Ellen Fletcher, a niece of Daniel Webster's first wife.

He is opposed to the use of tobacco. In his

own words: "I never smoke, and have seen the most evident proofs of the injurious effects of tobacco on the nervous system."

Dr. Brown-Séquard's general health has been very good, being exempt from many of the affections that flesh is heir to. But a desire to investigate the contents of his own stomach, under different circumstances, by means of which he could examine the gastric juice, or partially digested food, has brought on a rare affection, which is sometimes seen in man, namely, a persistent merycism, or rumination, when one is forced to chew a second time what has been swallowed. This has existed since 1844, in consequence of his having often performed on himself experiments, consisting in swallowing sponges, to which were attached threads; by drawing upon which, the sponges were withdrawn from the stomach, containing gastric juice and liquid or liquified food, which he wished to study.

This sacrifice on the altar of science should be honorably recorded, as a disinterested effort

by a truly philosophical man. The pains, also, to which Dr. Brown-Séquard has voluntarily subjected himself in pursuing the experiments which form the subject of this pamphlet, should not be forgotten in this connection. "Truth at any cost, even my own," has always been the uncompromising motto of the true philosopher.

On five occasions, has Dr. Brown-Séquard received prizes from that august body, the French Academy of Sciences; the last being the Institute's biennial prize of 20,000 francs. In 1878, he was elected to the chair of medicine in the Academy. In 1868, he was elected member of the National Academy of Sciences. In 1860, he became a member of the Royal College of Physicians of London. The Royal Society of London, under the auspices of the Queen, has twice bestowed on him a portion of the grant, set aside for the promotion of science. Many other foreign institutes have bestowed their honors upon him.

Among the many interesting theories and scientific points propounded by Dr. Brown-

Séquard, and which may truly be said to have gained stronger and stronger hold, may be mentioned the theory that "the fibrine of the blood is an excrementitious product, and not subservient to nutrition."

By a series of careful experiments, he succeeded in restoring the irritability of the muscles, soon after oxygenated and defibrinated blood had been injected, when a dead body had been long rigid. By repeating this with the same blood, it being oxygenated and defibrinated again, the irritability of the muscles was maintained for hours. Another statement of his is likewise worthy of mention. It is to the effect that arterial blood "is subservient to nutrition, while venous blood is required for muscular contraction." He also states that the animal heat of man is 103° F.—several degrees higher than previous investigators have put it. Moreover, as it has generally been accepted as a fact that poison tends to lower the temperature of the body, he suggests with much reason, that if an artificial heat be kept up the toxæmic in-

fluence will be lessened, and the chances of recovery increased inversely, etc. This theory — if carried out in clinical practice — would tend greatly to assist in the administration of remedial agents.

But that which has peculiarly attracted his attention and given rise to profound discussion, has special reference to the spinal cord; it may truly be considered as the greatest discovery of that region since the period when Sir Charles Bell unfolded to view the sensitive properties and "motor functions of the anterior and posterior roots of the spinal cord." To use the words of another :[1] "As the result of numerous ingenious experiments, Brown-Séquard concludes that the sensitive fibres do not communicate directly with the brain, but convey impressions to the gray matter of the cord, by which they are transmitted onward to the brain, and that their decussation or crossing takes place in the cord itself, at or below the point at which they enter, not in the cerebrum or me-

[1] See Appleton's Cyclopædia.

dulla oblongata. On the other hand, the anterior or motor fibres pass on directly to the brain, effecting their decussation in the medulla oblongata; the gray matter receives the impressions, conducts them to the brain, or reflects them upon the motor nerves, but is itself insensible to ordinary stimuli."

In the modern views of nervous disorders the opinions of Prof. Brown Séquard are looked upon with respect, and followed with implicit faith, so earnest have been his endeavors, and so conscientious his experiments as regards the treatment of functional and organic affections of the nervous system. We find that he maintains that morbid manifestations may be due to a reflex influence; that pressure on the carotid for congestion of the brain does not diminish the supply of blood to the brain, but the benefit derived from it is due chiefly to the pressure on the cervical sympathetic nerve, which causes a contraction of the blood-vessels of the brain.

He is entirely opposed to extirpation of the testicle as a cure for epilepsy, deeming it not

only irrational, but barbarous; recommends applying a white-hot iron to the head of patients when in the "coma of apoplexy, cerebritis, uræmia, or epilepsy"; and also as the most effectual cure for neuralgia, and when the patient is suffering from rheumatic pains. Charles Sumner's heroic treatment will be recalled in this connection. On the same principle, he strongly advocates ice along the spine. But that which seems especially to have met his high approval is the subcutaneous injection of morphia, quinia, etc, He advocates gallic acid in five-grain doses, six times a day, when the nervous derangements are due to congestion of the ovaries or kidneys, and does not particularly admire nitrate of silver for the treatment of locomotor ataxy, as it is often found to do more in the way of discoloring the skin than relieving the difficulty. For palsy he praises the chloride of barium, in from one-half grain to one grain doses three times a day, It has also been found very serviceable in tetanus. He regrets that errhines are not oftener employed.

On being once asked if he did not have some special or favorite branch of practice, Dr. Brown-Séquard replied: "I am chiefly consulted for nervous affections, both functional and organic, but I am not a specialist; and have studied, and continue to study, every branch of medicine." When one sees the vast strides made each year in physiology, therapeutics, chemistry, and microscopic anatomy, the labor involved in carefully keeping up with the times will be appreciated.

To enumerate the works and articles written by Dr. Brown-Séquard would be a difficult task, for they are in many languages, printed in different countries, and may be found in magazines, medical journals, physical periodicals, cyclopædias, and bound up with the lectures of other interesting savans. The medical and philosophical literatures of this generation are greatly indebted to him for his widely diffused knowledge, and the many surprising *facts* made plain to the sense. A uniform set of his elaborate productions would find a ready sale, and be

secured by every public library in the civilized world.

To give some idea, howevever, of the diversity of the subjects treated, the titles of a few may be quoted. Most of them are written in French :

1. Rech. et Expér. sur la Physiol. de la Moelle Épin. 1846.
7. Sur l'État de l'Irritab. dans les Muscles Paral. 1847.
13. Hibernation des Tenrecs. 1849.
14. Rech. sur la Rigidité Cadav. et la Putréfaction. 1849.
17. L'Action de Téter Indépendante du Cerveau. 1849.
19. Explication d'un Phénomène de Visibilité. 1849.
26. Rech. sur la Mode d'Action de la Strychnine. 1849.
34. Sur la Mort par la Foudre et l'Électro-Magnet. 1849.
64. Apparition de la Rigidité Cadav. avant la Cessation des Battem du Cœur. 1851.

80. Sur l'Irritab. des Muscles. Paralysés. 1851.
84. Preuve de la Contractilité du Tissu Cellulaire. 1852.
88. Sur le Nutrition des Muscles pendant leur Contraction. 1852.
100. Sur un Fait Nouveau relatif á la Physiol. de la Moelle Épin. 1852.
107. Guérison de l'Épilepsie par la Section d'un Nerf. 1853.
113. Sur la Cause des Mouvements du Cœur. 1853.
136. De l'Influence de l'Asphyxie sur la Chaleur Animale. 1856.
144. Nouv. Rech. sur les Capsules Surrénales. 1858.
155. Course of Lectures on the Physiology and Pathology of the Central Nervous System, delivered at the Royal College of Surgeons of England, 1858. 276 pages, 3 plates. Philadelphia. 1860.
158. Lectures on the Diagnosis and Treatment of the Principal Forms of Paralysis of the Lower Extremities. 118 pages. Philadelphia. 1861.

162. Lois des Phénom. Dynam. de l'Économie Animale.
178. Sur quelques Caractères non encore Signalés des Mouvem. Réfl· Normeaux. 1858.
186. Rech. sur l'Irritab. Musculaire. 1859.
192. Remarq. sur des Cas d'Éphidrose Parotidienne. 1859.
195. Sur un Cas de Greffe Osseuse. 1860.
199. Note sur les Mouv. Rotatoires. 1860.
203. Remarq. sur la Physiol. du Cervelet à propos d'un Mémoire de R. Wagner. 1861.
205. Remarq. sur l'Action du Nerf-Vague sur le Cœur. 1862.
207. Remarq. sur la Physiol. du Cervelet et du Nerf Anditif. 1862.
209. Rech. sur la Transmiss. des Impress. de Tact, de Chatouillement, de Douleur, de Températ., et de Contraction (Sens Muscul.) dans la Moelle Épin. 1863.

"Lectures on Nervous Affections" appeared in 1873.

THE "ELIXIR OF LIFE."

THE "ELIXIR OF LIFE."

THE justly eminent Dr. Brown-Séquard has recently been experimenting with a fluid, which has received the popular appellation of the "Elixir of Life." The present time, when his experiments are being so widely discussed by the press and elsewhere, seems to be a moment opportune for the appearance of a pamphlet stating clearly and authoritatively just what the experiments and "elixir" are.

The first announcement of the alleged discovery which is attracting so much attention was made by Dr. Brown-Séquard before the *Société de Biologie* of Paris, June 1st, 1889. The paper then read, together with the remarks provoked by it, appeared in the *Comptes Rendus*, or Transactions, of the society, for June 21st.

A second communication was made to the same society on the 15th of June, and was published in

the same number of the Transactions. A third "Note" was read at the meeting of the 22nd, and appeared in the Transactions of the 28th. The substance of these three papers was afterwards embodied in an article contributed to the London *Lancet* of July 20. The latter being of smaller compass than the former, at the same time omitting nothing essential that was contained in them, and in fact throwing new light upon the subject, it is quoted here at length in preference to the earlier announcements. Whenever occasion arises to quote from the Transactions of the *Société de Biologie*, the French will be translated. The *Lancet* article is in English, and as follows :

"THE EFFECTS PRODUCED ON MAN BY SUBCUTANEOUS INJECTIONS OF A LIQUID OBTAINED FROM THE TESTICLES OF ANIMALS. —

"On June 1st last I made at the *Société de Biologie* of Paris a communication on the above subject, which was published in the *Comptes Rendus* of that Society on June 21st (No. 24). I will give here a summary of the facts and views

contained in that paper and in two subsequent ones, adding to them some new points.

"There is no need of describing at length the great effects produced on the organization of man by castration, when it is made before the adult age. It is particularly well known that eunuchs are characterized by their general debility and their lack of intellectual and physical activity. There is no medical man who does not know also how much the mind and body of men (especially before the spermatic glands have acquired their full power, or when that power is declining in consequence of advanced age) are affected by sexual abuse or by masturbation. Besides, it is well known that seminal losses, arising from any cause, produce a mental and physical debility which is in proportion to their frequency. These facts, and many others, have led to the generally-admitted view that in the seminal fluid, as secreted by the testicles, a substance or several substances exist which, entering the blood by resorption, have a most essential use in giving strength to the nervous

system and to other parts. But if what may be called spermatic anemia leads to that conclusion, the opposite state, which can be named spermatic plethora, gives as strong a testimony in favor of that conclusion. It is known that well-organized men, especially from twenty to thirty-five years of age, who remain absolutely free from sexual intercourse or any other causes of expenditure of seminal fluid, are in a state of excitement, giving them a great, although abnormal, physical and mental activity. These two series of facts contribute to show what great dynamogenic power is possessed by some substance or substances which our blood owes to the testicles.

