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EXPERIMENTS
WITH
CHLOROFORM AND ETHER,

CONDUCTED AT HYDERABAD (DECCAN),

By

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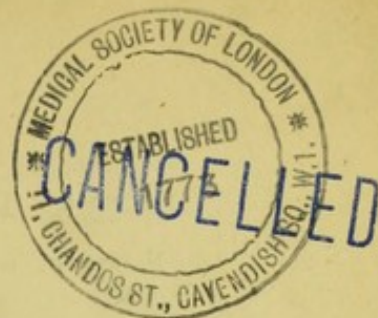


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EXPERIMENTS WITH CHLOROFORM AND ETHER.

1. The following experiments were performed in the Laboratory of the Hyderabad Medical School with the permission of Surgeon Lieut.-Colonel E. Lawrie, by Messrs. Leaf, Kelly and Chamarette, with the help of students Mahomed Abdul Gani, Ismael Khan and Abdul Hafiz. They were conducted with the view of watching the effects of chloroform on the respiration and circulation, and were for the most part extremely simple. The method employed consisted in first placing pariah dogs into a wooden box 3 ft. 10 in. long by 1 ft. 5 in. broad and 1 ft. 7 in. deep. The lid had an opening through which pieces of blotting paper saturated with chloroform were passed. The movements of the animal were watched through glass placed over the opening. As soon as insensibility was produced and the dog had fallen down it was removed on to a table. Chloroform was then administered to it on a cloth cap at the top of which a little cotton wool was stitched. The respiratory movements were carefully watched and the action of the heart (except in a few cases where a portion of the thoracic wall was removed) was observed by the vibrations of a needle thrust into the organ through the chest wall.

2. One hundred and sixty-four experiments were performed—one hundred and thirty on dogs and thirty-four on frogs. Before describing the experiments, we may mention that in no instance, excepting one, *viz.*, Experiment X, was a dog unintentionally killed by an overdose. In this case, as the animal was very savage and as it was removed from the box too soon, chloroform had to be vigorously pushed during the struggling stage.

3. The experiments were conducted with the following objects :

Object of experiments. I. To observe the effects on the respiration and circulation of chloroform administered in different ways.

II. To test the value of the different means of restoring animals after the respiration had stopped.

III. To observe the effects of temporary stoppage of the heart, whether naturally or artificially produced.

4. The following experiments were therefore made:—(1) Stimulation of the vagus under chloroform, (2) administration of enormous doses of chloroform, (3) ^{before & after section of vagi} administration of chloroform while the breathing was irregular and the animal struggling, (4) artificial respiration with and without bellows, (5) inflation of the lungs with oxygen, and (6) injections of ether and strychnine.

5. * Stimulation of the vagus, after the respiration ceased, which was tried in numerous cases, showed that the effects produced on the heart were not uniform. (By “respiration ceased” is meant not merely the non-entrance of air into the chest, but the entire absence of all abdominal and thoracic movements.) In some cases no apparent effect was produced on the needle-movements; in others, the movements were much quickened, but in the majority of cases they were markedly slowed or completely stopped for a longer or shorter period. Of the twenty-five dogs in which stimulation of the vagus was performed on the first occasion the respiration stopped, eleven recovered and fourteen died. Of the latter there were seven cases in which no slowing effect was produced on the heart, and there were only three cases in which stimulation was commenced immediately the respiration ceased. In the eleven that recovered, there were two cases in which it was doubtful whether any effect was produced, and two cases only in which stimulation was commenced immediately the respiration ceased. Experiments VIII, IX, XII A, XIII, XVI A B C and D, XVIII B and C, XXIV, XXVI, XXVIII, LIX, LXXII, CVII and CXX, show that the stoppage or slowing of the heart which was artificially produced after the cessation of respiration (and which occurred in all but two cases) in no way interfered with, if it did not actually aid in the animal’s recovery. It should also be noted that the stimulation of the vagus was not commenced in every case immediately, but was delayed on an average twenty or thirty seconds after the respiration had ceased. We found that stimulation during normal anaesthesia did not interfere with the dog’s subsequent recovery. These facts show that the temporary stoppage or slowing of the heart, which was almost invariably produced by the stimulation of the vagus whether occurring before or after the cessation of respiration, is *per se* harmless. In support of this truth, which was discovered by the Hyderabad Chloroform Commission, we may adduce Experiment L. In this experiment the heart stopped beating for fifty seconds between the cessation of breathing and the commencement of artificial

Nature of experiments. Artificial stimulation of vagus causing harmless inhibition. Natural inhibition harmless also.

* The current from an ordinary induction coil was always employed in these experiments and tested before being used, but it was frequently out of order and always uncertain.

respiration and the dog recovered ~~spontaneously~~. When more chloroform was subsequently given till the respiration ceased he again recovered ~~spontaneously~~. This shows conclusively that the fact of the heart having stopped is no proof of its weakness, and as we have never found the heart stop even temporarily during anaesthesia, or ~~after~~ ^{before} cessation of the respiration, in those cases in which both vagi have been divided, whereas it is common in dogs whose vagi are intact, we are led to believe that the stoppage which occurred in this case was purely reflex in origin. With the view of observing whether the heart's

Temporary arrest of heart impossible after section of both vagi.

action could, apart from reflex stoppage, be arrested temporarily or be affected in any way, prior to respiratory failure

we performed several experiments, in which both vagi were divided, and

Administration of large doses of chloroform.

the effects of administering enormous doses of chloroform noted. Experiments LXXI and CXVI are good examples. In

Also CXIX & CVI

these cases enormous doses of chloroform were given but at no

time prior to respiratory embarrassment was any feebleness of the needle-movements observed. The administration of the largest possible doses of chloroform

produced no prejudicial effect on the heart, and it is certain that no amount of chloroform given by inhalation can produce cardiac syncope or any direct effect

on the heart ~~up to the time~~ ^{until} the respiration ~~ceases~~ ^{fails}. The following facts prove

this: (i) the heart needle continued beating vigorously for a considerable time after the respiration had ceased, (ii) both animals twice recovered ~~spontaneously~~

after the cessation of respiration. Moreover, when the respiration finally stopped for a fourth time in Experiment CXVI, the needle was still beating

vigorously. In dogs therefore it is abundantly evident that the heart beats effectively after stoppage of the respiration by an overdose of chloroform;

and that temporary stoppage of the heart, whether produced spontaneously or artificially, is not a danger but a safeguard. This fact was originally

discovered by Dr. Bomford, and is strongly insisted upon by the Hyderabad Commission.

6. We found that when chloroform was given to an animal while he

Administration of chloroform while the breathing is irregular causes natural inhibition.

was struggling violently and holding his breath the needle ^{would}

frequently stoppe~~d~~ for some seconds, either during this period or very shortly afterwards. This was of such fre-

quent occurrence that at first it seemed as though the

needle, owing to the violent struggles, had been displaced. But that

this was not so, is proved by the fact that the needle in the majority of

cases, without being removed and re-inserted, continued beating regularly

later on.

In experiment XXXII the needle stopped for 2 min 10 seconds

7. In Experiment CXVI chloroform was given while the animal struggled violently. The effect of this on the needle beats was to make them extremely intermittent and irregular, not only during the struggling period but more or less throughout the whole Observation A. When, subsequently both vagi were divided, the needle beats at once became regular, showing that the intermittency and irregularity which were noticed in the first Observation A could not have been produced by the direct action of chloroform on the heart, but were entirely reflex in origin.

Pushing of chloroform during struggling stage is particularly dangerous.

8. In Experiment CXVI it will also be seen that the needle beats were more vigorous in Observation D after the section of the vagi than they were in Observation A when the vagi were intact, the respiration having stopped in both cases. The irregularity and intermittency of the needle which was noticed in Observation A were undoubtedly due to the fact that chloroform was given continuously while the animal struggled violently and the respiration was irregular. One effect ~~therefore~~ of giving chloroform during the struggling stage, or when the breathing is irregular, is to cause inhibition or extreme intermittency of the heart which may last throughout the whole administration, although the breathing may subsequently become regular. We found that after administering chloroform in this way the respiration would stop very suddenly and unexpectedly. Especially was this the case in large, strong healthy pariahs. ^x In all those ~~cases of~~ dogs that we failed to revive by pumping in air with bellows one minute after the respiration ceased, chloroform was thus administered with the cap tightly jammed over the face. Our experiments show that if chloroform be given to excess when the breathing is irregular the chances of recovery become very remote. *In the only accidental death we had chloroform was pushed during the struggling stage*

9. There was also another period during which the heart needle would stop temporarily: and this was either a few seconds before, simultaneously with, or after the stoppage of the respiration. These temporary stoppages, which were fairly common as already mentioned, were undoubtedly due to inhibition of the heart through the vagi, for when these nerves were cut they never occurred.

