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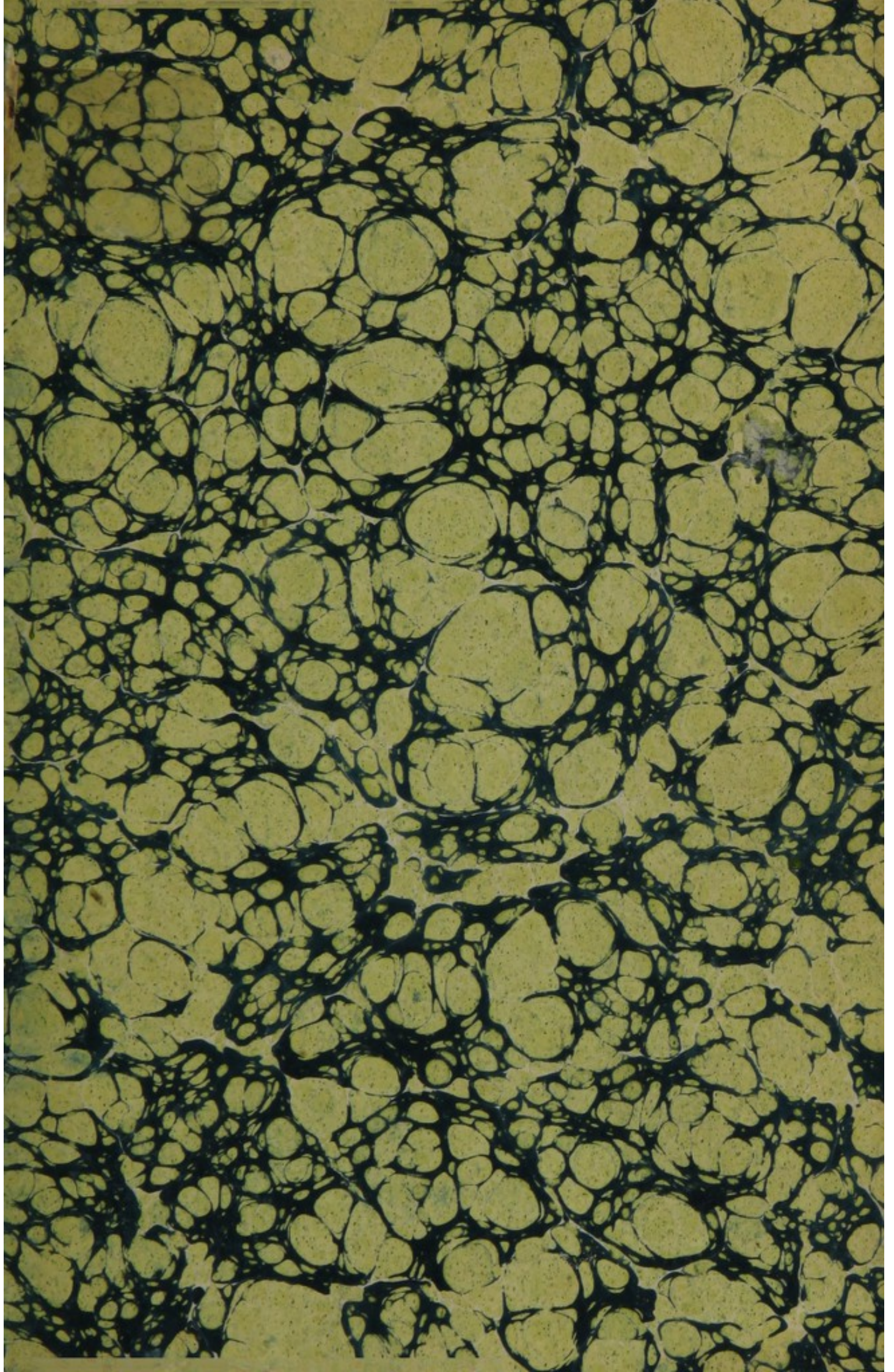
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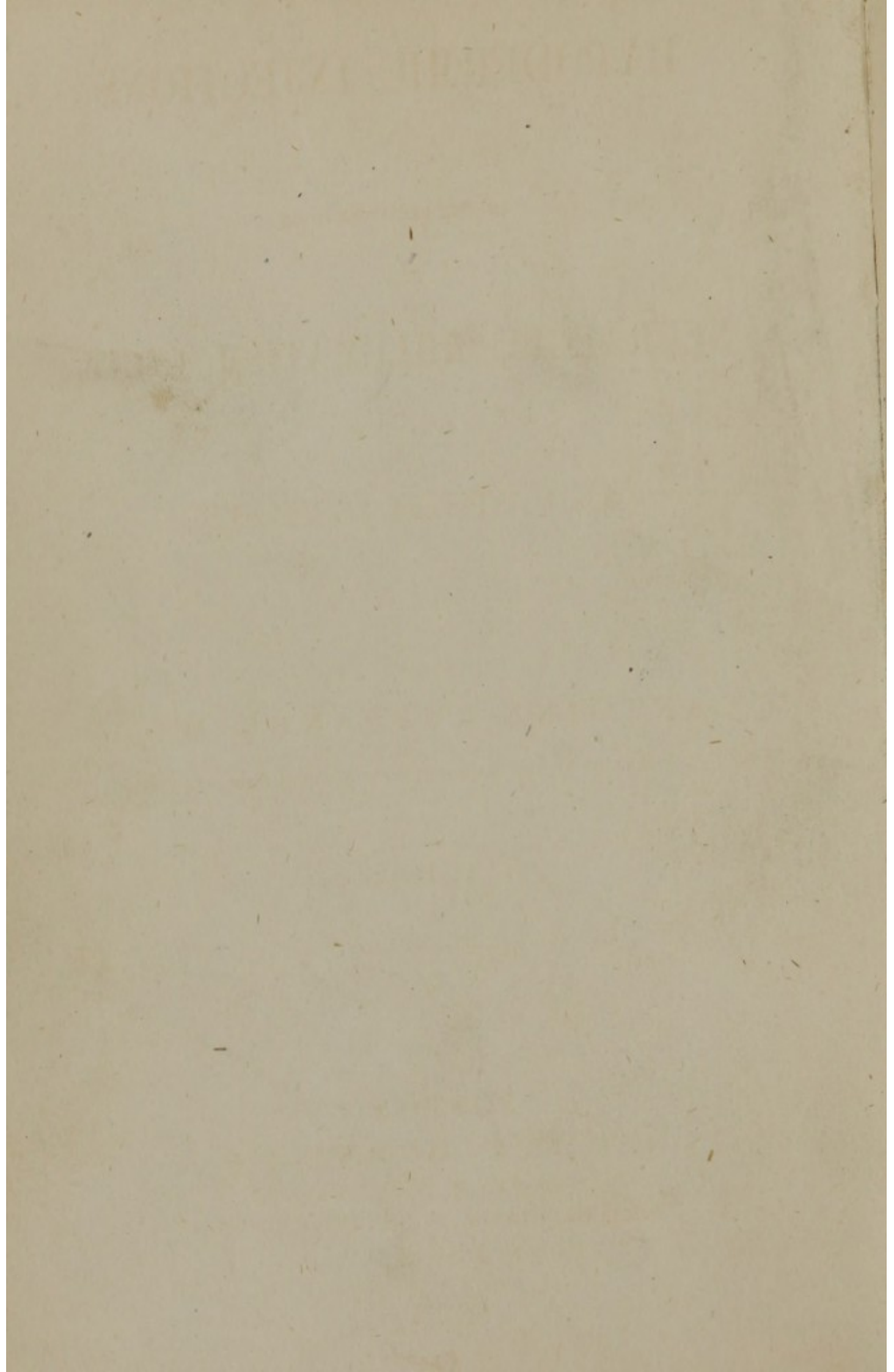
ANNEX

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THE UNIVERSITY OF CHICAGO



HYPODERMIC INJECTIONS

IN THE TREATMENT OF

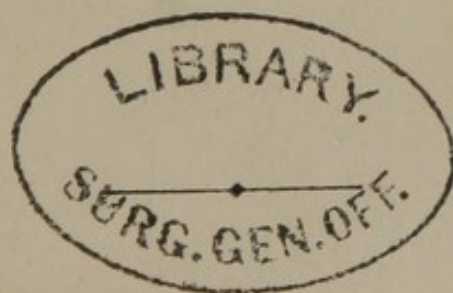
NEURALGIA, RHEUMATISM, GOUT,

AND OTHER DISEASES.

BY

ANTOINE RUPPNER, M. D.,

FELLOW OF THE MASSACHUSETTS MEDICAL SOCIETY.



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“THE art of healing proceeds with a silence and secrecy, like the great processes of Nature, to scatter blessings on all within its reach; and the couch of sickness, the silent retreat of sorrow and despair, is the scene of its triumphs. How striking is the contrast betwixt the art of medicine and the art of war!” — ROBERT HALL.

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PREFACE.

I PLACE the following pages in the hands of the profession, hoping thereby to supply the want of a guide in the application of Hypodermic Injections in the treatment of disease, which has repeatedly been expressed to me by practitioners residing in various parts of the United States and the Canadas.

I have made use of my former publications on this subject whenever I thought proper, and especially when I found cases of mine of sufficient importance to be transferred here.

Whatever may be the imperfections of this little work, the object must, I believe, meet the approval of the intelligent and candid.

BOSTON, 58 Boylston Street,
May, 1865.

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HYPOTENSIVE INJECTIONS

BY

THE TREATMENT OF DISEASE

Is the nature of the results of A. and
M. (1901) published in the British Med-
ical and Hospital Journal some weeks ago
that? Moreover upon the treatment of
Nervous by subcutaneous injections, with
Cocaine, for the first time, no paper on this
subject had before been published in the
British States.

Again only in the spring of 1901 I was
informed by the chairman of the committee
on scientific communications of the British
Medical Society for that they
prepared a paper on Hypodermic Injections.

The British Medical and Hospital Journal, 1901,
the British and Hospital Journal, 1901, 1901, 1901,
Treatment of Nervous by subcutaneous injections, with
Cocaine.

HYPODERMIC INJECTIONS

IN THE

TREATMENT OF DISEASE.

IN the course of the months of April and May, 1860, I published in the Boston Medical and Surgical Journal some notes, entitled: "*Researches upon the Treatment of Neuralgia by Subcutaneous Injection, with Cases.*"¹ So far as I know, no paper on that subject had before been published in the United States.

Again, early in the spring of 1861, I was solicited by the chairman of the committee on scientific communications of the Massachusetts Medical Society, for that year, to prepare a paper on Hypodermic Injections,

¹ Vide Boston Medical and Surgical Journal of April 5th, 12th, 19th, and May 3d, 1860: "*Researches upon the Treatment of Neuralgia by Subcutaneous Injection, with Cases.*"

to be read at the annual meeting of the society.

But professional duties, and a desire to make further and more careful investigations on this subject, by collecting the largest possible number of cases wherefrom to adduce correct data, caused a delay until the annual meeting in May of 1862, when I presented and read a paper on "Hypodermic Injections in the Treatment of Neuralgia and other Diseases of the Nervous System," which was published in the communications of the society of that year, Vol. X., No. 2, 1862, page 169.¹

From that time to the present, a period of three years, *hypodermic injection* has had a more extensive trial among medical men than before. Its field of application has not been limited only, as at first, to the various forms of neuralgia, but its usefulness has been demonstrated by Mr. Hunter

¹ Medical Communications of the Massachusetts Medical Society, Vol. X., No. 2, 1862.

of London, in delirium tremens,¹ by Professor Scanzoni of Germany, in puerperal peritonitis,² by Drs. Dupuy and Fournier of France, in tetanus,³ by Mr. R. Ellis of Chelsea, England, in hysteria,⁴ by Dr. J. Henry Bennet, of London, in uterine pain and sea-sickness,⁵ by Mr. W. J. Moore, of the Bombay medical service, as well as by Dr. Classeaud, of Smyrna, in malarious fever,⁶ by Dr. J. Mason Warren of Boston, in injuries of the nerves,⁷ and by Professor Von Graefe, who delivered lately a series of clinical lectures on the employment of subcutaneous injections in ophthalmic surgery.⁸

¹ Medical Times and Gazette of March and April, 1859, and British Medical Journal of January, 1859.

² Bullet. Gén. de Thérap. and Edinburgh Medical Journal, May, 1860, page 1045.

³ British and Foreign Med. Chirurg. Review, October, 1860, and Gazette des Hôpitaux, September, 1860.

⁴ Medical Times and Gazette for April 4th, 1863.

⁵ Lancet, March 12th, 1864.

⁶ American Journal Medical Sciences, October, 1863, page 533.

⁷ American Journal Medical Sciences, April, 1864, page 316.

⁸ Edinburgh Medical Journal, July, 1864, page 61.

In many cases of disease, where *pain* is *the* prominent symptom, and calls for immediate relief, the domain of Hypodermic Injection is undisputed, its therapeutic effects more definite, reliable, and satisfactory in results, than any medicines administered under the same circumstances by the stomach. Dr. Fuller, Physician to St. George's Hospital, London, speaks thus of this new method of treatment, in his late work on rheumatism, rheumatic gout, and sciatica:¹ "I have seen it produce effects as satisfactory as they were astounding. The agonized sufferer, who for many days and nights in succession has been unable to close his eyes, or obtain a moment's repose, notwithstanding the internal administration of morphia in large doses, has fallen into a calm sleep within a few minutes after the injection has been commenced." Dr. Alexander Wood, of Edinburgh, says:² "The effi-

¹ London, John Churchill, 1859, 3d Ed.

² British Medical Journal, Aug. 28, 1858, page 721.

cacy of the process is well known. I could narrate a vast number of cases in which it has proved eminently successful.”

My present purpose is, to again call attention to this important and interesting subject. As facts are the best arguments, I shall present the history and result of various cases of disease under my care during the last few years, treated, either principally, or as an auxiliary, by hypodermic injections. To these cases, sixty in number, I might readily add the observations of other physicians and surgeons, both foreign and American, who have paid attention to the subject. Its best commendation, however, lies in the fact of the almost universal testimony in its favor among the profession, and the general desire to obtain information on the subject.

I shall consider : —

A. *The superiority of hypodermic injections as a therapeutic agent in the treatment of pain in many diseases.*

- B. *The diseases to which this treatment is applicable, and to which it has thus far been applied.*
- C. *Injections, their nature, extent, and limit.*
- D. *The instrument, operation, and point of injection.*
- E. *Cases treated in practice, and their result.*
- F. *Disadvantages arising from this treatment, as compared with its advantages.*

A.

THE SUPERIORITY OF HYPODERMIC INJECTIONS AS A THERAPEUTIC AGENT IN THE TREATMENT OF PAIN IN MANY DISEASES.

We are often called upon, as physicians, to treat diseases differing each from the other, materially, in cause, symptoms, and severity, but having one characteristic in common, as if held together by an invisible bond of union. That characteristic is, *pain*, — *pain*, ever present, ever harassing the sick, like an exasperated enemy, — at the bedside by day, unappeased by night, — *pain*, invisible and inexplicable something that walks by the side of the physician, as if ready to bar the door of the sick chamber against his entrance, — a phantom, yet still a living reality.