"For a great many years I have believed that the weakness of old men depended on two causes —a natural series of organic changes and the gradually diminishing action of the spermatic glands. In 1869, in a course of lectures at the Paris Faculty of Medicine, discussing the influence possessed by several glands upon the nervous centers, I put forward the idea that if it were possible without danger to inject semen

into the blood of old men, we should probably obtain manifestations of increased activity as regards the mental and the various physical powers. Led by this view, I made various experiments on animals at Nahant, near Boston (United States), in 1875. In some of those experiments, made on a dozen male dogs, I tried vainly, except in one case, to engraft certain parts or the whole body of young guinea-pigs. The success obtained in the exceptional case served to give me great hopes that by a less difficult process I should some day reach my aim. This I have now done. At the end of last year I made on two old male rabbits experiments which were repeated since on several others, with results leaving no doubt as regards both the innocuity of the process used and the good effects produced in all those animals. This having been ascertained, I resolved to make experiments on myself, which I thought would be far more decisive on man than on animals. The event has proved the correctness of that idea.

"This innocuity was also proved on a very old dog by twenty subcutaneous injections of a fluid similar to that I intended to employ on myself. No apparent harm resulted from these trials, which were made by my assistant, Dr. D'Arsonval.

"For reasons I have given in many lectures in 1869 and since, I consider the spermatic as also the principal glands (kidneys, liver, etc.) as endowed, besides their secretory power, with an influence over the composition of blood, such as is possessed by the spleen, the thyroid, etc. Led by that view I have already made some trials with the blood returning from the testicles. But what I have seen is not sufficiently decisive to be mentioned here.

"Leaving aside and for future researches the questions relating to the substance or substances which, being formed by the testicles, give power to the nervous centers and various other parts, I have made use, in subcutaneous injections, of a liquid containing a very small quantity of water mixed with the three following parts:

First, blood of the testicular veins; secondly, semen; and thirdly, juice extracted from a testicle, crushed immediately after it has been taken from a dog or a guinea-pig. Wishing in all the injections made on myself to obtain the maximum of effects, I have employed as little water as I could. To the three kinds of substances I have just named I added distilled water in a quantity which never exceeded three or four times their volume. The crushing was always done after the addition of water. When filtered through a paper filter the liquid was of a reddish hue, and rather opaque, while it was almost perfectly clear and transparent when Pasteur's filter was employed. For each injection I have used nearly one cubic centimeter of the filtered liquid. The animals employed were a strong, and according to all appearances, perfectly healthy dog (from two to three years old), and a number of very young or adult guinea-pigs. The experiments, so far, do not allow of a positive conclusion as regards the relative power of the liquid obtained from a dog and that drawn from guin-

ea-pigs. All I can assert is that the two kinds of animals have given a liquid endowed with very great power. I have hitherto made ten subcutaneous injections of such a liquid — two in my left arm, all the others in my lower limbs — from May 15th to June 4th last. The first five injections were made on three succeeding days with a liquid obtained from a dog. In all the subsequent injections, made on May 24th, 29th, and 30th, and June 4th, the liquid used came from guinea-pigs. When I employed liquids having passed through Pasteur's filter, the pains and other bad effects were somewhat less than when a paper filter was used.

"Coming now to the favorable effects of these injections, I beg to be excused for speaking so much as I shall do of my own person. I hope it will easily be understood, that if my demonstration has any value — I will even say any significance — it is owing to the details concerning the state of my health, strength, and habits previously to my experiments, and to the effects they have produced.

"I am seventy-two years old. My general strength, which has been considerable, has notably and gradually diminished during the last ten or twelve years, Before May 15th last I was so weak that I was always compelled to sit down after an hour's work in the laboratory. Even when I remained seated all the time, or almost all the time, in the laboratory, I used to come out of it quite exhausted after three or four hours' experimental labor, and sometimes after only two hours. For many years, on returning home in a carriage by six o'clock, after several hours passed in the laboratory, I was so extremely tired that I invariably had to go to bed after having hastily taken a very small amount of food. Very frequently the exhaustion was so great, that although extremely sleepy, I could not for hours go to sleep, and I only slept very little, waking up exceedingly tired.

"I ought to say, that notwithstanding that dark picture, my general health is and has been almost always good, and that I had very little to

complain of, excepting merycism and muscular rheumatism.

"The day after the first subcutaneous injection and still more after the two succeeding ones a radical change took place in me, and I had ample reason to say and to write that I had regained at least all the strength I possessed a good many years ago. Considerable laboratory work hardly tired me. To the great astonishment of my two principal assistants, Drs. D'Arsonval and Hénocque, and other persons, I was able to make experiments for several hours while standing up, feeling no need whatever to sit down. Still more: one day (the 23d of May), after three hours and a quarter of hard experimental labor in the standing attitude, I went home so little tired that after dinner I was able to go to work and to write for an hour and a half a part of a paper on a difficult subject. For more than twenty years I had never been able to do as much. My friends know, that owing to certain circumstances and certain habits, I have for thirty or forty years gone to bed

very early and done my writing work in the morning, beginning it generally between three and four o'clock. For a great many years I had lost all power of doing any serious mental work after dinner. Since my first subcutaneous injections I have very frequently been able to do such work two, three, and one evening for nearly four hours. From a natural impetuosity, and also to avoid losing time, I had, till I was sixty years old, the habit of ascending and descending stairs so rapidly that my movements were rather those of running than of walking. This had gradually changed, and I had come to move slowly up and down stairs, having to hold the banister in difficult staircases. After the second injection I found that I had fully regained my old powers, and returned to my previous habits in that respect.

"My limbs, tested with a dynamometer, for a week before my trial and during the month following the first injection, showed a decided gain of strength. The average number of kilograms moved by the flexors of the right forearm,

before the first injection, was about 34 1-2 (from 32 to 37), and after that injection 41 (from 39 to 44), the gain being from 6 to 7 kilograms. In that respect the fore-arm flexors reacquired, in a great measure, the strength they had when I was living in London (more than twenty-six years ago). The average number of kilograms moved by those muscles in London in 1863 was 43 (40 to 46 kilograms).

"I have a record of the strength of my fore-arm, begun in March, 1860, when I first established myself in London. From that time until 1862 I occasionally moved as much as fifty kilograms. During the last three years the maximum moved was thirty-eight kilograms. This year, previously to the first injection, the maximum was thirty-seven kilograms. Since the injection it has been forty-four.

"I have measured comparatively, before and after the first injection, the jet of urine in similar circumstances — that is, after a meal in which I had taken food and drink of the same kind in similar quantity. The average length

of the jet during the ten days that preceded the first injection was inferior by at least one quarter of what it came to be during the twenty following days. It is therefore quite evident that the power of the spinal cord over the bladder was considerably increased.

"One of the most troublesome miseries of advanced life consists in the diminution of the power of defecation. To avoid repeating the details I have elsewhere given in that respect, I will simply say that after the first days of my experiments I have had a greater improvement with regard to the expulsion of fecal matters than in any other function. In fact a radical change took place, and even on days of great constipation the power I long ago possessed had returned.

"With regard to the facility of intellectual labor, which had diminished within the last few years, a return to my previous ordinary condition became quite manifest during and after the first two or three days of my experiments.

"It is evident from these facts and from some

others that all the functions depending on the power of action of the nervous centers, and especially of the spinal cord, were notably and rapidly improved by the injections I have used. The last of these injections was made on June 4th, about five weeks and a half ago. I ceased making use of them for the purpose of ascertaining how long their good effects would last. For four weeks no marked change occurred, but gradually, although rapidly, from the 3rd of this month (July) I have witnessed almost a complete return of the state of weakness which existed before the first injection. This loss of strength is an excellent counterproof as regards the demonstration of the influence exerted on me by the subcutaneous injections of a spermatic fluid.

"My first communication to the Paris Biological Society was made with the wish that other medical men advanced in life would make on themselves experiments similar to mine, so as to ascertain, as I then stated, if the effects I had observed depended or not on any special

idiosyncrasy or on a kind of auto-suggestion without hypnotization, due to the conviction which I had before experimenting that I should surely obtain a great part at least of these effects. This last supposition found some ground in many of the facts contained in the valuable and learned work of Dr. Hack Tuke on the "Influence of the Mind over the Body." Ready as I was to make on my own person experiments which, if they were not dangerous, were at least exceedingly painful, I refused absolutely to yield to the wishes of many people anxious to obtain the effects I had observed on myself. But, without asking my advice, Dr. Variot, a physician who believed that the subcutaneous injections of considerably diluted spermatic fluid could do no harm, has made a trial of that method on three old men — one fifty-four, another fifty-six, and the third sixty-eight years old.[1] On each of them the effects have been found to be very nearly the same as

[1] The paper of Dr. Variot and my remarks upon it have appeared in the *Comptes Rendus de la Societe de Biologie*, No. 26, 5 Juillet, 1889, pp. 451 and 454.

those I have obtained on myself. Dr. Variot made use of the testicles of rabbits and guinea pigs.

"In my third communication at the Biological Society, I said that both the intense pain each injection had caused me and the inflammation it has produced would be notably diminished if the liquid employed were more diluted. The three cases of Dr. Variot have proved the exactitude of my statement. He made use of a much larger amount of water, and his patients had to suffer no very great pain and no inflammation.

"These facts clearly show that it was not to a peculiar idiosyncrasy of mine that the effects I have pointed out were due. As regards the explanation of those effects by an auto-suggestion, it is hardly possible to accept it in the case of the patients treated by Dr. Variot. They had no idea of what was being done; they knew nothing of my experiments, and were only told that they were receiving *fortifying* injections. To find out if this qualification had anything to

do with the effects produced, Dr. Variot, since the publication of his paper, has employed similar words of encouragement, while making subcutaneous injections of pure water on two other patients, who obtained thereby no strengthening effect whatever.

"Since writing the above I have received a letter from Dr. Variot announcing that, after injecting the liquid drawn from the testicles into these two individuals, he has obtained the same strengthening effects I have myself experienced.

"I believe that, after the results of Dr. Variot's trials, it is hardly possible to explain the effects I have observed on myself otherwise than by admitting that the liquid injected possesses the power of increasing the strength of many parts of the human organism. I need hardly say that those effects can not have been due to structural changes, and that they resulted only from nutritive modifications, perhaps in a very great measure from purely dynamical influences exerted by some of the principles contained in the injected fluid.

"I have at present no fact to mention which might serve to solve the question whether it would be possible or not to change structurally muscles, nerves, and the nervous centers by making during a good many months frequent injections of the fluid I have used. As I stated at the Paris Biological Society, I have always feared, and I still fear, that the special nutritive actions which bring on certain changes in man and animals, from the primitive embryonal state till death by old age, are absolutely fatal and irreversible. But in the same way that we see muscles which have from disease undergone considerable structural alterations regain sometimes their normal organization, we may, I believe, see also some structural changes not essentially allied with old age, although accompanying it, disappear to such a degree as to allow tissues to recover the power they possessed at a much less advanced age.

"Whatever may be thought of these speculations, the results I have obtained by experiments on myself and those which have been

observed by Dr. Variot on three old men show that this important subject should be further investigated experimentally.

