Siegle's spray-producer would prove quite inadequate, and it would be necessary to employ one of those used for surgical antiseptic dressings.

In private practice, two to four times a day will be often enough for the inhalations of the spray, and such inhalations should be prolonged for half-an-hour. The patient should, at first, be recommended to make as little effort as possible in inhaling, and only by degrees should he be allowed to make deeper inhalations. A period of rest should follow each inhalation.

Benzoate of soda (as obtained from Messrs. Bell and Co., Oxford Street), is a white granular powder, with a faint odour of benzoin, and a sweetish not unpleasant taste. It is freely soluble in water. It is sold at one shilling and sixpence the ounce, and therefore is not very expensive, as has been stated.

The above is a condensed account of Dr. Max Schüller's recommendations and directions. I shall shortly call attention to some of my own observations.

ON SOME CASES OF ABNORMALLY HIGH TEMPERATURE.*

By HORATIO DONKIN, M.B.Oxon.,

Senior Assistant-Physician to the Westminster Hospital; Physician to the East London Hospital for Children.

CASES of high temperature have been from time to time reported with more or less detail, involving contradictions to the generally received opinions as to the amount of heating the human body can undergo without dangerous symptoms or death. These have not had much weight, chiefly, perhaps, from being without an amount of evidence sufficient to outweigh their alleged *à priori* unlikelihood, and from a neglect of full precautions to exclude imposture, which has been known to play some part in the production of cases of this kind.

We are at present taught that the danger to life becomes great when the thermometer placed (with due care) on skin or mucous membrane registers over 106 deg.; and that a few degrees higher than this are incompatible with life, if not quickly reduced. The cases I am now about to quote seem to some extent to contradict this teaching; and, if genuine, to establish, first, that temperatures as high as 111 deg. Fahr. and even several degrees higher, may occur without any concomitant symptoms of danger, and often without any discoverable organic disease confessedly sufficient to account for the rise; but, secondly, that the high temperatures are probably of a very short duration.

The second of these statements, though it may appear at first sight to lessen the difficulty of believing in these cases of high temperature ending in recovery, really raises a greater difficulty; for how is the fact of rapid cooling through nine or ten degrees in a few minutes to be accounted for, in the present state of physical or physiological knowledge?

I shall relate the chief points of several cases which seem to bear upon this subject, giving shortly the evidence for the genuineness of the facts alleged. It will be rather my object here to call attention to the possible occurrence of these cases, and incite to further observation of them, than to theorise on their explanation; for, if the facts be true, their importance is obvious.

CASE I.—The first case I shall quote is that of a nurse, aged 19, at the East London Hospital for Children. At the end of an attack of enteric fever in January 1878, her temperature rose one afternoon to 105 deg., and in the evening, at 8.30, to 109.4 deg. She was put into a bath at 90 deg., with orders for the water to be gradually cooled to 60 deg. After ten minutes of the bath, a thermometer in the mouth showed 97.6 deg. After this date, all enteric symptoms soon disappeared; but for several months there were remarkable fluctuations of temperature, of which the following will serve as examples.

1. On January 25th, 1878, the temperature at midnight was 110 deg., taken twice (with no appreciable interval of time between the observations) with the same thermometer. Very soon afterwards, 109 deg. was registered by another thermometer. Again, the first thermometer being used, the temperature was found to be 108.4 deg. Shortly afterwards, a third thermometer in the mouth showed 108 deg.; and again the same at 12.30, only 98 deg. The first two thermometers, again used in the axilla, now showed 99.2 deg. From this time till 1 A.M., the temperature, taken in the mouth, axilla, and rectum, remained about 99 deg. The pulse was 92. The skin was not very hot to the touch, as I was informed. No observations were made as to respiration. I would

note here, however, that when, on subsequent occasions, which, from the apparent evanescence of the high temperature, were very rare, actual observation was made of the skin and respirations, the number of the latter was considerably raised; and the skin, at least once, was found to be very hot to the touch.

