

touching anæmia. In the next lecture I shall continue the study of the treatment of general diseases, and shall make my subject the treatment of acute rheumatism.

ON THE TREATMENT OF ACUTE RHEUMATISM.

SUMMARY—Acute Articular Rheumatism—Natural Evolution of Rheumatism—Expectancy in Rheumatism—Divers Treatments of Rheumatism—Antiphlogistic Treatment—Blood-letting—Antimony—Anti-febrile Medication—Quinine—Local Treatment—Revulsive Method—Vesicatories—Anti-rheumatic Balms and Liniments—Hypodermic Injections—The Specific Medication—Alkalies—Salts of Sodium—Salts of Potassium—Acid Medication—Ammoniacal Salts—Propylamine and Trimethylamine—Cyanides—Salicylic Acid—History—Administration of Salicylate of Soda—Advantages and Disadvantages of Salicylate of Soda—Indications and Contra-indications of the Salicylate Medication—Treatment of Local Rheumatism—Balneo-therapy in the Treatment of Rheumatism—Sudorifics—Vapor Baths—Medicated Vapor Baths—Sulphur Baths—Resumé of Treatment—Treatment of the Complications of Rheumatism—Treatment of Cerebral Rheumatism.

GENTLEMEN: The plan which I have marked out for these lectures in practical medicine does not allow me to discuss the numerous theories which have been prevalent respecting the nature of rheumatism. I shall, therefore, enter at once upon the subject, which is the treatment of this disease in its acute articular and peri-articular forms.¹ I shall then examine the various modifications to which therapeutic rules must conform when rheumatism affects tissues and organs other than the joints.

Manifesting itself by severe pains in the joints, and intense febrile symptoms, acute rheumatism has been the subject of a variety of treatments. I shall trace for you, as rapidly as possible, the history of kinds of medication formerly in vogue, and then set forth at some length those which are to-day generally employed.

Clinical medicine has, in fact, made great progress in the treatment of

¹ The theories on the nature of rheumatism may be referred to four heads: The embolic doctrine; the parasite doctrine; the neuro-trophic doctrine; the humeral doctrine.

According to the first hypothesis, endocarditis is always primitive, and the inflammations of the joints depend on emboli which lodge in the vessels of the articular synovial membranes; these emboli are constituted of solid particles, taking their origin in the diseased valves.

2. The doctrine of infection is very much like the other; it has been maintained by Klebs. According to this view, the embolus is not formed in the heart, but results from the penetration into the blood of figured ferments (living microphytes), which are supposed to enter the system through the orifices of the skin dilated by the perspiration.

3. The neurotrophic doctrine has been defended by Heymann; it is based on the production of the arthritides under the influence of lesions of the nervous system. According to this theory, cold acts on the nervous centres and determines modifications in the trophic centres which preside over the joints.

4. There are two hypotheses concerned in the humeral theory. According to the one, it is uric acid which predominates, and rheumatism is assimilated to gout; according to the other, the peccant humor is lactic acid; this theory has been maintained by Richardson and Rauch (a).

(a) Bouchard, *Maladies par ralentissement de la nutrition*, p. 333. Paris, 1883.

rheumatic fever, and we are in position to-day to affirm that we possess a heroic curative agent for this affection, and which answers to the desiderata formulated with so much sagacity by Chomel, and reiterated in the remarkable article which my colleague, Ernest Besnier, has devoted to rheumatism in the *Dictionnaire Encyclopédique*.¹ We can then say that we have a medication for rheumatism, applicable to all acute febrile cases, which merits the appellation of specific. I refer to the salicylic treatment of rheumatism.

But before attaining this goal, therapeutics has had a route to traverse in which it has been guided by considerations based on the ideas which were entertained of the precise nature of rheumatism. Various methods of treatment the more readily found favor since by the natural march of the disease acute articular rheumatism spontaneously undergoes evolution toward recovery. I have in this particular shown in a communication made to the Medical Society of the Hospitals, that acute rheumatism presents itself under three forms—benign, moderate and grave. In the first form the disease naturally finishes its course in eight or ten days; in the second, oftenest observed, the duration is at least three weeks; in the grave forms the entire period of the disease is reckoned by months rather than by weeks.²

You understand then that physicians who have proposed certain treatments for rheumatism, have invoked in favor of the medication employed, what was in reality but the natural evolution of the malady, and it has been the easier for them to do this, that it is impossible for us at the onset of an attack to say what shall be the normal duration of the case which we have before our eyes. There has even resulted from this fact an application of the expectant method to the treatment of rheumatism, and Honoré has made himself defender of this method, which to-day has but few partisans.