Natural inhibition is common at or about the time of cessation of respiration.

10. After the temporary stoppages we found the needle would always go on beating for some time, generally some minutes after the respiration had ceased. In no single case did the needle ever stop permanently at the same time as the respiration. It was a common occurrence to find the needle beating fairly vigorously, though no pulse could be felt.

Cardio-inhibitory centre.

~~The absence of the pulse and~~ The stoppage of the heart needle movements therefore ^{is} ~~are~~ not necessarily indications that the

^x *and we were far less successful in restoring these dogs by artificial respiration, than judging from their size and strength we should have expected to have been.*

heart has failed or is weakened : ^{it} ~~they~~ may be and frequently ^{is a} ~~are~~ signs of activity of the cardio-inhibitory centre. We frequently found when chloroform was pushed on two or more occasions until the respiration ceased, that the heart was much more likely to be inhibited on the first than on the last occasion, and so far from the needle beats becoming less vigorous after increasing doses of chloroform, the exact contrary was observed, showing that the temporary stoppage and *apparent* weakness of the heart's action was brought about by the activity of the cardio-inhibitory centre, which on the later occasions became paralysed, the result being that the beats of the heart became rapid ^{& vigorous} and the effect produced was exactly the same as though both vagi had been cut.

11. In the experiments with artificial respiration dogs were poisoned as before until the respiration ceased, and then after varying intervals of time an attempt was made to revive them by pumping in air by means of an ordinary pair of bellows, the nozzle of which passed into an opening made in the trachea. After each inflation pressure was made on the thorax so as to imitate as far as possible natural respiration. Of fourteen dogs that we experimented on in this way, commencing artificial respiration one minute after all movements of the chest and abdomen ceased, ten recovered and four did not. In all the cases chloroform was vigorously pushed with the cap tightly jammed over the face in the struggling stage. We found that artificial respiration with bellows was sometimes successful in restoring an animal some considerable time after the respiration had ceased. In Experiment XLI the animal was twice restored, the first time 3m. 20s. and the second time 6m. 25s. after the respiration had ceased, notwithstanding the fact that in the latter case a large dose of chloroform had been given when the dog was struggling violently. Again, in Experiment XL, a very weak dog was three times resuscitated by artificial respiration, on the last occasion 5m. 10s. after the respiration had ceased. These experiments show that dogs ^{could} ~~can~~ often be restored some considerable time after the respiration has ceased, and ~~we found that~~ by performing artificial respiration with bellows we were able to revive ^{them} ~~dogs~~ after a longer interval ^{would have been the case} than by the ordinary manual method, where the longest interval which elapsed was 4m. 40s. ^{after which recovery took place}

12. Acting on the suggestion of Mr. Foy, experiments were made with a view to testing the value of oxygen gas in cases of chloroform poisoning. The gas was made by mixing dioxide of manganese and chlorate of potassium in a glass retort which was

Artificial respiration
with oxygen.

heated by a spirit lamp. As the gas was generated ^{was purified by} it bubbled through water contained in a gas-holder capable of holding 1,500 cubic inches. When the receiver was full it was connected by a tube to a pair of bellows, the nozzle of which fitted into an opening made in the trachea. The gas was forced out by pressure of water from above. In this way the oxygen contained in the receiver could be pumped directly into the lungs. After each inflation with the gas pressure was made on the thorax so as to imitate, as far as possible, natural respiration. The amount of gas used on each occasion varied from 100 to 500 cubic inches. Nine experiments were performed in this manner, and we found that we could only revive three of the nine dogs, by artificial respiration with oxygen one minute after the respiration had ceased. Except in Experiment C, in which a small puppy was twice revived one minute after the respiration had ceased, there was nothing to show that oxygen gas, apart from the expansion of the lungs which was necessarily produced at the same time, had any intrinsic effect in restoring the animal to life. We were never able, in these experiments, to restore a dog after a longer interval than one minute. Oxygen is therefore clearly not an antidote in chloroform poisoning.

13. Two experiments were made with injections of strychnine. In the first
 Injections of strychnine. $\frac{1}{25}$ of a grain was injected 40 seconds after, and in the second $\frac{1}{50}$ of a grain 30 seconds after the respiration had ceased, but no recovery followed in either case.

14. Twelve experiments were made with a view of watching the effects
 Injections of ether. of subcutaneous injections of 30 minims of ether after the respiration had ceased. We found that of twelve dogs only four recovered, and of these four, artificial respiration was practised in three. In other words only one dog recovered after the injection of ether alone. We frequently noticed that after the injections the needle movements were temporarily quickened but subsequently stopped abruptly. In some cases injections of ether produced no obvious alteration in the needle beats. There was nothing to show that injections of ether produced the slightest effect in restoring the animal. On the other hand, the fact of there being only one recovery, and of the needle stopping abruptly, undoubtedly pointed to an injurious effect. It is obvious that injections of ether are useless if not positively harmful in overdosing with chloroform.

15. Experiments CXXI to CXXIV show ^{the} ~~that~~ injections of chloroform into the cavities of the ventricles ~~did not produce sudden stoppage of the heart.~~
 Injections of chloroform and ether into the heart after removal of a portion of the wall of the thorax, Experiments CXXV and CXXVI show the effect of these injections into the ventricular substance. In

both series weakness and intermittency of the heart's action was produced but not sudden stoppage. Experiment CXXXIV shows that the final effect of injecting ether into the substance of the heart is exactly the same as that of chloroform. Experiments CXXXI and CXXXIII show the effects of filling the pericardium with chloroform and ether respectively: no visible prejudicial effect on the movements of the heart was observed in CXXXI until artificial respiration was stopped, and though the pericardium was filled with chloroform, it continued to beat vigorously for 21 minutes. Experiment CXXXV shows the effect on the heart of blowing in concentrated chloroform. *

16. The experiments on frogs' hearts show that both auricles and ventricle will go on beating for a considerable time whether the heart is soaked in liquid chloroform or exposed to its vapour. The only occasions on which the hearts were found to be quite motionless on opening the thorax were in Experiments CLVI and CLXII. Here the breathing had been interfered with and the hearts were found to be enormously distended, showing that they had failed through the respiration.

GENERAL CONCLUSIONS.

17. Our experiments prove what ^{Bernard has shown & what} Lauder Brunton and others have long insisted upon, viz.:—that chloroform is an irritant and kills protoplasm. Frogs' hearts hung up in the vapour of chloroform or immersed in the liquid ceased to beat, and the cessation then took place more rapidly than when they were suspended in air or immersed in water. When chloroform was injected into the heart substance of dogs it irritated and probably coagulated the protoplasm, and the organ was rapidly brought to a standstill. Precisely the same effects, only less intense, were produced with ether; and similar effects, only much more intense, were produced with dilute hydrochloric acid. Many irritants act like chloroform. The peculiarity of chloroform is that its undiluted vapour seems to be irritating in much the same way as the fluid: which is not the case with other irritating substances such as alcohol or dilute hydrochloric acid. The irritating and coagulating action cannot occur in the ordinary use of chloroform, and there is no more fear of coagulation of the heart than there is of coagulation of the general muscles; or of sloughing of the toes or stomach; or of necrosis of the tissues generally:—all of which may be produced by chloroform locally applied.

tend to show

18. The entire series of experiments ~~demonstrates incontestably~~ that

* although hearts placed in abnormal conditions may be weakened and stopped by

In this experiment when chloroform was blown in, the muscle became relaxed & the heart beats feeble, & had more resemblance to a flap than a true contraction. The right side was not distended. Two experiments were subsequently made in which chlorine was substituted for chloroform. Immediately or very shortly after the chlorine was blown in, the beats rapidly became quick & feeble & ineffective: when chlorine was discontinued, they became vigorous & vice versa. The right side of the heart in both these experiments remained full though not distended. In all these experiments it would seem as though the results were brought about through interference with the respiratory function.

overdoses of chloroform, under no circumstances can sudden cardiac failure and death from reflex stoppage or syncope take place ; nor, up to the cessation of respiration, can any direct effect be produced upon the heart by chloroform unless it be injected into its substance ^{or into its cavities}. In those experiments where both vagi had been divided no obvious effect could be produced on the heart beats by chloroform, administered in the largest possible doses by inhalation, before failure of the respiration ; and finally, in the experiments in which the thorax was opened ^{if} and artificial respiration was compulsory throughout, ~~nothing was so effectual in quickly arresting the action of the heart, as discontinuance~~ ^{discontinued}, even for a brief period ^{the heart's action was quickly arrested} of the artificial respiration. It is therefore clear that no amount of chloroform can act prejudicially on the heart ^{muscle} before interfering with the breathing, and in practice the remote possibility of danger arising ~~from the~~ direct action of chloroform on the heart is so infinitesimal that it may be entirely disregarded.