2. Several temperatures between 107 and 110 deg. having occurred between the end of January and February 19th, and there being reason to believe that they lasted but a very short time, from the fact of it being very rare to get two successive high registrations, I had a registering thermometer strapped in the axilla, and noted every twenty-four hours. This was done every day till March 2nd. On each removal, the index showed a temperature of over 108 deg.; the highest being 111.6, 110.5, 110, and four times 109 deg. During this period, two temperatures of over 108 deg. and two of over 107 deg. were taken in the mouth, noted at the time.

The patient was removed on March 2nd to the Westminster Hospital, for further observation. During nearly a month there, the temperature behaved in the same way; the maximum thermometer showing registrations from 108 to 111 deg.; and the temperature, taken in the ordinary way in the mouth and axilla, being often over 105 deg., and sometimes as high as 108 and 109 deg. On one occasion (March 23rd, at 6 P.M.), the house-physician registered 107.2 deg. in the right axilla; the maximum thermometer, which had been in the left axilla for half an hour, showing 107.8 deg. Five minutes afterwards, the temperature in the mouth was 98.8 deg., and in the right axilla 98.6 deg. This observation shows (a) that the high temperature was not local—to one axilla, for instance; and (b) that the temperature apparently fell in five minutes through nearly nine degrees. At the time of this high temperature, the pulse was 102, the respirations 32, and the skin was very hot to the touch. With the temperature-fall, the respirations sank to 24.

It is to be remarked especially, with reference to this case, that the high temperatures were generally unaccompanied by any discoverable constitutional symptom other than a feeling of "flushing", or "rushes of heat", described by the patient. No organic disease has been discovered in the patient, after repeated and careful examination by many observers, with the exception of uterine retroflexion and displacement of the left ovary. She was more or less anæmic throughout, and suffered from amenorrhœa. She complained frequently of considerable pain in the left side of the abdomen, probably in the ovarian region; and was always, and is still, short of breath.

I have published this case at length in the *Lancet* of May 11th, 1878, and of March 15th, 1879; to which reports I must refer those who are interested in the subject. But, before leaving it, I must give some account of the precautions taken to establish the alleged facts, in view of their abnormality and apparent inexplicability.

1. Several trustworthy observers registered the high temperatures.

2. Several thermometers were used: a fact which renders the objection of the inaccuracy of the instrument untenable.

3. From an early period of the case, I treated the patient as an impostor, though there was never any reason for suspecting her; and her great anxiety to be considered, as she felt, well, would render it likely that any imposture would have been in the opposite direction. Feeling, however, that no personal factor should enter into a scientific investigation, I caused, on several occasions, strict precautions to be taken to detect imposture; such as manipulation of the thermometer, or changing it for another, etc., or the concealment of some heated substance in the bed. *E. g.*,

a. Four temperatures between 107.4 and 108.6 deg. were taken in the mouth, the patient being persistently watched.

b. A temperature of 106 deg. was observed by myself on March 2nd, 1878, the axilla having been previously examined, and the patient's hands being in view during the whole time.

c. A temperature of 108.4 deg. was taken in the axilla on March 13th by the House-Physician at the Westminster Hospital, who kept in view the patient's hands.

d. A temperature of 105.2 deg. was taken in the axilla when the patient was under the influence of chloroform (for a vaginal examination).

e. On February 21st, temperatures of 106 and 105.9 deg. respectively were shown by a registering and non-registering thermometer, held simultaneously in the mouth.

f. On one occasion, the thermometer kept in the axilla to register the maximum temperature, which appeared to be so evanescent, was covered with strapping, and the patient's arm was strapped firmly to her side. Seals were, moreover, placed on the strapping, rendering it apparently impossible for the instrument to be reached without detection. On removal of the strapping, the thermometer registered 109.6 deg.

For these reasons, I infer that the temperature of 111.6 deg., the

* Read in the Section of Medicine at the Annual Meeting of the British Medical Association in Cork, August 1879.

highest recorded in this case, though in this instance it was taken by the maximum thermometer without the special precautions used on the above occasions, may be taken as genuine. It may also be inferred, from numerous observations made, that it is likely that the high temperatures were always rapidly evanescent.