Formerly, in the multiple manifestations of the disease, reasons were sought for the different kinds of treatment counselled in such cases. So, according as one considered rheumatism as an inflammation or was desirous of combating the febrile symptoms which accompanied it, or the articular pains which characterized it, or the rheumatismal virus itself, different remedial agents have been put in usage, which may be arranged in four groups—antiphlogistic medication, antifebrile medication, local medication, and specific medication.

(1) The antiphlogistic medication applied to rheumatism, comprises especially the treatment by bloodletting and tartar emetic. Vaunted of old by

¹ "We are to look for a medicine which, out of a total of 30 or 40 patients affected with rheumatic fever, will bring about a cure in a mean of 14 days. Then there would be no doubt as to the efficacy of the remedy. Such a remedy has long been sought for in vain."—Chomel.

"In the present state of science there is no anti-rheumatic medication, in the true sense of the term. There are only therapeutic agents applicable to rheumatic patients, according to the general and common rules of therapeutics."—Ernest Besnier in *Dict. Encyclopédique*.

² Dujardin Beaumetz—Critical Reflections on Expectancy as a Method of Treatment of Acute Articular Rheumatism. (a)

(a) (Bull. et Mem. de la Soc. Med. des hôp. de Paris, 2d Serie, t. xii, p. 184, 1875.)

Sydenham, restored to honor by Broussais, and applied with extreme rigor by Bouillaud,¹ bleeding in rheumatism is now completely abandoned, and this for several reasons. First, because contrary to the opinion of Bouillaud, it diminishes neither the intensity nor the duration of the disease, as Cullen long before the time of Bouillaud remarked. Secondly, because as Gubler observes, rheumatism is itself an anæmiating disorder, and determines an alteration of the blood characterized particularly by an *a globular* condition which sometimes persists. By the side of venesection we must place tartar emetic in large doses, once vaunted by Bayle, but now for a long time abandoned, in accordance with the just observations of Dance.²

(2) Antifebrile medication. In the first rank of antifebrile medicaments, we must place sulphate of quinine, and especially quinine in large doses, a kind of treatment which has been extolled by Briquet and Monneret.³ This medication consists in giving from two to four grammes of sulphate of quinine a day, and under the influence of these doses there is often observed a lull in the pain, and above all, a decline in the fever. Quinine has been accused of being the cause of grave cerebral accidents. This is a mistake, for these accidents which are among the complications of acute rheumatism, may occur apart from all medication. To-day, since the discovery of the salicylic treatment, quinine occupies but a secondary place in the therapeutics of rheumatic fever.

(3) As for local treatments they are very numerous, and consist especially of revulsive applications, soothing embrocations, subcutaneous injections, and the use of topical appliances that are more or less complex.

The revulsive method is very much employed. Little applicable to acute articular rheumatism by reason of the mobility of the symptoms, it gives remarkable results in the local arthritides, and I shall have more to say about it when I come to speak of chronic rheumatism.

At the same time it has been proposed to treat acute articular rheumatism

¹ This is Bouillaud's method of treating acute rheumatism: *First day*. On the arrival of the patient at the hospital at the evening visit, blood is let to the amount of twelve ounces. *Second day*. Bloodletting to the amount of from nine and one-half to twelve ounces, morning and evening, and in the interval, one application of leeches, or better still, wet cups around the joints. The local bleeding ought to be to the extent of nine, twelve, and even fifteen ounces. *Third day*. A fourth bleeding of from nine to twelve ounces, and local bloodletting in about the same quantity. In case the patient is better, stop the bloodletting. *Fourth day*. If the remission is not decided, practice another bleeding of nine ounces. In the fifth, sixth, and seventh days which follow, if the rheumatism is grave, repeat the bloodletting. Bouillaud pretends that by this treatment the mortality of rheumatism is diminished, and the disease is prevented from becoming chronic and that the duration of the disease is shortened from one to two weeks. (a)

² Bayle, *Bibliothèque de Thérap. II*. Dance on the Employ of Tartrate of Antimony in the Treatment of Acute Articular Rheumatism. (Arch. Gen. de Méd., 1849).

