caused to breathe an atmosphere containing the vapour of $\text{Ni}(\text{CO})_4$.

EXPERIMENT XVII.—A rabbit, weighing 1,090 grammes, was placed in a bell jar containing 24 litres of air. A small tube containing 0.6 cubic centimetre of $\text{Ni}(\text{CO})_4$ was broken inside the jar, and the fluid evaporated very quickly. As 1 cubic centimetre of the liquid $\text{Ni}(\text{CO})_4$ at 17°C . contains 0.87146 gramme of CO, which at 0° and 760 millimetres yields 696.5 cubic centimetres of gas, 0.6 cubic centimetre would yield about 417.9 cubic centimetres of CO gas. As 1 molecule of $\text{Ni}(\text{CO})_4$ contains 4 molecules of CO, the animal breathed an atmosphere containing 0.432 per cent. of $\text{Ni}(\text{CO})_4$ gas.

3.0 P.M., animal placed in jar; 3.7, agitated muscular tremors; urination; defecation; 3.13, animal sitting up on hind legs; no paresis; vessels of ear full of bright red blood; 3.25, weak in movements, but no marked symptoms; removed from jar; 3.26, temperature of mouth, 37.3°C ; 3.40, trembling and weak in legs.

The animal was found dead next morning, showing a lethal effect after breathing an atmosphere containing 0.432 per cent. for twenty-five minutes.

EXPERIMENT XVIII.—A rabbit, weighing 489 grammes, was placed at 3.45 in the 24-litre jar, the air of which contained 0.58 cubic centimetre of $\text{Ni}(\text{CO})_4 = 0.41$ per cent.

3.45 P.M., animal placed in jar; 3.46, vessels in ears full of bright red blood; animal agitated; 3.56, no very evident effect, except animal rubbing its nose with forepaws; 3.57, another quantity of 0.69 cubic centimetre of $\text{Ni}(\text{CO})_4 = 0.49$ per cent. of $\text{Ni}(\text{CO})_4$ gas was added; the air contained now nearly 0.9 per cent. of $\text{Ni}(\text{CO})_4$; 4.0, violent convulsions; animal lying on belly with the hind legs stretched out; great difficulty in breathing; the animal was quickly removed and placed in a large jar of pure oxygen; 4.10, died in severe convulsions.

It was rapidly bled, and the blood was passed into a vacuum and a small quantity of gas was obtained. This gas contained carbonic oxide, but no trace of nickel. The metal was found in the blood. Quantitative measurements of the gases were not made, as the object at this stage of the inquiry was to ascertain the presence or absence of carbonic oxide in the blood.

CONCLUSIONS.

The general results of the investigation may be briefly summarised thus:—

1. $\text{Ni}(\text{CO})_4$ is a powerful poison when injected subcutaneously.
2. The vapour of $\text{Ni}(\text{CO})_4$ in air, even to the extent of less than 0.5 per cent., is dangerous.
3. The symptoms are those of a respiratory poison, and are similar to those caused by carbonic oxide.
4. The spectrum of the blood of an animal poisoned by $\text{Ni}(\text{CO})_4$ is that of carbonic oxide hæmoglobin, and it is not reduced by sulphide of ammonium.
5. When the substance is injected subcutaneously, it is probably in part dissociated in the tissues, as there is evidence of the existence of nickel in these tissues; but the nickel also finds its way into the blood and is found there.
6. The substance produces a remarkably prolonged fall of temperature even when given in small quantities. This may be accounted for by the hæmoglobin being prevented to a large extent from supplying the tissues with oxygen. Nico, as we may for convenience term this substance, makes it possible to give graduated doses of carbonic oxide, and thus reduce temperature by directly interfering with the respiratory exchanges occurring in the tissues. The objections to its use as an antipyretic are that, owing to its poisonous properties, it is difficult to inject it subcutaneously in sufficiently small doses, while it is not easy to obtain a solution in any menstruum in which decomposition will not take place. If a convenient method of dissolving it could be devised, $\text{Ni}(\text{CO})_4$ might become a valuable antipyretic, the *modus operandi* of which is intelligible. We are at present experimenting in this direction.

We intend to continue the investigation, more especially as to (a) the solubility of the substance, (b) the quantitative effects on the gases of the blood, and (c) the quantitative effects on the gases of the air breathed by an animal under its influence.

PASTEURISM IN HUNGARY.—A muzzling Act appears to be rather urgently needed in Hungary, to judge from certain statistics which have recently been published. Between April 15th and May 1st, of the present year, no fewer than thirty new patients were admitted to the Pasteur Institute at Buda-Pesth. The total number of patients treated at the institute already amounts to 731.

