at the first application, up to 200 or 250. The Americans are said to have obtained much stronger currents (500 to 1,000 milliamperes) without any injury to the patients. Some patients can bear much stronger currents than others, but usually their endurance increases with the number of applications. If the skin on the surface of the abdomen covered by the external electrode is not perfectly sound, the current cannot be borne so strong, for great pain is produced wherever the cuticle is not perfect, such as over a scratch or an acne spot. These places should be covered with some oil silk or plaster before the external electrode is applied.

The application of electrolysis is itself antiseptic, but that no precaution may be omitted, it is usual to have the vagina syringed out with some antiseptic solution both before and after the operation. When it is necessary to perform galvano-puncture this precaution is, perhaps, the more desirable.

The object of the galvano-puncture, in a large number of cases, is to establish a channel to the uterine cavity, through which the ordinary platinum probe or electrode can be passed. The trocar or needle which is used for the puncture is always made negative, and may be composed of any metal; steel, perhaps, takes the best point. The punctures are not made very deep, usually about half an inch, and the trocar or needle is allowed to remain in the tumour about five minutes while the circuit is closed.

Fig. 3.

The needles I have had made for puncturing the tumours are composed of platinum or steel of the shape shown in the diagram, and are fitted on to a handle. They are intended to be used with a speculum, but might be used without if the greater part were insulated, leaving only about an inch of the metal bare at the end (Fig. 3).

When a tumour can be felt pointing, as is sometimes the case, through the uterine wall on either side of the cervix, enucleation can be favoured by electrolysis in the same way as Dr. Greenhalgh did some years ago, by burning a hole into the capsule of the tumour with the actual cautery. To accomplish this by electrolysis, a metal electrode can be used, like that depicted in the accompanying sketch, and

Fig. 4.

attached to the negative pole of a battery. With a strong current, a hole quite deep enough can be very quickly made. This instrument can also be used in the same way for hypertrophy or cancer of the cervix; the unpleasant smell which accompanies the use of the actual cautery is avoided.

The treatment of fibroid tumours of the uterus by electrolysis is not so easy and free from danger as Dr. Apostoli has been led to declare, through his own intimate knowledge of electricity and the manner of applying it. In the hands of those unacquainted with batteries and their manipulation, many most serious mistakes might be made which would cause the greatest discomfort to patients, and possibly in some instances jeopardise their existence. Any sudden break to a current of the strength used by Dr. Apostoli might in some patients cause alarming collapse; but with due care, and with a thorough knowledge of the instruments used and the way to use them, the operation is not difficult, and the patient is spared any severe suffering. An anæsthetic is seldom necessary, it being an advantage to have the patient conscious, as by watching the countenance much important information can be obtained as to the amount of destructive change going on in the uterus.

The great danger inseparable from abdominal section, and the uselessness of all medicinal treatment for the removal of uterine fibroids, makes this mode of treatment by electrolysis the more acceptable and

of greater importance. There are very few fibroid tumours which do not cause some inconvenience and more or less distressing symptoms. In some cases they render life almost intolerable. The ever-constant weight and dragging pain; the interference with digestion, defecation, and sometimes with micturition; the reflex neurotic symptoms and depression; the ever-constant ill-health, with exacerbations at the ordinary monthly periods, sometimes with downright acute pain or profuse hemorrhage, which incapacitates the patient for several days or a week; the drain on the vital powers produced by this incessant pain and sometimes constant loss of blood,—all these call for some relief beyond the usual exhortation to wait for the menopause or a useless visit to Kreuznach or Horncastle. Enucleation is often impracticable, and is never unattended with danger. In electrolysis we have a means of relief the application of which is not difficult to those who understand the medical and surgical uses of electricity. It is not unduly painful. It is, if properly applied, practically free from danger. If the tumour is not much reduced in size, the distressing symptoms are almost invariably relieved and the patient's general health improved; and she is not in a worse condition for more heroic measures, should they be deemed advisable, than before the application of electricity. The treatment is spread over rather a lengthened period of time; but, after the first or second application, no enforced confinement to bed is necessary or imposed upon the patient.

AN ADDRESS

ON THE

INFLUENCE OF THE GEOGRAPHICAL AND SOCIAL CHARACTERISTICS OF THE UNITED STATES UPON ITS MILITARY SERVICE, ESPECIALLY ITS MEDICAL STAFF.

Delivered at the Opening of the Section of Military and Naval Surgery and Medicine, at the Ninth International Congress held in Washington, September, 1887.

By HENRY HOLLINGSWORTH SMITH, M.D., LL.D.,
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GENTLEMEN,—In seeking a general topic appropriate to the opening ceremonies of this Section of an International Medical Congress, worthy of the consideration of the eminent military and naval surgeons who are present, nothing seems more natural than the thought which may readily present itself to the mind of a philosophical traveller desirous of recognising the special results of general causes, namely, The Influence of the Geographical and Social Characteristics of the United States upon its Military Service, especially its Medical Staff.