³ Vinay, Treatment of acute articulate rheumatism by sulphate of quinine. (Thèse de Paris, 1841.) (Briquet. Bull. de l'Acad. de méd., Paris, 1842, t. viii, p. 152 et 898.—Monneret, *Compendium de méd. prat.*, art. Rheumatisme, t. vii, p. 390.

(a) Bouillaud, *Traité clinique du rhumatisme articulaire*, Paris, 1840, p. 351.

by blisters around the joints, and Dechilly, Lasègue, Fernet, in France, Herbert Davies, Jeafferson, Greenhow, in England, Frantzel, in Germany, have vaunted the good effects of this method, which has found, it must be owned, few partisans in our own country.¹

Next in order come the local anodyne preparations. The number of these pomades, liniments and lotions is innumerable, from the opodeldoc of ancient repute and the complex balm of Fiorvanti,² to embrocations of steel and other

¹ Dechilly (Bull. et Mem. de l'Acad. de Med., 1870, t. xv, p. 665) proposed in 1850 to treat articular rheumatism by blisters made to surround the affected joints, and Herbert Davies, of London, recommended to apply the blisters not upon the joints, but in the vicinity. This treatment was said to assuage the pain and to abridge the duration of the rheumatism. Jeafferson and Greenhow, in England, have derived benefit from the so-called method of Davies; in France, Lasègue and Fernet have employed it. This is Lasègue's method: from the commencement of the pain and swelling, strips of blistering plaster from an inch and a half to three inches wide and long enough to surround the limb like a bracelet or garter, are applied half an inch or so above and below the painful joint. In Germany Frantzel has also adopted the practice of Davies. (a)

² Below are several formulæ of anti-rheumatic liniments:

1. Pomade of Gueneau de Mussy:

R Extract of hyoscyamus, }
 " " belladonna, } aa 3 parts.
 " " hemlock..... 4 "
 " " Axunge 40 "

M. Ft. pomade.

2. Liniment of turpentine and acetic acid (Pharmacop. Br.):

R Spts. tereb..... 15 parts.
 Acetic acid 15 "
 Camphor..... 3 "
 Olive oil..... 12 "

M. Fiat linimentum.

3. Rheumatic liniment:

R Oil of Cedar..... }
 Fluid Ext. Hyoscyamus..... } aa 1 part.
 Opodeldoc..... }

M. Fiat linimentum.

4. Calmative liniment:

R Tinct. opii..... }
 Chloroform..... } aa 1 part.
 Tinct. aconite..... }
 Sweet oil..... }

M. Fiat linimentum.

The formula for opodeldoc (tinct. saponis co) is too generally known to require reproduction here.

The balm of Fiorvanti is a very complex terebenthinate preparation. It consists of seventeen different ingredients: among them turpentine, elecampane, amber, storax, galbanum, myrrh, aloes, ginger, cloves, cinnamon, nutmeg, alcohol.

The balm of steel consists of steel needles dissolved in nitric acid, to which is added olive oil and alcohol.

(a) Davies, On the Treatment of Rheumatic Fever, in its Acute State, Exclusively by free Blistering, London, 1864.—Frantzel, Charité-Annalen, Berlin, 1874.—Fernet, Du rheumatisme articulaire aigu et de son traitement par les vésicatoires (Arch. gén. de méd., t. vi, p. 531).

absurd formulas which are patented and advertised as infallible for aching joints. These preparations have really a very limited action, and if they do good it is due more to the rubbing by which they are applied than to the absorption of any of the analgesic principles of which they are composed.

By the side of these revulsives and these soothing preparations we should place subcutaneous injections. Dieulafoi has proposed to calm the pains in the joints by hypodermic injections of water, for which, however, of late, phenic acid injections have been substituted, as employed by Kunz¹ especially, and Senator, Mader and others, in Germany. Badia and Heyfelder have used colchicine subcutaneously. This practice has not had many partisans, and I am not aware of anyone in France advocating these subcutaneous injections. When I come to speak of chronic rheumatism I shall have more to say about this kind of local treatment, and I hasten now to:

(4) The specific treatment of the disease under consideration.