Professor Romberg, of Berlin, we believe, when asked the question by one of his stu-

dents: "What is pain?" answered, "*Pain is the prayer of the nerve for healthy blood.*" This happy reply undoubtedly defines the cause of pain in very many cases, and implies the remedy, namely, the supply of healthy blood; but it may properly be asked: Shall our patient be allowed to continue to suffer till we have had time to supply that healthy blood which is wanting? Do we not often *lose* time at the bedside in philosophizing over a proper name for a given disease and its treatment, whilst our patient continues to suffer? "*Relieve me of my pain, Doctor!*" — is the cry of the sufferer; this is the first greeting we receive; often it is the last adieu.

Now, I believe that pain, whatever may be its cause, either direct or indirect, is *wear and tear* upon the entire system, particularly, however, the nervous system; that this wear and tear increases in exact ratio to the time it has to be borne, and to its intensity. Every minute we give relief is

just so much the wear and tear diminished and just so much time gained in the after treatment. To cut short the *career of pain*, be the cause what it may, I consider, then, the first duty of the physician, where pain is *the* prominent symptom of the disease under treatment. It ought, moreover, to be done in the safest and quickest manner possible. Time is thereby gained. None will question that remedies given to remove, or counteract, or control disease, acute or chronic, do act less efficiently when given to a patient harassed by pain, than when given to one who is comparatively at ease. The simple question then arises: Is there any therapeutic agent, other than the introduction of medicines into the system by the mouth, tongue, or rectum, by means of which we can relieve pain promptly and without any injurious consequences?

Experience has proved, beyond doubt, that *hypodermic injection* is the agent sought for. It commends itself, aside from

its successful application in daily practice, for the following reasons :

1st. Medicines taken into the stomach pass from thence en route through the *portal system*, before reaching the general circulation, and thus much of their efficacy is lost ; whilst rapidity of absorption is the great advantage of hypodermic injection.

2d. It is far superior to the administration of medicines by the tongue. The *modus operandi* of this resembles hypodermic injection in this particular, that the medicinal agent placed upon the tongue is immediately absorbed and carried into the general system, but is inferior to it, because if the medicinal agent tastes badly, is nauseating, or bitter, or the patient, being delirious, refuses medicine altogether, or is unable to open the mouth or move the jaws, as in a case of tetanus under my observation, we are compelled to give up in despair.

3d. The administration of medicines by

the rectum is also inferior to hypodermic injection, inasmuch as it answers well when we wish to introduce speedily stimuli and nutriment in urgent cases, or to administer small doses of narcotics for affections of the intestinal canal, the rectum, or other parts adjacent, but not in those cases where the part requiring the narcotic is supplied by the systemic circulation, and is under the influence of the cerebro-spinal nervous system.

4th. It is, for very obvious reasons, also preferable to the *enepidermic method*, in which the agent is simply applied to the surface of the skin; to the *iatraleptic method*, in which the absorbents are stimulated by friction to take up the agents which are presented to them in solution, or in a minute state of division; to the *endermic method*, proposed by M. M. Lemberbert and Lesieur, in which the obstacle which the epidermis offers to the entrance of the remedy is overcome by previously

removing it; to *inoculation*, which, largely practiced for the introduction of small-pox and cow-pox into the system, has been proposed by M. Lefergue St. Emilion, to be extended so as to secure the application of remedies. These methods, it is safe to say, have mostly, if not entirely, been abandoned in practice.

5th. A further recommendation in its favor is, that *the amount injected and thus placed into the system is accurately known*, which it is impossible to ascertain in stomachic doses. Physicians need hardly to be reminded of the disappointment often incurred in the action of a given dose of medicine. How often it fails to accomplish the desired object exactly to the extent we wish! And why? Simply because the effect of a given dose is not equal to the quantity taken into the stomach, but equal to the quantity absorbed, which we are unable to regulate or foretell.

But in hypodermic injection, we get *the*

whole effect of the known quantity introduced, which we cannot be sure of getting by the other methods. Thus, for example, if we introduce beneath the skin one-sixth of a grain of morphia, the effect which follows is that of the whole one-sixth; but if we introduce the same dose by the stomach, or by the rectum, the effect is not that of one-sixth of the grain taken, but it is equal to the quantity absorbed.

6th. Finally, it is our choice, because, both *a local and a remote effect are at the same time produced*. In all nervous diseases, but particularly in all the forms of neuralgia, we have both a local and a general disorder,—a painful point somewhere, and a general disturbance of the system. We search, therefore, for both a *local or topical*, and *a remote effect* in our remedy; the former being dependent for its effect on the tissue to which it is applied, the latter dependent on physical, chemical, or vital changes produced on parts at a distance

from those to which the medicine is directly applied, that is, on the system at large ; and in hypodermic injection we reach both of these desiderata at the same time.

Take, for instance, a severe case of tic-douloureux. You have the pain, perhaps, seated at or about the infra-orbital foramen, so severe, it may be, that the patient holds his hand constantly to the face. This is the local pain. At the same time, the whole nervous system is considerably affected, as is manifested by the general uneasiness, fretfulness, etc. of the patient. The operation is performed, and what is the result? In a few minutes, if not in as many seconds, the pain vanishes altogether, and the restless body revels in sweet slumber! And these same phenomena are revealed in all cases to which this treatment is applied.

B.

THE DISEASES TO WHICH THIS TREATMENT IS APPLICABLE, AND TO WHICH IT HAS THUS FAR BEEN APPLIED.

Dr. Alexander Wood, of Edinburgh, Scotland, who first called the attention of the profession to the employment of hypodermic injection as a therapeutic agent, limited its use first exclusively to uncomplicated cases of neuralgia, where the lesion is principally local, and seated in the superficial nerve-trunks; but it was not long before its field of application was enlarged; till to-day it is generally admitted, among those who have had most experience on the subject, that not only neuralgia and other painful disorders of the nervous system may thus be treated successfully; but it is looked upon by many with favor in the treatment

of paralysis, delirium tremens, rheumatism, gout, intermittent and malarious fever.

It would be, as is evident, a most difficult task to name all the diseases to which this treatment may be applied with benefit. This is no more possible than to give the exact number of drops to be injected in each case. To think, that, wherever pain accosts us, we must pull the syringe from our pocket, would be very erroneous. It is the judgment of the physician that will choose the proper case. It is his familiarity with this subject, and his experience of the effect of hypodermic injection upon various systems, that will, when the case is a proper one, tell him what amount to inject, and what to expect from it.

As a general rule, we may avail ourselves of it in neuralgia, both general and local, in various disorders of the nervous system, as paralysis, delirium tremens, mania, tetanus, chorea, wakefulness, in painful affections of the nerves caused by injury, in

uterine disease, in rheumatism and gout, in fevers, and lastly, in all cases where pain calls for immediate relief, and where its employment, for some potent reason, is not contra-indicated.

But may we not overrate our treatment? Undoubtedly, if we hope to cure at once, by hypodermic injections only, every one who suffers. Sometimes it alone suffices, as in many cases of neuralgia of recent standing, in delirium tremens, in wakefulness; but as for my part, I never omit, be the case what it may, to distinguish between *pain* and the *disease*, to relieve that pain by hypodermic injection first, obtaining both the local and remote effect, and then, when my patient is at ease, or, rather, while I keep him at ease, I apply such other remedies as my judgment dictates, or which the case may demand.

If the patient is infected with a syphilitic taint, or suffering from gastric and intestinal irritation, or exhibiting symptoms of

disease of the brain, or if we suspect pressure upon the nerve itself, caused either by a tumor, or by thickening of the bony canal through which the nerve-branch passes, or if he be old and feeble, or have heart-disease, I need not say we shall be disappointed in our endeavors, if we do not run risks. In all proper cases, on the other hand, hypodermic injection is and ought to be to the physician, what the splint is to the surgeon in fracture, one link only, from among many, in the chain of elements necessary to success.

C.

INJECTIONS: THEIR NATURE, EXTENT, AND
LIMIT.

Various agents have been injected by different operators, according to the nature of the case and the object to be accomplished. Dr. Wood uses Battley's solution, which is a preparation of double the usual strength of tincture of opium; Dr. Hunter and others inject sulphate and muriate of morphia; Dr. Béhier, in France, uses sulphate of atropia, and in paralysis injects sulphate of strychnia. Others recommend a combination of the morphine and sulphate of atropia in various proportions. I chiefly employ the *liquor opii compositus* of Dr. Squibb, as it answers all my purposes, is reliable, and of which one hundred drops are equal to one grain of sulphate of morphia.

Tinct. hyoscyami, tinct. cannabis indici, and other preparations, have had a trial, but have been abandoned, as uncertain and unsatisfactory in their action.

By reference to cases Nos. 20, 35, 36, 37, 38 of this essay, it will, however, be found that I have made use of new agents, such as a saturated solution of chloride of sodium, and solutions of nitrate of silver, of various degrees of strength. For this idea, I am indebted to an original memoir by Dr. Luton, of Rheims, published in the "Archives Générales de Médecine" for October, 1863, under the title, "Études sur la Médication substitutive."

Cases of neuralgia, especially chronic cases of sciatica, are often benefited by counter-irritation along the course of the affected nerve. It is, therefore, plausible to suppose, that if we inject a strong solution of any irritant near the painful point, — for example in the course of the sciatic nerve, — that deep-seated counter irritation

can be established, which, though limited in extent, would be sufficient, if not to remove the disease, yet, at least, materially to improve it.

Now, experiments which I have made establish the following facts:—

a. A saturated solution of chloride of sodium, or a strong solution of nitrate of silver, injected deep into the tissues and near the course of a nerve, contrary to expectation is not followed by diffused inflammation and suppuration.

b. The inflammation following the operation is circumscribed, the suppuration confined to the place of election for the injection, and both conditioned by the strength of the solution.

c. The immediate after-effect of the injection is a sensation, moderately painful, propagated along the whole course of the nerve, followed in from five to fifteen minutes by a feeling of perfect ease and comfort.

d. In this latter quality it resembles the action of sedatives when injected ; it differs from them, inasmuch as the injection is not followed by nausea, vomiting, or headache, as is often the case after injecting opium hypodermically.

e. From the first to the fifth day, on the average, a swelling appears, resembling in its character a small abscess, which about the seventh day suppurates more or less freely according to the degree of irritation we sought to establish by the solution. Sometimes this apparent abscess is absorbed without discharging ; sometimes we are obliged to open it. Generally, however, no interference is necessary, as it breaks itself, discharges, and then heals.

f. Complete absorption of the hardness does not take place under three or four weeks.

To cases Nos. 20, 35, 36, 37 and 38, of this essay, I desire particularly to call at-

tention; as this is the first record, to my knowledge, of any cases of neuralgia treated in the United States by the injection of *irritants*.

As to the extent and limit of the agent injected, little can be said. Here again the physician must be the best judge, as every case depends upon many conditions. It is impossible to establish an invariable rule. The history of the case, elicited from our patient, must be our guide. Age and sex are primary conditions. The danger, however, is in producing *too great an effect*. From five to ten minims will give ease and comfort in as few minutes; five or ten drops more may put the life of our patient in jeopardy, or at least be productive of much distress to him, and of much anxiety to ourselves. Sudden fainting, unseasonable and continued drowsiness, distressing vomiting, continuing for hours, — all these may be avoided by due care.

The following rules may, however, not be amiss:—

1. Chronic cases require a larger dose than acute ones.

2. The dose for females ought to be smaller than that for males.

3. First injections ought always to be smaller than subsequent ones, for the sake of safety. As a general rule, half the ordinary stomachic dose for males, and the third for females, ought to be used.

4. If the injection has to be repeated, the quantity can easily be increased. In such cases, sufficient time must be allowed to elapse for the effect of the first injection to pass off, before delivering the second.

5. In delirium tremens, mania, tetanus, and paralysis, the first quantity injected may be greater and more powerful than in cases of neuralgia. Large doses of narcotics may be injected with perfect safety in such cases.

6. The following are the minimum and

maximum doses I have made use of at a single injection:—

<i>Fluid Injected.</i>	<i>Minimum Dose.</i>	<i>Maximum Dose.</i>
Liquor Opii Comp., (Squibb's,)	Five Drops.	Sixty Drops.
Morphiæ Sulphas, ¹	1-8 of a Grain.	3-4 of a Grain.
Morphiæ Murias,	1-8 " "	3-4 " "
Atropiæ Sulphas, ¹	1-60 " "	1-30 " "
Strychniæ Murias,	1-24 " "	1-6 " "
Tinct. Hyoscyami,	10 Drops.	20 Drops.
Tinct. Cannabis Indice,	10 "	20 "
Solution Sodiæ Murias, ²	15 "	30 "
Solution Argenti Nitras, ³	5 "	20 "

There is sufficient latitude for the exercise of the physician's judgment between the two extremes. I make it a rule always to begin with the minimum dose, to establish a point of tolerance, and then increase the number of drops as circumstances require.

¹ A solution of equal parts of morphiæ sulphas and atropiæ sulphas is used by a few operators, especially by Dr. Brown Séquard, who recommends the addition of dilute sulphuric acid to the above.

² The solution of sodiæ murias must be a saturated solution.

³ The solution of argenti nitras may be prepared of various strength; viz.,—

1 gr. to 3 i. of water = first solution.

2 gr. to 3 i. of water = second solution, and so forth to the fifth solution. I have only used the first and second.

D.

THE INSTRUMENT, OPERATION, AND POINT
OF INJECTION

The success of the operation depends much upon the use of a proper instrument. We may employ either that of Travoy, used for the injection of per-chloride of iron, or that recommended by Ferguson for injecting a nævus, or the simple instrument constructed by Young of Edinburgh, or Tiemann of New York. It consists of a barrel made either of glass or caoutchouc, containing a piston which is graduated. The former is, in my opinion, the only reliable instrument for daily use, as the glass tube is graduated from one to twenty drops or more, and the amount of fluid to be injected is readily seen and regulated; an advantage which is wanting in the caoutchouc instrument, the piston of which is only

graduated for five, ten, fifteen, and twenty drops, and is very unreliable at best. I have discarded it altogether as unfit for any accurate operation. On the other hand, the glass instrument is easily kept clean, and answers all, even minute purposes. When still greater minuteness is required, a screw-syringe can be used, giving the exact number of minims by every turn of the wheel. The point of the hollow needles attached to the syringe ought to be sharp. The finer the needle, the better, for obvious reasons. Mr. Hunter uses needles made of silver, with a hardened gold point: one of tempered steel, however, answers every purpose.

In no case should a lancet be brought into requisition to make the required incision into which to insert a small glass syringe, for the purpose of injecting the narcotic, as I am fully aware has been done. This proceeding is not only clumsy, but positively dangerous.

The operation is simple. Take hold, with the left index finger and thumb, of a fold of the skin, so as to make the part beyond the fingers tense : let the point of the needle be passed through it with a quick and steady movement ; and, when pressed through, give it any direction which seems most practicable.