"It may be well to add that there are good reasons to think that subcutaneous injections of a fluid obtained by crushing ovaries just extracted from young or adult animals, and mixed with a certain amount of water, would act on old women in a manner analogous to that of the solution extracted from the testicles injected into old men."

To the above, by way of supplement, are to be added the following translations of passages from the earlier Paris announcements. First from the second "Note:"

"Not only is there nothing to be astonished at in the fact that the introduction into the blood of principles taken from the testicles of young animals is followed by an augmentation of vigor, but this result is even to be expected. In fact, everything shows that the force of the spinal marrow and also, though in a less degree, that of the brain has, in adult or aged man,

fluctuations connected with the functional activity of the testicles. To the facts which I mentioned in this connection at the sitting of the first of June, I believe I ought to add that the following particulars have been observed a great number of times in the course of several years in the case of two persons aged from forty-five years to fifty. At my advice, each time that they had a great piece of work, either physical or intellectual, to accomplish, they put themselves into a state of active sexual excitement, avoiding, however, all seminal ejaculation. The glands of the testicles then temporarily acquired great functional activity, which was soon followed by the desired augmentation of power in the nervous centres."—*Société de Biologie, Comptes Rendus*, June 21st, 1889, p. 420.

Again:

"It is evident that the pain and local inflammation from which I have suffered after each injection might be very noticeably diminished by the employment of a liquid more diluted with water, and also by the injection of a cubic

half-centimeter in place of double that quantity. This is what I propose to do when I return to the introduction beneath the skin of the testicular fluid. But before making these new attempts, I shall have to employ another method, although it appears to me it must be inefficacious. I mean the injection of the testicular fluid into the intestine. It is probable that I shall be able to introduce a fluid much less irritating on account of the quantity of water which I shall add to it into the rectal cavity. The local irritative effects will thus be very notably diminished, if not annulled. But I have good reason to fear that the principles of the testicular fluid, which augment the power of the nervous centres, may be modified by the intestinal juices, and that things may then proceed as in the stomach, where the work of digestion so completely changes the organic substances which are found in our food. I greatly fear that we may be forced to lay aside all hope of making the active principles of the testicular fluid enter into the blood, unless we employ the

method of subcutaneous injections."— *Ibid*, pp. 420–1.

Again from the "Third Note:"

"The idea which has conducted me in my experiments is, that the injections which I have made might replace the inefficacy of testicles but slightly active or inactive. I have good reason for believing that, if other persons succeed in their own cases in obtaining the favorable results which I have observed in my own case, a considerable palliative will have been found for the evil effects of seminal losses, in injections of the testicular fluid of mammals.

"It cannot be denied that the physiologists and physicians who may desire to repeat upon themselves my experiments might escape the pain by employing, simultaneously with the testicular fluid, cocaine. I believe the inflammation of the skin might be avoided if, in place of a single injection of a too considerable quantity, like that which I have employed, this should be divided so as to inject the tenth part of it only at any one point, making on the same day ten

injections instead of one, with the addition of a little distilled water." — *Société de Biologie, Comptes Rendus*, June 28th, 1889, p. 431.

Here follows a translation, from the Transactions of the *Société de Biologie* for June 21st, of remarks called forth by the original announcement:

"REMARKS ON THE SUBJECT OF M. BROWN-SÉQUARD'S COMMUNICATION, BY M. DUMONTPALLIER.

"The results established by M. Brown-Séquard, in consequence of subcutaneous injections of a peculiar fluid which held in suspension spermatic elements, are highly interesting, and, if the same results, under the same conditions of experiment, are established anew by other experimentors upon mammals and man, our learned President will have added a very important discovery to the considerable discoveries which medicine and physiology already owe him.

"But, while admitting that the major part of the results obtained by M. Brown-Séquard is due to the peculiar nature of the fluid injected

beneath the skin, may it be permitted me to mention that the subcutaneous injections of sulphuric ether and traumatic irritations have allowed me to recall to life invalids whose existence was gravely threatened, and that the survival was prolonged seven days in one observation and several years in a second one, although in both cases the existing organic lesions must have resulted sooner or later in death. — M. Brown-Séquard, better than any one else, knows that the common peripheric irritations, more or less repeated, irritations non-inflammatory, in a great number of cases, both physiological and therapeutic, often determine dynamogenic phenomena which are explained by the more or less permanent awakening of the principal functions. — In consequence, could not a certain part of the results in the case of M. Brown-Séquard's experiments be referred to the irritation of the nervous system of the periphery? — Whatever may be the value of these remarks, they can in nothing diminish the importance of our learned President's experiments."

In answer to this, it is to be noted that the subjects of M. Variot's experiments, which will be described later, while experiencing no inflammation, exhibited the same improvement of condition as did M. Brown-Séquard.

The following is translated entire from the Transactions of the *Société de Biologie* for July 5th, 1889, pp. 451–5:

"THREE EXPERIMENTS UPON THE PHYSIOLOGICAL ACTION OF TESTICULAR JUICE INJECTED BENEATH THE SKIN, IN ACCORDANCE WITH M. BROWN-SÉQUARD'S METHOD, BY M. G. VARIOT.

"The fluid which served me to make the subcutaneous injections was obtained by the crushing and trituration, by the aid of nippers and a spatula, of the pulp of the testicle of a rabbit or adult guinea-pig, in ten cubic centimeters of distilled water.

"The organs employed were absolutely fresh, having just been taken from the animals.

"After crushing several minutes in the water the fragments of testicular parenchyma as much as

possible, I decanted the fluid from the solid parts This fluid is reddened by the blood, slightly turbid, and contains in suspension small particles of pulp. — In each of my experiments, I injected beneath the skin two cubic centimeters of fluid, and the injections were forty-eight hours apart.

"*First Experiment.* —Man fifty-four years old, house-painter, very anæmic and debilitated from chronic intoxication. As a result of privations, he was taken with a persistent diarrhœa.

"His emaciation and debility were so great, that he kept his bed.

"Unless one had known this man's profession and the symptoms of previous intoxication, one would have believed himself to be in the presence of a case of visceral neoplasm of the abdomen, in view of his ghastly appearance, his emaciation, and his state of languor. Eight days ago, nevertheless, he got up, when, on the 22nd of June, I made beneath the skin of the abdomen two injections of *fortifying* fluid; that is the name I gave the fluid with this invalid, in order to justify my operation. For three or

four hours, pain and pricking sensations sufficiently lively in the region of the injections ; at the same time a feeling of general discomfort, with sensations of stiffness in the limbs. But in the evening this man experiences a feeling of unaccustomed comfort, which lasts throughout the next day. 'My head is better,' he says, 'I feel a flow of spirits, my limbs are more supple and elastic, I have more strength ; it seems to me as if I had been stimulated.' I notice, in fact, that the eye is much livelier, the face animated, and that he stands more firmly on his legs. He can walk without fatigue, he presses my hand with energy.

"Second injection the 24th of June. The effect is perceptibly the same on the following days ; the gaiety and high spirits return ; appetite greatly increased.— The 26th of June, this man experiences a return of virility, which has been wanting in him for several weeks.

"Third injection the 26th of June. The same effects.

"*Second Experiment.* — Man fifty-six years

old, very atheromatous, with an enlarged heart. Subject to violent palpitations and dizzinesses. Has suffered greatly for lack of work and means, very emaciated and extremely weak.

"He can stand only with difficulty, and walk but for a few instants without being obliged to sit down.

"Some tonics administered for two weeks and sufficient nourishment have not brought back his powers. He has no appetite.

"First injection the 22nd of June (rabbit's testicle). Discomfort and lassitude all day, so great that he thinks he has caught cold. Nevertheless, no elevation of temperature. The 25th he awakes wholly recovered. Since this day, he says, he feels more strength in his limbs, more elasticity; he begins to walk. The 24th he finds a tremendous change in his condition, and congratulates me on having found an invigorating fluid so active. 'I feel much more lively and strong, I can stand and move without becoming dizzy, as was the case before; I am no longer the same.' He goes up and down stairs, leaves his chair, walks.

"Second injection the 24th of June (rabbit's testicle). This complete transformation in the condition of his powers and also of his mind persists. He has high spirits and feels gay, when before he was melancholy and oppressed. The 24th of June he declares his appetite has greatly increased, that he feels very much stronger, and believes himself almost wholly re-established. He has had no spontaneous erection.

"Third injection the 26th of June (guinea-pig's testicle).

"The effects of nervous excitement continue, but the two injections made the 24th and 26th create no feeling of discomfort.

"*Third Experiment.* — Man sixty-eight years old, who was attacked two months ago with pulmonary congestion complicated with bronchitis; for a long time, he has been suffering with symptoms due to prostatic hypertrophy. His urine is purulent. He seldom leaves his bed, most of his functions are performed with languor, he eats very little.

"The 24th of June, two injections of the tes-

ticular juice of a rabbit beneath the skin of the abdomen.

"He feels for several hours lively pains and great discomfort. But after the next day he declares that he feels the good effects of the fortifying fluid. 'He takes a walk with pleasure, feels stronger, would like to lift weights as when twenty years old.' The 26th of June he awakes 'sharp set,' he says, as he has not been for a long time. He is enchanted at the effect of the injection, but suffers much from his bladder, while hoping speedily to regain all his powers to undergo the surgical treatment which will cure it.

"Second injection the 26th of June (guinea-pig's testicle); the first (24th of June) was made with the testicle of a rabbit.

"On the 27th this man says to us spontaneously 'that he woke up in the night with an erection, a thing which had not happened to him for over two months.' Moreover, he had a natural stool, which is equally contrary to his habits, since he does not ordinarily have a passage with-

out an injection. He expresses his satisfaction with great animation.

"*Conclusion.* — These three cases, observed with complete impartiality, seem to me to show :

"1. That the subcutaneous injections of testicular juice are painful, but harmless, creating no inflammation when they are made with wholly suitable instruments. I have not seen the complications indicated by M. Brown-Séquard, though I have made sixteen injections.

"Once only was produced a slight ecchymosis, which still persists. This ecchymosis is due to the puncture of a vein.

"2. The first effect of the injection has been to occasion a local pain, together with a general feeling of uneasiness, but without elevation of temperature. It is not then possible to explain the symptoms which follow by febrile excitement, as M. Féré proposes.

"3. The injections which follow the first are well supported, and no longer determine feelings of general uneasiness ; they are, nevertheless, sufficiently painful.

"4. As positive effect, I note a state of general nervous excitement; augmentation of the muscular force; excitement and regulation of certain visceral functions, and notably of the digestive tube; slight cerebral excitement. The men upon whom I have made these experiments belong to a class, in which it is a difficult matter to give an account of psychical excitement, properly so called.

"Genital excitement has been produced in two cases out of three.

"These observations seem to me to be sufficiently harmonious to merit being continued with more precision. I propose to myself, when I shall have an opportunity of doing so, to take a witness upon whom I shall inject distilled water.

"These three men do not read the newpapers, and are in consequence not acquainted with M. Brown-Séquard's experiments. I am content, by way of stating the motive of my injections, to tell these invalids that I inject upon them a fortifying fluid. All three insisted the injections should be continued.

"The symptoms of nervous excitement, which I have stated in the case of these three men, are so similar, that they employ the same terms in characterizing what they have experienced.