Thinking that there existed an alteration of the blood in rheumatism, and that this alteration consisted, as in gout, in the predominance of certain acids, and of uric acid in particular, or even supposing that it was possible to modify the fibrine of the plasma, clinicians have employed in this affection the alkaline treatment, at the head of which stand the salts of soda, and especially the bicarbonate of soda, which English practitioners have administered in large doses, till as much as an ounce daily was taken. A remedy very popular in gout, the benzoate of soda, has also been used in acute and sub-acute rheumatism, and Senator is the leading advocate of this medication.²

Some authorities have preferred the salts of potash to the salts of soda. Thus, in England, Garrod, Dickinson and Chambers give from an ounce to an ounce and a half of bicarbonate of potash daily to their rheumatic patients.³

¹ Kunz practices around the joints from two to six injections, with a Pravaz syringe, of a one-per-cent. solution of carbolic acid. This treatment, he alleges, calms the pains. Senator has also witnessed local alleviation from these injections. Mader makes use of a two-per-cent. solution, injecting one cubic centimetre. Badia administers colchicine in the same way, injecting in the neighborhood of the joints two milligrammes in one gramme of water. Heyfelder, of St. Petersburg, also favors the same treatment. These injections produce quite severe local irritation, but they hasten a cure, even in the case of chronic rheumatism, according to these authorities.

² Senator employs benzoic acid and benzoate of soda in acute rheumatism. He gives the latter in doses amounting to ten or twelve grammes a day. He considers benzoate of soda an auxiliary of salicylic acid. (a)

³ Garrod gives two scruples (ʒij) of the bicarbonate of potassa every two hours, day and night, till the fever is gone. Chambers' practice is to give one scruple of bicarbonate of potassa, every hour, in camphor-water. In England it is also a common custom to prescribe the citrates, tartrates, and acetates of potassium and sodium in the medium dose of fifteen grains every two hours, so that three or four drachms shall be taken during the twenty-four hours. Dickinson affirms that any quantity less than two drachms a day, is of no effect whatever, and he recommends to give from one ounce to an ounce and a half of potash

(a) Senator, Über die Wirkung der Benzoesäure bei der rheumatischen Polyarthrit. Zeitschrift für Kl. Med., 1879, t. 1, p. 243.

Some prefer the citrates, tartrates, or acetates of the fixed alkalies, in quantities of from half an ounce to an ounce in the twenty-four hours. Nitrate of potash has been administered in similar doses, and Gendrin, Martin Solon and Seux, in France, and Brocklesby, Macbride and William Whytt, in England, stand as the representatives of this treatment.⁴

In opposition to this alkaline medication we must note the acid treatment of rheumatism, and particularly the treatment by lemon juice. Proposed by Owen Rees,⁵ adopted by Donald Dalrymple,⁶ Hector Pelletier⁶ of Montreal, Perkins of Brussels, and by Ciraud,⁶ this lemon juice medication is not so widely different from the treatment by alkalies as one would suppose, for, as Golding Bird observes, lemon juice is nothing more nor less than supercitrate of potash.

I myself believed that I had found several years ago an alkaline compound containing ammonia for its base, which has an action truly specific in the treatment of acute articular rheumatism; I refer to those ammoniacal salts, propylamine and trimethylamine.

It was in 1872 that I commenced the trial of these preparations in the Maison Municipale de Santé, and on the 10th of January, 1873, I communicated the results to the Société des Hôpitaux. From this time, and as a consequence of this report, propylamine and trimethylamine have been the subject of numerous labors in France and elsewhere, and Aissa Hamdy, Peltier and Bourdet, in France, Phillippe Cæsari and Namias in Italy, Spencer in England, Mount in Canada, Loever and Leo in Germany, have published the results of important investigations on these remedies. Despite all these efforts this medication has

salts per day. He gives these alkalies in the following manner: Every four hours the patient is made to take a draught containing one drachm of bicarbonate of potash and one-half drachm of acetate of potash in spirits of mindererus.

