As with the ether in the C.E. or A.C.E. mixture, so in this instance the object is to produce its stimulating effect, although I think that in some cases the anaesthesia is prolonged thereby. My usual dose of ethyl chloride is $2\frac{1}{2}$ c.cm., but I now find that in certain cases in which a long anaesthesia is required I can give more than this, and I think, using this method, there need be no fear of anaesthetizing in the erect position. The advantages in dental and certain surgical work of this position are so great that it will be a pity if all ethyl chloride cases must be conducted in the recumbent position.

Method II.

When in Capetown it was reported to me by the makers of my inhaler that some practitioners complained that in using it the glass tube was occasionally blown from the tap. This has never occurred in my experience; I cannot say if it is due to faulty construction of the apparatus or to want of familiarity in its working; but I did find that in working in a temperature of say, 90° F., there was some loss by evaporation in filling the tube. It therefore occurred to me to introduce into the tube a few drops of ether, the object being to cool the tube before introducing the ethyl chloride, and also by mixture to prevent loss. This was done by way of filling a used 60 c.cm. "ethyl anaesthetic" (Duncan) bottle with ether. With the warmth of the hand and a little shaking a good flow from the bottle is readily produced. I then put in my $2\frac{1}{2}$ c.cm. as before, and the anaesthesia was the same as if no ether had been present. This led to several experiments, and eventually I found myself giving $2\frac{1}{2}$ c.cm. of ether and the same quantity of ethyl chloride.

It will be at once said that the evaporation is unequal, that is, the ethyl chloride comes off first and the ether at the end. This is only partly correct. It is surprising how quickly the ether evaporates. Let this mixture be made (the tube should of course be shaken), and let the tube be emptied into a one-gallon bag, and in a room of the temperature of, say, 65° F., it will be observed that the evaporation of both is complete in a few seconds.

But by passing the mixture through the metal tube and tap gradually, a larger percentage of chloride of ethyl will be presented to the patient on account of the metal surface it has to flow over. The inhaler used is well suited for this purpose.² It is claimed that this unequal evaporation is the condition desired, seeing that we first give a vapour largely composed of ethyl chloride, and later, when the depressing effects of ethyl chloride may show itself, the stimulating qualities of the ether will be manifest. At this later stage the ether will be more freely inhaled on account of the quicker and deeper respirations.

A breath of air may be given with advantage, and with less risk of lightening the anaesthesia.

I have hardly given a sufficient number of cases to give statistical results, but my object in writing is to direct the attention of anaesthetists to the latter method, as perhaps some might like to go into the matter with special reference to the proportion of the two drugs in order to secure the best results and their relative evaporation.

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, October 10th, 1903. ² Ibid., April 23rd, 1904.

NOTES ON A CASE OF QUININE HAEMOGLOBINURIA OR BLACKWATER FEVER.

By ARTHUR D. KETCHEN, M.B.LOND., L.R.C.P.LOND.,
HONORARY VISITING PHYSICIAN TO THE NEW SOMERSET HOSPITAL,
CAPETOWN.

S. H., aged 28, an Austrian, was admitted to New Somerset Hospital, Capetown, on April 17th, 1906. The previous history of his illness is so interestingly described in his own words that I have thought it best to include it in this report as it was written down by himself, and it is as follows:

"History of My Present Disease.

"The first attack of malaria fever occurred in March, 1903, when I was crossing the Nasai-Stepe (open flat country inhabited by a nomadic tribe of natives, the Nasai) on my way to Victoria Nyanza, German East Africa. Soon after I had sunstroke, with which I laid more or less senseless for about twenty days at a friendly native village without any attend-

ance, the result of which was that when I have been found by another European traveller, my back has been in pitiable state. This European has seen to my safe conduct to the nearest military station, where I stayed for six months before my wounds have been completely healed. In the meantime I started to rid myself of the malaria parasites by following the treatment advised by Professor Koch of Berlin (every ninth and tenth day 1 gram of quinine first thing in the morning) for two months, after which time the malaria symptoms completely disappeared.