Our experiments lay no claim to originality, but as far as they go they altogether confirm and to a certain extent amplify the results arrived at by the HYDERABAD CHLOROFORM COMMISSIONS.

EXPERIMENT I.

28TH MARCH 1892.—Full-grown pariah dog.

Under chloroform ; breathing easily ; cornea insensitive ; pulse and needle in heart beating vigorously.

H. M. S.

- 2 6 30—Chloroform pushed ; cap jammed over face.
- 2 8 15—More chloroform ; cap still jammed over face.
- 2 10 35—Respiration stopped.
- 2 11 38—Gasping ; cap removed ; pulse much slower and irregular—about 40 per minute.
- 2 13 0—Gasping ; pulse still beating and also the needle.
- 2 14 0—Pulse quicker.
- 2 14 30—Respirations 30 per minute ; pulse 104.
- 2 15 20—Cornea sensitive.
- 2 15 45—More chloroform ; cap close on face.
- 2 16 24—Slight stertor.
- 2 16 28—Breathing stopped.
- 2 16 48—Cap removed ; needle beating ; pulse beating 112 per minute.
- 2 17 48—Breathing recommenced.
- 2 18 5—More chloroform ; cap close on face.
- 2 19 15—Respirations 15 per minute.
- 2 20 0—Pulse 120.
- 2 20 30—More chloroform.
- 2 21 8—Slight stertor.
- 2 21 20—Respirations slow and short ; convulsive movements of the left lower limb.
- 2 22 12—Respiration stopped ; pulse continuing.
- 2 22 42—Two short respirations.
- 2 23 4—Gasping.
- 2 23 21—More chloroform ; gasping.
- 2 24 0—Pulse 32 ; respirations 28 ; cap jammed over face.
- 2 25 0—Quick gasping.
- 2 25 30—*Respiration stopped* ; needle in heart beating ; pulse continuing.

H. M. S.

2 26 35—Pulse stopped ; needle in heart still beating ; cap removed.

2 29 0—Needle stopped. Artificial respiration tried a few minutes afterwards, but unsuccessfully.

Remarks.—Pulse continued for some considerable time after the respiration had stopped, *viz.*, from 2h. 25m. 30s. until 2h. 26m. 35s., and the needle did not stop vibrating until 2h. 29m. 0s.

EXPERIMENT II.

28TH MARCH 1892.—Full-grown pariah dog.

H. M. S.

2 49 10—Chloroform commenced with dog on table.

2 49 18—Struggling violently and whining.

2 51 10—Holding breath and struggling.

2 51 12—Cornea insensitive ; cap removed.

2 52 0—Came out of chloroform ; cap kept close on face.

2 52 15—Struggling again.

2 52 18—Cornea insensitive ; cap removed.

2 53 45—More chloroform.

2 54 0—Cap removed ; breathing regular ; pulse 140 ; respirations 48.

2 55 0—Cap close.

2 56 0—Respirations 90 ; pulse small and fast.

2 57 0—Struggling ; pulse 120.

2 57 30—Respirations regular, 48 per minute.

2 58 0—Pulse 120, strong and full.

2 59 30—Respirations 80.

3 1 0—Pulse 100, not quite so full.

3 1 30—Cap removed for more chloroform and re-applied.

3 2 0—Pulse 109, smaller ; respirations quick, but not deep—80.

3 4 45—Cap removed for more chloroform and re-applied.

3 5 0—Respirations 76 ; pulse 102 and regular ; cap removed ; twitching of right limb.

3 7 5—Twitching of all limbs ; more chloroform.

3 8 12—Cap removed.

3 8 45—More chloroform ; pulse 112 ; respirations quick and shallow.

3 9 30—Pulse 120 ; respirations quick and shallow ; cap removed.

H. M. S.

- 3 11 15—Respirations 80.
- 3 12 30—Pulse 88, strong and full.
- 3 13 0—Cap close.
- 3 13 5—Cap removed.
- 3 14 0—Pulse 80.
- 3 16 0—Vomited ; chloroform again.
- 3 17 0—More chloroform ; pulse 100.
- 3 18 10—Cap removed.
- 3 19 25—Pulse 100, strong.
- 3 21 0—Pulse 88 ; respirations 80.
- 3 23 0—Pulse 80.
- 3 23 30—More chloroform ; dog retching ; cornea sensitive.
- 3 25 40—Cornea insensitive ; cap removed.
- 3 26 30—Respirations 80.
- 3 27 0—More chloroform.
- 3 27 30—Respirations 88 ; cap removed.
- 3 28 30—Respirations 96.
- 3 29 30—More chloroform.
- 3 30 0—Respirations 100.
- 3 30 24—Cap removed.
- 3 31 20—Pulse 80, strong and regular.
- 3 32 30—Respirations 120.
- 3 33 20—More chloroform.
- 3 35 0—Slight struggling.
- 3 35 30—More chloroform ; respirations 130 ; pulse 82 ; cap removed.
- 3 36 38—Pulse 80.
- 3 37 0—More chloroform ; cap jammed over face ; struggling.
- 3 38 0—Pulse 100 ; respirations 48 ; pulse very much smaller ; respirations very slow.
- 3 40 0—Twitching of hind legs.
- 3 40 12—*Breathing stopped* ; pulse still continues.
- 3 40 18—*Artificial respiration commenced.*
- 3 41 28—Moaning ; pulse stronger.
- 3 42 0—Natural respirations commenced. Artificial respiration stopped.
- 3 44 0—Respirations 64 ; pulse 138 ; feeble, hardly to be counted.
- 3 45 0—Respirations stronger ; pulse 118.
- 3 46 0—Pulse 90 ; respirations 100.

H. M. S.

- 3 47 0—Pulse 88; cornea sensitive; dog recovered.
 3 49 0—Pulse 100; respirations 120.
 3 50 0—Respirations 160.
 3 51 0—Pulse 108 and strong.
 3 53 0—Pulse 108; respirations 160.
 3 55 0—Pulse 96; respirations 120.

Remarks.—Subsequent notes were not entered as the dog was allowed to recover.

EXPERIMENT III.

29TH MARCH 1892.—Full-grown pariah dog.

H. M. S.

- 12 3 0—Chloroform commenced; cap close to face.
 12 3 10—Holding breath and struggling.
 12 4 0—Crying.
 12 4 10—Struggling violently.
 12 4 20—Struggling still.
 12 5 18—Cornea insensitive.
 12 7 20—Pulse 98, full and regular.
 12 8 36—Cap removed.
 12 9 40—Cap re-applied.
 12 10 0—Respirations 40.
 12 11 5—Pulse 112; respirations 42.
 12 12 0—Respirations 48.
 12 12 30—Pulse 112 and full; more chloroform.
 12 13 10—Respirations 48.
 12 14 6—Pulse 120.
 12 15 0—Respirations 48.
 12 15 20—Pulse 120.
 12 16 0—Respirations 42.
 12 16 20—Pulse 118.
 12 18 48—More chloroform.
 12 19 12—Pulse 120.
 12 20 0—Respirations 44.
 12 20 5—Respirations irregular and 38.
 12 20 50—Pulse 136.
 12 21 0—Cap removed.

H. M. S.

12 22 0—More chloroform; respirations 56.

12 22 45—Pulse 110.

12 23 50—Respirations 52.

12 24 48—Chloroform pushed.

12 25 30—Respirations 28.

12 26 20—*Respiration stopped.*

12 28 0—Pulse still felt to be beating feebly.

12 29 14—Dog began to breathe gently again, and the pulse became stronger.

A. 12 30 0—*Breathing stopped again.* Artificial respiration commenced.

12 31 45—Artificial respiration stopped. Quivering of the tongue.

12 32 0—*Artificial respiration recommenced.*

12 34 50—Artificial respiration stopped. Natural respirations commenced.

Pulse very good.

12 35 25—Respirations 64; cornea sensitive.

12 35 30—Chloroform pushed.

12 36 0—Cornea insensitive.

12 37 0—Respirations 64.

12 38 0—Respirations shallow.

B. 12 39 10—*Respiration stopped.*

12 39 14—Cap removed.

12 40 30—Gasping.

12 41 30—Breathing recommenced. Respiration 64.

12 42 0—More chloroform; cap jammed over face.

C. 12 43 0—*Respiration stopped*; cap removed.

12 43 30—Pulse stopped.

12 44 0—Gasping. Pulse to be felt.

12 44 30—Gasping ceased.

12 45 30—Needle inserted and found to be vibrating. No pulse.

12 47 0—Needle ceased vibrating. Artificial respiration commenced.