According to the statistics published by Basham and by Chambers, this medication protects from cardiac complications. (a)

⁴ According to Martin Solon, nitrate of potassa, given in large doses in acute articular rheumatism, causes resolution in from four to ten days, and oftener in seven than in ten. It manifests its action in the most severe cases as well as in the mildest. He administers the nitrate in the following way: The patient is made to take, every few hours, from two to four drachms of nitre in a cup of some bitter infusion, the time for each dose being so regulated that from half an ounce to two ounces may be administered per day; ordinarily a quantity of one ounce per diem is not exceeded.

The salt may be given in lemonade, in chamomile tea, or in any other simple herb tisane. Basham has employed the nitrate of potassa in still larger doses than the foregoing, *i. e.*, exceeding two ounces a day, but he makes especial use of the salt externally in strong solution, saturating with it felt or wadding, with which the inflamed joints are swathed. (b)

⁵ Owen Rees, *Edinb. Med. Jour.*, Aug., 1845. Donald Dalrymple, *Lancet*, Sept., 1850. Hector Pelletier, *Montreal Medical Journal*, April, 1853. Ciraud, *Jour. des Conn. Med. Chir.*, July, 1851.

(a) Garrod, *Lancet*, March 3, 1857. Behier, du Traitement, du Rhumatism, *Bull. de Ther. t. lxxxix.*, p. 529, 1875.

(b) Martin Solon on "The Employ of Nitrate of Potassa in Large Doses in the Treatment of Acute Rheumatism," 1843. Basham, *Union Med.*, March, 1850.

been abandoned, and this more on account of the difficulty of obtaining a reliable preparation than for any other reason.¹

Although I had effected the substitution of chlorhydrate of trimethylamine for the impure propylamine extracted from cod-liver oil and herring brine, and though I showed the chemical differences which separate the two amides, I recognize the fact that we have not a medicament possessing always the same

¹ Wertheim discovered propylamine in 1850 as a product of the reaction of potassa on narcotine; the same year Anderson obtained an identical compound from codeia, having the formula C_6H_9N , to which he gave the name it now bears. In 1851 Anderson's propylamine was found in herring brine, and Desaignes discovered it in *chenopodium vulgare*. The labors of Hofmann and Wurtz have brought to light the differences which exist between the three amides which have the same atomic constitution—propylamine, ethyl-methylamine and try-methylamine—and which result from the substitution of alcohol radicals for hydrogen, as may be seen in the following table:

Propyl.....	C_6H_7 H H	} $N=C_6H_9N$ (propylamine)
Ethyl.....	C_4H_6	
Methyl.....	C_2H_3	} $N=C_6H_9N$ (ethyl-methylamine)
Methyl.....	C_2H_3	
Methyl.....	C_2H_3	} $N=C_6H_9N$ (tri-methylamine)
Methyl.....	C_2H_3	

Awenarius, of St. Petersburg, in 1856, was the first to employ propylamine, obtained by him from cod-liver oil, in medicine. Other Russian physicians, as Nelinbin and Jean, of Kalenitzenko, subsequently made successful use of it as a medicament.

In 1872, John Gaston, in the United States, reported the results of his experience with propylamine in the treatment of acute rheumatism. Lagrange, in France, about the same time, made trials of tri-methylamine in the same disease, but the subsequent wide-spread usage of these amides in rheumatism is chiefly due to the communication of Dujardin-Beaumez to the Société Med. des Hôpitaux in 1873. (a)

Dujardin-Beaumez showed that propylamine from herring brine is nothing but trimethylamine, and he substituted for these commercial propylamines chlorhydrate of trimethylamine, which he administered in the dose of one gramme daily.

The clinical experience of Dujardin-Beaumez, Namias and Aissa Hamdy has shown that try-methylamine lowers the pulse and temperature, and diminishes the secretion of urea and the number of pulsations. It is, according to Pelletier, who assigns it a place between digitalis and quinine, a neurocardiac medicament.

Martineau has pretended that the ammoniacal salts have the same action as tri-methylamine. Dujardin-Beaumez has experimented comparatively in animals with chlorhydrate of tri-methylamine and chloride of ammonium, and he has shown that if these two medicaments lower the pulse and temperature, chlorhydrate of try-methylamine never produces, even in large doses, the convulsive accidents which are produced by chloride of ammonium. Laborde has repeated the experiments of Dujardin-Beaumez; he maintains that chloride of ammonium and chlorhydrate of tri-methylamine ought not to be arranged among antipyretics, and that they have a special action on the spinal cord, and that the salt of ammonium alone produces convulsions.