"At the end of August, 1903, being restored to health, I left this place and travelled among the different tribes for about three months, during which time I was enjoying perfect health without taking quinine or any other medicines. In November, while travelling among the warlike tribe 'Wanyaturus,' my caravan has been attacked in a forest by about 600 natives, some carriers of mine have been killed outright and the rest run away with the exception of one boy, with whom I reached the nearest military station after travelling day and night through forest for four days, and living on wild fruit all this time. At the station I arrived in exhausted condition, and the military doctor has found me in high feverish state in which I remained for about five days.

"When my temperature has settled to normal I commenced taking quinine as above stated, until one morning, disregarding the fact that my temperature has been on the rise, I took quinine, with the result that half an hour later I passed urine of very dark colour. The doctor upon arrival advised me to drink as much of mineral water, weak tea, etc., as possible, which advice I followed, and the urine got within twenty hours completely clear. The doctor had on this occasion told me not to take any quinine if my blood is in normal state, therefore I waited until my temperature was normal for two to three days in succession and took quinine again, half an hour later I had blackwater fever again. The treatment has been similar to the one above stated.

"After this I have not taken any more quinine, although I have suffered from malaria attacks, which have been of short duration without any after-effects, very often until I had a very heavy attack of seven days' duration. I could not retain any food in my stomach; in the morning the temperature has been lower, towards evening it gradually increased, accompanied by continuous vomiting and rigorous shivers, until about 10 p.m. it has reached its highest point, never less than 41.5° C. After I've got better the doctor has advised me to try quinine again, beginning with a very small quantity, and gradually to increase the same, as that was in his opinion the only way to reduce the enlargement of the liver and spleen, and to rid me at the same time of the malaria parasites. I expressed my doubts of being able to take any quinine without getting blackwater fever, upon which the doctor pronounced his willingness to administer the quantity of quinine personally; to this I consented. He gave me about one-tenth (1-10th) of a tabloid containing 0.5 gram first thing in the morning, half an hour after I had taken it I had blackwater fever again; all this time the doctor has not moved from my bedside. On this occasion my body has taken on a yellow colour which did not happen on the previous occasion.

"After this I gave up the treatment altogether. I continued to suffer from malaria attacks, but never longer than a couple of hours' duration. On my wanderings about the country I came to a station where the doctor has been greatly surprised at my anaemic appearance, and asked me the reason. I explained to him, but he only laughed at my explanation, and said if I were to put myself under his treatment he guarantees to put me right, referring at the same time to some people who have been treated by him under similar circumstances. I have, needless to say, thankfully accepted his offer. He gave me one-fortieth part of a tabloid (0.5 gram) quinine first thing in the morning. Result: Half an hour later I had blackwater fever; treatment same as before. This attack has been followed by dysentery, from which I suffered for about five weeks, having had three relapses. Soon after I left German East Africa, and travelled extensively in North-Western Rhodesia, British Central Africa, and Portuguese territory, until at last I came back to Salisbury. Ever since the attack of dysentery I had no more fever attacks, and have enjoyed perfect health for about fourteen months. After my arrival in Salisbury I began to be troubled with after-effects of dysentery, and came in search of medical assistance to Somerset Strand, Cape Colony, at which place I consulted Dr. Waldron, who has advised me to go to New Somerset Hospital, Capetown, which advice I followed."

Condition on Admission.

The patient is a somewhat spare man, markedly anaemic, and showing signs of chronic malarial poisoning. The spleen was enlarged and tender, and extended about 4 in. below the costal margin in the nipple line. There was slight dilatation of the heart, and the first sound terminated in a soft systolic murmur, heard best at apex. There was also slight enlargement of liver. He had suffered from dysentery prior to admission, and when in hospital there was some mucus in the motions, which were three or four in number in the twenty-four hours. There was also a certain amount of tenesmus. The urine was quite clear, acid reaction, specific gravity 1024, and contained neither albumen nor blood. The temperature was normal night and morning. The patient was