This manœuvre, as well as the injection of a determined number of drops, is the work of a second. The syringe withdrawn, the thumb must be pressed for a few moments upon the puncture, so as to prevent the escape of any fluid from it. This answers all ordinary purposes.

When the skin is held tense, as directed, the pain of the operation is greatly diminished : it is very severe when held loose, or not all, and there is danger that the needle may break. Unimportant as these directions may seem, upon their execution depends the success or failure of the operation.

Lastly, *the point of injection*, in neuralgic affections at least, is a subject of discussion among physicians, and deserves some notice.

Dr. A. Wood, taking for the basis of his experiments the valuable treatise of Dr. Valleix,¹ recommends, in his published observations on this subject, the injection of the fluid at the *foyer* or *seat of pain*, or as near as possible to it. This suggestion, however, applies only to neuralgia in its various forms, and to local rheumatism, but not to general affections, such as delirium tremens, etc.

Mons. Valleix has surveyed most carefully the various nerve-branches, with reference to neuralgia, and has pointed out not only the various points of convergence and union of the nerves affected, but he has called attention more particularly to each spot (point or foyer) where we may expect the pain to be seated, and where it is most amenable to treatment.

¹ Traites des Névralgies, Paris, 1841.

On the other hand, Mr. Charles Hunter, late of St. George's Hospital, London, and one of the first and most assiduous promoters of this treatment, in a paper on this subject, declares¹ that localization of the injection is not a condition necessary to the success of the treatment. "I have tried," he writes, "Dr. Wood's treatment and localization of the narcotic injection to the neuralgic part, and found it productive of considerable relief: as, however, I found frequent repetition of the injection in the same spot productive of abscess, I employed the hypodermic injection of other parts of the body, avoiding localization of the injection; and I have found that the hypodermic injection of the cellular tissue, beneath the cutis of any part of the body, is quite as striking and as curative in its effects as the injection localized to the neuralgic tissue. Moreover, it has these ad-

¹ "Med. Times and Gazette" of March 5th and April 6th, 1859, pp. 234 and 387.

vantages; viz., that inflammation is less likely to follow, and less pain must necessarily accompany the injection of a sound than an unsound or morbidly sensitive part. In such cases as tic-douloureux, sciatica, and constant or occasional pains of these nerves, a cure may follow a single injection; or, if not, more or less benefit will, in all probability, be effected. *I have had no case in which some benefit was not produced; but, from the cases of this description that I have had under my care, I cannot find that localization of the injection adds at all to the cure, except in those cases in which the mind of the patient has something to do with it, and there is a confidence alone in the local treatment."*

Mr. Hunter cites many of his cases to strengthen his assertions on non-localization. His cases of sciatica are the most numerous. He injects the narcotic almost invariably into the cellular tissue of the arm. He cites a severe case of tic-doulou-

reux in a lady, for which he injected half a grain of morphia into the arm, which effected a cure.

Mons. Béhier, of France, physician to the Hôpital Beaujou, in a paper read before the Academy of Medicine on this important question, and reported in the "Gazette des Hôpitaux,"¹ differs from the views of Mr. Hunter. He contends, that, when we have to deal with neuralgic or rheumatic pain, we should perform the injection, as far as possible, on a level with the seat of pain, and on that *précise spot*. The following are some of the facts on which he bases his precept:—

"One individual, suffering from a rheumatic affection of both deltoids, was cured the first day, on the right side, by an injection into the substance of the right deltoid, without the congerie muscle having been in any wise modified. Several times,"

¹ "Championnière's Journal," vol. xxx. art. 5680.

adds Dr. Béhier, "I have attempted, in order to verify Mr. Ch. Hunter's opinion, to perform injections in a region remote from the seat of pain, without ever having obtained any decided result. A few days since, I introduced, into the deltoid of a subject affected with sciatica, ten drops of sulphate of atropia, without any benefit to the femoral neuralgia."

Testimony like the above might be multiplied. The majority of observers, who have expressed an opinion, favor the localization of the remedy, at least in neuralgia.

So far as my own experience goes, judging from the numerous cases under my own care, and from those seen in consultation, I am in favor of *localization* of the injection, believing that there is a great difference whether we inject the narcotic at or near the painful point, or whether we place it, ostensibly to accomplish the same purpose, into the face, the arm, or the great toe.

In order to satisfy myself beyond question, I have repeatedly given to patients afflicted with neuralgia the benefit of the injection at the most painful point, and at a distance from the same. In all cases, I have had more satisfactory results from the injection at the most painful point. Where we inject a large dose, the effect may be at times the same in either position, near the foyer, or at a distance; but, as I always begin with the minimum dose, I am equally sure, that, whilst an injection of five drops at a point distant from the seat of pain produces little if any effect at all, the same introduced at the original foyer, or near it, accomplishes the object completely, gives relief, and sometimes cures. And why should we not be content to bring about with the minimum dose at the painful point that which it takes four and five times as much to accomplish at a more distant position? Besides, in making use of the minimum dose, we avoid the unpleas-

ant symptoms of nausea and vomiting, so harassing to the patient, and which are almost sure to follow a large injection.

But it is important and necessary to inject at the most painful point in the course of a nerve, or as near as possible to it, when we make use of the solutions of chloride of sodium and nitrate of silver; the object of which is to produce deep artificial irritation, inflammation, and suppuration, according to circumstances. Surely no one would think of doing such a thing a distance from the seat of the disease, as it would be contrary to the very object for which the irritant injection is made.

Mr. Hunter's¹ greatest objection to localization finally is, that the introduction of fluids into the cellular tissue has been found to be very liable to favor the formation of abscesses, when frequently repeated in the manner recommended by Dr. Wood.

¹ "Medical Times and Gazette."

Against this opinion of Mr. Hunter we have again the strongest testimony. Dr. Wood, who has treated, perhaps, more cases of this nature than any other medical man, has experienced no difficulties in this respect; at least, he does not mention the fact in any of his writings bearing on this subject. On one of his patients he made over one hundred punctures without any ill effects. Again: in two hundred and twenty-seven punctures made by Dr. Béhier, not one local accident had occurred.¹

M. Becquerel, of France, made analogous injections in twenty-one patients, with complete success in twenty cases, and without any tendency to abscess in a single subject.

Hérard, in a late number of *L'Union Médicale*, speaks of twenty-five injections without any evil consequences in the neighborhood of the wound.

Granting that in the forty-eight cases in

¹ Op. cit.

my own practice formerly reported, and in the sixty new cases reported in this essay (total, one hundred and eight cases), I made in each case on an average only ten punctures (though in more than one case have I injected the narcotic into the leg at least from fifty to a hundred times, if not often-er), — which gives a total of one thousand and eighty punctures, — I never witnessed the production of an abscess at or near the point of injection, unless I purposely produced one by the introduction of salt water, or a solution of nitrate of silver. It is, however, essential that the injection be not repeated at the same point for at least twenty-four hours, but a puncture may be safely made a little above or below the original point.

One thing is unmistakably proved by Mr. Hunter's experiments, — that subcutaneous injection is more widely applicable than its first advocate, Dr. A. Wood, had intended. When all other measures have

been tried and failed, as is but too often the case, to bring sleep to the restless patient, harassed by excruciating pain; when the delirious or the maniac actually defies all restraints put into service; when tetanic spasms exclude the possibility of introducing medicines into the stomach; when that member itself refuses any longer to perform its accustomed duties; when rheumatic pain constantly shifts from place to place; in surgical injuries, in puerperal peritonitis; in short, in all those affections where the nervous system at large is affected, where the pain is more or less general, the hypodermic injection of narcotics has been tried, and in all cases the effect was immediate, or nearly so, quiet or sleep either sooner or later supervening.

E.

CASES TREATED IN PRACTICE, AND THEIR
RESULT.

From the numerous cases which have come under my observation during the last five years, I have selected sixty, which I shall present with more or less minuteness, as their importance may demand.

They will be considered in the following order:—

- | | | |
|---------------|---|--|
| 1. NEURALGIA. | { | (a.) Local Neuralgia. |
| | | (aa.) Facial Neuralgia. |
| | | (bb.) Hemicrania. |
| | | (cc.) Cervico-Brachial Neu-
ralgia. |
| | | (dd.) Intercostal Neuralgia. |
| | | (ee.) Sciatica. |
| | | (ff.) Crural Neuralgia. |
| | | (b.) General Neuralgia. |

2. GENERAL DISORDERS OF THE NERVOUS SYSTEM. {
- (a.) Paralysis.
 - (b.) Hysteria.
 - (c.) Wakefulness.
 - (d.) Delirium Tremens.
 - (e.) Tetanus.

3. RHEUMATISM AND GOUT.

1. CASES OF NEURALGIA.

(a.) LOCAL NEURALGIA.

Cases of this class I shall present as follows:—

(aa.) *Facial Neuralgia.*

These, again, are subdivided into *Supra-Orbital*, *Infra-Orbital*, and *Mental Neuralgia*. The various forms, involving one or all of the branches of the fifth pair of nerves, as well as the *portio-dura* of the seventh, are of very frequent occurrence, and are a most excellent field wherein to test the value of *Hypodermic Injection*.

Case I. — Neuralgia of all the branches of the Trifacial, of thirteen years' standing. Injection at the Infra-Orbital point.

Mrs. W——, of Malden, Mass., aged thirty, mother of a child three years old, of nervous temperament and feeble constitution, had been a martyr to facial neuralgia for thirteen years, when in February, 1859 (at the request of her dentist, who, in the hope of giving her relief, had, a short time before, but in vain, extracted all the teeth), I saw her in consultation. Her request to me was, to do any thing I pleased, if I only relieved her of the constant agony of pain. Her shattered constitution, her pale and distressed countenance, her sunken eyes, gave additional emphasis to her request. Medical resources had failed to cure, though they relieved her at times.

I determined to try hypodermic injection, and, finding the infra-orbital point the most painful upon pressure, injected there a so-

lution of one-third of a grain of acetate of morphia.

The effect was immediate, more so than I could have foreseen. The pain ceased in a few minutes; but the patient fainted also. After she had recovered, nausea and vomiting followed, and continued to distress her for thirty-six hours. All that time she was free from pain, and with the aid of proper remedies, such as bismuth, etc., the stomach recovered its tranquillity. Two days after the operation, she visited me in Boston, when she told me that the night after the injection was the first she had slept for several consecutive hours for years. I advised now a course of tonics, and such hygienic measures as might tend to invigorate her constitution. Vegetable tonics, exercise in the open air, liberal diet, soon gave evidence of an improved condition.

February 18th, I repeated the injection (though only one-sixth of a grain) in the

thigh, where the pain seemed then to be seated. The same phenomena resulted as before.

During the year 1860, I saw this patient several times, much improved in health, and, to my surprise, free from neuralgia. I have often thought that the great impression, or rather the great disturbance, caused in her system by the first injection, namely, the severe vomiting, contributed much to bring about this happy result. At the present time of writing—August, 1864—I am assured by a friend of Mrs. W. that she is free from neuralgia.

Case II.—Neuralgia of the lachrymal branch of the ophthalmic division of the Trifacial, of seven years' standing. Injection at the palpebral point.

Mrs. H——, of Boston, aged thirty-five, mother of one child, consulted me, March 3d, 1859, for severe neuralgia of the face and head, of seven years' standing. The pain is confined to the right side, extends

to the sagittal suture, and is of a dull, heavy nature, almost constant, but at one time more severe than at another. The lachrymal branch of the ophthalmic division and the portio-dura is evidently involved. Two weeks ago, a small space around the ear began to be painful. The severity of the attack is affected neither by heat nor cold.

I injected fifteen minims of the solution at the palpebral point; and in few minutes Mrs. H. was at ease, though considerably nauseated.

Nine days after, the operation was repeated; again, twelve days later, invariably with the same favorable results, though each time followed by considerable gastric disturbance. The patient took, for a considerable time, tonics, such as *Ferro-citratis et Quiniæ*, with benefit.

No return of neuralgia to the present date of writing, — April, 1865, — though Mrs. H. has had a severe attack of fever, followed by varioloid.

Case III. — Neuralgia of the superior and inferior maxillary nerves of the Trifacial. Injections at different points.

Mrs. —, of Boston, aged fifty-nine, mother of seven children, of nervous temperament, has been subject to the severest form of tic-douloureux for eight years. It is confined to the right side of the face. Her health is literally broken down; her teeth she, too, sacrificed, but to no avail. Medical advice, the best the city could furnish, brought no amelioration.

September 15th, 1859, I injected ten minims of the solution at the *infra-orbital point*. From five to ten minutes afterwards, she felt no more pain, and became drowsy. Some hours later, she was seized with nausea and vomiting, which was relieved by proper remedies.

I continued to attend for some four months; during which time I repeated the injection often, and always with much benefit. On account, however, of disease

of the upper maxillary bone, I did not expect more than temporary relief. Tonics were not disregarded, and at present this lady enjoys a fair degree of health.

Case IV.—Neuralgia of recent standing, seated in the right temple.

Mr. —, of Boston, aged twenty, book-keeper, was attacked in the night, two weeks previous to consulting me, with violent pain in the right temple. Always enjoyed good health. Is of a nervo-sanguineous temperament. Can assign no cause for the pain. Used palliatives and external applications without success.

I injected ten drops of the solution at the *temporo-malar point*. Shortly after, complained of giddiness, but declared himself free from pain, which was very violent when he entered my office. Went to sleep for an hour. Had no pain when he left me. Patient took tonics for a considerable pe-

riod afterwards. No return of the neuralgia up to the present time.

Case V. — Neuralgia of twenty-six years' standing, seated in the *Pes Anserinus* of the *Portio-Dura* of the seventh or *Facial* nerve, and the third union of the *Portio-Dura* with the *Tri-facial*. Injection at the *Temporo-maxillary* point.

Mrs. F——, of Boston, widow, forty-eight years old, was attacked about twenty-six years ago with severe pain in the superior maxillary and malar bone, without being able to assign any cause for it. Her mother, although alive and seventy-four years old, suffered from early youth, for many years, from the same complaint. For several years, the neuralgia was confined to the right side, when, all of a sudden, it exchanged its habitat to the left. For the last six months, it has been entirely confined to the left ear, and a small space in front and behind it. She complains of a

constant noise within the ear,—similar to a swarm of bees,—which keeps her awake all night. Her general health has suffered much within the last few years, owing chiefly to the constant loss of sleep.

From October 11th to December 14th, I attacked the disease almost daily by the injection of *Liquor Opii Comp.*, now here, now there, wherever the pain was severest, but generally at the temporo-maxillary and auriculo-temporal points. I had always the satisfaction of seeing the suffering diminished in the course of fifteen minutes; ever returning anew, but gradually diminishing in intensity. I directed also the use of valerianate of ammonia daily, and, later, put her upon large doses of quinine. Gradually, the noise in the ear diminished. In proportion as her general health improved, the neuralgia became less troublesome, and assumed a much milder form. This state of things continues to this day. Mrs. F. enjoys a tolerable degree of health.