Geographical Peculiarities.—In a territory as vast as this by which we are surrounded, where, as Coleridge has said, “there is a nation of freemen living under the laws of Alfred, and speaking the language of Shakespeare,” where, with an area of more than three millions of square miles,¹ there are now a little over fifty millions and a half of inhabitants, and where, if you place the fifty millions in one state, as that of Texas, the population would not be as dense as that of Germany, or, if put in Dakota, would not be as crowded as that of England and Wales together,² geographical peculiarities must largely influence the characteristics of the people, and indirectly that of its military service.

A distinguished statesman has said that “he who constantly overlooks broad acres will soon become possessed of broad ideas,” and the average citizen of the United States, especially in its western portion, naturally exhibits an independence of thought that shows itself in all his transactions. With such an extended domain, with common laws, a common currency, and no internal Custom Houses, the habit of roving is soon developed, and the popular love of travel is so universal that it may properly be designated as a national characteristic. The young American of the present generation, it has been well said, “belongs to a new expansive race that lives on motion, whose home is in a Pullman car, and his domestic life, so to speak, mainly on the

¹ The last census (1880) gave 3,603,844 square miles, or 2,306,460,160 acres.

² *Our Country*, p. 17. By the Rev. Josiah Strong, D.D. New York. 1887.

wing." It is, therefore, quite natural that excursion parties to travel from 8,000 to 11,000 miles in one route, with all the comforts of hotel and sleeping cars, should be fully patronised.³ With such railroad facilities it was, of course, easy in the late war to transport troops, as well as the sick and wounded, from one point to another.

The area of the United States, showing the distances over which sick and wounded were comfortably carried in hospital-cars and boats, by rail and by river, may, perhaps, be better appreciated by the foreign members of this Section when it is stated that Texas exceeds in square miles any state in Europe, except Russia, Texas containing 274,356 square miles, and the Austrian Empire only 240,000, Germany 208,619, and Great Britain, including England, Scotland, Ireland, and Wales, only 120,000.

In the protection and regulation of frontiers of such dimensions from the raids of Indians, and in the enforcement of law and order for the benefit of an immigration that on May 12th, 1887, amounted in the Port of New York alone, in one day, to 10,000 persons, and in the last thirteen years to five millions of people, the army of the United States in time of peace finds full occupation.

In a country of this magnitude, which, with its varied climate, grows oranges and sugar cane in one section, and cuts ice with the plough and saw into pieces twenty-four inches square in another; where with the thermometer at 90° F. in Philadelphia in August, 1885, there was frost the same night in Michigan and Dakota; where vast alkaline plains and salt springs on the South are counterbalanced by great fresh-water lakes or inland seas on the North, it is not surprising that troops on the march or in camp should be especially affected by the varieties in temperature and soil created by these geographical peculiarities, and that our military surgeons should have a varied experience in the diseases induced by such surroundings. The reports of the Surgeon-General's Office not only show this in the prevailing diseases at our forts, as malarial and mountain fevers, rheumatism, and camp dysentery and diarrhoea, but they also exhibit the thermometric variations of a climate to which our troops are necessarily exposed. Thus at Fort Lyon on the Arkansas river, at an altitude of 400 feet, it sometimes happens that in summer the variation of temperature is 40° in twenty-four hours; while in winter it is often 80°, being 65° F. at 11 A.M. and -15° the same night.⁴ These climatic changes are well known, and not noted solely by the records of the Surgeon-General's Office, as Colonel Dodge, of the United States of America, in writing of the "Great Plains," says,⁵ "the winters of the plains are peculiar; for a week no overcoat is needed, the presence of winter being scarcely recognised. Then comes a storm, and no clothing suffices to keep the icy wind from the person. During the winter of 1872-3 at least seventy capital amputations were performed by the post-surgeon for frost-bite." The changes of temperature, though so marked in the West, are not limited to that region, the whole Atlantic Coast having a winter temperature 10° F. lower than that of Western Europe in the same latitude. In addition to the suffering caused by sudden variations of temperature, due to the influence of mountains, lakes and plains, the soldier on the march is also liable to suffer from the character of the soil. Thus on the Cimarron river, in the Indian territory, there is as described by Colonel Dodge,⁶ "for thirty or forty miles an expanse of loose sand so strongly impregnated with salt that the buffalo lick it up greedily; while rock salt is found in abundance, and can be quarried in masses from beneath the soil. On the west of the North Platte river, in the horrible 'alkaline plains,' the dry earth is covered with a whitish efflorescence, and every puff of the sultry wind fills each pore of the traveller with an acrid, caustic dust, that is irritating to an intolerable degree. The skin cracks, the eyes become inflamed, the tongue swells, the lips bleed, and the throat is parched. The water does not quench thirst, but irritates the alimentary canal, until after many days' marching the helpless traveller reaches his destination as full of suffering and torture as could be developed by the most inventive savage."