Remarks.—In A artificial respiration, commenced immediately after the respiration had stopped, was successful. In B there was natural recovery. In C the pulse stopped 30 seconds after the respiration, and the needle vibrated for 2m. 30s. after the gasping had ceased, while artificial respiration was tried after the needle had ceased vibrating.

Post-mortem.—Right auricle and ventricle contained blood, and were somewhat flabby. The left ventricle, firmly contracted, also contained blood. Lungs and heart removed separately.

EXPERIMENT IV.

1ST APRIL 1892.—Sickly pariah dog of small size.

H. M. S.

- 11 5 0—Chloroform commenced ; cap jammed over face.
- 11 5 45—Moaning.
- 11 6 15—Cornea insensitive.
- 11 7 0—Respirations full—64 ; pulse 120.
- 11 7 38—More chloroform.
- 11 8 6—Respirations 32 ; pulse 148.
- 11 8 35—Respirations 48 and shallow.
- 11 11 15—Pulse 148, not quite so full.
- 11 12 45—Respirations 44 ; pulse 160 and good.
- 11 14 10—Pulse 140, good ; respirations 40 and regular.
- 11 15 0—Chloroform pushed.
- 11 15 35—Respirations 36, shallow and irregular ; pulse 72, irregular.
- 11 16 0—Respirations extremely shallow, very little air entering chest ;
pulse 72.
- 11 18 20—Respirations 132.
- 11 19 30—Respirations 88 ; pulse 88.
- 11 20 0—Respirations 72, still very shallow ; pulse 88 ; dog allowed to
recover ; cap removed.
- 11 20 30—Respirations 36, deep and regular ; pulse 80 and fuller.
- 11 21 0—Respirations 44, deep ; pulse 80.
- 11 21 55—Cornea became sensitive.
- 11 22 30—Respirations 32, deep and regular ; pulse 104, intermitting
every sixth beat.
- 11 23 30—Chloroform added and cap jammed over face.
- 11 23 55—Cornea insensitive.
- 11 24 0—Cap removed.
- 11 24 55—Respirations 60, deep ; pulse 100, full.
- 11 24 58—More chloroform.
- 11 25 30—Cap jammed over face ; slight stertor.
- 11 26 8—Cap removed.
- 11 26 30—Respirations 76, shallow ; pulse 80, full and strong.
- 11 27 30—Respirations 64, deep and regular ; pulse 104, full, though not
so strong.
- 11 28 45—Chloroform pushed ; cap jammed over face.

H. M. S.

- 11 29 30—Respirations 32, deep and somewhat irregular ; pulse 132, good.
 11 29 45—Cap removed.
 11 30 10—Chloroform pushed again.
 11 30 30—Respirations 44, very shallow and irregular ; pulse 72, irregular.
 11 31 0—More chloroform ; cap close.
 11 31 45—Respirations 156 ; no air felt to be entering chest ; pulse 120, small.
 11 32 0—*Respiration stopped.*
 11 33 30—No pulse to be felt. *Artificial respiration commenced.*
 11 36 0—Needle inserted into heart found to be vibrating.
 11 37 8—Needle withdrawn and artificial respiration continued.

Remarks.—No recovery after artificial respiration.

Post-mortem.—Right ventricle flabby, contains a small quantity of coagulated blood. The left ventricle contains the same quantity of blood. Both auricles contain blood. Lower lobes of both lungs float in water, but contain less air than the upper.

EXPERIMENT V.

2ND APRIL 1892.—Sickly pariah dog.

H. M. S.

- 11 4 30—Chloroform on cap ; dog struggling and holding breath.
 11 5 25—Yelping.
 11 5 35—Cap removed for five seconds.
 11 6 0—Cornea insensitive, dog moaning.
 11 6 55—Pulse quick, 128 per minute.
 11 7 45—Pulse 160 ; respirations 20, regular, deep and moaning expiration.
 11 9 55—Respirations 12 ; pulse 184, weak ; cap removed.
 11 11 0—Respirations 14, regular ; pulse 176, weak.
 11 12 15—Spasmodic jerking motions.
 11 13 30—Respirations 20, regular, deep ; pulse 142, full.
 11 15 0—Respirations 48, regular ; pulse 100.
 11 16 30—Cornea sensitive ; more chloroform ; cap jammed over face ; dog struggling.
 11 44 45—More chloroform.

H. M. S.

- 11 45 0—Cap removed; pulse 120, good; respirations deep and regular.
 11 47 0—More chloroform.
 11 48 12—Respirations 16, irregular; pulse 136, irregular; dog struggling.
 11 49 5—Respirations 20, regular; pulse 158, still irregular.
 11 50 0—Respirations 20, regular. Pulse 168, small and weak.
 11 51 45—Cap removed.
 11 52 0—Respirations 24, deep and regular; pulse 170.
 11 53 45—Dog struggling and winking.
 11 55 30—More chloroform; cap close to face; respirations 20; pulse very rapid, hardly to be counted; animal struggling; cap removed.
 11 57 10—Pulse 132, very rapid and weak; dog allowed to come out and recover.
 1 40 15—Same dog chloroformed again.
 1 41 10—More chloroform.
 1 42 45—Cornea insensitive.
 1 43 15—*Respiration stopped.*
 1 43 40—Artificial respiration commenced.
 1 49 15—Artificial respiration stopped.

Remarks.—No recovery after artificial respiration.

EXPERIMENT VI.

4TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 1 35 10—Dog in box with chloroform.
 1 38 45—Struggling.
 1 40 15—Fallen down.
 1 41 12—Barking.
 1 42 35—More chloroform.
 1 44 25—Stopped barking.
 1 44 50—Removed from box and put on table.
 1 45 10—Cornea insensitive; chloroform stopped.
 1 46 50—Chloroform recommenced.
 1 48 35—Respirations 40 and natural.
 1 49 30—Respirations 44.

H. M. S.

- 1 49 45—*Breathing stopped*; cap removed.
- 1 49 50—Pulse continues.
- 1 51 15—Breathing recommenced; respirations 40, very shallow.
- 1 52 35—*Breathing stopped*.
- 1 53 10—Pulse stopped (?)
- 1 53 30—Breathing recommenced; chest movements very shallow.
- 1 53 50—*Breathing stopped*; pulse continues.
- 1 56 55—Pulse still continues.
- 1 57 35—*Artificial respiration commenced*.
- 2 1 45—Artificial respiration stopped.
- 2 2 25—Artificial respiration recommenced.
- 2 4 12—Artificial respiration stopped.
- 2 4 45—Pulse stopped.

Remarks.—It was thought that breathing had stopped at 1h. 49m. 45s., but shallow respirations commenced at 1h. 51m. 15s. and ceased again at 1h. 52m. 35s. At 1h. 53m. 30s. they began again and stopped at 1h. 53m. 50s. Artificial respiration commenced 3m. 45s. after the last respiratory movement proved unsuccessful.

EXPERIMENT VII.

4TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 2 25 0—Chloroform given on cap; dog struggling and holding breath.
- 2 26 32—Cornea insensitive. Cap removed.
- 2 28 0—More chloroform.
- 2 33 0—Left vagus exposed.
- 2 35 5—Respirations 56, regular.
- 2 36 5—*Uncut vagus stimulated for one minute*.
- 2 37 5—*Stimulation stopped*.
- 2 38 45—Respirations 44, regular.
- 2 39 15—Irritation of vagus.
- 2 39 30—Irritation stopped.
- 2 40 0—Respirations 36; pulse 128, good.
- 2 40 40—More chloroform.
- 2 41 10—Cap removed
- 2 42 0—More chloroform.

H. M. S.

2 42 15—Cap removed.

2 43 15—*Vagus irritated*.

2 44 0—*Irritation stopped*.

2 44 15—More chloroform.

2 45 0—Respirations 52 ; pulse 112.

2 46 45—*Vagus irritated* ; respirations 40 ; very shallow ; pulse stopped for some time.

2 47 45—*Vagus irritation stopped*. Respirations 36 ; pulse 100.

2 48 0 } More chloroform. *Vagus irritated*. *Vagus irritation stopped*.

2 48 15 } During this time there was one beat of the pulse, while the respirations were very shallow.

2 50 0—More chloroform ; cap jammed over face.

2 51 55—Respirations 80 ; very shallow.

2 53 15—Respirations almost stopped, 28 ; very shallow.

A 2 55 0—*Respiration stopped*.

2 55 15—*Vagus irritated*.

2 55 45—*Vagus irritation stopped*.

2 56 15—*Vagus irritation commenced*.

2 56 45—*Vagus irritation stopped*.

B 2 57 15—*Artificial respiration commenced*.

3 3 0—Needle inserted and found not to vibrate. *Artificial respiration stopped*.