Case VI. — Neuralgia of the Supra-Orbital, of four years' standing. Use of the Valerianate of Ammonia, and Hypodermic Injections.

January, 1860, I saw Mrs. —, of Boston, feeble and in consumption, of very nervous temperament, subject to *Supra-Orbital* neuralgia for four years. She is predisposed to rheumatism; but her neuralgia is more the result of her own carelessness in dress in the winter season than of her rheumatic predisposition. In spite of her condition, she will go skating and to dances, then return home and lie awake all night tormented by neuralgia.

She was put upon valerianate of ammonia, but without satisfactory results. February 3d, I injected ten minims of *Liquor Opii Comp.* The night was passed comfortably. The injection was repeated six times in two weeks, each time promising well. She continued under my treatment for some time longer, when she removed to

New York. I have never heard from her again.

Case VII. — Neuralgia of the Supra-Orbital Branch.

Mr. L——, aged twenty-eight, merchant, had suffered for several weeks from severe pain, situated at and about the *supra-orbital foramen*; is hardly ever free from pain; worse at night; sometimes experiences sharp pain at the *pes anserinus*. I injected one-sixth of a grain of acetate of morphia near the foramen. Felt relieved for several hours, but pain returned next morning. Injected one-quarter of a grain of the same. Four days later, repeated the operation, after which the pain did not return. Have not heard from this patient since the spring of 1860.

Case VIII. — Tic-Douloureux of the right side of the Face.

Mr. H——, fruit-vender, thirty-five years old, suffers from a severe attack of tic-dou-

loureux in consequence of exposure at his occupation. The pain has harassed him for the last two weeks. Injection at the *infra-orbital point* for three consecutive days. Received each time decided relief from the operation.

Case IX. — Neuralgia in the left Temple.

June 25th, 1860, I saw Mrs. —, feeble and in consumption, who had been troubled for about five months with excruciating pain in the left temple. Injected ten drops of the solution with favorable result, but causing considerable gastric disturbance. Operation was not repeated, as I lost sight of the patient.

Case X. — Facial Neuralgia situated in the course of the Infra-Orbital Branch, of twenty years' standing.

In December, 1860, I saw Miss K—, of Boston, who had been subject to facial neuralgia over twenty years. All ordinary

means of relief have failed, and her general health is much impaired in consequence of her sufferings. Pain is situated directly in the course of the *infra-orbital* branch of the *trifacial*.

Injected a weak solution near the *infra-orbital foramen*, causing considerable gastric disturbance. Pain returned, though not so severely as before. Repeated the injection several times, at intervals, always with favorable results. Patient was advised to take the following:—**R** Liquor-potassæ arsenitis, ℥ iss.; tinct. cinchonæ, ℥ iii.; syrupi aurantii, ℥ i. M.; cochl. parv. 3 t. p. d. Under the persistent use of tonics, and an occasional injection, Miss K. continued to improve, and says she has not been so comfortable for many years as of late. Though the neuralgia still troubles her slightly from time to time, yet she is able to work, and has gained sufficient strength to consider herself quite well.

**Case XI. — Neuralgia of the Supra-Orbital
Branch of the Trifacial.**

Mr. —, employed on the Providence Railroad, was seized suddenly with violent neuralgic pain at the *supra-orbital foramen*, after being exposed to wind and rain for some time. He at once called upon me. Judging it to be a genuine case of neuralgia, I injected eight drops of the solution, with success. The pain did not return.

**Case XII. — Neuralgia of the Supra-Orbital
Branch.**

In January of 1862, I saw, at the United-States Hotel of this city, Mr. G—, who had been under the care of a homœopath for over a week, for the purpose of relieving a severe attack of *supra-orbital neuralgia*. Cause, severe mental application and the too free indulgence of tobacco. Bowels inactive, and digestive functions disordered. I enjoined absolute rest, prescribed a cathartic pill, to be followed in the morning by a

saline draught and pil. morphiæ valerianatis, one-tenth of a grain each, to be taken every two hours during the night till pain ceased. Three pills were sufficient, and patient passed a tolerably quiet night. Cathartic operated well. In the morning I found him much better, but still now and then having a severe paroxysm of pain. Injected ten drops of the solution at the *supra-orbital point* with decided benefit. Under the use of medicines appropriate to the state of his system, Mr. G. improved rapidly; and, about six days from the time I first saw him, he was again able to attend to his official duties at the State House. The pain has not returned since.

Case XIII. — Neuralgia of the Infra-Orbital and Mental Branches of the Trifacial, in connection with Chronic Dyspepsia and great Debility.

Mr. B——, of Boston, merchant, forty-two years of age, and nervous temperament, consulted me, in February, 1862, on

account of general debility. The latter was undoubtedly caused by chronic dyspepsia, which had reached such a degree, that but few articles of food could be taken without being followed by severe colic in from half to an hour after each meal. During the preceding fall and winter, he made a tour through Europe, in the hope of recovering his failing health, but to no purpose.

I find him discouraged, emaciated, and prostrated from frequent attacks of neuralgia ("twinges" as he would call them), seated in the infra-orbital and mental branches of the trifacial. Headaches torment him almost constantly, and to stay in a room full of people is out of the question. Bowels irregular. We went to work together with a will; and by a judicious regulation of his diet, which consisted exclusively of beef-tea and kindred nourishment three times daily, and by keeping the bowels in as good a condition as possi-

ble, I had the satisfaction, at the end of about six months, to see my patient relieved of the colic, able to digest a greater variety of food, and to be decidedly "*less nervous.*" In about a year, he enjoyed most articles of food, and has been free from distress since. The *facial* neuralgia, however, was more obstinate, and from time to time the attacks were very severe. Subcutaneous injection was resorted to, on being called one night in March, 1862. Fifteen drops of *Liquor Opii Comp.* were injected near the *infra-orbital foramen.* No inconvenience arose: he rested well, and was free from pain during the night.

The paroxysm returning, the injection was repeated that and the following day.

During the course of a year and a half, I have been obliged to resort but twice to the operation. For the last eight months, Mr. B—— has enjoyed immunity from facial neuralgia. His general health may now be pronounced good, or, to use his own

words, "much better than for the last fifteen years."

Case XIV. — Neuralgia involving all the branches of the fifth pair of Nerves on the right side.

Miss K——, a maiden lady, residing near Cape Cod, consulted me early in the spring of 1863. She is forty-nine years old, dyspeptic, exceedingly nervous. Was seized with neuralgia about eleven years ago. With the cessation of her catamenia about three years ago, its violence increased. So acute is the pain, that she dare not leave the house without a veil over the face: the least breath of air, the faintest sound, a loud word spoken in conversation, each can conjure up, as if by magic, a paroxysm. Then her cry for relief is almost agonizing.

I resorted to hypodermic injection, as all remedial agents had proved unsuccessful. April 9th, injected twenty minims of Liquor

Opii Comp. near the infra-orbital foramen. Aside from considerable gastric disturbance, which followed the operation, relief was complete for four days.

April 14th, renewed the injection, with benefit continuing for seven days.

For four months the same treatment was continued whenever the occasion required, the paroxysms diminishing in intensity and frequency. My patient, though now and then reminded of her old enemy, considered herself another being.

During the whole time, however, that Miss K. was under my care, my utmost attention was directed to her general health. By the use of alteratives, such as Fowler's and Donovan's solutions, by tonics, and liberal but appropriate diet, her whole condition was much improved. This, no doubt, contributed much to the amelioration of her neuralgia.

Case XV. — **Case of Facial Neuralgia, resulting from exposure to cold wind.**

Mr. M—— saw me in January, 1864. About two weeks before, he was exposed for several hours to a cold wind. A few days after, the left side of his face felt benumbed; but soon he experienced such severe pain in the course of the branches of the trifacial nerve, that he found only relief in constantly pressing his hand against the cheek. After fruitless attempts to obtain relief, I injected the usual solution for three consecutive days, and had the pleasure of contributing much to the comfort and ultimate recovery of the patient. After the eleventh day, there was no return of the neuralgia.

Case XVI. — **Tic-Douloureux of the left side of the face, the result of exposure to cold.**

Mr. P——, merchant, gave me, June 2d, 1864, the following history: Froze the left side of the face some four years ago, since

which time he has been subject to sudden attacks of tic-douloureux. These paroxysms, which last from five minutes to an hour, are not influenced by the seasons, or any degree of heat or cold. He is otherwise healthy, and unwilling to take medicine.

June 2d, injected ten minims of Liquor Opii Comp. near the infra-orbital foramen, followed by instant relief for two days.

June 4th, repeated the injection, with the same satisfactory result; there being no return of neuralgia for about two weeks, when I introduced another injection. From that time till the present, I have lost sight of the patient.

(bb.) *Hemicrania.*

Case XVII. — Hemicrania relieved by Hypodermic Injections.

Mrs. A——, aged forty, anæmic and debilitated, has been subject to severe headaches of the right side for several years.

The attacks recur regularly every three weeks. The pain commences at the inner, sometimes at the outer, angle of the right orbit; passing up along the suture uniting the parietal bones, and extending down into the neck.

I threw the injection, as usual in quantity, into the cellular tissue of the back of the neck, where she said the pain was most violent at the time. In an hour she was at ease. The following night, when called to relieve her again, she was soon made comfortable by the same measure. After repeating the operation six times, there was no return of the hemicrania for twenty-three weeks. In fourteen months, I had only twice to resort to the same measures.

Case XVIII. — Hemicrania, the result of exposure.

Mr. W——, conductor on the Metropolitan Railroad, aged thirty-five, strong and

active, consulted me in February, 1864. Two months previous, whilst in the discharge of his duties, he was suddenly attacked with most violent, sharp pain, commencing over the right eyebrow, and passing from thence over the head into the neck, which he could not move, as the least motion would cause great suffering.

Quitted his post for several days, and improved a little under medical treatment; but, as soon as he returned to his duty, he was as bad as before. The pain came and left him at regular intervals.

I injected twenty-five minims of *Liquor Opii Comp.* into the neck,—the right side,—and sent him home. Rested well that night; but the neck was still sore the next morning.

Repeated injection. He returned in a week, saying he had not been so comfortable for a long while; but still, when on duty, he had now and then a slight paroxysm.

Gave another charge of thirty minims into the neck, the last that was necessary; for he reported himself well in a few days. I see the patient often; but he has had no recurrence of the hemicrania thus far.

(cc.) *Cervico-Brachial Neuralgia.*

Case XIX. — Cervico-Brachial Neuralgia, of many years' standing.

Mr. M——, German, forty-six years of age, carpenter, has suffered for many years from severe lancinating pain in his left arm, which was fractured at the upper third of the humerus when twelve years old. The pain, sharp and severe, shoots along the neck, from whence it starts downwards, is felt all over the shoulder, and is often most severe at the external angle of the clavicle, at its articulation with the scapula. I injected twenty drops of the solution. Sleep ensued in about thirty minutes. No nausea or vomiting. When he awoke, declared himself free from pain. Some weeks

after, the pain returned, with increased violence: fifteen drops were injected. The same phenomena and the same results followed. This happened in March, 1859. From then till now, in cold, wet, and damp weather, he has occasional and very slight pains, which he says are not worth noticing when compared with his former suffering.

Case XX.—Cervico-Brachial Neuralgia of both sides, complicated with Thoracic Neuralgia and Spinal Irritation. Injection of a saturated solution of Chloride of Sodium, and a strong solution of Argenti Nitratis.

The following case was treated, as a last instance, by the injection of a solution of *Chloride of Sodium* and *Argenti Nitratis*, to which I referred, page 10 of this essay, under the head, "*Injections, their Nature, Extent, and Limit.*" I think it will not prove uninteresting to my readers. I shall, therefore, be pardoned for giving the case at length.

October 21st, 1863, Mr. ———, a manufacturer from a neighboring town in Massachusetts, about forty years of age, and decidedly nervous temperament, moderately well built, anæmic, and of sallow complexion, bearing the impress of continued suffering in his countenance, consulted me; when I elicited the following history:—

Had always enjoyed a tolerable degree of good health, been very active, with plenty of care in business, till he contracted syphilis ten years ago, which was treated by mercurials. Four or five years later, he was attacked by a dull, heavy pain at the nape of the neck, with some tenderness upon pressure, resembling rheumatism; at other times the pain was sharp and severe. As the disease progressed, it involved the dorsal portion of the spine, and extended to the trunk, following the course of the intercostal nerves, particularly the 6th, 7th and 8th pair. Nor did

it rest there ; but it extended to the upper extremities, involving the cervical as well as brachial plexus in the derangement, running from the axilla down the inner side of the arm, and following the distribution of the nerve to its termination in the middle, ring, and little fingers.

Both sides were equally affected,—a circumstance extremely rare. So rare is this form of double brachial neuralgia, that Mr. Valleix¹ states he never saw a case of it in his long and varied experience.

Mr. ——— describes the character of the pain as spasmodic,—darting like electric shocks from the axilla down to the extremities of the ring and little fingers, bending the latter completely inwards, so as to be unable to stretch them during the paroxysm. During the interval, a dull, sore feeling remains. This is relieved, for the time being, by constant friction of the skin of

¹ Valleix, *Traité des Névralgies*, Paris.

the affected member. Unexpectedly the attack may come, or it may be excited by simply touching a cold surface with the extremity of the little finger.

In this state of things, days were passed uncomfortably, and nights more wearisome still. Naturally nervous, nervous irritability, impelled by an inexorable law of progress, commensurate with the cause, had its unlimited sway; and the pain-racked body could only find repose at night, when receiving its tribute in the form of a powerful potion, not of medicine, however, but of whiskey.

As for the rest, bowels are irregular, appetite variable, strength gone, and spirits depressed. He has had the best medical treatment. Early in the spring of 1863, he was advised to visit Europe, hoping to be benefited by the change. There he consulted that eminent physician, Dr. Brown Séquard, and remained under his care, slightly improving. Upon the patient's

return home, he got worse again, and by letter consulted the same gentleman again, July 28th, 1863. He was advised the following plan of treatment, August 20th, 1863, to be continued for six weeks or two months, and longer, if benefited:—

R. Ammon. Iodidi, ℥ v,
 Ammon. Bromidi, ℥ ii,
 Potassii Bromidi, ℥ vi,
 Ammon. Sesquicarb., ℥ ii,
 Infus. Calumbæ, ℥ iii,
 Aquæ Destillat., ℥ iv.
 Miscæ.

Directions: Three teaspoonfuls before breakfast, dinner, and at bedtime, with a little water.

Also —

R. Extr. Cannabis Indici, gr. $\frac{1}{4}$,
 Extr. Conii, gr. i,
 Ferro-Citratis et Strychniæ, gr. ss.

Miscæ. Ft. Pilula N. i.

Take one pill after each meal.

Further:—

R. Emplastr. Cantharidis (2 by 3 inches).

To be applied on the back of the head once every three weeks.

Besides these means of treatment, a *douche* of very warm water was to be applied to the spine every morning; and, if that was not possible, to have an application, daily, of a sponge dipped into water as warm as possible, between the shoulders. The *prognosis* was most favorable; viz., complete recovery.

