

able to that of the axilla, the latter generally suffices. You watch carefully the abdominal functions, and you regulate the bowels by giving mild laxatives, such as saline purgatives and the natural mineral waters, which are better than castor oil. It will be well to cover the abdomen of your patient with a layer of cotton batting, which is kept applied by means of a body bandage. This application immobilizes, in a certain measure, the intestinal mass, and prevents the too sudden shocks, which, in the present disordered state of the intestines, may do mischief. This wadding is much superior to poultices, which are inconvenient by reason of the clammy and uncomfortable moisture which attends them. Then I make my patient the subject of serious attention, being ready to act according to the rules I have just mentioned; if the temperature does not exceed 102° F.; if no complication arises, I adhere to the hygienic treatment, and those mild laxatives administered every day, and you have many times seen in my service that these simple means are quite sufficient for benign forms of the disease.

When the temperature exceeds 102° F., I begin the practice of cold lotions (sponging), which I repeat two or three times a day, or even oftener, according to the elevation of the temperature. These means often suffice to keep the temperature in the neighborhood of 102° F. But when it exceeds 103° F., and marches towards 104° F., then is the time for my intervention of salicylic acid. I give at noon, and in the space of an hour, four capsules, each containing seven and a half grains of salicylic acid, and I take care to administer during the day a certain quantity of milk, namely, about a quart.

Under the influence of the salicylic acid there is a depression of temperature; but to render this, in a manner, permanent, I repeat my dose the next day, at the same hour, then I omit the treatment for a day or two, and note the height of the thermal curve. If it attains the previous figure, I again give the acid for two days, in the same dose; and if the temperature still tends to exceed 104° F., I double the dose, and then give sixty grains in two hours—in doses of seven and a half grains every fifteen minutes; and sometimes I go as high as seventy-five grains; but I never prolong beyond two days the action of the medicament. Such are the sole means which I employ against the pyrexia.

In order to judge of the condition of the vital forces, I am guided by the assemblage of symptoms and the stage of the pulse.¹ As long as the pulse re-

¹ Malherbe has studied the modifications of pulse in relation to temperature in typhoid fever; and draws the following conclusions: 1. In typhoid fever the frequency of the pulse is not always proportional to the elevation of the temperature; 2. If the pulse remains of little frequency, and the temperature of but slight elevation at the onset of a febrile affection, typhoid fever is probable; 3. If the pulse remains between 80 and 90 in the course of typhoid fever, although the temperature rises above 104° F., or even 105° F., there is not generally reason to pronounce the prognosis to be bad; 4. If, on the other hand, the frequency of the pulse augments at the same time that the temperature rises above 104° F. or 105° F., the prognosis is very grave; 5. If the temperature suddenly falls, while the pulse increases in frequency, the prognosis is unfavorable; 6. The parallelism between the daily oscillations is subject to numerous modifications. (a)

(a) Malherbe, on the diagnostic and prognostic value of the relations of the pulse and temperature in typhoid fever [thèse de Paris, 1883].

mains between 80 and 90 a minute, I let the patient alone; when it raises above 90, I give alcohol, either in the form of Todd's mixture, milk punch containing brandy, or Spanish or Sicilian wines.

In the immense majority of cases, when the fever takes on a certain acuteness, there supervenes a nocturnal delirium of mild type; when this delirium becomes more active and boisterous, I resort to chloral, which I much prefer in these cases to opium and its derivations, which, in fact, have for their physiological effect to congest the brain; and you well understand that in ileo-typhus, in which this congestion is the rule, opiates may do harm. I administer, then, hydrate of chloral, in the dose of fifteen to forty-five grains, in a mixture of egg and milk sweetened; and I frequently associate bromide with chloral.