"Can these symptoms be explained by a sort of auto-suggestion, aroused by these little operations?

"Or, on the other hand, must they be attributed to the action itself of the injected substance, in accordance with M. Brown-Séquard's interpretation?

"I do not believe myself to be authorized by so small a number of facts, in spite of their apparent agreement, in positing formulated conclusions either way.

"REMARKS ON THE OCCASION OF M. VARIOT'S PAPER UPON THE INJECTIONS OF TESTICULAR FLUID IN THE CASE OF MAN, BY M. BROWN-SÉQUARD.

"I. The facts reported by M. Variot have assuredly great weight.[1] Whatever may be

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"[1] It is of consequence to say that M. Variot had no belief in success, when he began his experiments. Quite to the contrary, he expected negative results.

the idea adopted with regard to the explanation of the phenomena, there remains, if we add to these facts that which I have observed in my own case, this result, that upon four old men effects of the same order have appeared after subcutaneous injections of juice extracted from the spermatic glands.

"After my experiments, it might have been demanded whether, as I said in my first communication, the effects of these injections did not depend upon my personal idiosyncrasy. This question is peremptorily answered by the fact that four old men, very different each from the others, in age, habits of life, state of health, etc., experienced similar effects after the injections of which we are speaking. It is clear that these effects depend upon a totally different cause, from the idiosyncrasy of the individuals subjected to these experiments.

"Does this cause consist in an influence of the testicular juice upon the nervous system? Is it not rather an auto-suggestion, without hypnotization? There is no doubt but that I was

surrounded by circumstances the most favorable for the production of dynamic changes, changes of nutrition, secretion, etc., by the influence of a moral cause capable of acting as hypnotic suggestions act. Before undertaking my experiments, I felt convinced that I should see all the effects appear in me which did appear. This condition, essential to the influence of an auto-suggestion, existed then in me in the highest degree. The effects which appeared were more energetic than I had expected to establish; that is the only difference between my expectation and what happened.

"The three individuals whose history M. Variot gives us were surrounded by conditions totally different from mine. None of them knew what the matter in hand was. It had been simply told them that use was made of a fortifying fluid. Can it be believed that this indication was sufficient to occasion, by suggestion, effects as marked as those which appeared? How could the belief be entertained, when one remembers that every day we cause tonics to be

taken, promising the invalids their strength will increase, and that it is only seldom and slowly we see a favorable energetic action occur, while in M. Variot's three cases the good effects followed very rapidly, and in all three individuals? There is then reason for believing that it was indeed the injected fluid that in those cases produced the phenomena of dynamogeny of the nervous centres and especially of the spinal marrow.

"II. It is of consequence to repeat that the fluid obtained by the trituration of fresh testicles with the addition of a little water must be employed only after filtration, and that Pasteur's filter should be selected in preference to those made of paper. Although M. Variot has performed without accident injections with a liquid which has not been filtered, there is no doubt but that a risk is run of septicæmia in acting thus.

"III. The choice of an animal whose testicle to use is important. I believe that the guinea-pig should be preferred to the rabbit or dog

The dogs, with which we have had an acquaintance long enough to be sure there exists in their case no probability of rabies, might perhaps be more advantageously employed than guinea-pigs ; but it would be necessary to avoid using dogs which one has not been able to have under his eyes for several days. It might perhaps be dangerous to employ rabbits' testicles, by reason of the possibility of worm-germs.

"As to the employment in veterinary medicine of injections of testicular fluid, I believe that, to satisfy the necessity of having testicles larger than those of guinea-pigs, it will be necessary to employ the spermatic glands of sheep or of calves already somewhat mature.

"IV. I have received a great number of letters, asking whether the testicular fluid could be employed with advantage in other cases than in those of individuals debilitated by old age alone. It is quite natural to believe that there might be advantages, in cases of debility, in making use of injections of this liquid, when the testicles have much less power of secretion

than they should have in adult man in the normal state. It might be especially useful to make these injections in cases of debility connected with seminal losses, with disorders of the testicles, or with venereal excesses, especially when these have occurred at an advanced age."

SUPPLEMENT.

PERTINENT and interesting will be some reference, however necessarily incomplete, to contemporaneous authoritative opinion. The following extracts are given for what they are worth, and with but little attempt at arrangement:

The *Medical Age*, Aug. 26, 1889, announces that a firm of druggists, actuated by "the desire of determining the utility of the now well-known and much abused suggestions of Brown-Séquard, regarding the tonic properties of testicular fluid, of discovering its active principle, and of providing a preparation of it free from the objections inseparable from that commended by this distinguished scientist, that physicians might further experiment with it," claim to have discovered

and to furnish for use the active principle contained in "testicular fluid." The article in question, which bears the heading "The Rationale of the Brown-Séquard Treatment," goes on to say :

"The main subject which has engrossed attention, and which is of momentous interest to the practical physician is the possibility of obtaining the active principle in a concentrated form. The expectations entertained, seem to have been fully realized. Having discovered a base, or alkaloidal substance, in the testicles of various animals, its identification with a normal constituent of the human body and special glands, was not attended with any great difficulty.

"Physiological experiments have established the fact that in salts of the alkaloid *Spermine*,[1] we have the cause for the stimulant effects observed by Dr. Brown-Séquard. Inasmuch as the substance can be obtained in a crystalline condition, and is quite permanent, no danger of septicæ-

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[1] This substance is a leucomaine or physiological alkaloid, one of the natural products of living bodies.

mia can exist. After exposure to boiling alcohol and boiling water, bacterial agents cannot well survive. Injections made on animals, as well as in individuals, show that the claims made on behalf of this remedy, rest on a secure foundation. Although the action of various animal substances on the economy has been known for so long, the many difficulties attending the administration of readily decomposable and highly nitrogenized bodies, has been a barrier to experimental demonstration and recognition of the true agent at issue.

"The following will make clear the physiological features of the problem:

'Spermine, $C^2 H^5 N$, is the basic substance obtained by Schreiner (1878) from semen, calf's heart, calf's liver, bull's testicles, and also from the surface of anatomical specimens kept under alcohol. Previous to this, however, it had been known for a long time under the name of 'Charcot-Neumann's crystals,' which are the phosphate of spermine. These peculiarly-shaped crystals have been found in the sputa of a case of emphysema with catarrh, in the bronchial discharges in acute bronchitis, as well as in sputa of chronic bronchitis, in the blood,

spleen, etc., of leucocythæmics and anæmics, and in the normal marrow of human bones, as well as in human semen. Altogether it seems to have a very wide distribution, especially in certain diseases, as in leucocythæmia.

'It can be prepared from fresh human semen in the following manner: The semen is washed out of linen by a little warm water, evaporated to dryness, boiled with alcohol, and the insoluble portion allowed to subside by standing some hours. The precipitate is filtered off, washed, and dried at 100°. This residue, containing the spermine phosphate, is triturated, and then extracted with warm ammoniacal water. From this solution, on slow evaporation, the phosphate crystallizes in its peculiar-shaped crystals.

'The free base is obtained, on decomposing the phosphate with baryta and evaporating the filtrate, as a colorless liquid, which, on cooling, crystallizes. From alcohol it crystallizes in wavellite-shaped crystals, which readily absorb water and carbonic acid from the atmosphere. They are readily soluble in water and in absolute alcohol, almost insoluble in ether, and possess a strongly alkaline reaction. When heated with platinum it gives off thick, white fumes, and a weak ammoniacal odor. The aqueous solution of the base is precipitated by phosphomolybdic and phosphotungstic acids, tannic acid, gold and platinum chlorides.

'The hydrochloride, $C^2H^5N.HCl$, crystallizes in

six-sided prisms, united in tufts, and is extremely soluble in water, almost insoluble in absolute alcohol and ether.

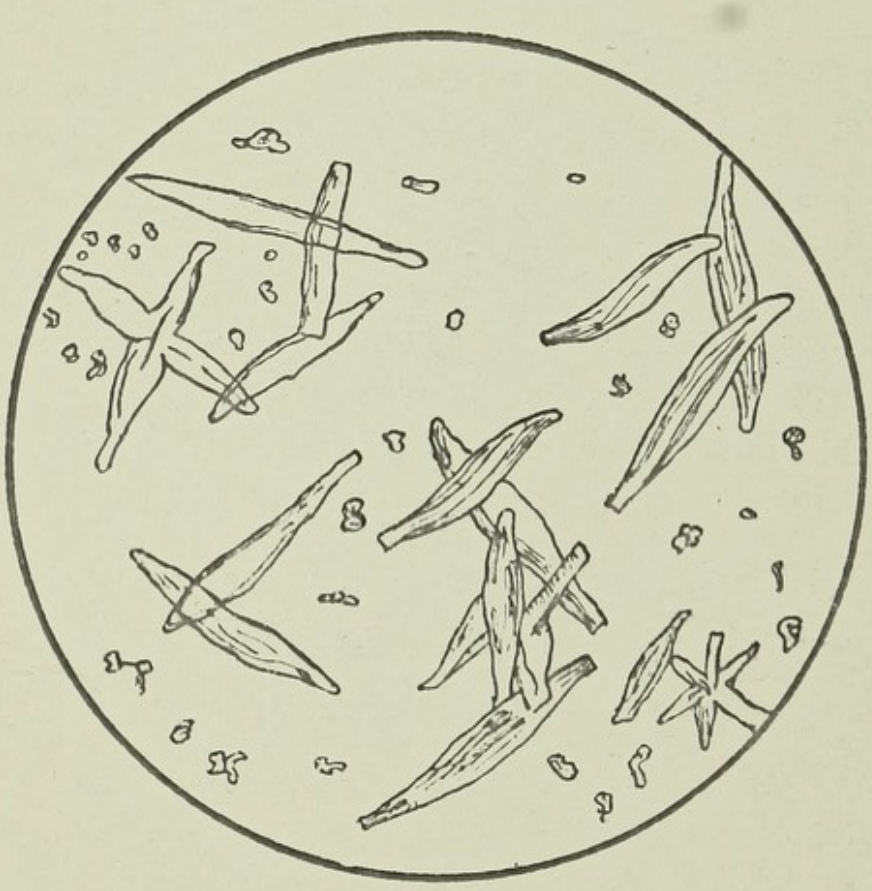
'The aurochloride, $C^2H^5N.HCl\ AuCl,^3$ forms shining golden-yellow, irregular plates, and when freshly precipitated it is easily soluble in water, alcohol, and ether, but the dried salt is incompletely soluble in water. The aqueous solution, treated with magnesium, gives off a sperm-like odor. The platinochloride crystallizes in prisms.

'The phosphate $(C^2H^5N)^2.H^3PO^4+3H^2O(?)$, forms prisms and slender double pyramids. It is difficultly soluble in hot water, insoluble in alcohol, easily soluble in dilute acids, alkalies, and alkali carbonates. It melts with decomposition at about 170°. It is probable that the above formula does not represent the salt as found, and from theoretical considerations Ladenburg is inclined to think that Schreiner's phosphate has the composition $(C^2H^5NH)^4Ca(PO^4)^2$.— *From Vaughan's & Novey's compilation on Ptomaines and Leucomaines.*'

"Again, in the work of Landois and Stirling ('Text Book of Human Physiology'), we read :

'*Chemical Composition.*—The *seminal fluid,* as discharged from the uretha, is mixed with the secretion of the glands of the vas deferens, Cowper's glands, and those of the prostate, and with the fluid of the vesiculæ seminales. Its *reaction* is neutral or alka-

line, and it contains 82 per cent. of water, serum-albumin, alkali-albuminate, nuclein, lecithin, cholesterin, fats (protamin?), phosphorized fat, salts (2 per cent.), especially phosphates of the alkalies and earths, together with sulphates, carbonates, and chlorides. The odorous body, whose nature is unknown, was called '*spermatin*' by Vauquelin.