treated with arsenic and iron medicinally, kept in bed, and dieted for his colitis. On April 20th a blood film showed one or two parasites of the aestivo-autumnal type. On April 23rd, at 8 a.m., he received by accident a dose of medicine which was intended for the patient in the adjoining bed; it contained 10 gr. of ferri et quin. cit. (B.P.), or, in all, $\frac{1}{2}$ gr. of quinine. He did not know that the medicine contained quinine, but on passing water at 10 a.m. he noticed that his urine was black, and immediately came to the conclusion that he had had some quinine. At 6 p.m. his temperature had risen to 102° , and this was reported to the house-physician, Dr. Pope, who, ignorant of the fact that the patient had already had a dose of quinine by mistake, ordered 10 gr. of quinine to be given. By 10 p.m. on the same day the temperature had fallen to 99.4° , and the urine was again clear. At 11 p.m. the 10 gr. dose of quinine ordered by the house-physician was administered, and at 2 a.m. on April 24th the patient's temperature had risen to 104.2° . He had had a severe rigor lasting twenty-five minutes, and he also vomited. When seen next morning the skin was of a yellow saffron and the colour of the conjunctivae was yellow. He had been sweating profusely. The urine was black, specific gravity 1022, and a large amount of albumen was present. There was a considerable deposit which contained some debris and casts. The quinine was at once stopped. The temperature rapidly fell during April 24th, and on April 25th the yellow colour had almost entirely disappeared, the temperature was normal, and the urine was quite clear but contained a faint trace of albumen. On April 26th another single dose of quinine (6 gr.) was given at 6 p.m., and at 10 p.m. the same night the temperature had risen to 102° , and he was again passing black water, the symptoms being the same as in the previous attack. The symptoms again rapidly subsided after ceasing the administration of the quinine, but there was a slight rise of temperature for one or two subsequent evenings. Again the urine rapidly assumed its normal character, being free from albumen on April 28th. The patient's condition now rapidly improved on liberal diet and on the administration of ferri ammon. cit. with liquor arsenicalis.

As some doubt had been expressed that the small dose of the quinine in the 10 gr. of ferri et quin. cit. could excite an attack, it was determined to repeat the dose of the medicine which had been given originally by mistake. On May 8th, therefore, at 8 a.m. in the morning, 10 gr. of ferri et quin. cit., containing approximately $\frac{1}{2}$ gr. of quinine, were given him. The blood on the previous day showed no parasites. At 10 a.m., two hours after taking this dose, the patient was again passing red water, and his temperature was rising; it reached 104.2° at 6 p.m. He again vomited, but on this occasion had no rigor. Films of blood taken during the paroxysm, and kindly examined by Dr. G. Robertson of the Government Health Laboratories, showed no parasites. This attack passed quickly off, and on May 14th the patient left the hospital, his general condition having considerably improved since his last attack, but the spleen showed practically no diminution in size. The systolic murmur heard over the precordial area had, however, disappeared.

The great interest of the case was the invariable sequence of an attack of blackwater fever after the administration of quinine, often in very small doses, to a patient suffering from chronic malarial poisoning, but who had been free from any attack of blackwater fever or malaria for fourteen months. The question as to whether "blackwater fever" could be induced by the administration of quinine has been for a considerable time much debated. Koch held the opinion that blackwater fever was a condition caused by quinine poisoning without malarial poisoning being a factor in the case, and Baccelli attributed malarial haemoglobinuria to the same cause in Italy.

That the administration of quinine in malarial infection has been followed by haemoglobinuric fever has been testified to by many observers. "Of 43 cases of blackwater fever which came under F. Plehn's observation in Cameroon 24 positively broke out a few hours after the administration of quinine, and of 55 cases treated by A. Plehn in the same place 48 of the attacks were directly caused by quinine. Most of the attacks set in two to four hours after the administration of quinine" (Scheube). The fact, then, seems to be undoubtedly established that administration of quinine in malarial subjects may cause haemoglobinuria. Cantlie, whilst recognizing this fact, however, states that though "the quinine in large doses seems to cause a recurrence of haemoglobinuria in those who have become the subject of the disease, this may be a clinical phenomenon, but it is hardly worthy of being accepted as a pathological axiom." Against this theory of the causation of the disease he adduces the fact that though malaria is prevalent in so many countries and quinine the universal remedy for the disease, yet blackwater fever is confined to a few restricted geographical areas. "That quinine may do harm during a paroxysm or may induce

a relapse is beside the question of the 'etiology' of the disease" (Cantlie in Allchin's *System of Medicine*).