A brighter side of this geographical description as affecting the soldier in other parts of the country is, however, found in many localities where shade, running streams, and pure springs furnish surroundings of great importance to the health and comfort of the camp. A picture of another portion of the Great Plains is so well drawn by the late Major-General Custer, of the United States Cavalry, that I quote it in full:

³ As the Raymond excursion parties from Boston to San Francisco, and thence to Alaska and the Yellowstone Park.

⁴ Report of the Surgeon-General's Office, p. 41, 1883.

⁵ *The Great Plains*, by Lieutenant-Colonel Richard Irving Dodge, U.S.A., p. 30, New York, 1887. [The western half of the United States is a broad highland, divided by the Rocky Mountains into nearly equal sections. The eastern section is a gently descending slope known as "The Great Plains," and consists principally of rolling prairies, like the waves of the ocean solidified.]

⁶ *Op. cit.* pp. 16, 17, 1877.

"To describe," says General Custer,⁷ "this region as one would view it in journeying on horseback over this beautiful and romantic country, to picture with the pen those boundless solitudes, so silent, that their silence alone increases their grandeur; to gather inspiration from Nature, and attempt to paint the scene as my eyes beheld it, is a task before which a readier pen than mine might well hesitate. The air is pure, fragrant, and as exhilarating as the purest of wine, the climate entrancingly mild, the sky clear and blue as the most beautiful sapphire, with here and there clouds of rarest loveliness, presenting to the eye the richest commingling of bright and varied colours. Delightful odours are constantly being wafted by, whilst the forests filled with the mocking bird, the colibri, the thrush, and the humming bird constantly put forth a joyful chorus, and combine to fill the soul with visions of delight, and enhance the perfection and glory of creation."

Such are only a few of the geographical peculiarities of the United States that my limits at present permit me to enumerate as affecting its military service in time of peace, whilst during war they naturally entered into the consideration of the plans for the hospital treatment and transportation of the sick and wounded.

Social Characteristics.—In studying the social characteristics of any nation, the influence exercised by the habits and surroundings of its early settlers must always be remembered, as these continue to develop the character and peculiarities of subsequent generations. "It is impossible," says Roosevelt,⁸ "to understand the social and political life seen in the United States, unless we bear in mind the fact that the first settlers, whilst handling the axe and the plough, also carried the rifle. These colonists soon acquired military training in the long continued wars in which they were so often engaged, being compelled to defend their homes and families against savages capable of sending into the field thousands of warriors whose bravery and organisation made them as formidable as trained soldiers." Indeed, the Iroquois, or Six Nations—the Hurons, Oneidas, Mohegans, Mohawks; and other tribes of the North—were constantly on the war-path against the early settlers of this country from 1609 to 1792; and from the latter period to the present, the army of the United States has been frequently called on to punish the aggressive acts of the Creeks and Seminoles on the South, and quite recently to control and disperse marauding and massacring parties of Dakotas and Sioux, of Comanches and Apaches on the south-west, a large number of the latter being now held at Fort Marion, in Florida, as prisoners of war. As late as 1862 the Dakotas made a terrible massacre of the settlers in Minnesota, and in 1873 the Modocs killed Peace Commissioner Thomas and many families; while, two years later (1876), the noted chief, Sitting Bull, with a large body of warriors, successfully opposed the United States soldiers sent to punish him, and escaped with the bulk of his possessions and tribe into Canada, after killing Major-General Custer and nearly all his command in the battle near the Big Horn Mountain (June 25th, 1876).

That Indian warriors are not to be despised as foes was also shown in the experience of the regular troops of France and England during the last century, especially in the defeat of the British General Braddock near Fort Duquesne, now Pittsburg. The "massacre of Wyoming," immortalised by the poet Campbell in his *Fair Gertrude of Wyoming*, also illustrates the sufferings of the colonists from Brant and the Oneida Indians.

In these contests, so characteristic of the settlement of a country reclaimed from the wilderness and the savage, we find the origin of the military spirit and habits of life that left their impress on later generations, and furnished the armies of 1776 and 1861 with riflemen whose remarkable skill had been gained in hunting from their youth upward.

Among a people whose social life is characterised by each family residing in a separate dwelling, where the humblest day labourer enjoys wheat bread and meat daily, and rides, in our large cities, to and from his labour in a street car, spending a penny of his wages each day for the much coveted newspaper; in a community where his children are educated even to a high degree at the public expense,⁹ it is very common to recognise an amount of intelligence in the masses that is largely due to republican institutions, and especially to our common school system, and this intelligence becomes available in many who are recruited from time to time into the military service.

⁷ *My Life on the Plains*, by Major-General G. A. Custer, U. S. Cav., p. 11, N. Y., 1874.

⁸ *Life of Thomas Benton, Senator U. S.*, by Theo. Roosevelt, p. 61, et seq., Boston, 1887.