'*Fig.* 548.—Crystals from Spermatic Fluid.

'*Seminal Fluid.*—The sticky, whitish-yellow seminal fluid, largely composed of a mixture of the

secretions of the above-named glands, when exposed to the air, becomes more fluid, and on adding water it becomes gelatinous, and from it separate whitish, transparent flakes. When long exposed, it forms rhomboidal crystals, which, according to Schreiner, consist of phosphatic salts with an organic base(C^2 H^5N). These *crystals* (Fig. 548) are said to be derived from the prostatic fluid, and are identical with the so-called Charcot's crystals (Fig. 144, *c*, and § 138). The prostatic fluid is thin, milky, amphoteric, or of slightly acid reaction, and is possessed of the seminal odor. The phosphoric acid necessary for the formation of the crystals is obtained from the seminal fluid. A somewhat similar odor occurs in the albumen of eggs not quite fresh. The secretion of the vesiculæ seminales of the guinea pig contains much fibrinogen (*Hensen and Landwehr.*')

"Even ancient works furnish a corroboration of Dr. Séquard's results. The following from 'The New London Dispensatory,' by Dr. Salmon, issued in 1684, being a translation of the late edition by the Fellows of the College of Physicians, dated 1676, will show what results were attributed to the *internal* administration of materials now under consideration, even though they were prepared in a crude way, and though good interpreters were lacking:

'The Boar: The stones and pizzle (dried) for weakness of genitals and barrenness.

'The genitals of a dog are used by magicians to provoke lust.

'Castor: 'It revives and quickens the spirits, etc.'

'Deer: The stones dried and drunk in wine, excite lust.

'Horse: The testicles in powder excite venery, etc.'

"It is needless to multiply these quotations. Suffice it to say that to preparations obtained from the otter, hare, weasel, panther or leopard, badger, bear, fox (among four-legged animals), similar properties are ascribed.

"Among birds, the eagle, buzzard, quail, crane, and domestic cock are credited with similar stimulating properties.

"In the fish kingdom, we have the oyster, cockles, the poulp, thornback, roach, and especially the sturgeon. Regarding the latter, it is worth while to make an extract from Dr. Salmon's work: 'The spawn with salt makes caviare, which nourishes, increases seed, and excites lust, etc.'

"It is to be regretted that our periodical sources of information, the newspapers, should have given the whole subject a highly sensational clothing, and employed a figure of speech 'Elixir of Life,' which is entirely unwarranted.

"Dr. Brown-Séquard never made any extravagant claims for this treatment. In fact his article is characterized by modesty and cautiousness. . . . .

"That the method of preparation employed by Dr. Brown-Séquard is rather unscientific or at least unpharmaceutical, goes without saying. At the same time the credit of devising this means of resupply of the energizing principle is his due, and is deserving of the highest recognition. Evidently, since the salt in question appears to be quite permanent, there exists no valid argument against its employment as a perfectly safe and legitimate medicinal agent.

"The action of the remedy appears to be simply that of a stimulant, and the duration of its action is limited by natural causes.

"It is excreted through natural channels, the

urine, fæces, etc. The employment of boy's urine in South America as an equivalent to beef tea or extract of beef, may be regarded also confirmatory evidence of the tonic stimulant effect of natural secretions.

"That it wastes or departs from the system in diseased conditions is shown by quotations from 'Landois and Stirling,' and the same conditions are undoubtedly partly responsible for the debility of old age.

"It is, of course, rather early to speculate on its mode of action, but enough has been ascertained to point out the proper line of research. Whether it be simply a nerve stimulant or whether it has a direct influence on the organized elements (corpuscles) of the blood itself, of a revivifying or energizing nature, will in due course be determined.

"The very fact that it is wasted or excreted in diseased conditions, characterized by important lesions, is a strongly corroborative element of our syllogism. When we replace the loss, an increase of vitality results.

"There can be no valid argument against the employment of the pure salt by the stomach, inasmuch as we already partake of it in meats of all kinds. Much must, however, be wasted in this manner. If used in form of the phosphate, or hydrochlorate, it would appear advisable to give it when the condition and contents of the stomach are best calculated to allow of its absorption. Being a crystalloid, spermine and its salts are dialysable, and would therefore be absorbed readily if the process were not obstructed by too great a quantity of food matters.

"It may be noted here that in experimental administration, all ammonia with which the salt is usually associated, was carefully removed, as also the phosphoric acid combined with it, as it exists in the structures. The results obtained from the hydrochlorate, show that the alkaloid itself is the active agent. On healthy individuals, the substance seems to act simply as an exhilarant or stimulant to the nervous system, this fact being especially noticeable in its action on the sexual apparatus. The strength of solution used,

was 4 grains of spermine hydrochlorate to the ounce, representing, in each 15 minims, one eighth grain of the salt. Its entire safety having been first demonstrated on animals, it was afterwards employed on suitable human subjects. One case in animals is deserving of especial mention : A rather aged cat had a fang extracted some six months ago, there being at that time an ulcerated condition, and an abscess subsequently formed directly under the eye, the latter suppurating continuously. After three injections (one daily) the suppuration has entirely disappeared, and increased vivacity of the animal is also noticed.

"An aged negro, long troubled with rheumatism and general decrepitude, due to exposure and habits, after three injections showed a remarkable improvement. Whereas he could previously raise himself on the steps of a street car with great difficulty only, requiring a stoppage of two or three minutes, he is now able to enter without delay, almost as easily as any healthy person would. Injections were made in both arms and

legs, and he can now move all the members as he has been unable to do for many years. It may be remarked that he had no knowledge of the material employed, or of the supposed effects. It is needless here to multiply cases, as the object of investigation was mainly to identify the active principle and demonstrate the possibility of presenting it in a state of purity.

"Regarding the alleged dangers of this treatment, it may be said that the *form* of medication itself is not unattended with danger in unskilled hands. Too often the physician is an unskilful mechanic, and where the syringe should be kept superlatively clean and always sterilized after each operation, it often becomes, through neglect and consequent accumulation of septic matter in the needle or barrel, an instrument of torture, or worse. Of these mistakes, or sins of omission, we seldom hear.

"In conclusion, several questions may be pertinent as a compact grouping of the reasoning employed:

"1. Why do all animals that are continent display excessive energy?

"2. Why does excessive indulgence, or loss of the seminal fluid, invariably weaken the animal?

"3. Why is a larger quantity of spermine contained in the generative parts and nervous system, than in other organs of the body?

"4. Why is this substance found in the sputum or detritus of wasting structures?

"5. Why do such marked tonic results follow its replacement.

"6. Why do certain kinds of food-material, now known to contain this principle, act as decided stimulants, and the evidence of which is usually first discerned in the condition of the generative apparatus?"

Upon this an editorial in the same periodical comments as follows:

"In the scales of professional opinion, the merits and demerits of Brown-Séquard's claims, are about evenly balanced. No small amount of ridicule has emanated from different sources, notably certain members of the French Academy, which appears somewhat incongruous, to say the least. It is passing strange that those

who unhesitatingly accepted the weather-cock assertions of Pasteur, unsupported as they were, and are, by evidence, and based upon no tangible scientific fact, should without inquiry reject the claims of a scientist of world-wide reputation, made upon the strength of nearly a quarter of a century of careful honest experimentation. It is sad to think that the gentleman to whom we are most indebted for our advance in neuropathology and physiology, should be the subject of ribald jests, while the emanations of the *Laboratorie de Rage*, based upon experiments of one day, entirely divested of control, are eagerly snapped up the day following, loudly heralded, and widely disseminated. Were Dr. Brown-Séquard's statements proven wholly fallacious, which they are very far from being, his age, professional standing, and well known honor and probity should, at least, entitle him to respectful attention.

"But his claims have not as yet been disproven by any reliable experiment. On the contrary every day brings more or less confirmation

— not through the lay press, who have taken the matter up in a sensational way; not through the irresponsible parties calling themselves physicians who rush into public print twelve hours after an imperfect investigation, or perhaps none at all; neither by those who have attempted the experiment, and unfamiliar with its details, have failed. It is such who bring discredit upon experimental physiology and pathology, and who tend to intensify the would-be sarcasm of 'Elixir of Life,' and make it the rallying cry for all classes of pretenders. This very fact is most unfortunate and to be deplored, as it deters many honest professional men from entering the arena of experimentation and research, while it has also served a host of charlatans with the means of advertising themselves and their wares, with little trouble and expense. Worse still, many of the profession have taken their cue from the public press, hence have conceived an entirely erroneous opinion regarding both Prof. Brown-Séquard and his claims.

"Dr. Séquard nowhere heralds an 'Elixir of

Life,' 'Fountain of Youth,' or other such nonsense, and this likening to Ponce de Leon, is simply an emanation of the reportorial brain. His statement made before the *Société de Biologie*, is simply to the effect that, in his own case, and in experiments conducted more or less continuously since 1869, he had reason to believe a discovery had been made of a new nerve stimulant, concealed, or contained, in the spermatic secretion; that its influence is chiefly expended upon the exhausted central nervous system. The fact it relates to the most sacred portions of the animal economy, and that the abuse of these organs by man is such as to bring not only them, but their possessors, in moral disrepute, seems to tempt popular and vulgar levity.

"The claims, however, are not altogether new to the world, presumably. We now have every reason to believe that the ancient civilizations — Chaldea, Egypt, and Ethiopia for instance — forgot more of pathology and physiology than we yet know. Among these ancient peoples there was a strong veneration for the sexual apparatus

as the origin of Life, which underlay their worship, and yet survives esoterically to every known religion of the world, Christianity included; to-day the phallic and yoni emblems appertain to the worship of the Nazarine and his virgin mother. We find the same reverence vulgarized, yet plainly patent in the Middle Ages; also that the generative organs and their products, from their earliest times to the present, were regarded as furnishing potent remedies for diseases of a certain class. In the British Pharmacopæia of 1676 (Salmon) such products are accredited with inciting lust, furthering impregnation, stimulation of the sexual function in both sexes, and preventing 'falling sickness' (epilepsy). These have fallen in disrepute, not from evidence of lack of therapeutic activity, but on account of inexpediency — difficulty of securing and preparing. To-day, in portions of England the farriers employ the secretions of testes, administered on a fasting stomach, to renew the sexual function in exhausted stallions and other stock getters, and it must be admitted such

therapeusis is attended with a degree of success entirely incompatible with the claim of coincidence.

"All this goes to show that Brown-Séquard had a practical basis for his experiments, and, moreover, that from the first they were not devoid of scientific probability. It is a trite assertion of Science, that 'No superstition or myth is wholly devoid of truth.'