A boisterous delirium often accompanies ataxic phenomena, constituting thus what was formerly described under the name of ataxo-adyamic fever. When this state is not too intense, and the fever is attended with dryness of the skin, I place my patient in a warm bath, which I repeat every day or two. If the ataxo-adyamic condition becomes more intense, I have recourse to envelopment in the wet sheet, which envelopment I repeat two or three times a day, according to the necessity. I add often in these cases to the chloral or the bromide, preparations of musk, of which Trousseau made great account, and I give from seven and a half to fifteen grains of musk, in pills rather than in potion, the latter being very disagreeable to the taste. Such are the therapeutic means which I employ in the adynamic and ataxic forms of typhoid fever, and I come now to other morbid determinations of the disease.

The pulmonary complications are the most frequent. They include bronchitis, pneumonia, broncho-pneumonia, and sometimes, though very rarely, pleurisy. In the treatment of these pulmonary complications, you should avoid the application of blisters; the patient, in fact, being in a state of constant agitation in his bed, and the functions of the skin being altered, these fly-blisters are attended with ulceration, or even gangrene, and may thus become a serious evil. You should use, instead, dry cups, which render us great service in typhoid fever with pulmonary congestion, and with these cups you may cover the whole chest of your patient. You may also give internally a little tincture of aconite, which diminishes, though feebly, this congestive tendency. It will be well also to have your patients well propped up in their beds, so as to prevent those hypostatic congestions which too horizontal a position determines.

I have but little to say about cardiac complications, at least from the point of view of treatment. Here we have, unhappily, one of the causes of sudden death in typhoid fever, not easily explicable always, whether we suppose, as Dieulafoy does, a simple reflex action, whether we attribute the fatality, as does Hayem, to symptomatic myositis, or whether we make it depend, according to Laveran and Bussard, on cerebral anæmia, or whether it results from these last two causes combined, as Huchard maintains.¹ Our therapeutics, in fact,

¹ Four theories have been advanced to explain sudden death in typhoid fever.

1. *Theory of reflex action.*—This theory has Dieulafoy for its advocate. According to him the syncope is due to a reflex action which has its starting place in the diseased intestine.

have very little power to prevent such a termination. I agree, at the same time, with Huchard, that tonics, general stimulants, and perhaps nitrite of amyl, may in these cases render some little service.

On the part of the digestive tube there may supervene several complications. One of these consists in the appearance of gastric troubles, and I have already spoken to you of them while on the subject of diet in this disease; the other is an accident much graver and always mortal, namely, perforation of the bowels; lastly, the third results from the occurrence of intestinal hemorrhages. I have little to say to you from a therapeutic point of view concerning intestinal perforations, yet apart from perforations as a determining cause, peritonitis has been sometimes observed in typhoid patients. In these cases there is a possibility of a recovery by a rigorous treatment, which consists in the application of ice to the abdomen, and immobilization of the intestinal mass. As for intestinal hemorrhages, we have seen that when they are of moderate intensity they are often rather beneficial than otherwise; unhappily it often occurs that they are too abundant, and we are called on to interfere with applications of ice to the abdomen, and the internal administration of perchloride of iron or ergotine. For my part I very much prefer ergotine or ergotinine, which I give in hypodermic injections. I have thus far omitted to say anything about the diarrhoea. While recognizing the fact that a typhoid patient ought to have two or three movements a day, there are cases when the passages are altogether too frequent, and exhaust the patient. I advise you in these cases to make use of the salicylate of bismuth, in from forty to sixty grains a day.

The renal complications present a certain gravity in typhoid fever. Fothergill even thinks that it is the non-elimination of the products of com-

He bases himself on the experiments of Goltz, Bernstein, Jarchanoff, and of Francois Franck, who have demonstrated that a shock affecting the intestinal mass determines sudden arrest of the heart in animals.

2. *Theory of cerebral anæmia.*—This theory has been defended by Laveran, and by Bussard, according to whom death supervenes from anæmia of the bulb and secondary arrest of the heart.

3. *Theory of myocarditis.*—Hayem has called attention to the frequency of granular degeneration of the cardiac muscle in typhoid fever, and it is in this way that he explains the arrest of the heart and sudden death in this disease.