⁹ In the normal and high schools the course of instruction trains the pupils to a degree that qualifies them to become teachers or fits them to become clerks or professional men, many rising to distinction at the bar or on the bench, as well as in the medical profession.

This service, though permanently held on a comparatively small scale, is yet capable of being developed to an extraordinary degree at short notice, as was fully illustrated in the war of 1861, when the call of the Government aroused the people to an active response to the support of the regularly constituted authorities at Washington. As a nucleus for a larger army, the small force usually held, while proving sufficient for the protection of our large frontier, also preserves, by education and training, an elevated class of officers capable of judiciously organising the fresh troops, or the militia or national guard, of the various State organisations.

The social characteristics of the people of the United States are also exhibited in the facilities presented to each one to attain political and social eminence. As the highest offices of the Government are open to the ambition of any native-born citizen, it is not uncommon to note great changes effected in a few years in the position attained by any properly qualified individual. Hence one who commenced life as the humblest citizen often reaches the most elevated station in civil and military life, more than one President of the United States having been advanced from the work of the farm or trade to the duties of the Presidential chair.¹⁰ "The genius of our national life," as was recently well stated by President Cleveland,¹¹ "beckons to usefulness and honour men in every sphere, and offers the highest preferment to manly ambition and sturdy honest effort, hastened by patriotic hopes and aspirations."

The private soldier of our army may also rise from the ranks to the highest grade of military command if he has the proper merit, two Brigadier-Generals now on the Army List having well illustrated this deserved promotion.¹²

It is, therefore, not surprising, when we recall the sudden development of events caused by the late war, that we should recognise in many of our military leaders, as well as military surgeons, during this period, those who previously and subsequently occupied offices or were and are now engaged in civil pursuits;¹³ and Major-General Sherman has written¹⁴ "that at the close of the war some of our best corps and division commanders, as well as staff officers, were taken from civil life," thus showing the influence of the social characteristics of the United States upon its military service in time of war. When the late war commenced (March, 1861) the Army of the United States consisted only of an aggregate strength of 13,024 officers and men, of whom 115 were medical officers, all told. On the subsequent 4th of May, or sixty days later, its strength had been increased to 30,973; but at no time during the war did the Regular Army attain a strength of 25,000. All the rest engaged in the war were Volunteers who regularly enlisted for three years or the war, making 2,670,851 men enlisted from 1861 to 1865.¹⁵

When, by the proclamation of President Lincoln, an army of 500,000 men was created in a few months, when from the workshop and the factory, from the loom and the mine, from the pulpit and the bar, there sprang up a body of intelligent men in response to his call, the medical colleges and the hospital surgeons were not tardy in offering their contribution of skilled service. Soon the civil surgeon, transferred from private practice to army life, and assimilated to the regular staff under the title of "Brigade-Surgeon of Volunteers," found himself compelled to add a knowledge of military laws to the professional education he had previously received. In this way more than one of those occupying professorial chairs became the military head of a hospital or the medical director or surgeon-in-chief of an army corps; and the historian of the future will doubtless recognise, in these transformations during war, the influence of the social characteristics of this country upon the performance well and thoroughly of duties that are usually assigned to the regular army.

During the war of 1861, the medical staff of the regular army was increased from its original 115 officers on its rolls to 2,109 regimental surgeons and 3,832 assistant surgeons, all taken from private life, and only familiar with civil practice. Although these gentlemen were thus so suddenly transposed, they proved themselves amply qualified for their new duties; and at the end of the war, Surgeon-General Barnes

said:¹⁶ "The ability, courage, and zeal manifested throughout the war by the officers of the Medical Department, under all circumstances and upon all occasions, was honourably testified to by the number (32) killed in battle, or by guerrillas or by partisans; 83 were wounded in action; 4 died in rebel prisons; 7 of yellow fever; 3 of cholera; and 271 of diseases incident to camp life, or the result of exposure in the field."

Of the amount of labour they performed, it is also stated¹⁷ that "there were treated by them in 205 general hospitals 6,954,834 cases of diseases and wounds, and that of these only 186,216 died of disease and 49,205 of the effects of wounds."

The amount of money expended by the Medical Department of the United States during this period for the benefit of the sick and wounded, and exclusive of salaries, was 47,356,982.24 dollars, all of which expenditure of money and medical supplies was almost without exception distributed by these medical officers over this vast country and properly accounted for.¹⁸ Lieutenant-General Grant also bears his testimony to the valuable services rendered by surgeons taken from civil life, and placed in charge of troops in the field. Writing of his western campaign on the Mississippi river in 1862, he says¹⁹: "When long continued heavy rains, with high water in the river, had covered the entire country, so that the troops could scarcely find ground on which to pitch their tents, malarial fever, measles, and small-pox broke out; but the hospital arrangements and medical attendance were so perfect, that the loss of life was much less than might have been expected."

In thus giving credit to the services rendered by the volunteer surgeons during the war, it must not be forgotten that they were ably directed and assisted in all the details of army routine by the experience and skill of the surgeons and medical directors of the regular army, and many "brigade-surgeons of volunteers" yet recall with satisfaction the agreeable and useful results of their personal association with the members of the accomplished Medical Staff of the regular army.