(a) Dujardin-Beaumez, On the Comparative Therapeutic and Physiological Action of Muriate of Ammonia and Chlorhydrate of Tri-methylamine, *Gaz. Med. de Paris*, No. 26, 1873. On Propylamine and Tri-methylamine in the Treatment of Acute Articular Rheumatism, in *Gaz. Med. des Hôp.*, Jan. 16, 1873, and *Gaz. Hebdom.*, 1873, Nos. 13, 15 and 16.

composition. But the dominant reason for the abandonment of trimethylamine was the discovery of a substance much more effective in the treatment of rheumatic fever, namely, salicylic acid.

Trimethylamine, in fact, had no curative action except in rheumatism of moderate intensity, and in these cases it procured alleviation of the pain and cessation of the fever, just as does salicylic acid, but it failed in the severe forms. Luton's specific treatment of acute rheumatism by the cyanides, and cyanide of zinc, in particular, has also shared the same abandonment, as well as the *veratrum viride* medication proposed by Heuser; the salicylic acid treatment has deservedly superseded them all.

The application of the salicylic preparations to the treatment of acute articular rheumatism was the result of empiricism, and even to-day, as you will see as I go on, we cannot explain by the physiological properties of these preparations their specific effect in the treatment of rheumatism.

Employed from time immemorial in the treatment of fever and ague, willow bark (*salix alba*) had also given good results in certain cases of rheumatism, but these were lost sight of, and notwithstanding the discovery of salicin in 1829, this crystalline principle was not used in the treatment of rheumatism.

It was Stricker, who, in 1876, first made therapeutic use of, not salicin, but salicylic acid, which Kolbe and Lauteman had just discovered by way of synthesis by acting on phenol.¹

What was the idea which directed Stricker in the administration of salicylic acid in rheumatism? Did he believe that the anti-fermentative properties which had just been discovered in it were applicable to this disease? Did he think that it would do good, like quinine, by its anti-pyretic action? We do not know. At any rate, he showed quite conclusively that in administering

¹ In 1827 Leroux, a pharmacist of Vitryle Francois, discovered salicin in willow bark. A few years later appeared Blaincour's treatise on the employment of salicin in intermittent fever.

In 1836 Peria obtained salicylic acid by the action of potassa on spiraea ulmaria (queen of the meadow). Then Kolbe and Lauteman obtained it by way of synthesis, by passing CO₂ into phenol containing a little sodium. Salicylate of soda is thus obtained at the present day.

In 1876 Kolbe and Meyer demonstrated the antiseptic action of salicylic acid, and it came into use for dressing wounds. The same year Stricker employed salicylic acid in acute rheumatism, and called attention to the rapid curative action of the medicament, which was especially noticeable when 50 centigrammes (7½ grains) were given every hour. At the same time that Stricker counselled salicylic acid in rheumatism, Maclagan made trial of salicin, and quite a discussion arose as to which was preferable, Maclagan claiming remarkable results from salicin.

In 1877 G. Sée communicated to the Academy of Medicine his observations on the treatment of rheumatism by salicylate of soda and showed the advantages of the sodium salt over salicylic acid. From this date the salicylate of sodium treatment became generally adopted and medical journalism has swarmed with treatises on this particular part of therapeutics.

(a) Stricker, Berlin. Klin. Wochen., Jan., 1876, No. 1. Maclagan, Lancet, 1876-77, etc. Blaincour, Thèse de Paris, 1830, No. 235. G. Sée, On the Treatment of Rheumatism by Salicylate of Soda, Academy de Medicine, 1877, 2d Serie, t. vi Nos. 26 and 27.

salicylic acid in the dose of fifty centigrammes every hour, you may throttle rheumatism in its march, and complete its evolution in three or four days.¹

I did not hesitate, when I learned of Stricker's success, to test the new treatment in the wards of my hospital, and I obtained, like him, remarkable effects. One of my pupils, Dr. Anger, whom I have since then had the misfortune to lose, has recorded in his thesis the principal points in this experimentation.