I stated the above simply to show that much care and ability have been brought to bear upon this interesting case; but as the patient did not improve at all from September 8th till October 21st, during which time he followed the directions, he discontinued the remedies, and some time after the case came under my care.

As to the diagnosis of the case, there could be no doubt. To put that man at ease, and to give him sleep, without whiskey, for the night, seemed to me the first step. To accomplish this, I injected fifteen minims of *Liquor Opii Comp.* near the insertion of the deltoid, sent him home to bed,

refused all whiskey for the night, and asked him to report next morning.

October 22d, 9 A.M. Reports he felt somewhat nauseated, but rested almost the whole night without having taken his usual stimulant. Towards morning, felt the pain in his arms, but only slightly, which was relieved by friction. I need not say he was greatly pleased with the result.

The injection was repeated that same morning and evening, followed by perfect rest during the night.

October 23d to October 28th. Renewed the operation daily once in the evening, injecting always ten minims.

During the same time, the bowels were regulated by

℞ Extr. Hyoseyami, ℥ i,

“ Conii,

Pulv. Aloes, aa ℥ ss,

“ Ipecac, gr. v.

Mix. Ft. Pil. N. x. Two pills at night.

He took also —

℞ Infus. Gentian. Co., ℥ iiss,
Extr. Valerian. Fl., ℥ iss.

Mix. Two teaspoonfuls three times a day.

The result was all that could be desired. From the 22d, positively no stimulants had been indulged in to relieve pain; and on the morning of the 29th he left for home, as he said, "*a new man.*"

To control the neuralgia, I ordered —

℞ Morphiæ Valerianat., gr. i,
Extr. Hyoscyami, gr. x.

Mix. Ft. Pil. N. x.

One pill at night, to be repeated every two hours if necessary. The other remedies were to be continued.

November 4th. One week after we parted, Mr. — came to my office "*for another injection,*" as he said. He had got along very well for three days; the pain was hardly perceptible, and then increased somewhat, but was by no means so severe

as before. Could rest at night without stimulants. At present, the neuralgia is *intercostal*. Appetite and bowels improved; can apply himself more regularly to business.

November 4th, 5th, 17th, and 20th. Renewed the operation, each time with benefit. Whenever, in the course of two, or three days, the pain does return, it comes with diminished force. Advised salt-water baths daily.

December 1st. Has been almost entirely free from pain for ten days; still some trouble was there, under the scapula, along the arms, in the fingers, the intercostal spaces, the breasts. Convinced that the neuralgia was less intense but more obstinate as I invaded its dominion, I then resorted to the injection of a saturated solution of chloride of sodium, and a solution of argenti nitratis, to which I alluded under Section *c*, page 29, of this essay, similar to experiments I made previously in several

cases of sciatica¹ and one case of general neuralgia.²

Dec. 1st. Injected fifteen drops of a saturated solution of chloride of sodium into the body of the deltoid of the right arm. This was succeeded by a smart pain extending through the whole arm, which subsided in a few minutes. No neuralgia.

Dec. 2d. Experienced no inconvenience from the solution. There is no swelling, no irritation, no pain.

Dec. 3d. Injected into the right arm, a little below the insertion of the deltoid, five drops of a solution of two grains of nitrate of silver to one drachm of distilled water. This operation was immediately succeeded by severe pain, and a sensation of burning, which extended along the arm down into the hand. This lasted, however, but about fifteen minutes, when the patient

¹ Vide Case No. xxxv., page 103.

² Vide Case No. xli., General Neuralgia, page 111.

was as comfortable as ever. Left for home to-day, but promises to write.

In a letter dated December 4th, the patient remarks, "The waggish expression, that, 'to cure a headache, you must jam your toe so as to make it ache worse,' I thought applicable to the case last night; for my arm at the point of injection, and below the elbow, extending to near the wrist, on the top side (with the palm of hand down), ached badly until past midnight, when it eased off a little, and sleep was my portion. The part affected by the injection last night is stiff and sore this morning, but not particularly painful, whilst the pain so much complained of in that arm is less."

I advised the application of poultices to the arm; which was done, and the uncomfortable feeling began to subside in a few days.

December 14th. Patient presents, at the point of injection, a swelling of the size of

a small hen's egg, quite hard, and semi-transparent. No pain upon pressure. It points to the formation of an abscess. I did not interfere, as it caused no inconvenience, and in four weeks was completely absorbed. On the whole, Mr. D.'s neuralgia never before had been so decidedly relieved, and for so long a period, as since the last operation. There was little, if any, pain in the arms.

From *December 15th* till *April 21st*, 1864, I saw the patient several times, when I had recourse to hypodermic injection. He stated, the last time I saw him, that certainly nothing ever before benefited him so much, and controlled the pain so completely, as the operation; but still, as the neuralgia was wont to return, though in much milder form, a change of climate was determined upon, thereby securing, also, entire freedom from business cares. At last accounts, Mr. — was sojourning in the State of Wisconsin, apparently profiting by the change.

The history of this case demonstrates that moderate injections of *Liquor Opii Comp.* are sufficient to control severe neuralgic pain for days and weeks. As was seen, stimulants were dispensed with after the first operation.

In that respect, if in no other, was the patient a new man. A great drawback to the treatment was undoubtedly the patient's residence, over one hundred miles in the interior of the State, so that he was only seen at irregular intervals; but, even then, the result was quite satisfactory.

The application of nitrate of silver by injection is also very instructive. The symptoms were marked. A small additional fraction would have produced suppuration. In how far a free discharge of matter from the arm would have benefited the case, we may judge by the result of cases of sciatica, where the same experiment, carried to the point of suppuration, has been tried successfully. As it was,

the injection, whatever may have been its *modus operandi*, held the neuralgia of both arms for a longer period in check than any narcotic agent previously employed.

(*dd.*) *Intercostal Neuralgia.*

Cases of *intercostal neuralgia* are not unfrequently met with in medical practice. Its particular symptom is pain about the mammary region and the intercostal spaces. Young women are particularly subject to it when suffering from well-understood irregularities of the uterine system. The most painful point is found on the outside of the spinous process of the vertebræ, or along the lower margin of the rib.

Case **XXI.**

Mr. G——, of Boston, thirty-six years old, master of a ship, consulted me about a severe pain in his left side, situated along the lower margin of the seventh rib. Is

subject to rheumatism ; and, whenever that complaint leaves him, he suffers from pain in the side. Has been blistered, &c., with no good result. Fifteen drops of the solution were injected at the intercostal space of the sixth and seventh rib.

He was free from the neuralgia for several days, when twenty-five drops were injected ; and three weeks later, when Mr. G. went to sea again, he was still free from his old trouble. I have not seen him since.

Case XXII.

Miss ——, of Boston, nineteen years old, anæmic and delicate, suffers from dysmenorrhœa. In May, 1863, she was attacked with sharp and severe pain, starting from the spinous processes of the dorsal vertebræ, along the lower margins of the fifth, sixth, and seventh ribs. At times, the pain is also felt in the mammary region. I applied the injection at the intercostal spaces twice, at an interval of five days. The re-

lief was complete. She took for some time the citrate of iron, and other proper remedies directed to her general health. Recovered speedily.

(*ee.*) *Sciatica.*

Case XXIII. — **Sciatica of three and a half years' standing.**

Mrs. —, aged twenty-six, of nervous temperament, but strong constitution, aborted six years ago: since that time her health has been impaired. Five years ago she was attacked with severe pain in the right sciatic nerve, starting from the ilium, and shooting down the thigh to the knee. Saw her in November, 1859. Examination reveals tenderness of the whole right hip, and a painful point was felt upon pressure near the posterior superior spinous process of the ilium.

Subcutaneous injection was twice practised in her case by me, with good results; the patient being each time relieved for a

considerable period. Under the use of tonics, she continued doing well, and she suffers but seldom from pain in the hip or limb.

Case XXIV.—Sciatica of about six months' standing.

Mr. E——, aged thirty-six, merchant, of feeble constitution, and troubled with disease of the kidneys, applied to me, suffering from a severe attack of sciatica, which confined him to his bed. Pain is situated at the outer, lower portion of the thigh, and also in the knee. Is very nervous, and can bear pain very ill. Pulse 110, skin hot, appetite poor. Ordered a brisk cathartic and sedative pill.

Towards evening, the pain continuing to be severe, I injected twenty drops of the solution. The operation was painful; no gastric disturbance followed; and, in about three-quarters of an hour after, the patient was asleep. Passed a good night; but, in

the morning, pain returned. Repeated the injection on three successive days; and I had the satisfaction to see my friend comfortable, and, in a week from the commencement of the attack, to see him return to his business. He has had no return of the pain.

Case XXV.

Mr. R——, mechanic, aged forty-two, has suffered for more than a year from severe pain in the course of the right sciatic nerve, beginning about two inches below the hip-joint, and extending down to the knee. Is hardly ever free from pain; and cold and wet weather aggravates it still more. Has used every remedy. After administering a cathartic the day before, I injected twenty-five drops of the solution into the thigh, with good result. The patient was free from pain for several days: and, when he had a renewed attack, I injected thirty-five drops, and later forty-five

drops ; after which the pain did not return again. No gastric disturbance.

Case XXVI.

May 7th, 1860, I saw, in consultation, a gentleman, aged sixty-eight, who has for years been subject at times to severe, persistent pain in the left hip and limb, felt only when he attempted to rise from a chair or sofa, and never causing any trouble when sitting quietly. Complains also of great weakness in the limb. The case presents more the characteristics of confirmed chronic rheumatism, with great loss of strength, than those of sciatica. As every thing had been tried, it was proposed to essay subcutaneous injection ; for which purpose I was called.

May 7th. Injected one-eighth of a grain of sulphate of morphia : patient felt somewhat drowsy, but declared himself free from pain, and went to sleep. Left him in that condition.

May 8th. Has passed a comfortable night. Can move about with more ease, but still feels an uneasy sensation in the limb. Repeat the injection.

May 9th. Reports free from pain.

May 10th. Pain returned: injected one-quarter of a grain of morphia.

Free from pain for several days. Repeated the operation once more with benefit.

Some weeks later, I received a very handsome note of acknowledgment from this gentleman, in which he expressed his satisfaction of the treatment, and the benefit he had derived from it.

Case XXVII.

Mr. A——, aged about sixty, a retired merchant, of good constitution, slightly nervous temperament, had been confined to bed, by a severe attack of sciatica of the left side, for about three weeks; when I was asked to see him, in consulta-

tion with the attending physician. This was not the first attack. Twice before, he had suffered from the same disease, which then yielded under the use of quinia and local remedies, such as cupping, leeches, and the application of morphia to the blistered surface ; but this attack seemed to defy all these formerly successful remedial agents, and the patient has been more or less in constant pain. Pulse 100, bowels regular, appetite good.

August 30th, 7½, P.M. Injected fifteen drops of Squibb's Liquor Opii Comp. near the great trochanter of the femur, where the patient complained most of pain, shooting from thence down to the knee, and along the outer side of the leg into the foot.

9½, P.M. Called again with the attending physician, and found the patient resting comfortably on the left, or painful side, and free from pain. Nothing further was done.

Aug. 31st, 8, A.M. Patient passed a com-

fortable night: slept without the use of Dover's powder, and complains of but very slight pain. Repeated the injection; omitted all medicine.

September 1st and 2d. Free from pain, and no injection needed for two days. Sleeps better, and can turn over in bed without much trouble.

September 3d. Made an attempt to stand, but found it impossible: the weight and motion give pain. Can, however, be placed in one of Eliaer's extension-chairs. Repeat the injection at night.

September 4th. Rested well: no pain in the thigh, but complains of a constant prickly sensation in the leg and foot. Foot is considerably swollen around the instep and ankle, and quite painful to the touch. Order the application of equal parts of Tinct. iodini comp. and ether sulphur.

October 1st. Patient continued steadily to improve from day to day, and is, at the date of this report, able to walk about quite

freely, though mostly with the aid of his cane. Goes out daily.

October 12th. Patient, whilst in the act of stepping into his carriage, slipped, and fell heavily upon the sidewalk, sustaining a severe contusion of the hip. The pain in the course of the sciatic nerve returned with renewed violence. External applications were ordered to the hip, and the injections repeated (fifteen drops) at the most painful point. Passed a comfortable night. Being mostly free from pain during the day, the injection was resorted to for some time late in the evening, always insuring a good night's rest. Recovery was complete in a short time.

During the cold of the winter, Mr. A. had a renewed slight attack of sciatica, which, however, was promptly checked by a resort to hypodermic injections; and for the last four months he has been gaining strength, and continues to be perfectly well up to the present.

Two months ago, January, 1865, this patient had a new attack of sciatica, which yielded to three consecutive injections. Is perfectly well again.

Case XXVIII.—Right Sciatica of many years' standing. Injection of Narcotics; Sulphate of Atropia; Tinct. Cantharidis.

During the winter of 1861 and spring of 1862, I was repeatedly called to visit Mr. B——, an old bachelor of about sixty. He left his room but rarely, owing to his inability to walk any distance on account of sciatica, which was aggravated by exercise. His general health was below the average. His negligent and filthy habits of life, however, rendered any disease possible. Medicines were tried unsuccessfully. He therefore desired me to give him the benefit of subcutaneous injection. Opium injections always relieved him for days, and enabled him to walk about; but they were large: often as much as forty drops of

Liquor Opii Comp. were injected at one operation. This may be accounted for, however, in a great measure, by the long standing of the disease, and the insensibility of the nervous system to impressions of any kind, short of pain, brought about by the inveterate habit of the patient of literally *eating* medicines for years.

I sought to establish counter-irritation along the course of the sciatic nerve, from hip to knee-joint; but by the constant use of liniments, which he had been in the habit of applying for years, several times during the day, by means of a small block of wood, covered with a strap of rough leather, which he rubbed up and down the limb daily for hours, with all the strength he could muster, the skin had been rendered as hard and dry as sole leather, and the strongest counter-irritant left hardly any impressions.

I then injected a solution of one-twen-

tieth of a grain of sulphate of atropia. This subdued the pain entirely, but was followed by such unfavorable head-symptoms, peculiar to the action of atropia, that I desisted from further experiments in that direction.

In February of 1862, I ventured to inject near the great trochanter twenty-five drops of tinct. cantharidis. The pain that followed the injection was quite severe. The sciatica, however, subsided for the time. In the course of four days, the injection was followed by a considerable abscess, which, by the aid of poultices, in time discharged a large quantity of pus, and healed kindly. Aside from the soreness, this gave more relief than any thing I tried in this case. The patient left the house several times, and seemed materially improved. In March, he died suddenly of apoplexy.

Case XXIX. — Right Sciatica of several months' standing. Cure by the injection of Sedatives.

Dr. D——, of Boston, stout, about forty-five, happy temperament, and otherwise perfectly healthy, had suffered for several months from severe right sciatica, which rendered him lame, and unable to follow his professional duties regularly as surgeon-dentist, when he sent for me, during the last week of June, 1862. He had consulted his medical friends, but got no relief. When I visited him, June 27th, he was lying on his bed, suffering intensely. The pain started from the hip-joint, and extended down the thigh and leg into the foot. Ten minims of *Liquor Opii Comp.* were injected.