Among the numerous civil surgeons thrown temporarily into military service, was the President of this Section, who, with others from various portions of the United States, was taken from the duties of a surgical professorship in a university to learn by personal observation in the field, the correctness of the precepts of military surgery, which he had previously tested and taught only in civil hospitals. With others thus transported was also a late Vice-President of this Section, a surgeon distinguished for his literary as well as his surgical accomplishments, and who soon proved himself as proficient in the field and active service as he was in the treatment of fractures and dislocations in civil life. Few medical men have gained more reputation for skill and sound judgment as a military surgeon than was justly accorded to our former associate in organising this Section, Dr. Frank Hastings Hamilton, of New York City. Entering the army in the early months of the late war, he was successively promoted to be "Brigade-Surgeon of Volunteers" and "Medical Inspector," proving himself on all occasions fully equal to the duties that so suddenly devolved upon him. His recent death created a void in this Section and in the medical profession of the United States that has been widely felt.

As military and naval surgery is only a division of the science of general surgery, these transformations from civil to military life are not so marked a change of duty as might at first be supposed. Military and naval surgery and medicine, as a Section of an International Medical Congress, naturally brings into its scientific discussions many points that are common to the education of both military and civil surgeons. Hence not a few of those now present have laid aside their former military titles and duties, and are again occupied with their professional life as civil surgeons; while the great army of 2,000,000 of men that formerly existed has been reduced in various ways to 25,000—800,000 officers and men having been paid off at the end of the war, most of whom are now engaged in civil pursuits. In these changes of service many officers and privates have personally illustrated the traits so well ascribed to the late author²⁰ of a well-known work on International Law, and shown like him that "when soldiers they were completely soldiers, but when civilians not a vestige of the soldier remained." Lest, however, the change of duties of our former military surgeons should leave this Section without that direct and recent support that its title justly calls for, I am happy to be able

¹⁰ The distinguished General Andrew Jackson was in early life apprenticed to a saddler, then became a schoolmaster, a lawyer, a General of Militia, and subsequently the incumbent of the "White House" and the great leader of the Democratic party in the United States, they annually celebrating the return of his birthday (January 8th) with appropriate "ceremonies." (Wickoff's *Reminiscences of an Idler*, p. 26, 1880.)

¹¹ Address of President Cleveland at the unveiling of the Garfield Statue at Washington, May 12th, 1887.

¹² The Adjutant-General and the Chief Signal Officer, U.S.A., were once privates. (*Public Ledger*, Philadelphia, March 5th, 1887.)

¹³ Alex. L. Webb, LL.D., President of the College of New York, became Assistant Chief of Artillery of the Army of the Potomac, Chief of Staff, and then a Major-General.

¹⁴ *Memoirs*, vol. ii, p. 383, July, 1885.

¹⁵ *Appleton's Encyclopedia*.

¹⁶ *Surgical History of the Rebellion*, vol. 2, part ii, p. 901, et seq., by Surgeon Geo. A. Otis, U.S.A., and David L. Huntington, U.S.A. Washington, 1883.

¹⁷ *Op. cit.*

¹⁸ *Surgical History of the Rebellion*, as before quoted, p. 902.

¹⁹ *Personal Memoirs of Ulysses S. Grant*, vol. i, p. 458, N.Y., 1885.

²⁰ *Memoirs of Major-General Halleck*, by Sir Sheraton Baker, Bart. London, 1878, p. 18.

to state that it has the active interest of many who are well and widely known as at present connected with both the army and navy of various nations during long periods of service, of gentlemen whom you will all recognise in the immediate vicinity of the chair and around this hall as active participants in the discussions of the topics that will be presented. Some of them have spent their lives in active service, and having retired, now rest on their laurels; others carry on their persons honourable scars of wounds received in the performance of their arduous and benevolent duties. Some have served with recognised distinction in the Black Sea, and at the bombardment of Sebastopol during the Russian war. Some were in the Indian Mutiny, the Crimea, and the Soudan. Some merited distinction in the Franco-Prussian war, and some have served in ironclads through the din and suffering of heavy maritime bombardments in China and elsewhere, and some, after a quarter of a century, can recall the exposure and privations they endured as prisoners of war.

From the vast amount of experience thus collected in active service, will be drawn most of the scientific work of the Section, a Section only developed within a few years in connection with the different meetings of this International Medical Congress, and now growing in importance by the accumulated facts gained during the wars of the last fifty years.