At the same time Prof. Germain Sée, who was making trial of Stricker's method of treatment substituted for salicylic acid the salicylate of soda, and published the results of his clinical experience in his important communication to the Academy of Medicine, June 26th, 1877, and despite the efforts of Maclagan to bring the profession back to salicin, it is the salicylate of sodium which is to-day universally employed.²

How ought you to conduct this salicylic medication? What are its disadvantages? What are its effects? These are points which remain for us to

¹ Salicylate of sodium, administered to the human subject in large doses, determines an irritation of the digestive tube. After a dose of five grammes (75 grains) there supervene buzzings in the ears, or roarings, with sometimes brain troubles and delirium, lowering of the pulse and temperature. Salicylic acid is rapidly eliminated in the urine, in the form of salicyluric acid. According to Lecorché and Talamon, salicylic acid considerably augments the excretion of urea and uric acid, an augmentation which continues for three or four days; then the excretion progressively falls, sometimes quite suddenly. There is also an increase of the excretion of phosphoric acid. Several explanations have been given of the action of salicylate of sodium in rheumatism. Some have attributed it to a special influence on the sensibility, but the experiments of Bochefontaine on animals have shown that salicylate of soda has no action on normal sensibility, and even if it had, it would be difficult to show why it should act in acute articular rheumatism, and not in gonorrhœal rheumatism. It has been claimed that this medicament owes its power to a special influence on the vaso-motor system, exercising a constrictive action on the dilated vessels of the synovial membrane. This is all pure hypothesis. Oltramare thinks on the other hand that it has a vaso-dilator action. The diuretic, also the anti-pyretic effect of this medicament has been invoked to explain its remedial action in rheumatic fever, while Binz has put forth the opinion that it acts directly on the living protoplasm. Vulpian proposes the following explanation: The analgesic, diuretic, vaso-motor and anti-pyretic properties of salicylic acid cannot explain its specific action in rheumatism. It does good by acting directly on the articular elements, bringing them back to their normal state, and if one does not observe the same curative effects in gonorrhœal rheumatism, and in chronic rheumatism it is because the anatomical lesions are different. (a)

² Maclagan claims that salicin is less disagreeable than the salicylate and is much better tolerated. His method of giving it is as follows: Thirty grains an hour till an ounce is administered, that is, sixteen hours. At the end of this time the pain is generally gone, and the temperature normal or nearly so. Then thirty grains every three hours till the second ounce is taken, and finally the same dose three times a day for eight or ten days. (b)

(a) Petit, on "The Employment of Salicin, Salicylic Acid, and Salicylate of Soda in Therapeutics." Bull. de Ther., t. xci, p. 454 and 508, 1876. Vulpain, on "The Mode of Action of Salicylate of Soda in Acute Articular Rheumatism." Bull. de Ther., Paris, 1881, t. c. p. 97. Lecorché and Talamon, on "The Action of Salicylate of Soda on the Urea, Uric Acid and Phosphoric Acid of the Urine, in Acute Rheumatism." Revue. Mens. de Med. et Chir., March, 1880. Anger, on "The Treatment of Rheumatism by Salicylic Acid," Thèse de Paris, 1877.

(b) Maclagan, on "The Treatment of Rheumatism by Salicin and Salicylic Acid. Lancet, June 21, 1879.

study. You prepare with salicylate of soda solutions more or less dilute which you administer to the patient. These solutions have a rather disagreeable taste, which is remedied to a certain extent by giving the medicine in milk. Here is the formula which I generally use:

R Salicylate of soda 15 grms. (℥ ss)
Water 250 grms. (℥ viij and 3 ijss).

M. Signa. A tablespoonful *pro re nata*. Each dose should contain one gramme of the salicylate.

The question of dose plays an important part in the results attainable by this medication. Stricker was right in asserting that it is necessary to administer the salicylate of soda every hour till complete cessation of the rheumatism. You must give large doses, and proportion them to the gravity of the affection.

I am accustomed, in rheumatisms of moderate intensity, to administer daily from 4 to 6 grammes (1 to 1½ drachms) of salicylate of soda, in fractional doses, two hours apart, and if by the second day I obtain no abatement of the pain and fever, I increase the dose so that the patient shall take 10 grammes (150 grains) during the twenty-four hours; ordinarily 6 grammes a day will suffice.