4. *Theory of cerebral anæmia and myocarditis.*—Huchard shows that none of the preceding theories sufficiently explain the pathogeny of sudden death in typhoid fever. According to him, two predisposing causes, the alteration of the heart and the anæmia of the brain, place the typhoid patient in almost continual imminence of syncope.

The granular degeneration of the heart muscle, and the consequent enfeeblement give rise to anæmia of the cerebrum and bulb, and the latter, already pre-existent and persistent in the convalescence of typhoid fever, concurs on its part in promoting syncope and in permanently arresting the heart (a)

(a) Huchard, Critical Study on the Pathogeny of Sudden Death in Typhoid Fever (Un. Med., 1877). Hayem, Note on the alterations of the muscles in fever, and particularly in variola (Soc. de biol., 1866), also, Relations which exist between sudden death and vascular alterations in typhoid fever (Arch. de phys., 1869, p. 700), also, Studies on the symptomatic myosites, [Arch. de phys., 1870. Dieulafoy, On Sudden death in typhoid fever [thèse inaug., 1870], etc.

bustion which is the point of departure of the typhoid state.¹ The kidney, in fact, is congested in typhoid fever, and the urine is albuminous. Whether we are concerned with an infectious nephritis, as Bouchard thinks, or with a congestive nephritis,² there none the less results a perturbation in the functions of the renal organ, and I have already spoken to you of the important part which I assign to this perturbation in explaining the toxic action of certain medicaments in typhoid patients. It is necessary, then, to favor the functions of urination, and you can accomplish this by giving abundant drinks to your patient, and one of the best is certainly milk. I share, in this regard, the view of Jaccoud, who thinks it a good thing to give to his fever patients one or two quarts of milk a day.

The skin, as you know, may become the seat of mortifications more or less deep (bed-sores); these eschars are sometimes of great gravity, extending so far as to expose the bones of the pelvis. I have even observed myelitis consecutive to the opening of the vertebral canal in typhoid patients. I have already shown you by what hygienic means you may avert these mortifications of the skin, but when despite your care they appear, you will require a special dressing for them. The best in my opinion is a solution of chloral. It was in a case of gangrenous ulceration of the hip of great extent, in a young typhoid female, that I made the first local application of chloral, and the astonishing results which I obtained from this outward medication encouraged me to study and make known the antiseptic properties of chloral, and this work of mine has served as a basis for the local therapeutic employ of chloral, to-day so much in vogue.

You make, with one-per-cent. solutions of chloral, frequently repeated

¹ Fothergill has studied the typhoid state; according to him this state depends on the retention of materials of combustion which should have been eliminated, and this takes place under two conditions. Either there is an excess of production of these effete organic matters within a given time, and under circumstances unfavorable to their elimination, so that they accumulate in the blood; or else, under conditions of normal combustion, renal degeneration prevents their removal from the organism. He concludes that in typhoid fever we should aid the various excretory emunctories, skin, kidneys, intestines, etc., and promote elimination. (a)

² A renal form of typhoid fever has been described by Gubler, A. Robin and others. Hardy in 1878 devoted several chapters to this subject. Legreux and Handt and Renault, of Lyons, have also studied the renal lesions of typhoid fever. Bouchard has shown by the presence of bacteria in the urine the parasitic nature of this nephritis.

This nephritis is multiple, parenchymatous and interstitial, and the inflammatory process affects all the elements of the kidney. The symptoms of the renal form are characterized by adynamia, stupor, dryness of the tongue, œdema of the members, lumbar pains and cutaneous disorders; the last are especially ecthyma, furuncles, etc. The urine is sanguinolent, and contains an abundant grayish retractile albumen. (b)

(a) Fothergill, On the typhoid condition [Edinb. Med. Jour., Dec. 1879, p. 225]

(b) Gubler, Leçons faites à l'hôpital Beaujon sur l'albuminurie, et article Albuminurie [Dict. encycl. des sc. méd., Paris].—A. Robin, La fièvre typhoïde. Essais d'urologie clinique [thèse de Paris, 1877].—Legroux et Hanot, Observations d'albuminurie dans la fièvre typhoïde [Arch. gén. de méd., 1881, p. 971].—Petit, Des néphrites de phys., janvier 1881.—Bouchard, Des néphrites infectieuses [Rev. de méd., 1881, p. 971].—Didion, De la fièvre typhoïde à forme rénale [thèse de Paris, 1883].

dressings, and you have care especially to introduce into the excavation which results from the mortification of the tissues, wadding or lint soaked in this solution.