Remarks.—In this experiment artificial respiration was commenced 2m. 15s. after the respiration had stopped and was unsuccessful. Irritation of the uncut vagus at first completely stopped the respiration for a short time and then made it short and shallow. No notes were taken of the needle movements during irritation of vagus.

EXPERIMENT VIII.

4TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

3 16 0—Chloroform commenced ; dog crying.

3 17 0—More chloroform.

3 18 0—Cornea insensitive.

3 23 50—More chloroform.

3 24 45—Cap removed.

H. M. S.

3 28 35—More chloroform.

3 38 0—Pulse 128 ; respirations 40, regular.

3 39 0—*Uncut left vagus irritated.*

3 39 15—*Irritation stopped.* During irritation there were three beats in 15 seconds.

3 40 15—*Vagus irritation commenced again.*

3 41 15—*Vagus irritation stopped.* During irritation respirations 27 ; pulse 28.

3 44 45—More chloroform. *Irritation commenced again.*

3 47 45—*Irritation stopped.* Respirations very shallow. For the 3 minutes that the vagus was irritated the pulse was 48; 56 and 32 beats a minute and for the first 30 seconds there was no pulse.

3 51 14—More chloroform.

3 51 40—*Respiration stopped.*

3 51 45—*Irritation of vagus.* } During this time the pulse completely
3 52 15—*Irritation stopped.* } stopped.

3 53 45—*Artificial respiration commenced.* The animal was allowed to recover.

Remarks.—In this experiment the vagus was stimulated for 3 minutes when the respiration was very shallow so that the pulse was completely stopped for 30 seconds, and soon afterwards the animal took breath and gave obvious signs of recovery. Chloroform was again given, and the vagus irritated 5 seconds after the respiration had entirely ceased ; and during the 30 seconds it was continued, the pulse was completely stopped. Artificial respiration was commenced soon afterwards and the animal recovered.

EXPERIMENT IX.

5TH MARCH 1892.—The same dog as that used in the last experiment.

H. M. S.

2 0 0—Chloroform commenced.

2 1 5—Struggling.

2 2 20—Cornea insensitive.

2 7 30—Wound re-opened and left vagus exposed.

2 10 0—Slight struggling.

2 10 30—Still struggling.

H. M. S.

- 2 11 0—Cornea insensitive.
- 2 14 30—More chloroform.
- 2 14 45—Chloroform stopped. Secondary coil at 9".
- 2 17 15—Pulse 96 ; respirations 36 and regular.
- 2 20 10—More chloroform.
- 2 21 15—Respirations 92 ; pulse 72.
- 2 22 30—*Irritation of uncut left vagus commenced.*
- 2 23 30—Pulse 72 ; respirations 48. For 15 seconds there was no pulse. Irritation stopped.
- 2 27 30—Respirations 52 ; pulse 64.
- 2 28 30—*Irritation commenced.* Respirations 61 ; pulse 78. Some little time after the irritation was commenced there was no pulse.
- 2 29 30—*Irritation stopped.*
- 2 31 45—Respirations 88 ; pulse 102.
- 2 32 45—*Irritation commenced again.*
- 2 33 45—*Irritation stopped.* Pulse 40 ; respirations 72.
- 2 34 15—Respirations 84 ; pulse 160.
- 2 35 15—*Irritation commenced*, and more chloroform given.
- 2 36 15—Respirations 95 ; pulse 42. Irritation stopped.
- 2 41 30—Cornea sensitive ; dog moving.
- 2 42 22—More chloroform ; cap jammed over face.
- 2 45 22—More chloroform added.
- 2 45 30—Respirations very slow and shallow.
- 2 46 15—*Respiration stopped and irritation commenced.*
- 2 47 15—*Irritation stopped.*
- 2 48 30—Feeble gasps.
- 2 49 15—*Artificial respiration commenced.*
- 2 51 0—Natural respirations began again and the dog was allowed to recover.

Remarks.—In this experiment the uncut vagus was irritated for 1 minute immediately after the respiration ceased, as well as on three occasions for 1 minute each during anæsthesia. In all cases in which the effect on the pulse was noticed there was found to be marked slowing. Before artificial respiration was commenced the dog took feeble gasps, and it is probable that he would have recovered without artificial respiration.

EXPERIMENT X.

6TH MARCH 1892.—The same dog was used as in experiments VIII and IX.

Remarks.—In this experiment the dog was put in the box and removed struggling. An overdose was accidentally given during the struggles. The respiration suddenly stopped. The heart was acting vigorously, but artificial respiration failed to revive the animal.

Post-mortem.—Right auricle and ventricle distended with clotted blood. Left ventricle contained a few clots. Valves healthy. Heart and lungs examined *in situ*. The lower lobes of both lungs were considerably congested.

EXPERIMENT XI.

7TH MARCH 1892.—Medium-sized pariah dog.

H. M. S.

- 1 53 45—Dog in box with chloroform on blotting paper.
- 1 57 15—More chloroform.
- 2 0 40—More chloroform.
- 2 3 30—Dog struggling.
- 2 4 35—Dog fallen down.
- 2 7 40—More chloroform.
- 2 9 20—Dog removed from the box and placed on the board.
- 2 10 45—More chloroform.
- 2 11 30—More chloroform.
- 2 12 0—Cornea insensitive. Incision commenced for exposing vagus.
Cap removed.
- 2 15 30—Vagus exposed.
- 2 17 0—Pulse 88 ; respirations 36 and regular.
- 2 17 45—More chloroform.
- 2 18 45—*Uncut vagus irritated*. Respirations 32 ; pulse 104.
- 2 19 30—*Irritation stopped*.
- 2 19 45—*Vagus irritated*. Respirations 26 ; pulse 87. For some seconds
no pulse was to be felt. Respirations jerky.
- 2 21 55—Cornea sensitive ; more chloroform.
- 2 22 40—Chloroform stopped ; cornea insensitive.
- 2 23 15—Vagus ligatured in two places.
- 2 44 15—Vagus cut ; respirations 34 ; more chloroform.
- 2 25 15—Slight struggling.
- 2 25 15—More chloroform.

H. M. S.

- 2 26 20—Cornea insensitive ; chloroform stopped.
- 2 26 50—More chloroform.
- 2 27 30—Cornea insensitive.
- 2 29 30—More chloroform.
- 2 30 0—Chloroform stopped.
- 2 30 45—*Irritation of peripheral end of vagus.* Respirations 55 ; pulse 46. Respirations at first stopped completely, then became rapid and jerky. Pulse stopped completely for some time during irritation.
- 2 31 45—*Irritation stopped.*
- 2 33 0—More chloroform.
- 2 34 55—Cornea insensitive ; chloroform stopped.
- 2 35 15—Respirations 64 ; pulse 104.
- 2 36 45—*Irritation of cardiac end of vagus.* Pulse 105 ; respirations 70 and irregular.
- 2 38 45—More chloroform ; cornea sensitive.
- 2 40 10—Cornea insensitive ; chloroform stopped.
- 2 40 30—Pulse 112 ; respirations 56.
- 2 40 42—Cornea sensitive ; more chloroform.
- 2 42 20—Cornea insensitive ; cap removed.
- 2 42 45—*Irritation of central end of vagus.* Respirations 56 ; pulse 84.
- 2 43 0—*Irritation stopped.*
- 2 44 30—Cap removed ; cornea insensitive.
- 2 45 0—*Irritation of cardiac end.* Pulse 108 ; respirations 108.
- 2 46 0—*Irritation stopped.*
- 2 46 15—More chloroform ; cornea sensitive.
- 2 47 10—Incision made for exposing right vagus.
- 2 48 0—Chloroform stopped.
- 2 50 15—Pulse 104 ; respirations 32.
- 2 51 45—*Stimulation of entire right vagus.* Pulse 76 ; respirations 64.
Respirations became shallow and quick.
- 2 52 30—More chloroform.
- 2 52 45—Chloroform stopped.
- 2 53 45—Respirations 64 ; pulse 64.
- 2 54 45—*Irritation of right entire vagus ;* more chloroform ; pulse 93 ; respirations 66.
- 2 55 45—*Irritation stopped.*
- 2 57 45—Right vagus ligatured.