June 28th. Spent a comfortable night; repeated the injection. Cathartic medicine was ordered at the same time.

June 30th. Pain returned; when I applied counter-irritation along the course

of the sciatic nerve, from hip to knee. Injection was renewed.

From July 1st to 17th, resorted repeatedly to the injection: under its use he rapidly recovered. July 18th, he attended to his professional duties. His strength, which had been greatly reduced, improved under the use of tonics; and from July, 1862, to date, he has had no relapse.

Case XXX.—**Right Sciatica of several months' standing.**

Mr. B——, master of one of our public schools, stout, muscular, moderately active, forty years old, suffered like the doctor whose case I stated last, and by whose advice Mr. B. consulted me. Pain runs along the entire right limb, is almost constant, and renders walking difficult.

The treatment, with but very slight modifications, was the same as in the previous case. Injections relieved the pain entirely, and, with rest and adjuvant treatment, he

left his bed at the end of two weeks. He has had no return of the complaint.

Case XXXI.—**Double Sciatica** of several years' standing. Successful treatment by Subcutaneous Injections.

Mr. B——, a manufacturer, from the interior of this State, sixty years old, nervobilious temperament, and overtasked with business cares, has been subject to attacks of sciatica of both limbs. The pain is, however, more persistent in the right limb. Is lame, and stoops much. Medicinal treatment has given but temporary relief.

September 17th, 1863, I injected ten drops of the solution near the great trochanter of the right thigh, which relieved the pain effectually.

Two weeks later, Mr. B. reported that he had been more free from pain during the above period than ever before, but reported also some gastric disturbance after the operation. Reduced, consequently, the injection to eight drops, with good result.

Remedies aiming to give tone to the nervous system, as ferri-valereanitis and others of the same class, were directed to be taken.

From September 30th to November 20th, I saw this gentleman several times, each time repeating the injection, till, November 20th, it was discontinued. Walking was much improved, lameness mostly gone, and inconvenience from pain very trifling. This patient has not been under treatment since.

Case XXXII. — Left Sciatica of two months' standing. Entire relief by Subcutaneous Injection.

Mr. F—— had suffered from severe pain extending along the course of the sciatic nerve of the left thigh for eight weeks, when he consulted me, November 3d, 1863. The pain being intense, I injected twice on the day of consultation, and once on the second day. The third day he attended to his business as usual, and had no further need of my services.

Case **XXXIII.** — Left Sciatica of several months' standing. Complete relief by the operation.

In the early part of January, 1864, Mr. H——, residing in Cambridge, aged fifty, of active business habits, and of a nervous temperament, came limping into my office, experiencing evidently great inconvenience at every step. The case proved to be left sciatica of from two to three months' duration, which had defied thus far all treatment.

Cause, exposure to cold, almost constant riding in and out of town; great depression and exhaustion of the system. A friend of his recommended him to my care.

Ten drops of the usual solution were injected near the great trochanter of the left thigh, followed by relief in from five to ten minutes.

I also ordered —

℞ Extr. Colchici Fld. (Squibb's),
 Liquor Opii Comp. “ āā ʒ iss.,
 Aquæ Cinnam.,
 Aquæ Gaulther., āā ʒ iss.

Mix. A teaspoonful morning and night.

This was done, as there was an evident predisposition to rheumatism in the patient. Further, I enjoined perfect rest and freedom from all business care for a time. It will be unnecessary to recapitulate here the treatment daily pursued. I would state, however, that during the months of January, February, and March, the injection was applied at first three times, and later but twice a week. From the last day of March, 1864, till the present, there has been no occasion for the repetition of the operation.

Case XXXIV. — Recent case of Left Sciatica.

After exposure to a severe rain-storm for several hours, Mr. D——, a master mechanic, living in one of the Boston suburbs, was suddenly attacked with excruciating pain, extending from the left hip-joint to the knee, which rendered walking almost impossible. External applications and internal remedies proved of no avail. In this condition he consulted me.

February 20th, I injected ten drops of liquor opii comp. Pain was soon relieved, and motion rendered more easy; but the gastric disturbance was greater than I had yet observed in any case that has come under my observation. Three days later, five drops only were introduced, followed by relief, but giving rise to the same unpleasant gastric symptoms. A subsequent attempt was attended with similar results. I made no further injections, but insisted upon rest, applied counter-irritants along the course of the nerve, and gave appropriate remedies. The patient ultimately recovered.

*The following four cases of Sciatica I commend to the attention of the reader especially, as they were treated by the injection of irritants; viz., a saturated Solution of Chloride of Sodium and a Solution of Nitrate of Silver.*¹

¹ Vide page 10, ante, caput e. "Injections, their Nature, Extent, and Limit."

Case XXXV.—Right Sciatica treated by the injection of a saturated Solution of Chloride of Sodium and a Solution of Nitrate of Silver.

Mr. B——, provision-dealer, aged thirty-two, stout and active, of hereditary rheumatic diathesis, consulted me, November, 1863. For several months he suffered from a dull, heavy, almost constant pain, starting from the lumbar region and the extremity of the coccyx, extending to the hip-joint, and thence along the course of the sciatic nerve to the knee. There had been no lack of liniments and other applications.

November 16th, 9 P.M., I injected fifteen drops of liquor opii comp., and found next morning that the patient had spent a comfortable night. The operation was several times repeated.

January 1st, 1864, the pain being still felt, though much modified,—owing, undoubtedly, greatly to the fact that Mr. B.

was compelled to be about his business,— I determined to inject twenty minims of a saturated solution of chloride of sodium. I perforated the tissues as deep as I thought safe, the object being to bring about an inflammatory action near the seat of pain, and in the immediate vicinity of the nerve.

The injection was followed by a slight burning sensation, extending through the whole length of the thigh; but on the third day the point of injection was quite painful, slightly swollen, indicating the formation of an abscess. Aside from the inconvenience experienced in walking, the sciatica had disappeared. Poultices were applied; and, four days later, the swelling had subsided, and all uncomfortable sensations ceased.

January 28th, the patient was exposed to wet and cold, and had a relapse.

I now injected five minims of the solution of nitrate of silver. Result, severe burning pain for about twenty minutes;

but, when that ceased, the sciatica had also departed.

On the fifth day, there was a swelling of the size of a small hen's egg; on the eighth, after being poulticed, a small quantity of matter was discharged; and, in the course of a week, the abscess had healed kindly.

The amelioration was greater than ever before. Severe weather, wet, and cold, remind Mr. B., however, of his old enemy. He requires but seldom medical aid.

Case XXXVI.—Right Sciatica of ten weeks' standing. Injection of Nitrate of Silver; Recovery.

Mrs. M——, widow, forty-six years of age, and tolerably good constitution, was exposed to a rain-storm during the first week of March, 1864. The tenth of the same month, she was seized with severe pain in the right hip-joint, shooting from thence down to the knee. Was obliged to take to her bed; and counter-irritation

was applied, besides the use of internal remedies. She improved; but, as soon as she attempted to use the limb, the paroxysms returned. Saw her for the first time, March 29th. The pain then extended along the whole course of the sciatic nerve, down to the knee. As to the cause, there was no doubt. Ordered colchicum and opium internally, and spt. terebinth. externally, with friction; absolute rest in bed, and the limb in a straight but somewhat elevated position.

April 4th. No satisfactory improvement; when I injected ten drops of the nitrate of silver solution, followed immediately by a sensation of severe burning through the whole limb, which, in the course of half an hour, subsided. Swelling and tenderness followed in five days, but no suppuration. Sciatica much relieved.

May 11th. Since April 20th, Mrs. M—— has been doing some housework, experien-

cing comparatively little inconvenience till the night of the 10th, when she was over-fatigued. Injected again fifteen drops of the solution, followed by the same symptoms as before, except somewhat more severe; considerable swelling, tenderness, and slight suppuration. Recovered in eight days. Took tonics and nervines for a considerable time afterward. Recovery complete. I have seen the patient but twice since June, 1864.

Case XXXVII. — Recent Right Sciatica. Injection of Solution of Nitrate of Silver.

Mr. C——, a cooper by trade, healthy, and of good constitution, aged forty-one, was suddenly attacked, while at work, with excruciating pain, extending from the hip-joint, along the outer border of the thigh and leg, into the foot. For a week, he had no rest neither night or day. In this state he consulted me, February 12th. His pain

was at once relieved by the injection of liquor opii comp. near the foyer of suffering, and he slept all night.

The next morning, when pain returned as severe as ever, I injected ten drops of the solution of nitrate of silver into the thigh. The usual phenomena ensued: on the seventh day, slight suppuration was established, passed off, and on the eleventh day the abscess had healed. The sciatica has troubled him no more since.

Case XXXVIII. — Left Sciatica of recent standing. Injection of Solution of Nitrate of Silver.

Miss F——, schoolmistress, aged twenty-seven, rather feeble, and nervous temperament, got her feet wet on returning from school, February 11th, 1864. The immediate result was a severe cold, followed, in about five days, by pain shooting from the hip-joint down to the ankle. Is unable to walk or sleep. An injection of liquor opii comp. relieved her temporarily.

Anxious to try the effect of the irritant, I injected ten drops of the solution, followed by a severe sensation of burning for some time. There resulted hardness and swelling at the point of operation, with slight suppuration on the ninth day. Relief complete. She took iron and alteratives for some time after. No return of the complaint.

(ff.) Crural Neuralgia.

Case XXXIX.—Severe Neuralgia of the Right Leg, extending from Knee to Foot; Cure.

Mr. F——, merchant, about thirty-five years old, well built, of regular habits, but a bon vivant, consulted me, January, 1865, about severe pains, shooting from the knee, along the outer border of the leg, into the foot. Can assign no cause for the malady. Is subject to varicose veins below the knee.

Several moderate injections of liquor opii comp., and the wearing of elastic stock-

ings, gave the desired relief in a short time. Has had no return of the neuralgia since.

Case XL. — Neuralgia of both Legs. Relief by Subcutaneous Injection.

Mr. G——, of Boston, forty years old, short stature, and nervous temperament, constantly obliged to be on his feet, has been subject to severe attacks of double crural neuralgia for two years.

The paroxysms last from five minutes to an hour, or more. Medicines do little good. I made repeated injections of liquor opii comp., ranging from five to twenty drops; till finally, after the lapse of several months, the neuralgia has yielded to the treatment. For the last three months, Mr. G. has been free from pain.

(b.) GENERAL NEURALGIA.

Case XLI. — General Neuralgia, assuming at times the character of Cervico-Occipital, — Cervico-Brachial, — Intercostal, — Mammary, — Abdominal, — Lumbar, and Sciatic Neuralgia, with temporary loss of power of motion. Injection of Sedatives, Chloride of Sodium, and Nitrate of Silver.

The subject of this protean malady is Miss A—— of Boston, twenty-four years of age, sparingly developed, strumous habit, and nervous temperament.

Called to visit her October 27th, 1863, I ascertained the following facts: Has been an invalid for years, always feeble, and unable to endure fatigue. Some five years ago, she was thrown from a carriage, and supposed to have sustained some injury of the spine. Her health began to fail from that time. Shortly after, she was attacked by severe neuralgia of the neck and head, (cervico-occipital), which at times would end in contraction of the muscles of the

neck, drawing the head completely over to the affected side, sometimes the right, sometimes the left side, continuing for two or three days at least in the same position, and rendering any motion painful.

In such a condition, I have seen her again and again. At other times, the neuralgia appears in the shoulder and arm, (cervico-brachial), or in the side, breasts, and intercostal spaces, or in the groins, or in the course of the sciatic nerve; in short, everywhere where Nature has laid out her nerve-tracks. Nor is here the measure full. About fall time, all strength seems to leave her limbs; she is unable either to walk or stand for months,—absolutely confined to her room, lifted by a kind and tender sister daily from bed to arm-chair, and *vice versâ*.

Such was the routine I witnessed from October, 1863, till February, 1864, when the power of motion and sufficient strength had returned to enable her to move about

unassisted. Enjoys better health in the country during the summer months. Good medical advisers have not been wanting.

The following is a summary of her condition, October 27th, 1863: Reduced in strength; loss of appetite and sleep; constipation; catamenia, irregular and scanty; unable to walk or stand; head drawn to the right side of the neck; neuralgia in the neck and shoulder; soreness upon pressure over the sixth and seventh dorsal vertebræ.

My course with this patient was summarily, as follows: The neuralgia was treated by subcutaneous injection. I was never disappointed in its effects in her case, however often I had to repeat the operation, as the largest dose she could bear was only five drops of liquor opii comp. As soon as I went beyond the five drops, there ensued, invariably, *entire loss of voice* for several days. This phenomenon I witnessed again and again, as I was sometimes obliged to

secure the patient's comfort at the expense of temporary aphonia. By a timely operation, the neuralgia and contraction of the muscles of the neck were often arrested, and sometimes cut short at the very beginning of the attack. When I arrived too late, and the head was already thrown over to the shoulder, subcutaneous injection at the point of greatest contraction caused the rigid muscles materially to relax; but no sooner had the fire, so to speak, been arrested in one place, than it would assert its supremacy in another. When met with the injection, relief was sure to follow, for a time at least. In the course of a few months, the paroxysms recurred less frequently.

December 4th, injected below the inferior angle of the right scapula fifteen drops of a saturated solution of chloride of sodium. Severe pain followed for a few minutes; which, however, soon subsided, and with it the neuralgia.

Soreness supervened in four days ; but no swelling or further inconvenience was apparent.

January 24th, 1864, the pain being severe in the hips and along the course of the sciatic nerve, I injected ten drops of a solution of nitrate of silver near the great trochanter. A queer feeling ensued, as the patient stated.

A swelling of the size of a walnut appeared the next day, which, on the fifth, broke, and discharged a moderate quantity of pus. The neuralgia was much relieved ; and, for some time after, it was unnecessary to repeat the operation.

From February 1st to June 1st, the injection was resorted to several times, each time with greater success. It is just for me to state, that this mode of treatment saved my patient many hours of suffering ; that her general health was much improved ; and that when she left for the country, in June, she could look back with satisfaction

upon the result of the treatment. During the eight months that I applied the injection, Miss A—— never experienced any ill effects from the hypodermic injection of narcotics and irritants, as is often the case when opium is taken into the system for any length of time, nor any bad counter-effects when it was abandoned.

It is further my duty to state, that much of the improvement of the case was owing to constitutional treatment, which, from the very first, was brought into play. Sedatives alone, and combined with tonics, such as the valerianate of iron, of zinc, iron, and quinine, &c., were fully administered. Very liberal diet, and ale and porter, were also given daily. Salt-water baths and friction had, too, their beneficial influence : in short, every agent that could be pressed into service to contribute towards a favorable result was forced to pay its tribute.

I saw Miss A—— some time in November, 1864, upon her return from the coun-

try. She looked much improved, walked tolerably well, and stated that her neuralgia tormented her much less than before. I advised a continuance of the use of tonics, and a sedative pill for the night. I have been informed that the young lady is getting along well, and has had no occasion, thus far, to resort to hypodermic injection.