Apart from these eschars I ought to mention erysipelas of an infectious kind, and for that very reason of extraordinary gravity; phlegmons, accidents quite common in typhoid fever of a subinflammatory character, deeply hidden in the interstices of the tissues, and the possibility of which ought to make you examine, with the most scrupulous attention, the painful points of which typhoid patients sometimes complain during their convalescence. You well understand that these purulent collections should be thoroughly drained and treated by antiseptic washings and injections.

Such are, gentlemen, the principal complications which you will have to meet; there are still others of which I shall not speak, for they are exceptional; such as gangrene of the limbs, œdema of the glottis resulting from laryngo-typhus, suppurative parotitis, but it is very rarely that you will have occasion to treat these complications.

I shall say but little of the convalescence of typhoid fever; remarking at the same time that relapses are frequent in this disease, and especially that variety of remittent or intermittent fever which accompanies convalescence from typhoid fever; a variety which David Borelli has plausibly explained by the presence of intestinal ulcerations slow to cicatrize.¹ The entire therapeutics of convalescence is summed up in a problem of alimentation, and you should employ all your care and skill in directing aright the diet.

Such is the aggregate of therapeutic means which you ought to employ in typhoid fever; in putting them in practice you will succeed in curing the great majority of your cases, and without admitting with certain physicians that it is possible, by therapeutic means, to cause the mortality of typhoid fever to disappear, I am of the opinion that there is no disease in which the success won by therapeutics are more numerous.

It is in following step by step the disease whose evolution he has mastered, that the physician by his earnest and thoughtful care and his attention to little points, by his energetic intervention when complications appear, may in many cases say that he has saved the life of his patient, and to express briefly my thought, I might conclude with this phrase, which although a solecism, is the truth—"The best treatment of typhoid fever is a good physician."

¹ David Borelli has described, under the name of slow ulcer of typhoid fever, certain intestinal ulcerations developed under the influence of this disease, and which take a long time to undergo reparation. The presence of these ulcerations determines attacks of remittent fever, which resemble much what one observes in pyæmia, and which are rebellious to quinine. Borelli has been able to prove the existence of these ulcerations by post mortem examinations. The treatment consists in the administration of milk or broth, in maintaining immobility of the abdomen; it is useful to add now and then a laxative to maintain freedom of the bowels. (a)

(a) David Borelli, on slow ulceration of the intestines in typhoid fever [Ann. Clin. degl. Incur, Anno. 1, 1877].

APPENDIX.

THE NEW ANTIPYRETIC—ANTIPYRINE.

Since the foregoing chapter was written a new antipyretic has been brought to the knowledge of the profession. In many respects this new febrifuge medicament, to which the name antipyrine has been given, seems to be superior to all the other agents of the antipyretic medication. Numerous monographs concerning it have appeared in the medical journals of both continents, and the properties of the new medicine have been discussed before numerous medical societies. From the already quite extensive literature of antipyrine we select portions of the recent contribution of Dr. Leon Arduin, in the Bulletin General de Therapeutique, March 30th, 1885:

"The antipyretic medication has from all time interested practitioners, and if it will not do to accord to fever all the gravity which was attributed to it once, there are nevertheless cases where it becomes not only a complication, but even a veritable danger, against which the physician should direct all his efforts. If we pass in review the principal antipyretics employed down to the present time, such as salicylic acid, salicylate of soda, phenic acid, resorcin, in fine those of quite recent discovery, such as kairine, aspidospermine, and thallin, one does not fail to see that the inconveniences, and sometimes the dangers attending these medicaments, make physicians often hesitate to employ them. Only one remains in the first rank. I refer, of course, to sulphate of quinine, whose marvellous action is incontestable. Now, in typhoid fever, is it not a fact that the action of quinine becomes *nil*, or almost so, after a few days?