H. M. S.

- 2 58 30—Cap removed ; cornea insensitive.
 2 58 35—Vagus cut.
 3 0 0—Pulse 124 ; respirations 48.
 3 0 50—More chloroform.
 3 1 15—Cap removed ; cornea insensitive.
 3 1 45—Dog struggling.
 3 3 15—Respirations 44 ; pulse 104.
 3 3 45—Respirations 54 ; pulse 91. *Irritation of central end of right vagus.*
 3 7 0—More chloroform ; dog struggling ; cornea sensitive.
 3 7 50—Struggling violently ; cornea insensitive ; cap removed.
 3 8 45—Pulse 88 ; respirations 80.
 3 10 15—More chloroform.
 3 10 45—*Cardiac end of right vagus irritated for 15 seconds.* Respirations 36 ; pulse 76.
 3 15 15—More chloroform and stimulation of vagus. Respirations 24 ; pulse 76. *Respirations stopped* at commencement of irritation.
 3 18 30—*Cardiac end of right vagus irritated.* Respirations 24 ; pulse 140.
 3 20 15—Chloroform pushed ; cap jammed over face.
 3 21 15—*Respiration stopped.*
 3 21 45—Cap removed.
 3 22 0—Needle inserted in heart.
 3 22 45—No pulse to be felt but needle still beating.
 3 24 30—Quivering of the tongue.
 3 26 15—Needle stopped.
 3 38 0—*Irritation of cardiac end of right vagus.*
 3 39 0—*Irritation of central end.*

Remarks.—In this experiment the effect of irritating the peripheral end of the vagus was to stop the respiration completely for a short time and then make it rapid and jerky. No slowing effect was observed on the pulse, except on one occasion, viz., at 2h. 19m. 45s. ^{and at 2 30 45} Needle continued beating 4m. 30s. after cessation of the pulse.

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EXPERIMENT XII.

11TH APRIL 1892.—Sickly, very emaciated, pariah dog.

H. M. S.

- 1 28 0—Dog in box with chloroform.
- 1 32 12—More chloroform.
- 1 35 20—More chloroform. Dog sitting up.
- 1 38 0—Dog fallen down.
- 1 38 10—Taken out ; chloroform on cap jammed over face.
- 1 39 45—Cornea insensitive.
- 1 40 15—Incision for exposing vagus commenced.
- 1 55 28—Left vagus exposed.
- 1 56 5—Vagus tied in two places.
- 1 57 55—Vagus divided between ligatures.
- 1 58 10—Needle inserted.
- 1 59 0—Pulse 104 ; respirations 24.
- 2 0 0—Chloroform pushed so as to stop respiration.
- A 2 1 30—*Respiration stopped* ; needle vibrating.
- 2 2 20—Gaspd feebly. As it was thought that respiration was returning, more chloroform was added.
- 2 3 0—*Respiration stopped*.
- 2 3 45—*Peripheral end of cut vagus irritated*. Movements of needle during irritation were considerably lessened and pulse became intermittent and almost imperceptible.
- 2 4 45—*Irritation stopped* ; needle still vibrating ; pulse to be felt ; tongue drawn forward and mouth kept open.
- 2 5 50—Pulse stronger and needle more vigorous.
- 2 6 20 } Animal began to breathe and six breaths were taken during
- 2 6 45 } this interval.
- 2 6 50—Natural respiration commenced ; needle vibrating strongly.
- 2 7 15—Needle vibrating vigorously ; pulse 152, intermittent and irregular.
- 2 9 30—More chloroform pushed to stop breathing.
- 2 9 45—Pulse 168.
- 2 11 6—No pulse could be felt although the needle was vibrating ; breathing very feeble.
- B 2 11 30—*Breathing stopped*.
- 2 11 45—*Irritation of cardiac end of vagus*.

H. M. S.

- 2 12 45—*Irritation stopped.* During this minute (2h. 11m. 45s.—2h. 12m. 45s.) no movements of the needle could be seen for 45 seconds, after which the poles having slipped from the nerve the heart's action commenced again.
- 2 14 30—Needle still vibrating.
- 2 15 5—Needle movements ceased.
- 2 16 0—Needle withdrawn and *artificial respiration commenced.*
- 2 23 25—*Artificial respiration stopped* and needle re-inserted. No movements to be seen.

Post-mortem.—Right ventricle flabby, not contracted. Right auricle filled with venous blood. Left ventricle contained a little blood.

Remarks.—A. Though the dog was very sickly, he recovered on irritating the vagus (for 1 minute) 45 seconds after the respiration had ceased. B. In the second experiment the vagus was irritated (for 1 minute) 15 seconds after the respiration had ceased and he did not recover.

EXPERIMENT XIII.

12TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 1 41 55—Dog in box with chloroform.
- 1 47 15—More chloroform.
- 1 54 20—Moving about.
- 1 55 0—More chloroform.
- 1 57 0—Taken out. Cornea insensitive.
- 2 0 0—Coming out; cornea sensitive.
- 2 0 15—Respirations 36; pulse 104, good.
- 2 1 30—Incision commenced for exposing left vagus; more chloroform.
- 2 5 40—Vagus exposed.
- 2 6 20—Ligatured in two places.
- 2 7 0—More chloroform.
- 2 7 30—Vagus cut between two ligatures.
- 2 8 0—Stopped chloroform.
- 2 8 15—Chloroform pushed; cap jammed over face.
- 2 10 20—*Respiration stopped.* Cell found not to be working. Artificial respiration for a few minutes.
- 2 11 15—Breathing regularly. Needle inserted into heart; beating vigorously.

H. M. S.

- 2 12 0—Chloroform pushed.
- 2 13 0—Needle beating vigorously.
- 2 14 15—*Respiration stopped.*
- 2 14 45—*Irritation of cardiac end of vagus.*
- 2 15 30—Needle stopped till 2h. 15m. 50s.
- 2 15 45—*Irritation stopped.*
- 2 15 50—Movements of needle recommenced vigorously.
- 2 16 30—Needle movements vigorous.
- 2 17 0—No pulse to be felt.
- 2 17 30—Respirations 40 per minute.
- 2 17 50—Return of pulse.
- 2 18 0—Pulse 80 per minute ; respirations full, jerking and sighing.
- 2 20 0—Wound stitched.
- 2 24 0—Needle very vigorous and animal allowed to recover.

Remarks.—In this experiment the cardiac end of the vagus was stimulated for 1 minute, commencing 30 seconds after the respiration had stopped. For 20 seconds the heart needle completely stopped. Before the irritation was commenced the movements of the needle were very feeble and intermittent. On discontinuing the irritation of the vagus the movements of the needle became very vigorous, and as the respiration was re-established the pulse improved. Although at 2h. 16m. 30s. the needle was beating vigorously, it was not until 2h. 17m. 50s. that the pulse returned.

EXPERIMENT XIV.

12TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 2 24 10—Dog in box with chloroform.
- 2 26 30—More chloroform.
- 2 31 0—More chloroform ; walking about.
- 2 33 40—More chloroform.
- 2 38 0—More chloroform.
- 2 39 0—Fallen down ; taken out and placed on table.
- 2 41 45—Breathing shallow ; cornea insensitive.
- 2 42 30—Breathing regular ; cornea sensitive.
- 2 43 0—More chloroform.
- 2 44 30—Left vagus exposed.
- 2 45 30—Tied in two places.

H. M. S.

- 2 46 0—Cut.
 2 46 15—Needle inserted in heart ; movements vigorous.
 2 47 30—Chloroform pushed ; cap jammed over face ; needle vigorous.
 2 48 30—Needle movements feeble ; breathing shallow and jerky and chiefly abdominal.
 2 48 15—*Respiration stopped* ; needle moving slowly.
 2 49 45—*Vagus irritation of cardiac end commenced*.
 2 51 45—*Stopped*.
 2 52 43—Movements of needle stopped.
 2 53 15—Needle removed. Artificial respiration commenced.
 2 57 45—Artificial respiration stopped ; needle re-inserted ; movements slow.
 2 58 45—*Artificial respiration recommenced*.
 3 0 45—*Artificial respiration stopped*.

Remarks.—In this experiment the cardiac end of the vagus was stimulated for 2 minutes, commencing 1m. 30s. after the respiration had stopped. No apparent effect was produced on the movements of the needle. Artificial respiration commenced 5 minutes after the respiration had ceased was unsuccessful. It was observed that the needle movements completely stopped at 2h. 52m. 43s., but that after artificial respiration was employed they recommenced.

EXPERIMENT XV.

12TH APRIL 1892.—Pariah puppy.

H. M. S.

- 3 4 30—Dog in box with chloroform.
 3 7 0—More chloroform.
 3 8 0—Fallen down.
 3 8 20—Cornea insensitive. Removed on the table.
 A. 3 9 30—*Breathing stopped*.
 3 10 0—*Artificial respiration commenced*.
 3 12 0—Natural breathing recommenced. Artificial respiration stopped.
 3 13 15—Operation commenced for exposing left vagus. More chloroform.
 3 14 15—Cap removed.
 3 15 0—More chloroform.
 3 16 20—Chloroform stopped.
 3 16 45—Left vagus exposed.