"Further, the existence, long known, of Charcot-Neumann's crystals, presupposed an alkaloid, that has recently been identified, and corresponds exactly to the *Spermine* of Schreiner, C^2H^5N (1878). The alkaloid is further found in the gray nerve-matter of the brain, in eggs, oysters, lampreys, fish ovæ and milt; likewise in the products of all atonic mucous membranes whence is developed excessive secretion or waste. Still further research has developed its presence in excess in the sputa of senile and acute bronchitis, in the expectorations of phthisis, and of emphysema with catarrh, and in the blood and spleen of anæmics and leucocythæmics.

"Certainly there is food for reflection in the fact this product is discoverable in wasting diseases in excess. In the circulation of leucocythæmics, where the proportion of white blood corpuscles to red is as one to *three*, instead of as in health one to *three hundred and seventy-three*, spermine is readily isolated in considerable quantities, and the brain suffers correspondingly for lack of a vital element.

"It is a well known physiological fact, that those suffering from wasting diseases fail mentally and physically in a degree altogether disproportionate to the amount of food ingested and assimilated; especially is this true in catarrhal pneumonia. We must, then, look for some other element than the mere fact of waste, as generally understood. Again, the loss of the vital portions of the sexual apparatus, which interfere with the secretion of the seminal fluid, so completely transforms the individual, physically and mentally, that physiology has been forced to acknowledge an unknown cause, inadequate of explanation by mere loss of gland-

ular tissue. Such individuals are rarely long-lived, are exceptionally predisposed to disease, are lacking in general brain activity, and incapable of great physical and mental exertion.

"Again, it is an indisputable fact that genital affections of all classes are accompanied by pallor, wasting and general exhaustion of the economy, most manifest in the central nervous system, a most pitiable condition ensuing. The wasting diseases of the female organism, notably leucorrhæa, are as positive in these effects as the excessive loss of semen, or a violent urethritis, in the male. Barrenness is a frequent concomitant, and invariable when the discharge is both profuse and of long standing, and there is the usual evidence of mental decrepitude. Observe how rapidly the cachectic, chlorotic, nervo-sanguine blonde girl, and the prematurely aged and haggard spinster of middle life, both suffering from excessive lues, by happy marriage, even when entailing unaccustomed labor, in great degree, renew vitality, youth, and health, and obtain rapid abatement of the flux!

"In laboratory experiments it has been found that the *hydrochlorate of spermine* ($C^2H^5N.HCl$) is the most desirable and convenient preparation of the alkaloid, as it is freely soluble in water; to casual inspection it resembles hydrochlorate of cocaine." Of them, "it may be said they were undertaken in a somewhat skeptical spirit, and they embraced a period of six weeks. Though not perfected in all details, enough has been discovered to warrant the assumption that there is a good deal more than mere assertion in the claims of Prof. Brown-Séquard. It seems probable the salt will prove a valuable addition to our materia medica as a hæmatic and nerve stimulant, with specific applicability in collapse, wasting diseases, and certain forms of mental disorder.

"Regarding the irresponsible experiments undertaken, or claimed to have been made, appearing daily in the lay press, it may be remarked that the majority bear *prima facie* evidence of spuriousness. We may also believe that more than one case of septicæmia has been

developed, since ignorance of the method of preparation, of segregation of effete and dangerous products, of removal of possible micro-organisms, and of the physiological axiom, that 'The truth of the positive is developed only by the negative,' is unwittingly self confessed.

"The seminal secretion, *per se*, is a fluid of extreme instability, and when mixed with blood corpuscles tends to rapid decomposition. Unless obtained immediately after the death of the animal, and rapidly prepared and filtered, its employment is prone to be attended with disastrous consequences, and even then it can not be deemed positively safe unless the preparation has been such as to carefully inculcate sterility through every stage of the process.

"Some of the adverse criticisms that obtain are based upon false premises. One writer claims to have secured identical results from the subcutaneous injection of serum, but this is not tenable, since this fluid, with extremely rare exceptions, when thrown into the cellular tissue, induces abscess formation, a fact that never

occurs with spermine, or properly prepared testicular fluid. Again, a chemist, Mr. J. D. Riker, ascribes the virtues claimed by Brown-Séquard, to the ammonio-phosphate of magnesium, and phosphatic salts, such as are found in semen; yet no microscopist or chemist would mistake the crystals of spermine for any of these salts, as they are widely divergent in form and arrangement. Further, the phosphates produce no appreciable result in any doses that are compatible with the use of the hypodermic syringe, and the physiological effects of phosphorus (as cited by this writer), are very far from being those of the phos*phates*, either individually or collectively. Hydrochlorate of spermine, however, employed subcutaneously in a dose of one-fortieth of a grain, in a dog thirteen pounds, induced marked physical and mental activity, and powerful and prolonged stimulation of the genital system. This experiment has been repeated several times with identical results: and here at least these sequels cannot be attributed to imagination, or psychic influence, since control

experiments were wholly negative, and operator and observer alike skeptical. It is interesting to note also that experiments undertaken by M. Variot (Therapeutic Gazette, August, 1889, p. 566), of the French Academy, by Prof. W. A. Hammond, and by Dr. H. C. Brainard, of Cleveland, are all corroborative of those of Brown-Séquard. Space will not permit of details, but we will undoubtedly have occasion to allude thereto, and to the labors of other investigators again in the near future. And, while we are not prepared to assert so profound advantages are to be derived from the new discovery as are claimed, there is little doubt hydrochlorate of spermine will find, for a time at least, a field of usefulness."

In a contribution, admirably exact in statement, logical and fair, to the *Medical Record*, of New York, Aug. 24, 1889, Dr. Henry P. Loomis, of New York, reports from his own practice ten cases treated by injection of "testicular fluid," of whom five were ignorant of and five understood the character of the treat-

ment. Dr. Loomis's observations and conclusions are:

1. While the closest scrutiny of the materials used is demanded, with proper care there need be no danger of septicæmia. Bad results followed in none of his cases, and in only a few did the injection cause a moderate amount of pain, lasting from six hours to eight.

2. The fluid exerts upon the nerve-centres some potent but as yet not understood influence, which may in time prove to be beneficial in some cases, but necessitates cautious use in others. It is not safe to proceed upon the theory that "if it does no good it can do no harm."

3. Its effect upon *old men* seems to be an augmentation of vigor and vitality, certainly continuing several days. Dr. Loomis has seen in its employment nothing in the slightest degree resembling the secondary depression, which generally follows the use of ordinary stimulants.

4. In cases of actual disease, it seems to pro-

duce no effect upon pathological conditions or processes.

5. It does produce "nutritive modification" in the tissues of elderly men, through the medium probably of stimulation of the nerve-centres. That this modification, however, may occur to the extent of alterations in muscular structure not essentially allied to old age disappearing, and tissues regaining their former power, as Dr. Brown-Séquard deems not impossible, there is as yet ground sufficient neither for affirming nor denying.

6. The theory warrants further experimentation.

Dr. Loomis's communication was the occasion in the *Medical Record*, of the same date, of an editorial emphatically *adverse* to Dr. Brown-Séquard's theory.

From the *Boston Medical and Surgical Journal*, July 11, 1889:

"THE TESTICLE AS A REJUVENATOR.

"Twenty years ago, at least, Dr. Brown-Séquard exhibited tendencies towards a belief

that the testicle might be of value for other purposes than the impregnation of the ovum, provided it was taken when young,— that it was competent, when its vital principles were properly injected for the respective purposes, not only to call into existence the very young but to rejuvenate the aged.

"It seems that the idea has continued to germinate in the brain of the learned, but eccentric, physiologist all these years. In 1875 he made experiments with grafts of testicular tissue upon dogs, and to his delight succeeded, as he thought, in renewing the youth of one wretched old cur. Since then he has continued these strange investigations at various times, and during the month of June this year made two separate communications to the *Société de Biologie* of Paris upon the subject, describing the methods used and the supposed results. He, apparently, thinks he has discovered a sort of *elixir vitæ*, or fountain of perpetual youth, of simpler composition than those elixirs so sedulously compounded by the mediæval philoso-

phers, and easier of access than the elusive fountain which enticed poor Ponce de Leon to his fond and fatal journey.

"According to the reports of Brown-Séquard's communications given by the French journals, he has been experimenting with a fluid obtained by crushing and washing the testicles of young animals, which was mixed with blood from the spermatic veins and water. This fluid he injected into his own subcutaneous cellular tissue almost every day for two weeks, with results so gratifying that he hastened to communicate them to his biological confréres. Notwithstanding his ripe age, between seventy and eighty years, he experienced a rejuvenescence of all his forces, physical and mental. The former healthy and vigorous contractility of the intestines and bladder had returned, as also had his general muscular strength. Intellectual labor had again become easy to him.

"Dr. Brown-Séquard did not succeed apparently in inoculating his hearers with his own enthusiasm for his procedure. Scepticism

and physiological objections found expression through MM. Dumont-Pallier and Féré. Nor did the society treat his results with sufficient seriousness to discuss the question as to the value of the ovary for similar purposes, or as to the possible results of injecting subcutaneously an ovarian aqueous extract into the male and a testicular extract into the female."

"The sooner the general public, and especially septuagenarian readers of the latest sensation, understand that for the physically used up and worn out there is no secret of rejuvenation, no elixir of youth, the better. There is no animal or vegetable product, from whatever animal or whatever gland, and however appropriated by the senile organism (by ingestion or injection), that can put back the march of the fell destroyer by one day — except, indeed, so far as it acts as a vital stimulant or nutrient, and how can any stimulant or nutrient undo the effects of atheroma, fatty degeneration, senile atrophy!" — *Ibid.*, Aug. 15, 1889.

From the *Times and Register*, New York and Philadelphia, Aug. 17, 1889:

"THE ELIXIR OF LIFE.

"Dr. Ernest Laplace, who has been with Brown-Séquard within a not very remote period, strongly dissents with those who look upon the French physiologist as in his dotage, and affirms that he is still in the full possession of his mental faculties. His opinions are, therefore, to be received with the respect due to his great achievements, and his theory should have an impartial examination. We need not more than advert here to the improbability of any lasting effect being produced by these injections of testicular fluids. There is a disease which sweeps into the arms of death all who escape from other fatal ills, and that is old age. The periods of physiological activity and of subsequent decay come with the same unerring certainty as the succession of the seasons. Numerous experiments have been made, in fact, the world has been scoured, in the endeavor to find means of prolonging life, or, at least, the period of sexual activity. It cannot be said, however, that there has been any success in this

search. Stimulants to the sexual appetite exist, but they are not lasting in their effects, and serve simply to more quickly exhaust the little vitality remaining. Since Hufeland's day no one has thought it well to prepare a work upon the art of prolonging life; and we may doubt, with Erasmus Wilson, if the art has made much progress since Hufeland wrote his book, now a century old. While all works upon medicine may be said to treat of this art, yet none have treated the subject in the simplest and most direct form, apart from the treatment of disease. In these latter days, when the profession is so overcrowded, it is likely that honor and profit would result if one were to take up as a specialty the art of prolonging the lives of aged persons and chronic incurables. But even if the effects reported by Brown-Séquard do not prove to be permanent, or really beneficial in the long run, it is probable that he has discovered a most valuable and powerful stimulant; one which may prove useful in other than the affections for which he used it. In the low

stages of fevers, in anæmias, in many cases where a powerful stimulant to the exhausted vitality is needed, the testicular fluid may prove useful. There are such cases when alcohol does not answer; where strychnine is powerless, phosphorus and nitro-glycerin too evanescent, and ordinary tonics fail completely. In these, and in true neurasthenia, as well as in phthisis, the new remedy may find a place; provided the remarkable observations of Brown-Séquard are verified by other investigators.