Nevertheless, leaving one side intermittent fever, it is still in dothineritis that the action of quinine is the most manifest. Besides, sulphate of quinine has certain inconveniences attending its use, such as buzzing in the ears, cephalalgia, vertigo, nausea, etc. In a word, despite the incontestable action of sulphate of quinine, we are still looking for a good antipyretic medicine, for in a number of febrile diseases it is impossible for us, in the present state of therapeutics, to lower with certainty a too elevated temperature, and, at the same time, to do this with entire safety to the patient.

Antipyrine is a derivative of oxymethylquinizine, which is the product of acetacetic ether reacting on phenyl hydrazine; if to this oxymethylquinizine you introduce a new methylic group, you have methylated oxymethylquinizine, which Knorr has called dimethyloxyquinizine, and Felehné, antipyrine. This substance is in the form of grayish-white powder, slightly bitter to the taste, and slightly soluble in water.

Our clinical and therapeutical study of this medicine is based on more than fifty cases, most of them occurring in the practice of Dr. Huchard. Several facts of a practical nature result from these observations. The first, which M. Huchard has made known, is the almost elective action of antipyrine in diseases of the lungs, and in the fever of the tuberculous; for it is seen that with minimum doses of eight grains, and even of four grains, you obtain a sure fall of the temperature, and this sometimes by more than 2°.

Moreover, it suffices to cast a glance over the thermometrical tracings, to see the progressive and almost mathematical fall of the temperature with feeble doses. Generally the first dose makes the temperature fall from 1° to 1½°. If you cease the administration of the medicament the temperature maintains itself at this point for several hours, and even descends several tenths of a degree. If you administer a second dose, the heat falls from ½° to 1°, and keeps at this level for several hours. It is this remarkable action which has caused M. Huchard to say that antipyrine might be considered as a specific, not of tuberculosis, but of tuberculous fever. One cannot too much insist on the effect of small doses, in opposition to the practice of the Germans, who employ exaggerated doses of from four to five grammes (3 j to 3 jss) a day. This point, in fact, is of capital importance, for one of the greatest inconveniences of antipyrine is the production of excessive sweats, which often prostrate phthisical patients. Under the influence of smaller doses, however, of from four to eight grains, this inconvenience is completely obviated; temperature falls, the dyspnoea is calmed, the insomnia disappears.

Our observations show that antipyrine lowers the temperature in pneumonia in a remarkable manner, and that this effect is noticed when small doses are used, contrarily to what takes place in typhoid fever, where much larger doses are necessary.

What is now the action of antipyrine in typhoid fever? It is always attended with a fall of the temperature. Large doses, however—as much as 15 grains three times a day—are required. Moreover, the temperature falls much less considerably than in diseases of the lungs; 1° , $1\frac{1}{2}^{\circ}$, and the duration of this action is shorter. The pulse diminishes sensibly in frequency, nevertheless this diminution is not in relation with the fall of the temperature.

In fine the quantity of urine seems to augment at the same time that a slight diminution of the urea is noted.

In fact, we may already formulate the following conclusions: The general march of the disease is not influenced in a notable manner; hence it will not do to give antipyrine in all cases of typhoid fever, but only in those where the temperature is very high; therefore we should not seek to make typhoid fever cases undergo their evolution without fever, but content ourselves with lowering the temperature sufficiently so that the disease may follow the natural course, *i.e.*, pursue its evolution like a relatively benign acute disease.