When once the pain is subdued, I take care not to stop the salicylate medication, which, in smaller doses of two or three grammes a day is prolonged for a fortnight, but the dose is instantly increased if I see any tendency to a return of the rheumatism. For if the salicylic treatment often causes the symptoms of acute inflammatory rheumatism to disappear as if by magic, it does not arrest the disease altogether, and if you leave off abruptly the administration of the medicine, you will see the rheumatism return with a new intensity; the relapses are then more stubborn to treatment than was the incipient attack. Therefore, I cannot too strongly recommend you, after the cessation of pain, and the disappearance of the rheumatism, to keep your patients in bed for two weeks, and to consider them all this time as under the influence of the malady.

Clinicians have much discussed and much exaggerated the dangers of these doses of salicylate of soda. Such disastrous results have been attributed to them, that you will sometimes see families obstinately oppose the employment of this medicament. The salicylate, in fact, does produce buzzing in the head and some vertigo, especially when the dose is large; but these symptoms are transient and not at all alarming. Children, it must be admitted, support admirably the salicylate,¹ while women experience the cerebral effects in a much more marked degree than men, and you should make a note of this fact when you prescribe it to females.

¹ Deseille, by observations made in the service of Bergeron, has shown that salicylate of soda is well borne by children, who can take six grammes a day with safety. Muscular rheumatism yields in forty-eight hours or more, and acute rheumatism of the joints experiences a very marked sedation at the end of two to five days of treatment. (a)

(a) Deseille on the Salicylic Treatment of Rheumatism in Infants. Thèse de Paris, 1879.

To the salicylic medication have been attributed all the complications which may appear in the course of rheumatism, and in particular, those which manifest themselves on the part of the cerebrum, or the heart. This is a mistake. I believe, on the contrary, that the salicylate, administered at the onset of the rheumatism, opposes the evolution of the malady, and so far, within an actual limit, the cardiac complications which play so considerable a part in the prognosis of rheumatism. Will the salicylic medication prevent every complication? Assuredly not, for in certain cases it is the cardiac rheumatism which appears as the first symptom of the disease.

Therefore, you ought to employ this medication in the greater number of cases, and I know of but one contra-indication to the use of the remedy; namely: its non-elimination by the urine. This is a point to which I alluded when treating of diseases of the kidneys, in a former lecture.

Whenever salicylate of soda is administered to a patient suffering from parenchymatous or interstitial nephritis, the smallest doses may determine cerebral accidents of the greatest gravity, therefore you ought to examine carefully the urine of your patients before advising the salicylic treatment.

Does salicylate of soda thus administered cure all cases of acute rheumatism? One may reply in the affirmative for the great majority of cases. At the same time there are a certain number of rheumatic patients who are not benefited by this treatment. I am convinced, however, that save in exceptional cases, these refractory forms are tendinous rather than synovial, and that, as a general rule, the more frankly acute the rheumatism, the more amenable it is to medication by salicylate of soda.

There is another form of rheumatism which resists the salicylate medication. I refer to gonorrhœal rheumatism. Whether this rheumatic inflammation be diffused, or localized in a joint, it is pretty certain that salicylate of soda has little or no action on these muscular or tendinous rheumatisms, and that you have no other means of subduing these obstinate arthritides but the revulsive method.

Thus far I have been occupied only with acute articular rheumatism, but there are certain other forms of rheumatism of which I must speak. I refer to muscular rheumatism, and those rheumatisms which are not accompanied with fever, and which have been described under the name of rheumatic pains, pains which come on under the influence of atmospheric changes, and which are so frequent and so annoying in old persons of arthritic habit. These manifestations are amenable to external treatment, and you can use revulsion or topical anodynes, or baths.

Revulsion is one of the most powerful means of treatment of local rheumatism, and according to the degree of the arthritis, you can use tincture of iodine,¹ blisters and galvanic cauterizations.

¹ The officinal tincture of iodine (French Codex) is iodine 1 gramme, alcohol 12 grammes. In the United States a decolorized tincture is prepared as follows: R Iodine, 5 grammes; alcohol, 50 grammes; aquæ ammon. fort., 11.60 grammes. M. It takes about five weeks to obtain complete decolorization. For relief of intense pain, the iodine tincture