"Variot has endeavored to eliminate from the experiments with the testicular fluids the effects of imagination. He described in glowing terms the results of the new method, and then injected pure water instead, but the patients found no relief. This is not satisfactory, however, as it is not always possible to carry conviction through simulated enthusiasm. Had he selected another physician, who believed in the method, and allowed him to address the patients, he himself believing that he was using the true fluid, the conditions of the experiment

would have accorded with those found in actual practice."

Again:

"THE ELIXIR OF LIFE.

"When Koch's discovery of the bacillus of tuberculosis was published, a thrill of elation went through the entire medical profession. A memorial stone was erected that marked the dawn of a more exact science as displayed in our knowledge of the diagnosis and treatment of a disease that continuously claims a greater number of victims than any other that afflicts the human race.

"The laity never realized that the sum of man's knowledge of himself had received a very valuable addition.

"This discovery was quickly followed by others in the same domain, and to-day the germ theory of the cause of many diseases is almost universally accepted by educated physicians.

"Suddenly, almost in the twinkling of an eye, the medical profession is called upon to

deal with the most striking phenomenon of the age, just offered to the world by the aged and renowned scientist, Professor Brown-Séquard, in what is popularly termed the use of the Elixir of Life, which consists of the testicles of inferior animals being removed, and immediately cut in small pieces, triturated or mashed so as to express and expel the living spermatozoa and juices of the gland, the straining of these juices, composed of serum and sperm, and immediate injection with a hypodermic syringe into the cellular tissues of old and physically broken-down men.

"The process has been tried by a great number of physicians, with the most diverse reports of the results.

"The secular press, day after day, teems with comments, interviews, and statements of the wondrous powers and efficacy of the promising treatment, and the prurient tastes of the people are pandered to *ad nauseam*, until we are constrained to ask, Why is this thus? Why this public discussion of a subject that is usually

tabooed in common conversation? At first it was taken up by the papers very daintily, but it was enough to excite the lively imaginations of a host of readers, and these people wanted to know more about what they hoped was a potent aphrodisiac and actual live forever business.

"Many at once thronged physicians' offices, and at every opportunity hailed their medical advisors to consult them in regard to the new fountain of life that has brought hope to their fainting hearts.

"Never until now has the medical profession been made to realize that more than half of the men of the period believe their genital organs are very much below normal, and their owners are in a frame of mind that makes them willing to undergo a minor surgical operation and endure any probable amount of pain, for a very slight assurance that for them the generative standard could be raised to a degree that would be entirely satisfactory to themselves.

"It is only a few years ago that the discovery was made that nearly all of women's ailments

were due to derangements of the uterus and its appendages. The medical profession was at once equal to the occasion and discovery, and there sprang into being the now potent gynecologist. We will now usher to the front the man who will make a specialty of the treatment of the male genitalia. The transfusion of vital fluids from the inferior animals to man will be thoroughly investigated and its utility proven, or it will be relegated to the past as a visionary dream. . . . .

"The greatest good that will result from this New Elixir of Life will be the creation of a new body of specialists, whose time and talents will be devoted to affections of the male genitalia."— *Cincinnati Lancet-Clinic*, Aug 17, 1889.

Further:

"EXPERIENCE WITH THE ELIXIR VITÆ.

"St. Louis, August 16, 1889.

"Editor *Weekly Medical Review*. — I scarcely know how to respond to your very kind

request to write up my experience with the so-called Brown-Séquard 'elixir of life'; however the first thought to one examining the fluid with a microscope is much more likely to be that he is looking at a *lively* or live, than a life mixture. From the first, I have expressed myself as having no confidence in the medicinal effects of this elixir other than what may follow a psychical impression. It might be harsh and unjust to style it the dotage dream of a prince in physiology, but milder language of similar import might convey an idea of the impression I have *ab initio* entertained. And what was then an impression, notwithstanding the startling reports of marvelous results, following the hypodermatic use of the mixture, which daily appear in our newspapers, *ad nauseam*, has after careful experimentation with, to be sure, but a limited, yet I think a sufficiently large, number of patients, when I take into consideration the time and labor wasted, become a conviction; and I am satisfied with the proofs of the faith that is within me regarding the so-called 'Brown-Séquard Elixir Vitæ.'

"I have no faith in its re-vitalizing influence, unless to inoculate one with micrococci, bacteria and bacilli — living organisms, but too frequently death-producers — is to re-vitalize. It is an old saying that 'in death there is life,' but for some years we have been almost unconsciously formulating another sentence composed of exactly the same words, and equally true, but of just the opposite significance, *i. e., in life there is death.* The introduction of myriads of living organisms into bodies previously unoccupied by these death-dealing germs, has doubtless been effected during the past two weeks to an alarming extent. For, it is but reasonable to suppose that the haste to as quickly as possible introduce the elixir before the *dynamic* (?) power resident in the living (?) molecules of matter, before the cells, not spermatic, had really become dead matter, has precluded the use of the microscope in 999 out of every 1000 instances in which it was used.

"One of the patients on whom I experimented three times, was unable to sleep half as

much as usual, and complained of unusual dryness of the mouth on the night following a one-drachm injection. Another one had a copious and fœtid sweat the night following an injection of one drachm, made at 8:30 P.M., and would not allow a second use of the elixir(?) Another, still, had an attack of vomiting and diarrhœa during the night following an injection about 5 P.M., and did not present himself for a second experience.

"No other symptoms, either favorable or unfavorable, were observed. But four patients were experimented with.

"On two occasions I discovered tubercle bacilli in the preparations made from material obtained from what appeared to be perfectly healthy sheep. It is needless to say that these mixtures were not used.

"I invariably filtered the mixtures before using them; this should have removed most, if not all, of the bacteria that might have been in the distilled water used, but in nearly every instance, in about an hour and a quarter after the

compound had been formed, would bacteria be seen; and on several occasions, bacilli were present. The bacterium termo predominated. Next in frequency was what I took to be the vibrio ruguda. In one sample I found a number of vibrio serpens, three hours and fifteen minutes after removal of the gland from the scrotum. One specimen was literally crowded with vibriones rugudæ and bacilli of tuberculosis. My friends, Dr. S. S. Porter and his son, of 2924 Chestnut street, and I spent hours together over this sample.

"On one occasion, thirty-five minutes after removal of a gland from the scrotum of an animal that had been nearly killed, but not quite, an hour before examination of the elixir (?) by Drs. Waldo Briggs and George C. McCosh and myself, we discovered a great many bacteria termo and bacilli; the latter seemed to be the vibriones rugudæ.

"While doing the microscopical work in connection with my experiments, I was astonished to note the frequency with which I observed

two, and sometimes three, spermatozoa with thin heads (or bodies) laid one almost exactly on top of the other (side to side), appearing like but a single spermatozoon with two or three tails.

"In one instance I could not find a single live spermatozoon twenty minutes after the death of the animal from which the parts were removed; while in another instance, eighteen hours and thirty minutes after the death of the sheep, and eleven hours after the placing of the drop of elixir (?) under the cover of glass, I discovered living spermatozoa.

"All of my material was taken from what was supposed to be healthy sheep, about eight or nine months old. And all implements and instruments used were carefully sterilized before each time the mixture was made. Neither eruptions, flushings, nor abscesses have followed any of the experiments.

"ALEXANDER B. SHAW, M.D."

Weekly Medical Review, St. Louis, Aug. 17, 1889.

A communication from Indianapolis to the New York *Sun* says:

"Dr. Purman of this city has just made a practical demonstration of Brown-Séquard's life elixir theory. Dr. Purman easily procured the consent of Noah Clark, who is 50 years of age, generally debilitated, suffers from rheumatism and from disease contracted during the war, and is a very fit subject for the experiment tried upon him this morning.

"Dr. Purman drove out to the stock yards this morning, and selected the healthiest lamb obtainable. The lamb was killed and the necessary parts were brought to his office. The preparation was very simple. The parts were cut and pounded in a mortar, or thoroughly 'triturated.' Two drachms of water was added and the preparation was carefully filtered. The result was a reddish fluid — the elixir. One and a half drachms of this were injected into the emaciated arm of Clark a little below the shoulder with an ordinary hypodermic syringe. Granville Allen and Dr. Theodore Parker were

present during the operation, which took place within two hours after killing the lamb.

"A few minutes after the operation, a reporter called at the office and saw Mr. Clark. He was a limp picture of dejection, and seemed to have little vitality.

"'You know how you feel sometimes when you get up in the morning,' he said, 'you feel sleepy and lifeless, and unable to do anything. That's the way I have felt ever since the war.'

"About four hours afterward Mr. Clark walked down town from Fort Wayne avenue, and climbed up two flights of stairs without stopping. 'I feel a decided difference,' he said positively.

"'It used to take me an hour to get down town, and this time I have walked it in twenty-five minutes. I have not felt this way for twenty-five years. I have new vitality. I do not drag my feet along, and it is no trouble to hold my head up. I used to go along all bent over.'

"Clark stood quite straight. 'The doctor

noticed an improved look in my eyes, and more strength in my walk,' he added. 'Before I could not read a newspaper without glasses, as I now can. The injection has certainly done me good. Whether this will last or not I don't know, but I hope it will.'

"Clark to all appearances was certainly improved. His complexion and eyes clearly indicated an exhilarated state."

A communication to the Boston *Globe* from Detroit says :

"Dr. John W. Palmer, a prominent physician of Detroit, has been experimenting with the elixir of life, and with remarkable results. His patients are 60 and 70 years old respectively.

"The elder man was decrepit and had been in failing health for years. The first injection seemed to put new life into him, and with the second administering the effect has been remarkable. He walks erect, has the appearance of long life ahead of him, and says he feels stronger than for years.

"The younger man did not indicate such pro-

nounced results on the first trial, but with the second he showed the rejuvenating effects, and asserts his belief that the new remedy is a life preserver if not a cure-all.

"Dr. Palmer says: 'I have just begun experimenting. I do not know what the discovery may result in. This I do know, that an immediate effect is to exhilarate and tone up. I believe that in many cases it may save life in bridging over a crisis. The preparation is in no sense dangerous, for an antiseptic enters all its composition, and its base is from the healthiest of animals.'"

Dr. Allen McLane Hamilton, of New York, declares:

"The theory is opposed to all the laws of physiology and chemistry. Further than that, I believe it is a very dangerous proceeding, and that it is time for reputable physicians to express their disapproval of the experiments. There is great danger of introducing a violent poison into the system. It is well known that

the putrefaction of albumen produces some of the most deadly poisons. It is quite possible that this substance injected into the veins should act there as the arrow poison does which is used by the South American Indians. When the elixir is sterilized by heat or the admixture of substances to prevent decay, it is quite certain that it must be so changed as to lose any beneficial element it may have had when fresh. But I do not believe it has any benefieial element when fresh. When skillfully prepared and injected before decay sets in, it would have no more effect than water would. But there is always danger. It is hard to tell when the moment is passed at which the harmless substance becomes dangerous. The juices of a newly dead body, as undertakers and medical students know, are much more dangerous when absorbed through a wound than those of a body that has been preserved some time. Dr. Brown-Séquard's injections were all very painful. I believe that many cases of erysipelas have followed these injections."