H. M. S.

- 3 16 59—Tied in two places.
 3 17 0—Cut between ligatures.
 3 18 0—Chloroform pushed ; struggling.
 3 19 0—Needle in heart.
 B. 3 20 45—*Breathing stopped* ; needle movements vigorous.
 3 21 15—*Irritation of cardiac end of vagus*.
 3 22 15—*Irritation stopped*. Sixty needle beats during minute.
 3 23 15—Pulse 74 per minute.
 3 24 0—Animal began to gasp. No proper respiration.
 3 24 50—Gasping stopped.
 3 25 0—*Cardiac end of vagus irritated*. Needle stopped.
 3 26 0—*Irritation stopped*. No movements of needle.
 3 27 0—*Artificial respiration commenced*.
 3 30 0—Needle removed. *Artificial respiration stopped*.

Remarks.—A. The moment the puppy was brought out of the box on to the table the breathing stopped and he had to be recovered by artificial respiration. B. The cardiac end of the left vagus was irritated 30 seconds after the respiration stopped and was continued for 1 minute without producing any alteration in the movements of the needle. Sixty beats were observed during the time of irritation.

EXPERIMENT XVI.

13TH APRIL 1892.—Healthy pariah dog, wt. 35 lbs. 8 oz.

H. M. S.

- 1 5 0—Dog in box with chloroform.
 1 9 0—Moving about.
 1 10 0—More chloroform.
 1 14 30—More chloroform.
 1 14 31—Moving about.
 1 16 15—Struggling.
 1 18 35—Fallen down ; taken out and placed on table.
 1 20 15—More chloroform.
 1 20 30—Cornea insensitive.
 1 23 45—Artificial respiration commenced because breathing was feeble.
 1 26 45—Natural respirations recommenced.
 1 29 15—Left vagus cut between two ligatures.
 1 30 40—Needle inserted ; movements vigorous.

H. M. S.

- 1 31 30—Needle vigorous ; respirations natural.
- 1 32 0—Chloroform pushed ; cap jammed over face.
- 1 32 15—Respirations shallow ; needle vigorous.
- 1 33 30—Respirations very shallow ; needle vigorous.
- A. 1 39 50—*Respiration stopped. Stimulation of cardiac end of vagus.*
- 1 40 15—*Irritation stopped.*
- 1 46 50—Movements of chest re-commencing.
- 1 48 50—Natural breathing.
- 1 50 0—Animal struggling.
- 1 51 30—Chloroform pushed.
- 1 53 30—Needle vigorous.
- B. 1 53 50—*Respiration stopped ; needle vibrating.*
- 1 54 15—*Irritation of cardiac end of vagus.*
- 1 55 15—*Irritation stopped.*
- 1 55 50—Needle still moving.
- 1 57 30—*Artificial respiration commenced.*
- 1 59 30—Natural breathing commenced.
- 2 1 30—Needle replaced in heart ; movements vigorous.
- 2 2 0—*Irritation of cardiac end of vagus.*
- 2 3 0—*Irritation stopped. During the irritation tetanic movements of needle were observed.*
- 2 4 45—Chloroform pushed.
- 2 5 45—Needle vigorous.
- C. 2 9 0—*Respiration stopped ; needle vigorous.*
- 2 9 30—*Irritation commenced.*
- 2 11 30—*Irritation stopped. During the irritation needle stopped for 10 or 15 seconds.*
- 2 11 45—Needle much more vigorous.
- 2 11 55—Natural respiration commenced.
- 2 13 45—Respirations deep and spasmodic ; needle vigorous.
- 2 14 58—Respirations natural ; animal struggling.
- 2 15 50—Chloroform pushed again.
- 2 16 0—Needle vigorous ; respirations shallow.
- D. 2 16 15—*Respiration stopped ; needle vigorous. Irritation of cardiac end of vagus commenced.*
- 2 17 15—*Irritation stopped. Before the irritation was stopped, the respirations had commenced. During the irritation the needle stopped completely for 10 seconds.*

H. M. S.

2 27 30—Breathing rapid ; needle vigorous ; cornea sensitive.

2 30 50—More chloroform ; animal struggling.

2 35 45—Chloroform was pushed ; animal struggling.

2 36 15—Needle vigorous ; respirations shallow.

2 37 4—Pulse 72.

2 38 15—Pulse 72 ; respirations shallow.

2 41 0—Respirations shallow ; *irritation of cardiac end of vagus*.

E. 2 42 0—*Irritation stopped*. During the period of irritation 40 beats of the needle were seen and when it was discontinued 80 in the minute.

2 43 30—Natural respiration commenced.

2 44 30—*Respiration stopped* ; needle vigorous.

2 46 40—Natural respiration returned ; animal struggling ; needle vigorous.

2 46 45—More chloroform ; needle vigorous.

2 47 45—*Irritation of vagus*.

2 49 15—Needle movements tetanic.

2 52 30 Do.

2 53 30 Do. Respirations shallow.

2 54 45—Needle movements vigorous.

2 55 50—More chloroform.

2 56 0—Respirations shallow.

2 56 30—Natural respiration commenced.

2 57 0—*Irritation stopped*.

F. 2 59 15—*Vagus irritation* commenced again.

3 1 30—Chloroform pushed.

3 2 45—*Breathing stopped*.

3 3 3—Chloroform stopped.

3 3 35—Diaphragmatic movements commenced.

3 4 5—Natural breathing.

3 5 0—Pulse 136.

3 7 32—Chloroform pushed.

3 8 45—*Irritation of vagus*.

~~The respiration keeps stopping and then returning with deep gasps which cause the animal to shake his head.~~ Every time the breathing stops, the pulse gets full and then stops.

H. M. S.

- 3 29 40—Natural breathing.
- 3 30 50—Howling.
- 3 32 45—Chloroform pushed with a large sponge in cap.
- 3 35 10—More chloroform ; cap held down tightly.
- 3 35 55—*Respiration stopped.*
- 3 36 35—Pulse stopped ; heart needle moving vigorously.
- 3 37 10—Pulse returned.
- 3 37 42—Respiration returned.
- 3 38 10—Shallow gasps.
- 3 38 21—No pulse ; heart needle vigorous.
- 3 38 45—*Respirations stopped.*
- 3 39 45—Needle vibrating.
- 3 40 30—Base of needle vibrating.
- 3 41 0—Needle stopped.

Remarks.—In A the cardiac end of the cut vagus was stimulated for 25 seconds immediately after the respiration ceased. In B it was stimulated 25 seconds after the respiration had ceased and the stimulation continued for 1 minute followed by artificial respiration 4m. 45s. after the breathing had stopped. In C it was commenced 30 seconds after the respiration had stopped and continued for 1 minute, and during this time the needle stopped completely for 10 or 15 seconds. In D it was commenced immediately after the respiration had stopped and continued for 1 minute, and during this time the needle stopped completely for 10 seconds. In E irritation was commenced when the respiration was very shallow and the needle slowed from 72 to 40. In F the vagus was irritated for 9m. 15s. and caused tetanic movements of the needle. In all cases after irritation of the vagus the animal recovered naturally, except in B when artificial respiration was also employed. But it is probable that the dog would have recovered without this. The only way in which the animal could be finally killed was by combining the effects of chloroform with those of asphyxia. On all occasions in which the vagus was irritated the movements of the needle were markedly slowed. This experiment shows that though the needle may be beating vigorously, it does not necessarily follow that the pulse can be felt.

EXPERIMENT XVII.

14TH APRIL 1892.—Healthy large-sized pariah dog, wt. 42 lbs.

H. M. S.

- 1 26 0—Dog in box with chloroform.
- 1 29 5—Staggering.
- 1 30 12—Sitting up.
- 1 31 28—Fallen down.
- 1 32 5—Taken out of box ; cornea sensitive.
- 1 32 48—Placed on table and chloroform given on cap ; dog yelping
and struggling.
- 1 33 42—Cornea insensitive ; cap removed.
- 1 38 20—Struggling ; more chloroform ; vagus exposed.
- 1 39 5—Cap removed.
- 1 40 0—Vagus tied in two places.
- 1 40 8—More chloroform ; vagus cut.
- 1 40 15—Cap removed.
- 1 41 12—Needle inserted and found to be vibrating vigorously.
- 1 42 15—Respirations jerky and 32 ; pulse 88, intermittent.
- 1 42 30—
- 1 45 30—} Time taken up in looking after the cell.
- 1 45 45—Dog coming out ; more chloroform.
- 1 46 25—Cap removed ; pupils dilated ; breathing very shallow ; mouth
opened and tongue pulled out.
- 1 47 18—More chloroform on cap.
- 1 48 25—*Respiration stopped* ; pulse 48.
- 1 48 50—Pulse cannot be felt.
- 1 49 0—*Peripheral end of vagus irritated*.
- 1 49 40—Respiration commenced : 3 breaths only taken when respiration
ceased again.
- 1 50 0—Irritation stopped.
- 1 51 45—Needle still vibrating.
- 1 53 20—Pulse returned.
- 1 54 5—Pulse disappeared.
- 1 56 28—*Artificial respiration commenced* and needle withdrawn.
- 2 2 0—Artificial respiration stopped ; needle re-inserted, not vibrating.