Case XLII. — General Neuralgia, resulting from carcinomatous Disease. Value of Hypodermic Injection.

Sept. 10th, 1862, I was called to visit Mrs. — of Boston, thirty-five years of age, who, a few months before, had undergone a severe surgical operation, — removal of the right breast for carcinomatous disease. Shortly after the operation, she was attacked with severe right sciatica. About the same time, for the purpose of recuperating her health, she removed, by advice of her physician, into the country; but not improving, and rather getting worse, I was called to see her upon her return.

Of nervous temperament, vivid imagination, intelligent, and educated far above the average; complexion sallow, and expression of countenance anxious; unable to walk across the room without suffering; appetite poor, and bowels irregular, harassed with constant nausea,—such is the general record of my first visit.

It was at once evident that the sciatica was merely another symptom of the original dreadful disease which had taken possession of the frame; and that, at any time, this sciatica might show itself somewhere else, under a different aspect.

From September till February 4th, 1863, the day of her death from exhaustion, my fears proved but too true; the neuralgia assuming sometimes the type of facial, occipital, intercostal, abdominal, lumbar, sciatic, and plantar neuralgia. To increase the misery, the stomach would retain no medicine; only the simplest

articles of food, and these were digested in small quantities.

Treatment.—I relied upon hypodermic injection to relieve the pain, which soon proved the only means by which to give ease and comfort to my patient; but so sensitive was the stomach and nervous system, that four drops of liquor opii comp. entirely relieved the pain, and generally sufficed to insure a good night's rest, whilst five drops would cause nausea and vomiting.

For about five months, the injection was daily administered twice, sometimes oftener. In no instance have I seen it produce greater or more gratifying results. Days and nights of suffering were changed into hours of comfort and ease. If the injection was omitted, the distress was great. Although a cure was out of the question, yet the satisfaction my patient felt, when punctually, at 8, P.M., I made my appearance,

impressed itself strongly upon my mind. The evening she died, but a few minutes before my arrival, she is reported to have remarked, "In a few minutes the doctor will be here, and the injection will make me comfortable and easy." Hardly had she whispered these words, when the clock struck eight. I entered the room: she took my hand, clasped it firmly, thanked me for my services, and was no more. A good and noble woman had departed this life. I had the satisfaction to have eased her hours of suffering.

Case XLIII. — General Neuralgia, of several months' standing. Relief by the Injection.

Mrs. F—— of Springfield, Illinois, of poor health and feeble constitution, took a cold nine months after confinement. In consequence, she was seized with intercostal neuralgia, which in time assumed the facial, lumbar, and sciatic type. At times, all the nerves of her body seemed to ache.

Proper constitutional remedies were prescribed, and, in addition, the injection introduced into the præcordial region and the thigh eight times. Relief was complete after every operation. In five weeks the patient recovered, but continued to take tonics and alteratives for a period of three months.

Case XLIV. — **General Neuralgia, resulting from too constant application to business.**

Mr. H——, merchant, aged forty, completely lost his health in consequence of too great and constant application to business. Besides loss of sleep, appetite, and strength, there existed a great degree of irritability of the nerves, manifesting itself in constant twitching of the muscles, and pain which seemed to wander all over the body at times.

My chief reliance in this case was relaxation from business; proper constitutional treatment, tending to improve the digestive

organs and to give strength ; not forgetting sleep. This last desideratum I was able to bring about by the hypodermic injection of fifteen drops of liquor opii comp. for sixteen evenings ; after which time, natural sleep supervened, the twitching of the muscles ceased, and recovery took place in a comparatively short time.

2. GENERAL DISORDERS OF THE NERVOUS SYSTEM.

(a.) *Paralysis.*

Case XLV. — Paraplegia, resulting from gunshot wound in the Abdomen, and lodgement of the ball in the lumbar region. Caries of the fourth and fifth Lumbar Vertebrae. Terrible paroxysms of Cramps in both Legs, continuing for weeks, relieved by the Injection of Narcotics, Atropia, and Strychnine. Partial restoration of the use of the Limbs. Death from Dysentery.

The history of this case is, I think, so interesting and instructive, that professional

readers, above all, will excuse me if I enter fully into its details.

Adino Hall, aged twenty-three, private in the 1st Mass. Vol. Infantry, was wounded in one of the battles on the Chickahominy, in June, 1862. The ball entered near the umbilicus, but did not make its exit. Subsequent symptoms and observations placed it between the fourth and fifth lumbar vertebræ, between which it remained securely embedded. He was taken up exhausted, and in the hospital found to be paralyzed in the lower half of the body, including bladder and rectum. Some time after, he was discharged as incurable, and sent home. Here he was seen by several eminent surgeons, and urged to enter the hospital, which he declined to do.

Late in July, 1862, during a temporary absence of his attending surgeon from town, I was requested to see him during the interval; and afterwards, at the surgeon's request, continued to attend him.

At my first visit he appeared much emaciated, paralyzed in his lower limbs, and without control over his bladder or rectum. In the lumbar region was a suppurating wound, oval, measuring seven and three-fourths inches in transverse diameter, and laying open the space occupied by the fourth and fifth vertebræ. Destructive caries had supervened, and pieces of bone repeatedly were thrown off. I was daily looking for an opportunity to see the membrane covering the spinal cord to some extent exposed to view.

He would be suddenly seized, every few minutes, with severe *cramps*, as he called them, starting from the toes, and creeping up the leg to the knee. The paroxysms came without the least warning, and lasted from one to three minutes. Holding and pressing the limb, or rubbing it with great force, would seem to shorten the paroxysm. At such times he would scream so loud as to be heard by his neighbors. Large doses

of opium and other narcotics had lost their effect; his nights were broken, and sleep anxiously looked for.

Such was his condition when I was called to see him. During my first visit, he had two attacks of cramp. I injected at once twenty-five drops of liquor opii comp. into the calf of his right leg. He slept five and one-quarter hours, and had no recurrence of the cramps for seven and one-half hours. When I saw him again in the evening of the same day, he felt some pain; but it was less intense than before the operation. Injected thirty drops into the left leg. The wound was dressed and poulticed. I ordered for my feeble, emaciated, and suffering patient, a liberal allowance of beef-tea, mutton-broth, &c., and a plentiful supply of champagne.

Had a good night's rest, is free from pain, and says he is a new being.

For two months, August and September, I visited him twice daily, having recourse

to the injection as circumstances required. It never failed to give the desired relief. The wound also progressed favorably. August 26th, a considerable portion of diseased bone was removed by the forceps. Gradually three and four days intervened between the injections.

But the paralysis continued the same. I thought this to be a favorable opportunity to try the effect of strychnia on the paralyzed motor nerves. Of a solution of gr. i. to 3 i. of distilled water, I injected ten drops into the wound of the back. In eighteen minutes, this was followed by considerable twitching in both limbs; an uncomfortable sensation, as the patient described it.

The injection was daily but gradually increased till it reached thirty drops: each time the same phenomena ensued, more or less marked according to the amount injected. At times he acquired the power to lift either leg, being able to hold it up without assistance for two or three minutes.

Tinct. nucis vomicæ was also administered internally. Strength was constantly gained ; and December 14th, 1862, the wound in the back had healed, the ball still remaining embedded in the body of the vertebræ. He also regained partial control over the bladder and rectum.

For two months, January and February, I continued my experiments with the injection of strychnia. On the 4th of February, he managed to get slowly from his bed unassisted, and to stand up ; not, however, without the aid of a cane. He managed further, unassisted by any person, to descend one flight of stairs into the kitchen, managing to take hold of various objects near by to assist him and to lean against for support. He continued to manage to get about during the spring and summer of 1863. After September, I saw him but seldom. One day he left his daguerrotype at my house. I finally lost sight of him, till in June, 1864, when I was in-

formed that he had suddenly died of dysentery.

I regret very much not to have had an opportunity to make a post-mortem examination, so as to remove the vertebræ with the ball.

To recapitulate: This case presents several remarkable facts: —

1st. The nature and extent of the injury in the most vital parts.

2d. The complete and instant paraplegia following the injury.

3d. The extension and serious nature of the wound in the back, involving caries of portions of two lumbar vertebræ.

4th. The decided effect of the injection of narcotics in arresting the cramps, when other remedies had failed.

5th. The signal effect of the injection of a solution of strychnia upon the paralysis, and partial recovery of the use of the limbs.

6th. Death caused by dysentery, and not by the injury sustained.

Case XLVI. — Paraplegia of recent date; supervening Rheumatism. Injection of a Solution of Sulphate of Strychnia; Recovery.

Mr. W—— of East Boston, sailor, aged forty-three, after long exposure to cold and wet, was attacked with rheumatic fever in February, 1864, which confined him to his bed for eight weeks. From that he recovered, when he observed that he was gradually losing control over his limbs. March 27th, 1864, when I saw him for the first time, he was unable to lift or move either. At times, he had sharp pains in the calfs of the legs. The bladder was also partially affected, bowels constipated, appetite and strength gone.

He was directed to take liquor potass. arsenitis, tinct. nucis vomicæ, and other appropriate remedies, for some time. Liberal diet, friction to the limbs, and the douche bath to the spine, were also ordered.

April 24th, there was scarcely, if any, improvement in his condition, except that

he had more control over the bladder, and had gained some strength. I injected now fifteen drops of a solution of sulphate of strychnia into the calf of the right leg, which operation I repeated seven times in twenty-three days. At the end of that time, he managed to get out of bed without assistance, and to walk, when assisted to some degree by a friend, although compelled to rest every few minutes.

The 2d of June, when I saw him for the last time, he walked tolerably well with the aid of a cane. The friction, douche bath, and alteratives were advised to be continued for a month longer. At last accounts, the patient was well.

(b.) *Hysteria.*

Case XLVII. — *Hysteria, aggravated by continued Wakefulness. Cure by Hypodermic Injection.*

Miss W——, aged eighteen, nervous temperament, and very excitable, suffered from

repeated attacks of hysteria, caused by mental troubles, the nature of which she was unwilling to reveal. When I saw her, she was in tears, and had not slept for forty-eight hours. She could not control her feelings; refused to take medicines. Under these circumstances, I injected fifteen drops of liquor opii comp. into the left arm, and had the satisfaction to learn the next morning that Miss W—— had slept for several hours, and was more calm.

At her request, I repeated the injection the following evening, and subsequently twice more, after which she recovered.

(c.) *Wakefulness.*

Case XLVIII. — **Wakefulness, cured by Injection of Narcotics.**

Mr. F——, a merchant, aged fifty-four, in good health, had been so closely confined to his business, which caused him at the

time considerable anxiety, that he was unable to sleep at night, and his friends expressed fears that he might get the brain fever.

I saw him in the evening, and injected twenty drops of liquor opii comp. into the leg. In half an hour he was asleep. Rested for six and a half hours. I repeated the operation for four successive evenings, each time increasing the dose; and after the fifth operation he slept as well as ever. I sent Mr. F—— into the country to rest from business.

(d.) *Delirium Tremens.*

Case XLIX.

Mr. B——, aged twenty-six, of small stature, but strong and well-built, a German mechanic, presented unmistakable symptoms of delirium tremens, when I was sent for to see him, May 12th, 1860. After an attempt to quiet him by means of medicine, which proved futile, I inject-

ed three-quarters of a grain of morphia into the cellular tissue of the arm. Twenty minutes after the operation, the patient sunk into a slumber, which was not broken for an hour and a half. This was at 11, A.M. At 4, P.M., when I saw him again, he was rather noisy, but more easily persuaded to keep quiet than in the morning. I injected again one grain of morphia, and in less than half an hour the patient was asleep. Next morning, May 13th, at 8, A.M., I learned that he had slept well during the night, without hardly ever awakening, and found him calm and cheerful; talked rationally, and said he felt weak, but like himself again. The operation was not repeated, and in five days after he was at work again.

Case L.

Mr. St. —, German, aged thirty-four, of nervous temperament, addicted to drinking, had suffered from an attack of delir-

ium tremens for two days, when I was called to see him. This was the third time he had had the disease. For two days the delirium was on the increase. Persuasion was useless, as I soon saw, to get him to bed: he declared it to be on fire. I at once dissolved one grain of morphia, and injected it into the thigh before he was aware of what was going on. Refused to let me feel his pulse; but, after about fifteen minutes, he complained of fatigue in his limbs, and said they felt as if going to sleep. Without making any resistance, he was laid on his bed, half closed the eyelids, and dozed away. He made another attempt to get up, but soon sleep overpowered him.

6, P.M. Slept for nearly three hours, but is noisy again. Repeat injection.

9, A.M. Find patient calm, but very weak; pulse 108; no appetite. Slept almost the whole forenoon.

In the course of a week, this patient re-

covered so far as to be out; and in another week's time he followed his usual avocation.

Case LI.

Mr. S——, bar-tender in a large liquor store, came the second time under my care for delirium tremens, in October, 1863. Had been restless for two days before I saw him. At this period, he is very noisy; three men can hardly hold him; insists that the house is on fire; but is quiet, docile, when I converse with him.

Injected at once forty drops of liquor opii comp. into the arm, to which he raised no objection. He continued to be noisy for half an hour, when he became calm, and fell asleep. At 7, A.M., I repeated the operation again; he slept most of the day. Another injection at 10, P.M., after which he slept the whole ensuing night and part of the following day; seemed to be sufficient to restore the patient.

Case LII.

Mr. H——, aged twenty-seven, gentleman of leisure, had unmistakable symptoms of delirium tremens when I saw him. Had not slept for thirty-six hours. Injected thirty drops of liquor opii comp. Soon he was asleep. Repeated the operation five hours afterwards, and again eleven hours later. This patient recovered without difficulty.

*(e.) Tetanus.***Case LIII.**

I had the opportunity in November, 1860, to observe the effects of subcutaneous injection in a case of traumatic tetanus, which occurred in the practice of another physician, but who requested my assistance in regard to subcutaneous injection, if I thought proper to apply it to the case. Although death followed on the second day after I saw the patient, it is not say-

ing too much in praise of this therapeutic agent, if I state summarily, that the effect of the operations which I performed upon the patient at different periods during two days was such as to induce me to recommend urgently a trial of the same treatment in similar cases: To inject a large dose of the narcotic at once, say from thirty to sixty drops of liquor opii comp.; and to repeat the operation frequently, so as to put the patient completely under the effect of the agent. There is in these cases more than an average chance of success.

Unless I am mistaken, this case was the first of its kind in which hypodermic injection has been brought into requisition in this city, if not on this continent.

Case LIV.

In another case of traumatic tetanus which I saw in consultation in a neighboring town, though not present until the

last hours before death, I applied the injection at once, twenty-five drops of liquor opii comp., in the back, near the spinal column, to the great relief of the poor sufferer. Four hours after, the same quantity was injected; and for six and three-quarter hours, till death ensued, the previous agony and distress were changed into comparative calm and ease. If it was for no other reason than to have it in our power to let our patient die free from the really terrible agony of this dreadful disease, hypodermic injection ought to take its place in the front rank of therapeutic agents. I trust that the opportunity will be afforded to me yet to apply the injection at the outset of the disease, in order to dispute with death, inch by inch, its hitherto sure victim.