Reverting to our original proposition of the "Influence of the Geographical and Social Peculiarities of the United States upon its Military Service," and especially upon the duties of its Medical Staff, it becomes apparent that this influence could not be limited solely to the creation or transformation of civilians into military and medical officers, but that a rank and file would be obtainable, remarkable for its intelligence and adaptation to service, as compared with ordinary soldiers. In commenting on this fact, the late Lieutenant-General Grant said,²¹ "the ingenuity of the Yankee soldiers was equal to any emergency, and I found volunteers in the ranks and among the non-commissioned officers prepared to meet every call for aid, whether professional or mechanical. Many could run a grist mill, steam engine, or locomotive, build bridges, lay down railroads, erect houses, and make excellent cooks." Thus, surrounded by intelligent and educated soldiers, who were often skilled mechanics previous to enlistment, our surgeons readily obtained an excellent ambulance corps and reliable nurses, finding many capable of constructing a variety of appliances for the treatment, transportation, and care of the sick and wounded, by land and water, thus contributing to the many hospital cars and boats that are pictured in the *Surgical History of the Rebellion*, by Surgeon Otis of the army, and many of which can be seen in Washington in the Army Medical Museum.

The limit of time assigned me on this occasion does not permit more than this very brief allusion to such an extended and varied subject as has been suggested for your consideration; but it may suffice to explain the presence of many in this Section not now in the service as military surgeons, as well as the absence in the United States of the large standing armies usually seen in Europe. Freed from entangling political alliances, the necessity for such an army in the United States does not exist, and, as has been well said,²² "the genius of our political institutions, and the settled convictions of our people, forbid the maintenance among us of large standing armies. They are justly dreaded as productive of useless and wasteful expenditure, injurious to the habits and morals of the people, and dangerous to public liberty." The testimony of the present head of our army also shows²³ "that we do not need such an army, as this is a country where every man is intelligent enough to take up a musket and learn the manual of arms at short notice."

The military surgeons in the United States, being fortunately limited in their experience until the late war, were necessarily largely indebted to the distinguished surgeons of Europe for their knowledge of the precepts of military surgery. The names of Hennen, Larrey, Guthrie, and many of a later period equally well-known as authorities on the surgery of the field, and some of whom will soon favour the Section with the results of their recent experience,²⁴ tend to show how much European military surgery has had to do in moulding the professional opinions of army surgeons in the United States; though our late war furnished our medical staff with an opportunity of reciprocating this professional obligation, and of yielding abundant fruit in return for the good seed which Europe sowed in former years. The valuable and extended treatises on military surgery and medicine, issued by our Government, as *The Surgical and Medical History of*

the Rebellion in the United States, testifies to the fact that the sound precepts uttered by European surgeons at the commencement of this century, though apparently dormant for years, had not lost their vitality, but contained a germ that, like the mustard seed in the parable, has grown and expanded, until all nations can enjoy and benefit by its growth, and rest under its scientific shade.

I have thus imperfectly indicated some of the peculiarities of the medical service of the United States army, as they might appear to the European observer, and shown how the late war modified the usual relations of civil and military surgeons. Both now unite in this Section in the endeavour to alleviate the evils resulting from war.

Among the important subjects to be discussed, that of asepsis, antiseptics, and the influence of the atmosphere upon wounds is one that attracts attention everywhere, and has created in the United States as well as in Europe a new era in operative surgery. It will receive full consideration by those of extended experience and sound judgment. One of the lessons learned in the late war in this connection that will hereafter be discussed was, that wounds and disease are better treated in a hospital tent than in any house-like structure, no matter how carefully built and ventilated, because the walls of the latter absorb fetid and poisonous evacuations, and subsequently give them back to the atmosphere, it being conceded that the fresh air of Heaven, even without a shelter tent, and subject to our great climatic changes, is less injurious to the patient, if properly clothed, than the air breathed in the best hospital building. Although many thousands of dollars were spent by our Government in the construction of military hospitals, models of which are to be seen in Washington, yet experience of the advantages of hospital tents was so well settled, that it is stated in the *Medical and Surgical History of the Rebellion*,²⁵ "that wounded treated under canvas did better in every way, and recovered sooner, than those treated in the large permanent hospital." A paper on the Hospital Tent for a Depot Hospital embracing over 12,000 patients, and another on Huts, will be hereafter read.

In connection with the subject of a pure atmosphere, it seems appropriate to allude to the æsthetic, as well as hygienic, effects obtainable in a hospital structure (when necessarily occupied) from the influence of growing and especially flowering plants in modifying the air of a ward; the respiratory action of the leaves of plants, as is well known, taking carbonic acid gas from the atmosphere, whilst the flowers and odorous plants furnish oxygen and ozone, the latter of which, as has been demonstrated by the wonderful work of Pasteur, destroy or weaken microbes or poisonous germs, and attenuate them so that disease from their action can be prevented. We of the medical profession in the United States deeply regret his enforced absence from this Congress, and from the expression of our appreciation of his remarkable discoveries.

Before closing, permit me to call the attention of the Section to the results recently obtained in medicine and surgery from the use of electrical instruments as aids to diagnosis.