I have dwelt thus long on this case, as it is perhaps the only one that I am fully justified in considering as able to stand *alone* as establishing the facts alleged. For, though in some of the others the evidence is very strong, I have not been able to investigate and observe them personally to such a rigorous extent as the nature of the inquiries would claim. But, if genuine, as I believe them to be from the evidence in my possession, they are valuable as illustrations.

CASE II.—This case was kindly supplied to me by Dr. Greig Smith, of the Bristol Royal Infirmary, and was published by his permission in the *Lancet* of March 15th, 1879, to which I must refer for particulars and good evidence of precaution in the establishment of the facts. The temperature frequently rose to 108 deg., with no evidence of organic disease. The girl, aged 19, was very emotional, and suffered from abdominal pain, "ovarian" tenderness, and at first vomiting. She had "hot flushes" at the time of the high temperatures, and looked flushed. On one occasion, Dr. Smith found a temperature of 99 deg. ten minutes after one of 104 deg.

CASE III.—This was published by Dr. Ormerod in the *Lancet* of November 9th, 1878. A woman aged 32, among many other high temperatures, had one of 115.8 deg. There were great abdominal pain, and marked excitability, but no urgent symptoms; and no organic disease was discovered.

CASE IV.—Dr. Cheadle reports to me a case of a girl aged 18, in St. Mary's Hospital, convalescent from enteric fever, where a series of rapidly fluctuating temperatures occurred, beginning about one month after the fever had seemingly disappeared. The highest was 111 deg. One of 108.6 deg. was taken with every precaution by Dr. Cheadle himself.

CASE V.—This case was published by Mr. J. Cæsar in the *Lancet* of June 14th, 1879. Among other high temperatures, 113 deg. was taken. The girl, aged 15, was unconscious during the period in which the high temperatures occurred. She had been suffering from enteric fever, complicated by double pneumonia; but made a rapid and complete recovery. Mr. Cæsar himself made the observations of temperature.

CASE VI.—A man aged 34 was admitted into Westminster Hospital under my colleague Mr. Davy, with synovitis of the knee. After the actual cautery, he suffered great pain. His temperature on one occasion was found to be 112 deg.; on another, 110.4 deg. was noted, falling in twenty-five minutes to 100 deg. More than one thermometer were used; two having been tested and found to be nearly accurate by Dr. Dupré. There was no constitutional disturbance other than a feeling of great heat, and no evidence of organic disease or pus-collection. Great pain was always coincident with the high temperature.

CASE VII.—This case was of a woman aged 42, who was admitted into the London Hospital suffering great pain in the stump of a thigh, injured after amputation. She had several temperatures over 108 deg. On one occasion, 111.2 deg.; on another, 112 deg. There was profuse sweating. On incision into the stump, no pus was found; but the pain was relieved after the removal of some diseased bone, and the high temperatures occurred no more. There was evidence in this case that the high temperature did not probably last *more* than an hour; but no observation was made as to how *short* a time they may have continued. I am indebted for the notes of this case to Mr. J. Andrew Clark, the house-surgeon, from whose account I have condensed the above notice.

CASE VIII.—I mention this case as being probably valuable on account of several very high temperatures having been noted in the *rectum*. On one occasion, two thermometers being placed simultaneously in the rectum and axilla, registering respectively up to 115 and 117 deg., both indices were driven up to the top of the stem. Though I have notes of this case, which occurred abroad, and good evidence of its accuracy, I have not yet received permission to publish the particulars. But in general I may say that it corresponds with most of the other cases, both as regards recovery and the presence of great pain.*

REMARKS.—In analysing these cases from the facts in my possession, over and above what I have space to quote here, the following results appear.

1. In most, *pain* is a very prominent symptom.
2. The female sex is probably more prone to show these phenomena than the male. Seven of the above cases were females. The man,

moreover (Case VI), was described to me by the house-surgeon as very emotional.