A MODIFICATION IN THE FORM OF SOUND FOR FINDING SMALL VESICAL CALCULUS.

By SIR HENRY THOMPSON, F.R.C.S.,

Surgeon Extraordinary to His Majesty the King of the Belgians; Consulting Surgeon and Professor of Clinical Surgery to University College Hospital, etc.

I HAVE never been quite satisfied with any sound employed for the purpose of determining the presence of a small calculus in the bladder, and have modified the form for myself several times during the last twenty or thirty years. It is in my opinion difficult to exaggerate the importance of finding a model perfectly adapted to attain the object required. Hence any improvement, however slight, is a matter worthy of serious consideration.

The discovery of vesical calculus in its earliest stage has always been for me a subject of great interest, and one to which I called special attention many years ago. I believe I may fairly claim to be the first who regarded the ability to ascertain and demonstrate the presence of a stone when very small as an extremely important—as it was at that time an unusual—achievement of surgical art.

I now venture to offer my latest form of sound as one possessing better qualifications for the purpose named than any I have yet seen or employed.

There are two chief considerations to be borne in mind in designing such an instrument.

First, it should be so formed that all the necessary movements can be made with facility; that (a) the operator may pass it easily into the bladder, and also know with certainty the direction of the beak when lost to view; and (b) that he should be able to rotate it with ease between the finger and thumb, when the beak is turned downward behind the neck of the bladder, especially when, from enlargement of the prostate, the well-known depression exists there in which calculus is likely to lodge.

The first condition is attained by using the flattened handle of a good old pattern; the second, by placing close to it a small cylinder, a combination which now appears to me better than the entirely cylindrical handle which I originally introduced for lithotrites and sounds about the year 1860 for the purpose named. The shaft of the sound should be rather slender, and the under surface of the flat handle is rough, while the upper is polished, so that the direction of the beak (upwards or downwards) is recognised by touch.

Secondly, there should be special adaptation in the form of the beak to strike a very small concretion, and elicit a note therefrom. This is accomplished by flattening the beak a little in the opposite plane to that of the flat handle.

Fig. 1.—A, the flat handle; B, the cylindrical portion; C, the beak showing its widest diameter.

It must be manifest to all on consideration that, long as we have been contented to employ a beak of cylindrical contour, this form is specially adapted to avoid direct impact on encountering a small calculus, since these bodies have mostly a nearly spheroidal or ovoid form, and naturally glance off when contact occurs. In fact, a blade flattened in the direction above described is more certain than a cylindrical one to make direct contact, and will transmit to the operator a greater sense of resistance and a more audible note.

Fig. 2 shows the beak in its narrowest diameter.

The wider measurement of the beak which I have employed for ordinary purposes may be from 20 to 22 French scale, the narrower about 14 or 15, becoming a little thicker, although still flattened, towards the extremity. Such an instrument passes easily in any fairly healthy urethra, and, in the presence of most forms of enlarged prostate, with rather increased facility in comparison with the ordinary form.

It should never be forgotten in connection with seeking a small calculus that the dense fluid medium in which our instrument acts greatly increases the difficulty—as compared with the same action occurring in air—of obtaining rapid and direct contact with a small body of which the specific gravity is comparatively light. Hence the need of flatness and breadth of surface to ensure a direct blow, and the means of moving rapidly to ensure an audible note.

The drawing represents the instrument, which was made for me by Messrs. Weiss about a year ago, and I have had reason to be satisfied with its efficiency in detecting small calculi and fragments present in the bladder.

ON THE VICISSITUDES OF OPIUM.

By SAMUEL WILKS, M.P., F.R.S.,

Consulting Physician to Guy's Hospital.

I HAVE read with much interest and instruction the address on therapeutics by Dr. Gairdner, and been much struck with his remarks on the vicissitudes which many remedies undergo in the course of a few years. He particularised mercury and antimony. I much wish he had added to these opium with its preparations, and had attempted to explain its chequered history, and why, with some practitioners, it had fallen almost into desuetude, being replaced by other drugs. For my own part I can give no other explanation for this change than that of fashion, the tendency to drop an old established habit or custom for a new one.