Antipyrine is well tolerated by infants at the breast. It disturbs neither the appetite nor the digestion, does not provoke vomiting, causes little vertigo, and no buzzing in the ears or headache. It diminishes the frequency of the pulse, has little or no action on the respiration. Although large doses are said to have occasioned vomiting, this evil certainly does not attend fractional doses.

As for the physiological effects of this medicament, it has been found to produce in hares and guinea pigs convulsions, both clonic and tonic, with paraplegia or general paralysis; according to Bouchard, it acts on the medulla oblongata and on the brain. It has also a remarkable hæmostatic action; we have seen hemorrhage arrested much more rapidly with antipyrine than with ergotine, and even perchloride of iron; it needs, in fact, only from two to four minutes for antipyrine to arrest a hemorrhage which takes seven minutes for ergotine to arrest, and thirty minutes for perchloride of iron.

From the point of view of its action on the circulation, we have always noted a slowing in the beatings of the heart. Animals die by paralysis of that organ. As for its effect on the blood, according to Prof. Demme, it is a protoplasmic poison. The prominent indications for the use of this new remedy are hyperthermia and continuity of the fever. What ought we to understand by hyperthermia! Are we to give this name simply to extreme temperatures, without any distinction of diseases? A temperature of 104° F., for instance, does this constitute an hyperthermic temperature? Assuredly not. Hyperthermia is not an abstract formula, which we can measure by an invariable figure, which one can define by the degree of the fever simply, with the thermometer in hand. The hyperthermia changes with each disease. What is hyperthermia for acute articular rheumatism is not hyperthermia for scarlet fever, and if a temperature of 104° F. is hyperthermia for the first it is not for the second.

Now, it is against these hyperthermic temperatures, and it is against them alone, that it is necessary to give antipyretics, and it is not when the fever constitutes simply an element of the disease that we must give the medicine, it is only when it becomes a complication and a danger. But this is not all; there remains an important point to elucidate. What is the end which the therapist has in mind in giving antipyretic medicaments? Do you mean always and constantly to bring back a hyperthermic temperature to the normal? If this is the end you have in view, you will find yourself at each moment astray; you will make nothing but failures.

What you are to demand of these medicaments is to bring back the temperature to where it should be in the normal course of the disease, and in doing so you will have sagely acted, since you will have suppressed a complication and a danger.

The second indication is the continuance of the fever. It is useless to insist on the benefit which the patient derives from the natural remissions in the course of fevers, and on those which the antipyretic procures.

Modes of Administration.—These are three in number. 1, By hypodermic injection; 2, by the rectum; 3, by the stomach.

1. The hypodermic method is rejected on account of the pain which these injections determine. If this method be resorted to, 15 grains may be dissolved in a syringe of warm water and injected.

2. Antipyrine may be given in lavements. Make a solution, one part to fifteen, and add two tablespoonfuls to a small lavement. You obtain thus effects almost as satisfactory as when given by the mouth.

3. In giving antipyrine by mouth, which is the best mode of administration, you dissolve the medicament in a little sweetened water, flavored with a few drops of essence of peppermint or tincture of orange peel. It may conveniently be given in a little wine and water.

The doses are: 7 to 12 grains in phthisis; 15 to 45 grains in typhoid fever and the great pyrexias. It is best never to give more than 15 grains at once, and the doses should be at least an hour apart.

CONCLUSIONS (Dr. Henri Huchard):

1. In all the febrile diseases the fever is not an indication for the employment of antithermics. It is the exaggeration of the fever. It is the complication of hyperthermia, different with each disease, which constitutes the indication.

2. In the great pyrexias, such such as typhoid fever; in the consumptive diseases, such as pulmonary phthisis, the continuity of the fever constitutes a new indication.

3. In fine, it is necessary to give fractional and feeble doses, to avoid the sweats and to avoid plunging the patient into that state of adynamia which may result from abuse of the medicament.

4. In the last place, it will not do to demand of the medication more than it can physiologically perform. I mean to say that it will not do to try to make a grave disease pursue its course with a normal temperature.

TRANSLATOR.