As electrical telegraphs are now a portion of the armament of all armies in the field, and regularly educated electricians constitute a portion of each army corps, with the view of keeping up communication with the heads of Government (as in the instance of the battle of Tel-el-Kebir, where the news of the victory was transmitted to Her Majesty the Queen of Great Britain in forty-five minutes after the result), electrical batteries, etc., are readily obtainable by the medical staff. With the numerous miniature electrical or incandescent lamps all are familiar, the cavity of the mouth being so illuminated as to show a shot in the substance of the cheek, whilst the gastroscope enlightens the cavity of the stomach. Although also probably known to many of those present, I have thought that attention may be properly called to the benefits obtainable in diagnosis from the induction balance and the telephonic probe, both of which can be seen in Washington. The new electric probe of Trouvé, which vibrates on touching a ball, is also worthy of mention.

Another new invention termed the "thermoscope" or "thermopile," measures and indicates the temperature of the body in fever, and promises to enable the surgeon sitting in his tent or office, to take the temperature of an important case some distance from him, and then, through the telephone, direct the nurse what to do without leaving his seat,²⁶ and it is even suggested that an alarm contrivance can be made to call up the nurse whenever the patient's temperature reaches the danger point, as is now done in fire alarms in store rooms, or a hot boiler wanting water.

It has also been suggested by Mr. Sumner Tainter's curious combina-

²¹ *Memoirs of Lieutenant-General U. S. Grant.*

²² Address by Major-General B. F. Butler, at West Point, N. Y., 1839.

²³ Lieutenant-General Phil. Sheridan, U.S.A., in the *New York Tribune*, April 27th, 1887.

²⁴ Longmore, Esmarch, and others.

²⁵ *The Medical and Surgical History of the Rebellion*, part 3, vol. ii.; *Surgical History*, p. 922, second issue, Washington, 1882.

²⁶ Those desirous of details can consult *The Age of Electricity from Amber Soul to Telephone*, by Park Benjamin, Ph.D. New York: Scribner, 1886.

tion of phonograph and telephone, or the "electric phonograph," that the reader of a paper in a medical congress can hereafter have his thoughts recorded on a properly prepared iron disc, and, when invited to read it, instead of taking a trip across the ocean, will forward his disc, which, being connected with the speaking telephone, can be heard by the audience as well as if the writer was near and spoke through the telephone.²⁷ A serious objection to this arrangement is that we should be deprived of the pleasures due to social intercourse at the place of meeting and the magnetic influence of the speaker.

The programme as printed for each day will enable you to know the subjects of papers and discussions to be presented to the Section, and I will no longer trespass on your patience and keep you from the consideration of the valuable treatises that will be offered by the matured experience of those who are to participate in our scientific work.

THE GALVANO-CAUTERY SOUND, AND ITS APPLICATION ESPECIALLY IN HYPERTROPHIED PROSTATE; WITH REPORT OF CASES.

Read at the International Medical Congress, Washington.

By ROBERT NEWMAN, M.D., of New York.

THE galvano-cautery sound originally devised by me, for treatment of the hypertrophied prostate gland, has also been applied to other localities, and proved beneficial in kindred maladies. To show the benefit of its use as originally intended I will first report one successful case as a typical illustration.

CASE 1. Hypertrophy of the Prostate; Curc.—Dr. T. F. H., aged 60, who had practised in New Jersey for the last thirty-five years, came to me on May 25th, 1886. He suffered greatly from enlarged prostate, frequent and painful micturition, and cystitis. The history of the case shows that he had a violent cystitis attended with painful micturition as early as 1874. His urine was dark and blended with pus and blood. He had a renewed and aggravated attack in 1879. The present attack had been marked since 1884. At times he had retention of urine, and was obliged to draw it off with a catheter.

Examination.—Digital examination by the rectum disclosed a hypertrophied prostate, enlarged in its entirety, with a preponderance of pars intermedia. There was a slight discharge from the urethra. Examination of the urethra with the *bougie à boule* showed at 2½ and 5½ inches respectively from the meatus two strictures, easily passed with a No. 18 French sound. At these points the walls of the urethra were somewhat indurated. The ejaculatory ducts were 7½ inches from the meatus, indicating that the galvano-caustic applications must be directed to that point as a central region. The patient was otherwise in perfect health.