Another theory accounting for the disease is that it is caused by a parasite analogous to that causing haemoglobinuric fever in cattle. This opinion is held by Dr. Sambon.

Another question of interest is, Can the malarial parasite alone or quinine in a non-malarial subject cause haemoglobinuria? As regards the first question opinions are still divided. Scheube says, "It (blackwater fever) is occasionally observed in patients who have not taken quinine immediately or for some time previously." As regards the second question, only three cases have been known to Scheube where the administration of quinine was followed by haemoglobinuria in a non-malarial patient, these cases being two of typhoid fever and one a leukaemic patient.

Another point of interest is the dose of quinine which is necessary to provoke an attack. In the case here reported $\frac{1}{2}$ grains caused symptoms of haemoglobinuria to appear within two hours. The idea that the dose of quinine must necessarily be large is therefore quite erroneous. The most modern views of this interesting condition are ably summed up by J. W. W. Stephens and Christophers in their book on the study of practical malaria, and are as follows:

Between this phenomenon (quinine haemoglobinuria) and blackwater fever there is, in our opinion, practically no difference. It (blackwater fever) occurs only in those who have previously suffered from malaria, and, in fact, there is considerable evidence to show that it occurs frequently in direct association with a malarial infection. The haemoglobinuria follows the administration of quinine after a certain variable interval, two to three, frequently five to six, or possibly twenty-four hours. The amount of quinine does not determine whether the haemoglobinuria is slight or severe. After haemoglobinuria has been produced by quinine a second administration does not necessarily produce a second attack.

The indications for treatment of the case reported in this note were perfectly clear, and simply consisted in stopping the administration of the quinine, which was so evidently the exciting cause of each attack, and if, as the evidence of such authorities as Stephens goes to show, the quinine is the exciting cause in all cases, the continued administration of this drug seems quite irrational and productive of nothing but harm. In this case, within twenty-four hours of the commencement of the attack, the urine had again become its natural colour, the jaundice had almost disappeared, and the temperature was only slightly above normal. If repeated doses of quinine had been given the patient's symptoms would have been intensified instead of disappearing, and from the gravity of the condition after single doses it would have been easy to foresee a fatal termination had the original cause of the attack been frequently repeated over a short period of time. Manson and others, among whom is Hare, advocate that if parasites are found in the blood during an attack of blackwater fever the quinine should be still given; but this seems to me to be wrong, inasmuch as the consequent enormous destruction of red blood corpuscles is probably much more detrimental to the patient's condition and chance of recovery than the presence of the malarial parasite, for the destruction of which the quinine is originally given.

It is interesting to note that the patient states that his earlier attacks of malaria were treated successfully with quinine. The view, therefore, that he showed a special idiosyncrasy to the drug, and that to him even in small doses it acted as a powerful poison, may be dismissed. It was only after he became the subject of chronic malarial poisoning that the taking of the drug was followed by such serious symptoms of blackwater fever.

A UNIFORM CATHETER SCALE.—The American Surgical Trade Association has (we learn from the *Medical Record*) announced that at a meeting held in Philadelphia in June it was resolved that in order to secure uniformity the trade should, after January 1st, 1907, adopt the French scale for all catheters, bougies, and sounds.

THE late Colonel Arthur Drummond Currie of Martley, Worcestershire, bequeathed sums of £200 each to the London Hospital; the Middlesex Hospital; the Midland Hospital for Incurables, Leamington; the Worcester General Infirmary; and the Asylum for Idiots at Knowle.