3. RHEUMATISM AND GOUT.

Drs. Béhier and Hérard of France, and Dr. Cowdell of England, have reported cases of rheumatism (chiefly muscular) successfully treated by hypodermic injections; but I am not aware (although I have taken much pains to inform myself upon the subject) that any medical writer in this country has reported cases of rheumatism, both acute and chronic, treated principally by this agent. If I shall succeed in calling the attention of physicians to its applicability in the treatment of these diseases, I have no misgivings about their experience coinciding with mine. .

In a case of acute rheumatism (rheumatic fever), we have two conditions to take into consideration,—one is the pain, seated usually in, around, or near one or several of the large joints; the other is the constitutional disturbance manifested by fever, dry skin, inaction of the bowels,

loss of appetite, &c. The pain I propose to control entirely by hypodermic injections, and not by the internal administration of medicines; the fever, bowels, &c., on the other hand, by medicines with which no narcotics previously given by the stomach can interfere.

In chronic rheumatism, I rely also much upon the injection; the constitutional treatment varying with every case according to circumstances. I select the following cases from my note-book:—

Case LV.—Rheumatism of six months' standing, treated by Subcutaneous Injections. Recovery.

Mr. S——, a grocer in this city, but residing in West Roxbury, aged forty-eight, tall and well-built, but general health much impaired by over-work, consulted me in November, 1863. I learned the following facts: Six months ago, he was attacked by rheumatism, which permanently settled in

the right shoulder-joint, gradually rendering motion impossible and the arm useless. The elbow, wrist, and finger-joints were enlarged. It was impossible for him to shut the hand or bend the fingers. The muscles had wasted away, so that the greatest discrepancy existed between the two arms.

The pain in the shoulder-joint was constant; he was unable to lie on the right side; his sleep was broken. He was emaciated; had no appetite; bowels inactive; subject to a bad cough, accompanied by copious expectoration and profuse night-sweats. He received good medical treatment, but had given up in despair, and discontinued for some time the use of medicines.

Examination satisfied me that the lungs and heart were sound; that the cough was mostly nervous, and Mr. S. much reduced in strength from constant suffering.

Two conditions were, therefore, requisite to rescue him from his perilous condition; namely, to relieve him of pain, and to im-

prove his digestive functions so as to give him strength. I doubted, however, whether the patient would ever recover the full or partial use of the right arm.

I injected fifteen drops of liquor opii comp. below the insertion of the right deltoid. In ten minutes the patient was nauseated, and vomited a large quantity of bile. He then went to sleep.

The following night was the first, after the lapse of months, that Mr. S. slept uninterruptedly, and at times on the right side. He arose much refreshed, — such was his report at my next visit. I directed extr. colocynth. comp. and hydrarg. chlorid. mite., āā gr. ii., in the form of a pill, to be taken at night, beef-tea and other nourishing food several times during the day, tepid salt-water bath daily, and the cutaneous circulation to be stimulated by friction. The injection was repeated every other day during the month of December, with satisfactory results. It was uniformly followed by sleep: the bowels became more regular, and

appetite improved. The cough diminished as well as the expectoration and night-sweats, without any special treatment in that direction. It is evident these resulted from extreme debility entailed by suffering and loss of sleep. I now directed the joints of the affected arm and hand to be daily painted with tinct. iodini comp., and flexion and extension to be practised to a limited degree. Vegetable tonics were administered, and ale and porter with animal food ordered. Strength daily increased, and the pain assumed a milder character.

From January 1st to April, 1864, I saw Mr. S—— twice a week, each time repeating the operation. Motion and flexion of the joints of the arm and hand gradually became more easy and less painful. About the middle of March he wrote a letter without difficulty, and had strength enough in the right arm to lift a chair and similar objects. The muscles became soon also more fully developed.

May 6th, Mr. S. called on me for the first

time in the city. The injections are now discontinued, but the tinct. iodini is still applied, and tonics continued. At this date the cough has disappeared entirely; appetite is good, and bowels regular. Begins to look after his business, and bids fair to be as well as ever.

July 1st. Patient has steadily improved; can close his hand without effort, and move the arm tolerably well.

August 20th. Saw Mr. S. to-day, looking well and hearty. He is busy on his farm, takes no medicines, and, with the exception of some stiffness of the shoulder-joint, has nothing to complain of.

Case LVI.—Rheumatic Fever, treated principally by the use of Hypodermic Injections.

Mr. S——, merchant, residing in one of the suburbs of Boston, about fifty-five, of bilious temperament, rather delicate organization, and enjoying only a moderate degree of good health, was attacked with rheumatic fever, February 11th, 1864, when

I was called to see him. In two days the disease had fully developed itself in the large joints of the right side, and, during the succeeding days, invaded also the left. The least touch anywhere caused pain; even the weight of the bed-clothes could not be borne. Pulse from 90 to 110 for several days; tongue coated, bowels irregular.

Of nervous temperament, and anxious, my patient was ill prepared to bear pain. The bowels were immediately acted upon, and the pain relieved by an injection of fifteen drops of liquor opii comp. near the knee-joint.

This secured a good night, reduced the pulse, and brought about profuse perspiration. The pain was kept in check by the operation; the bowels were made to act twice in twenty-four hours for several days. For six weeks I continued to apply the injections when necessary. They were discontinued without any ill effects to the patient, and no relapse followed.

Pain was charmed away; sleep at hand when least expected; the stomach continued to receive and digest food; strength was not made subordinate to debilitating measures; convalescence was more rapid than ordinarily.

The maximum dose injected in this case was from ten to fifteen drops, repeated once or twice daily. In a few months this patient recovered entirely, and has been in better health since than before his sickness.

Case LVII. — Acute Rheumatism, treated by Hypodermic Injection.

Mr. W—— of Roxbury, aged thirty-two, strong and robust, a member of the fire-department, whilst on duty got drenched with water, and continued at work for several hours till relieved; when next day he was seized with severe pain in his knee-joints, which began to swell considerably. There was also high fever. This was the

second attack of rheumatic fever in two years. I injected twenty drops of liquor opii comp. near the right knee-joint; prescribed an active cathartic.

March 27th, I ascertained that he had slept considerably during the night, and that the pain was much relieved. Fever abated, but still pulse ranges as high as 98. I introduced again fifteen drops with beneficial effect. During nine days of my attendance, I operated seven times. Besides the benefit of the injections, cathartics and simple food were the only means that were employed during the treatment. He made a rapid recovery.

**Case LVIII. — Rheumatism, confined to both
Legs.**

Mr. B——, machinist, aged twenty-seven, well developed and otherwise healthy, had an attack of rheumatic fever about two months ago. He feels well, except that the knee and ankle-joints continue swollen,

and are painful when he attempts to move about.

I advised the application of tinct. iodini comp. to the joints, and gave five injections in eleven days, from ten to twenty drops each, near the knee and ankle-joints. The pain ceased, and the swelling disappeared gradually. In seventeen days, Mr. B—— was able to move about without much inconvenience.

Case LIX. — Rheumatism, treated principally by Hypodermic Injections.

Mrs. A——, mother of three children, and in rather feeble health, had been confined to her bed for nine weeks when I saw her in May, 1864. Her complaint was rheumatism, which had permanently settled in the knee-joints, rendering any motion of the limbs painful. There was also considerable swelling around these joints. I administered colchicum internally, and injected ten drops of liquor opii comp. near

the left knee-joint. She had a more comfortable night. The injection was repeated several successive evenings, as at that time the pain was most severe. Each time it gave the desired relief. In seventeen days she had sufficiently recovered to be able to be moved into the country. Mrs. A. has had another attack lately, which yielded, however, to internal remedies and a few injections.

Case LX. — Chronic Rheumatic Gout, of several years' standing. Benefited by Hypodermic Injections.

Mr. —, merchant, fifty-four years of age, strong and robust, a high liver, has been subject to attacks of rheumatic gout for twenty years. Generally the paroxysms, which are very severe and obstinate, follow some imprudence which has been committed in eating or drinking, or both.

When I saw him, October 12th, 1864, he was confined to his bed; the left foot much

swollen, inflamed, and exceedingly painful around the ankle and great toe. The treatment consisted of cold applications to the foot, and a pill composed of hydrargyri submuriat., extr. colchici, pulv. digitalis, pulv. ipecac., and extr. aconit., — a combination which had benefited him before.

October 13th, there was no abatement of the pain; when I injected fifteen drops of liquor opii comp. into the left leg, followed by complete relief in half an hour.

October 14th, repeated the operation, also the next day, both times with satisfactory results. The inflammation began now to subside considerably. The injection was applied every other evening for a week; at the end of which time the patient left his bed and gradually resumed his duties. No relapse since.

F.

DISADVANTAGES ARISING FROM THIS TREATMENT AS COMPARED WITH ITS ADVANTAGES.

Having presented various cases of disease in order to demonstrate the advantages of hypodermic injections under proper conditions over the administration of medicines by the stomach, the question may be asked, whether there are not disadvantages inherent in or arising from this therapeutic agent, which renders our reliance on its advantages in practice somewhat doubtful, or counterbalances them altogether.

Presuming that the case be a proper one for treatment, and that the requisites for the success of the operation discussed at some length in the preceding pages have not been disregarded, I know of but *two*

possible disadvantages which may arise; namely:—

a. *The nausea and vomiting following sometimes the introduction of narcotics by the hypodermic method.*

b. *The possibility of producing local inflammation and abscess in the part repeatedly punctured.*

These are the principal objections urged against hypodermic injections. Time, experience, and observation have proved that the first can be overcome, and that the second is not an obstacle inherent in the operation, but the result of carelessness on the part of the operator.

a, *The nausea and vomiting* are, with some rare exceptions, the constant concomitant of the introduction of a considerable quantity of opium in its various forms by the hypodermic method. It follows the operation in from five to thirty minutes. Often it is inconsiderable, amounting to simple nausea and slight head-symptoms, passing

off in an hour or less ; at other times it is very severe, continuing for hours and days.

Bismuth, chloroform, hop-tea, champagne, and like remedies, sometimes afford relief, especially the free administration of champagne ; sometimes all these fail.

The injection once administered, though it relieve the original pain, yet, followed by these unpleasant symptoms, is not unfrequently refused the second time by the patient.

As early as May, 1859, in order to overcome this objection, I experimented with *tinctura hyoscyami*, *tinctura cannabis indici*, and other sedative preparations introduced into the subcutaneous cellular tissue. The nausea and vomiting were not attendant upon these ; but the effect of these agents upon the pain, the principal symptom to be removed, was very imperceptible.

These experiments proving, therefore, unsatisfactory, I commenced the introduction of narcotics invariably, in the strong

as well as the feeble, with the *minimum dose*, in order to establish, so to speak, a *point of tolerance* wherefrom to form correct data. For the sake of uniformity and reliability, I make use of Dr. Squibb's liquor opii compositus, of which one hundred drops are equivalent to one grain of sulphate of morphia.

In all my experience, I have found but two cases where only four drops could be borne, as five would produce some nausea. Leaving such exceptional cases out of consideration, I regard five drops as the minimum dose with which to commence.

Further, instead of introducing this dose merely beneath the skin, I inject it deep into the muscles, and seek to strike as near as possible, and often directly, at the painful point and near the nerve. In no case thus operated upon have I been disappointed in the result. The agonized sufferer was relieved, if only temporarily, and nausea and vomiting avoided.

It is true, the operation may have to be repeated oftener than where a larger dose has been introduced, as there is a certain ratio between the dose injected and the time of relief; but what patient would not prefer frequent operations to the most disagreeable and distressing symptoms of nausea and vomiting? Having then established this point of tolerance, where the stomach can bear the injection, I gradually increase the dose when necessary. I have repeatedly injected twice on the same day thirty drops without producing the slightest disturbance, where, at the commencement, five drops constituted the maximum dose.

One other circumstance deserves mention. In cases of delirium tremens, no matter how great the dose injected may be, or how often repeated, I have never had to contend with the symptoms of nausea and vomiting; in consequence of which fact, I always deliver the maximum dose dictated by the circumstances of the case.

Injections reduced then to the minimum standard, often repeated if necessary, and introduced deep into the part, I recommend as the best and reliable means to avoid the symptoms of nausea and vomiting.

b. *The possibility of producing local inflammation and abscess in the part repeatedly punctured is alleged as a second objection.*

Under section "D," page 32, considerable space was devoted to the consideration of the conflicting opinions of Drs. Hunter, Wood, and others, regarding the localization of the injection at the painful point, the principal one against which, by Dr. Hunter, is, that it is productive of local inflammation and abscess in the part repeatedly punctured. I refer my readers particularly to that section, as it sets, I think, this objection effectually at rest. Unless my own judgment deceives me, I have never yet seen, in my own practice, a case of local inflammation or abscess pro-

duced by the injection, unless that object was especially aimed at by the introduction of irritants, such as a solution of chloride of sodium, or nitrate of silver.

No physician would undertake to inject again and again at precisely the identical point where he operated before; but, due judgment being exercised, I maintain that any number of injections, say from fifty to one hundred or more, may be introduced within a space of one or two inches' circumference, and no ill consequences follow. As the fluid is quickly absorbed, there is no disposition in such a small puncture to inflame and suppurate.

In a case which occurred quite recently, phlegmenous erysipelas followed frequent injections in the thigh; but in that very instance the erysipelas did not begin at or near the point of puncture, but at a distance from it. Moreover, the patient has had the same disease twice before, when no injections were applied.

This is the only case of its kind that has ever come to my knowledge. Local inflammation and abscess in the punctured parts are not the consequences of the operation, because they may have happened under certain conditions of the system; but they are abnormal conditions, resulting from a want of care and judgment. If such is not the case, then nothing could be more dangerous than the insertion of the needle into the tissues, the danger increasing in the ratio to the depth the fluid is introduced.

CONCLUSION.

What has been stated in the foregoing pages proves then, satisfactorily,—

1st, That the stomach is by no means the most rapid way of introducing medicines into the system.

2d, That the cellular tissue has great power of absorption.

3d, That narcotics, injected either near, at, or remote from the painful point of a nerve, will diminish the sensibility of that nerve, and, in proportion to the amount, depth, and position of the injection, remove the pain entirely or in part.

4th, That what is true in regard to narcotics has also been found to be true in regard to other classes of remedies, particularly in reference to solutions of chloride of sodium, and nitrate of silver.

5th, That the effect of narcotics, so applied, is not confined to their local action; but that they reach the brain through the venous circulation, and there produce their remote effects.

6th, That, destitute as we are of any precise experiments as to the applicability of the cellular tissue as a medium for the reception of medicinal agents, the experiments made with the syringe show that it seems to offer an excellent surface for the operation of the absorbent action of the venous system.

7th, That the small syringe affords a safe, easy, and almost painless method of exhibition.

8th, That the method now described is demonstrated beyond a doubt to be extensively applicable in the treatment of disease.

THE END.