"On the theory that it might have the effect claimed for it, how could the substance act on the system?"

"It couldn't act. Those who have tried it offer no explanation of the result obtained. They say practically that a 'vital fluid' has been given the patient. It is a return to the medical systems of the middle ages. It affects some through mental exhilaration. Its hold on the public is due to a love of the mysterious. It is not a new idea. Mention of its use was made three centuries ago. Although Dr. Brown-Séquard is well advanced in years, I believe that antedates his time."

"Have you been requested to prepare the fluid for any of your patients?"

"A gentleman came to me with such a request the other day. I refused his request; but if, under any extraordinary condition of affairs, I should be persuaded by a patient to try it, I should inject the fluid with the same confidence that I should inject water. People do live longer now than they did formerly, but length-

ened life is due solely to the advance of sanitary science and to the care which people take of themselves."

From the correspondence of the *Journal of the American Medical Association*, Chicago, Aug. 24, 1889:

"Dr. Wm. A. Hammond, who like most others was at first disposed to pooh-pooh Brown-Séquard's alleged discovery of the rejuvenating power of the testicle, now announces that the results of a number of experiments which he has himself made are such as apparently to confirm the correctness of Brown-Séquard's assertions. In the experiments he used the testes of freshly killed lambs, in preference to the rabbit or guinea pig, employed in France; great care being taken to thoroughly filter the solution employed in the injections. He began his experiments first on himself, to make sure that the method was not dangerous to the patient. Since then he has experimented on several old men without their being aware of what was being done to them, and in the case of one

From the *Western Medical Reporter*, Chicago, Aug., 1889:

"BROWN-SÉQUARD AND THE FOUNTAIN OF YOUTH.

"And now we are asked to believe that the venerable Brown-Séquard has discovered the secret of life — the perennial fountain — the waters of which once quaffed, metamorphose the trembling and impotent old man into a strong and virile youth. The wondrous brew which is to defy Old Time is the juice of the testes of animals; the method of administration is by hypodermic injection. M. Variot follows the 'bell-wether' over the fence and confirms Brown-Séquard's experiments by a series of cases. These cases were old men of 54, 56 and 68 years respectively. The injections were followed by 'general exaltation of nervous sensibility, stimulation and regulation of digestion, and an increase of muscular vigor.'

"It is fortunate for our eminent brother that the world is too enlightened to believe in sorcery and witchcraft, otherwise we would tremble for his safety. We regret that the preparation

of the magic draught has not been more thoroughly outlined. If we are not mistaken, the distinguished and learned compounder forgot to mention whether the decoction should be brewed at the full or dark of the moon.

"It is a lamentable and indubitable fact that some men outlive their usefulness. Why is it that men who have achieved renown in science, letters and politics, live long enough to ruin the good work of the vigorous early and middle periods of life? Had John Bright died a few years earlier, there would never have been a single criticism of his life and works. The stand which he took regarding the momentous questions involved in our own civil war, was enough to enshrine him in the memories of patriotic Americans at least, for all time. His attitude in the Irish question more than neutralized his previous commendable actions. That Bright, the great and liberal commoner, should tacitly ally himself with the aristocracy in the oppression of the Irish, can only be explained by the inconsistency which is but natural to the man in his dotage.

"Tennyson, who has done work which will justly immortalize him, has nevertheless lived long enough to produce material — poetry by courtesy — which is but the driveling of senility, if indeed it is no worse. Many years ago Brown-Séquard, by his researches in neuro-physiology and pathology, took his place among the foremost medical philosophers of the age. If some good genius had impelled him to cease philosophizing and experimenting at 'the zenith of his fame,' nothing could have dimmed the lustre of his contributions to science. His unlucky star certainly must have been in the ascendant, for some years later we find the poor old man going from place to place and trying to convince the profession that the theory which had made him famous, was wrong. The ancient story of the cow that gave the good pail of milk and then kicked it over, seems very appropriate in this connection.

"What is most peculiar about the latest freak of our eminent scientist, is his verification of a time-honored and fallacious notion of the

laity as to the potency of 'fries' — a notion the practicability of which might be testified to by full many a sorrowing capon. The ancients had great faith in the magic of Séquard's brew. Horace is quoted as imploring a famous and powerful witch to impart to him the secret process by which a certain rejuvenating draught was made. This was manufactured at night with great mystery by grinding up flesh torn from fiery Roman stallions. The *Medical Record* suggests that the brew of Brown-Séquard contains a stimulating leucomaine, to which its effects may be attributed. Had the 'discovery' originated in the mind of a lesser light in medicine, the *Record* — which is nothing if not candid — might have suggested the possibility of the claims of Brown-Séquard being unmitigated bosh. We are thankful for the suggestion as to leucomaines, however; our ideas of the potency of a certain food preparation are now more lucid. Science makes clear and technical what the olfactories of our patients have already discovered.

"If the 'rejuvenator' prove to be as potent as is claimed by its originator, it might be well for us to give Chinese therapeutics more attention. There may be more in the nostrums of the almond-eyed heathen than our more enlightened medical philosophy has yet dreamed of.

"Apropos of Brown-Séquard's pharmacological and therapeutical discovery, it might be well to inquire whether the distinguished investigator has not stolen some of Shakspeare's thunder.

'Round about the caldron go,
In the poisoned entrails throw.
Toad, that under coldest stone,
Days and nights has thirty-one,
Sweltered venom, sleeping got,
Boil thou first i' the charmed pot!

'Fillet of a fenny snake,
In the caldron boil and bake
Eye of newt, and toe of frog,
Wool of bat, and tongue of dog,
Adder's fork, and blind worm's sting,
Lizard's leg and owlet's wing,
For a charm of powerful trouble,
Like a hell broth boil and bubble.

'Scale of dragon, tooth of wolf;
Witch's mummy, maw and gulf
Of the ravined salt sea shark;
Root of hemlock, digged i' the dark;
Liver of blaspheming Jew,
Gall of goat, and slips of yew,
Silvered in the moon's eclipse;
Nose of Turk, and Tartar's lips;
Finger of birth-strangled babe,
Ditch delivered by a drab—
Make the gruel thick and slab:
Add thereto a tiger's chawdron,
For the ingredients of our caldron.

'Cool it with a baboon's blood,
Then the charm is firm and good.'—
Macbeth, Act 4."

The *Independent*, Aug. 15, 1889, views the matter thus:

"THE BROWN-SÉQUARD SENSATION.

"While Dr. Brown-Séquard has not called his new injected fluid an elixir of life, it is clear that he is not sure but it almost deserves the name. He recognizes it as probably the fact that certain processes and changes in the human

body are irresistible and finally fatal. In infancy the bones are gelatinous and flexible; but gradually the proportion of lime-salts increases and the amount of cartilage decreases, until, in old age, the bones are brittle and perishable. This change goes on steadily, before and after puberty. So there is a gradual change in the structure of brain and nerve tissue and of muscles, until they cease to perform their functions and a person dies of old age. As one passes from childhood to maturity certain mental or physical powers are developed, and then decay or are entirely lost. There is the regular and apparently irresistible course of things by which a period of protected weakness is followed by a period of parentage and strength, and this again by impotency, physical and mental degeneracy, and death. Dr. Brown-Séquard does not assert that this process can be permanently arrested by any new-discovered elixir of life; but he does suggest and believe that as the strength and active vigor of the years of a man's freshest youth come from the absorption into the blood of fluids then pro-

duced, which have a special stimulative power upon all parts of the body, so by the introduction, subcutaneously, into the system of old men of a solution of fluids taken from young and vigorous animals, this lost force can be restored to the circulation, and the old vigor very much recovered. It is as if fresh yeast were put into dough, fresh malt into the stale product of the brewery. He believes that substances which once came naturally into the blood, and thus stimulated the vigorous action of the whole system, can be artificially restored to the circulation, and will then in a measure invigorate the action of muscles and brain. . . . . .

" Whether the effect [produced by his experiments] came from any specific property in the fluids injected into the circulation, or was purely the result of what is called auto-suggestion or imagination, and yet without hypnotism, is the question to be decided. Dr. Brown-Séquard speaks with some reserve, but evidently believes that there is a real specific power in the fluid taken from the active glands of the young ani-

mals employed in these experiments. He quotes the results of experiments made upon three old men by Dr. Variot, who has used the fluid with success on several old men, but failed when, with similar words of encouragement, he has used only pure water. The experiments have, during the past week or two, been repeated in a number of cases in this country, and with varying success, some operators declaring that the results have been all that Dr. Brown-Séquard describes, and others that no appreciable effects have followed. The latter conclusion seems probable, and it is yet far from certain whether anything more than imagination must be accredited with the good results recorded.

"But this may be regarded as probable, that nothing more than a mere stimulus can be expected of any such injected fluid. We remember when injections of blood were first suggested and tried what wonderful results were expected; but they have not followed. The transfusion of blood is rarely tried with any good results. It is ridiculous to speak of this as an 'elixir of

life.' There is no elixir of life, and Dr. Brown-Séquard would never pretend to have found one. All he would say is that he has found something which stimulates the nerve centers and empowers them to do a certain amount of work. No medicine will reverse the course of nature. It will not replace the superfluous phosphates of the bones with cartilage. It will not restore the lost power and function of bodily organs. It can only for a time stimulate to activity, a stimulation which is as likely to shorten as it is to prolong life. There has been so much that is unscientific and foolish written on the subject during the past few days, so much that might give wild hopes to people whose powers are enfeebled, that we have thought it well to give the facts on their best side, so that all that is claimed can be clearly known, and to indicate what we see needs to be again and again repeated, that

'Neither god of love nor god of skye
Can doe, said she, that which cannot be donne.'"

Hon. Charles Levi Woodbury writes :

"It depends on which part of the life you lengthen. It would be a great worry to parents to lengthen childhood thirty or forty years. It would be a sore deprivation to one's heirs to prolong old age unnecessarily for such a period. It would be a great discouragement to young women marrying wealthy middle-aged men, and generally would make life sentences for matrimony or the penitentiary unendurable. The tendency of the change would seem to lead to an increase of suicide and divorce, and its effect on life tenures under the civil service reform would be disheartening to the average voter. The ancients said 'whom the gods love die young,' and although Methuselah set an early example of long life, it has not been vigorously pursued by succeeding generations.

"Could Dr. Brown-Séquard apply his secret to lengthening the youth and beauty of woman and manhood, it would be more popular than an application to the preceding or succeeding stages of existence. But, as every believer in a future

state thinks we are to live forever, it makes but little difference in the long run, how much of it we spend in the present form of life.

"Another view is that, as bores are numerous, the prolongation of their lives would be a nuisance, the thing should be regulated by ballot, and none permitted to take the elixir except those who could command a large majority of relatives and neighbors to that end, as Balder did in the Scandinavian mythology."

And so stands Dr. Brown-Séquard's "Elixir of Life" at present.

THE END.