May 26th. The fenestra of the galvano-cautery sound (in which the platinum wire is) was brought against the hypertrophied prostate at 7½ inches from the meatus; then the cautery was applied by two instantaneous flashes. The operation occupied but a moment, and was painless and bloodless. The patient immediately left for home by rail, 80 miles distant. On June 7th he reported that he had suffered no inconvenience from the last operation. The galvano-cautery was repeated in the same manner as on the first occasion, with the same result. On June 21st to make more room for the instrument and enlarge the calibre of the urethra, electrolysis was applied with an egg-shaped electrode (No. 23 French) as the negative pole against the first stricture in the urethra. The positive sponge electrode was held in the palm of the hand. Only three milliamperes were used for five minutes, when the electrode passed through both strictures and into the bladder. October 5th.—A No. 23 French sound passed very easily through the entire length of the urethra, proving that during an interval of 3½ months the calibre of the urethra had suffered no contraction. October 12th.—The galvano-cautery was applied to the prostate at 7½ inches. Three effective flashes were given. October 19th.—The patient felt better, and had suffered no pain or unpleasant effects from the cautery, which was repeated to-day. On November 9th, 15th, and 22nd, the galvano-cautery was applied as before. The patient was better; the urine was now clear, without sediment. He passed water more easily, and had ceased to use the catheter. On December 21st and 30th slight flashes of the galvano-cautery were applied to the prostate at 7 inches. On January 24th, 1887, the galvano-cautery was applied to the prostate at 8 inches. On March 9th stronger applications were made at 8 inches. The patient had no untoward symptoms or pain, but several days after the appli-

cation passed occasionally with his urine small coagula of blood, without unpleasant feeling. On March 21st light applications were made at 7½ inches. Digital examination disclosed that the gland had been reduced almost to its normal size, the left lobe only appearing a little large; the other side and the pars intermedia were normal. On May 18th the patient reported continued improvement, and considered himself well. He passed urine voluntarily, easily, at regular intervals; slept undisturbed the whole night; and could retain the water for eight hours. The urine was clear, and there was no residuum. The galvano-cautery was applied at 8 inches over the left lobe. On May 30th the application at 8 inches was repeated. On June 14th and 28th further galvano-cautery applications were made. On July 12th a No. 24 sound passed easily into the bladder without irritation or inconvenience. The meatus urinarius was small, and would admit no larger size; there was, however, no valid reason for cutting it. The prostate was normal.

REMARKS.—I submit this record as a typical case, so perfect in its simplicity that the facts must stand unquestioned and undisputed. My diagnosis of hypertrophy of the prostate had been confirmed by three surgeons (of New York and Philadelphia) of the highest standing as operators, teachers, and authors, whose works are recommended by colleges as text-books, and are in almost every medical man's library. The patient is a physician, and gave, in writing, his diagnosis of the case, its treatment, and results. He feels improved—nay, well, and is so jubilant over his cure that he is ready in person to give any information about his case; even to submit to examination to prove that his prostate is now normal. He testifies that treatment by galvano-cautery is painless and without inconvenience. He has had eighteen sittings. The course of treatment was under unusual difficulties, the patient travelling before and after each operation eighty miles, therefore coming very irregularly, sometimes at intervals of more than three months. It is expected that better results will be obtained where the patient is near the operator's office, and comes regularly every three or five days as directed. Whether or not a relapse will occur, and what the *post-mortem* appearance may be, the future will disclose. At present it must stand as a successful case.

The *galvano-cautery sound*, as devised by me, was first introduced to the profession at a meeting of the American Medical Association, held in St. Louis, when I had the pleasure to demonstrate its working at the Surgical Section, June 5th, 1886. Since then I have constantly laboured to improve the instrument. For many years I have endeavoured to apply the galvano-cautery directly to narrow cavities like the deep urethra, bladder, etc., but for want of a suitable instrument was unable. The stumbling-block was that instrument makers would not carry out my plans, declaring them impossible; or when my proposed instrument was nearly completed, the instrument maker improved according to his idea, producing a miscarried monster unrecognisable as my offspring, and better adapted for a dry dock than for my purposes. The desired instrument was a catheter-shaped, smooth-surfaced sound of small size, and so easy of introduction as to glide to the spot to be cauterised. Both poles, thoroughly insulated, running side by side without touching, must be placed within the small tube of this instrument, and the mechanism so arranged that the platinum burner could be heated to the desired degree instantaneously with certainty and beyond possibility of failure. The cautery, its beginning, duration, and ending, as well as the quantity used, must be under the absolute control of the operator. The platinum must not, in its entire length, touch anything; the heat must be concentrated, and not approach the surrounding parts of the instrument; the connections must be perfect and act promptly. The instrument must be light, small, handy, and have the correct curve, and so arranged that the operator can manage the entire procedure without an assistant. The entire mechanism must be placed within the limited space of a No. 18 French scale sized tube. Next we must have a battery so constructed as to give a certain quantity of electricity of a fixed potency, suited to the work to be done and the instrument; too high a potency will melt the platinum wire, or cut the tissues like a razor; on the other hand, too low a potency will fail to heat the wires or not be effective. It is not practicable to measure the heat for galvano-cautery, or say how many degrees we need. Sufficient electricity and no more must be generated to heat the platinum burner to the desired degree. According to the length and size of the burner this heat must be adjusted; a fluid battery changes it almost every instant by polarisation.

The instrument is catheter-shaped, of smooth, polished metal, with a short curve at one end, where there is a fenestra, in which is placed a platinum wire. A serpentine form is best for this wire; each end is firmly fastened to one of two copper rods inside the tube, and represent respectively the positive and negative poles. The other end

²⁷ *Op. cit.*