3. There is no serious importance in the temporary rise of temperature *per se*. All of these cases ended in recovery; in some, notably in Case I—where even *pain* was not a very prominent symptom—there was generally no concomitant complaint of any severity, with the exception of pain at the time of the high temperatures.

It has been objected to these cases, that most of the high temperatures have been taken in the axilla; and it has been said that this fact (1) renders fraud a more likely hypothesis than if the thermometer had been placed in the mouth or rectum, and (2) may mean merely a local temperature.

With regard to fraud, Case I shows that some high temperatures occurred in the mouth, and that others, though taken in the axilla, were verified by precautions which may be said to have excluded fraud. The objection that the temperature was merely "*local*", whatever this may mean, applies equally to all clinical observations of temperature. It is assumed, when a temperature of (*e.g.*) 104 deg. is taken in the axilla in a case of fever, that this is the temperature of the body. The difference between a temperature taken in the axilla and one taken within a mucous orifice, such as the rectum, depends chiefly on minor and accidental points, as evaporation, etc., and is simply a matter of a degree or two. An observation of a high temperature taken simultaneously in two axillæ is, as far as our present knowledge goes, as valuable an evidence that the heat is not merely local, as if one of the thermometers had been placed in the rectum, or on any other mucous surface.

It is for the physiologist to discuss the question as to whether or not a surface-temperature, taken with proper precautions either on the skin or the mucous membrane (allowing for accidental modifications), represents approximately in all cases the temperature of the whole circulating blood. At present, certainly, clinical thermometry is based on the assumption that it does.

And further, should future observation confirm the facts I have alleged, we must look to physiology to give us some explanation of the rapid fall of temperature which seems to have taken place at least in some of the cases. In some cases, as my notes show, there was considerable sweating with the high temperatures; in others, shortness of breath. In Case No. 1, in which alone I have any observations on the quantity of urea eliminated, there appears, from one series of observations of the urine carried on every two hours, that there was no concomitant increase of urea with the higher temperatures. From the want of evidence of increased oxidation occurring with these abnormally high temperatures, further observation is needed, in similar cases, of the products and state of the eliminatory organs; and it is important to have additional evidence as to the length of time the high temperatures last. This is more difficult to obtain than would appear at first sight.

Cases of this nature would seem, as far as my very limited observation goes, to hint at some "nervous" origin. In the absence of any evidence of an accepted cause of increased body-temperature, and of other symptoms that we might in such a case expect, we find, in most of the instances I have quoted, some amount of emotional excitement, and in nearly all *great pain*. I will enlarge no further on this, as the suggestion of an ultimate nervous origin for any symptom is after all at present almost a cloak for ignorance, and an illustration of the method *obscurum per obscurius*.

To refer to the sympathetic supply to the blood-vessels, or to a "heat-regulating centre", in this context, would be premature. I am therefore content to bring the facts alleged in this paper, with such evidence for them as I have been able to give, before the notice of others, in the hope that further clinical observation will decide in one way or the other as to their genuineness; and, in the event of this being confirmed, that physiology may throw some light on their explanation.

AMPUTATION AT THE HIP: USE OF DAVY'S LEVER.

By R. CLEMENT LUCAS, B.S.Lond., F.R.C.S.,
Assistant-Surgeon to Guy's Hospital, and to the Evelina Hospital for Sick Children.

As it is by the accumulated experience of many surgeons, rather than by the extended practice of one, that an instrument is accepted or condemned, I think it right to state the result of my trial of Mr. Davy's lever for the compression of the common iliac artery during amputation at the hip-joint. The patient was a boy, aged ten years, who had suffered from hip-joint disease for six years. When he was admitted into the Evelina Hospital, there were shortening of the limb, eversion, and a gluteal abscess. I excised the head of the femur on August 4th, but the patient showed little recuperative power; he suffered from profuse sup-

* Since this paper was written Dr. Roddick of Montreal has kindly informed me that he has no doubt as to the accuracy of the observations as to temperature. The case was admitted for some uterine trouble, but afterwards symptoms of pyo-nephrosis occurred. The high temperatures happened nearly always when the urine had been clear for a day or two. They were very frequent.