When a student, between forty and fifty years ago, I was taught that opium was a remedy of the most potent and valuable kind, having of necessity a widespread utility owing to its action on the nervous system whereby it diminished the functional activity of every organ of the body, whether this was brain, liver, kidney, intestine, or uterus. It consequently lessened the wear and tear of the tissues and so tended in many conditions to sustain or prolong life. In a similar manner it would arrest many morbid actions depending upon acute cell growth, as in inflammations, and was a remedy, therefore, in all diseases terminating in "itis." This was illustrated by cases which could be confirmed by the eye, as the rapid subsidence of a sore throat under a dose of laudanum, or the quickly healing large sloughing ulcer in the leg under the continued action of the same drug; a treatment, I may remark, largely pursued by Mr. Aston Key. What I was then taught I have never had any reason to dispute; for a long practice has confirmed me in the truth of these doctrines, and I have continued the use of opium and morphine as heretofore, having found no other drugs to replace them.

How often, therefore, must have been my surprise when meeting sometimes intelligent and well-educated young men in consultation over acute cases of disease to be informed that they had not prescribed opium because there was no pain or sleeplessness to warrant its use, never having heard that the drug was administered for any other objects than to relieve these symptoms. And not only have I found this igno-

rance of the best properties of opium, but with some medical men an actual dread of it, some ill-defined fear of its excessive harmfulness so as to make it a drug to be avoided by all possible means, and that every substitute should be thought of in its stead. Thus even in cases of pain and insomnia I constantly find numberless drugs, including chloral, sulphonal, bromidia, exalgine, cocaine, etc., given in vain, when a grain of opium has had the desired result. The attendant has afforded me no further explanation of his conduct than that "he dare not give opium." For my own part I have seen more evil results from the long continued use of chloral and bromides than from opium. In cases where the respiration is involved the fear is explicable, but then very often groundless. It is well known that opium in large doses has the effect of lowering the respiratory process and drying up secretion in the bronchial tubes; therefore judgment is required in its administration; but speaking from my own experience I have no hesitation in saying that opium has been one of my most valuable remedies in the treatment of chest disease. In pneumonia I have been in the habit of prescribing solid opium and Dover's powder three or four times a day, or laudanum or morphine in the liquid form. The late Sir W. Gull never abandoned the use of opium in pneumonia. In pleurisy it is absolutely necessary in many acute forms, and in chronic cases of empyema, where drainage has been practised, the life of the patient during a very protracted illness could never have been endured without the daily use of opiates. Then again in bronchitis the fear of opium is very widespread. When I suggest its use I am met by the remark that it will stop secretion and kill the patient and that remedies are being given to promote secretion. When I hear such a vague assertion without discussing the merits of the case, I am wont to make another general assertion of a like kind, that I want to stop secretion and not promote it, just as I should try and arrest cell growth in pneumonia and not try to promote it. So widespread is this fear of opium that I have seen it stated in a medical work as an aphorism, "Never give opium in chronic bronchitis." I call this erroneous and absurd, for no reason is given why in chronic catarrh of the bronchial tubes the object should be to promote the process rather than check it. The secretion which accompanies heart disease does, I believe, relieve the lung; but this is altogether another matter. I will only mention one example amongst many of the value of opium in bronchitis. An old gentleman, between 70 and 80 years of age, had been suffering long from bronchitis; he expectorated a large quantity of mucus, was constantly coughing, and had in consequence most restless nights. My suggestion of an opiate to the medical man was met in the usual way—the fear that it would stop secretion and be followed by a rapidly fatal result. We, however, at last agreed to give a full dose at bedtime and to meet on the following day. We found the patient delighted to see us, and he expressed his thankfulness for a good night and cessation of the cough. The expectoration had ceased and scarcely a *râle* could be heard in the chest. From that time he recovered. I am fully aware how susceptible children are to opium and with what caution it must be given. I remember two cases of so-called inflammation of the lungs in children where an overdose was given and the patients lay for hours in an insensible and most precarious condition. When they did recover, however, from the effects of the opium, their bronchitis was gone. In disease of the heart the cases are too numerous to mention in which I have seen the efficacy of opiates. For example, one is called to see a patient sitting up in his chair with dropsy, dyspnoea, and the usual symptoms. The main complaint is the awfully restless night which he looks forward to with horror. As soon as he feels sleepy and nods his head he starts up with a gasp; in these circumstances the medical man says he fears to give a sedative, for if he sent his patient to sleep his nerve centres would no longer respond to this sense of breathlessness, and he would die. Having very little knowledge of scientific therapeutics I do not discuss the question, but I recommend a night draught of a quarter of a grain of morphine. I do not remember a single case of any harm resulting and the experience of its success is overwhelming. The heart itself is often benefited, for every medical man must have seen cases where inordinate action of the heart was quieted by an opiate.