Remarks.—In this experiment irritation of the peripheral end of vagus was commenced 35 seconds after the respiration had ceased and continued for one minute. During this time only a few movements of the needle were

observed. Before the irritation was commenced the needle beats were very feeble and had almost ceased. Artificial respiration was commenced 8m. 3s. after cessation of respiration. The dog having been taken out of the box too soon and chloroform given when he was struggling and yelping, he did not recover.

EXPERIMENT XVIII.

14TH APRIL 1892.—Small pariah dog.

H. M. S.

2 9 0—Dog in box with chloroform.

2 11 5—More chloroform.

2 13 10—Staggering.

2 16 8—Fallen down.

2 16 12—Taken out ; cornea insensitive.

2 16 38—Struggling.

2 17 25—More chloroform.

2 18 20—Cap removed.

2 18 36—Incision for exposing left vagus commenced.

2 18 45—More chloroform.

2 21 0—Nerve tied in two places.

2 21 30—Nerve divided.

2 22 4—Needle inserted, beating vigorously.

2 22 30—Pulse 96 ; respirations 32.

2 23 24—Chloroform pushed ; cap jammed tightly over face.

A. 2 24 15—*Respiration stopped*. Movements of needle slow but vigorous.

2 25 30—*Respirations commenced spontaneously* just when vagus irritation was about to be commenced which was therefore not attempted.

2 26 50—Cornea sensitive.

2 27 3—Chloroform pushed.

B. 2 28 12—*Respiration ceased*. Needle movements vigorous.

2 29 45—*Peripheral end of left vagus irritated*.

2 30 35—Gasped.

2 30 45—*Vagus irritation stopped*.

2 31 0 } Time occupied in testing cell.
2 37 0 }

2 37 30—Chloroform pushed.

2 39 30—*Breathing ceased*.

H. M. S.

- C. 2 39 45—*Irritation of cardiac end of vagus.*
 2 40 15—Tetanus of needle.
 2 40 30—Natural movements of needle.
 2 40 35—Two shallow inspirations.
 2 40 45—*Irritation stopped.* Movements of needle much more vigorous.
 2 41 6—Natural respirations returned.
 2 42 45—Cornea sensitive.
 2 43 50—More chloroform ; cap jammed over face.
- D. 2 44 45—*Breathing stopped ; cap removed.*
 2 45 50—*Breathing commenced.*
 2 47 48—Cornea sensitive.
 2 49 6—*Irritation of cardiac end of vagus.*
 2 49 40—Pulse 52.
 2 50 0—*Vagus irritation stopped.*
 2 51 20—Pulse 108.
 2 51 35—Cap re-applied loosely.
 2 51 45—Struggling.
 2 52 15—Cornea insensitive.
 2 53 5—Breathing shallow.
 2 53 35—More chloroform.
 2 55 20—Cap more tightly applied.
 2 56 0—*Breathing stopped.* Shortly afterwards took one breath.
 2 56 15—*Breathing stopped.*
 2 56 50—Pulse strong and regular.
 2 57 0—Breathing recommenced.
 2 57 0 } Took eleven breaths.
 2 58 0 }
 2 58 30 } Took fourteen breaths.
 2 59 5—More chloroform.
 2 59 30—Pulse still strong and regular.
- E. *Breathing stopped.* Cap still on face.
 3 0 15—Diaphragmatic movements. Pulse still strong and regular.
 3 0 40—Pulse slower.
 3 1 35—Pulse quicker.
 3 1 40—*Respiratory movements commenced.*
 3 1 50—*Natural breathing recommenced.*
 3 2 10—More chloroform.

- 3 2 28—*Respiration stopped* ; pulse very weak.
- 3 2 50—Pulse stopped.
- 3 3 0—Needle movements weak.
- 3 3 25—Cap removed ; needle movements very slow.
- 3 3 50—Needle vibrating.
- 3 4 15—Needle stopped.

Remarks.—In A just when the cardiac end of the vagus was about to be irritated respiration commenced spontaneously. In B the peripheral end of the vagus was irritated 1m. 33s. after respiration had ceased and was continued for 1 minute when the animal recovered. In C the peripheral end of the vagus was irritated 15 seconds after the breathing had ceased and continued for 1 minute when the animal recovered. In D the animal recovered naturally. In E after true respiration had ceased the dog took long breaths at intervals and recovered, after which chloroform was pushed till death. The effect of irritating the vagus was in all cases to slow though not to obliterate the pulse, except in C when it caused the movements of the needle to become tetanic. When the irritation was stopped the movements of the needle became much more vigorous.

EXPERIMENT XIX.

15TH APRIL 1892.—Full-sized pariah dog.

H. M. S.

- 1 24 30—Dog in box with chloroform.
- 1 29 10—More chloroform.
- 1 29 45—Staggering.
- 1 33 30—Fallen down.
- 1 33 42—Taken out ; cornea sensitive ; dog struggling and yelping.
- 1 34 10—More chloroform ; cap jammed over face.
- 1 35 48—Cornea insensitive ; cap removed.
- 1 36 10—Dog struggling again ; more chloroform.
- 1 37 0—Incision commenced for exposing left vagus.
- 1 37 20—Cap removed.
- 1 39 0—Cornea sensitive ; more chloroform.
- 1 44 36—Dog struggling ; more chloroform.
- 1 45 0—Cap removed.
- 1 49 5—Vagus exposed and tied in two places.
- 1 51 12—Vagus divided.

H. M. S.

- 1 52 45—Needle in heart.
- 1 52 50—Cornea sensitive.
- 1 55 0—More chloroform ; cap loosely applied over face.
- 2 0 30—More chloroform.
- 2 1 10—Breathing almost stopped ; needle movements feeble.
- 2 3 5—*Breathing ceased* ; needle movements feeble. Before this observation was taken the breathing was chiefly diaphragmatic, hardly any air entering chest.
- 2 3 15—*Cardiac end of vagus irritated*.
- 2 4 15—*Irritation stopped*. During irritation needle movements few and far between.
- 2 4 20—Needle movements more frequent.
- 2 6 30—Needle movements ceased altogether.
- 2 6 45—*Vagus irritated*.
- 2 7 45—*Irritation stopped*.

Remarks.—In this experiment the needle movements, before any irritation was attempted, were very slow and feeble. There was some loss of blood due to accidental division of a vein. Before the incision was made for exposing the vagus, the breathing was very bad, the dog having had an overdose of chloroform administered while it was struggling and yelping. It was removed from the box too soon, and when placed on the table the cap was tightly jammed over its face. The vagus was irritated 10 seconds after the respiration ceased, and the irritation was continued for 1 minute. During this time the movements of the needle were few and far between.

EXPERIMENT XX.

15TH APRIL 1892.—Full-sized pariah dog.

H. M. S.

- 2 12 10—Dog in box with chloroform.
- 2 17 43—More chloroform.
- 2 19 30—Fallen down.
- 2 19 45—Taken out ; struggling and yelping.
- 2 20 0—More chloroform ; cap jammed over face.
- 2 21 25—Cornea insensitive ; cap removed.
- 2 22 0—Cap re-applied as the dog was coming out.
- 2 23 5—Cap removed.

H. M. S.

- 2 23 45—Incision commenced for exposing left vagus.
 2 29 0—Vagus exposed and tied in two places.
 2 30 45—Vagus cut.
 2 31 30—Chloroform pushed.
 2 31 45—Needle inserted, beating vigorously.
 2 36 0—Pulse good.
 2 38 40—More chloroform.
 2 38 45—Respirations shallow.
 2 39 0—*Respiration ceased.*
 2 39 10—Needle movements feeble.
 2 40 0—*Irritation of cardiac end of vagus.*
 2 41 0—*Irritation stopped.*
 2 41 5—Needle movements became stronger than they were before irritation was commenced.
 2 45 50—Needle stopped.

Remarks.—In this case irritation of the vagus was commenced 1 minute after the respiration had ceased and was continued for 1 minute during which time no movements of the needle were to be seen. After the irritation the needle movements became stronger than they were before, and continued for 6m. 50s. after the respiration had ceased. Chloroform was given while the animal was struggling and yelping, and the cap was kept tightly jammed over the face.

EXPERIMENT XXI.

16TH APRIL 1892.—Full-sized pariah dog.

H. M. S.

- 1 6 10—Dog in box with chloroform.
 1 10 5—More chloroform.
 1 13 0—Walking about.
 1 18 10—More chloroform.
 1 20 18—Sitting up.
 1 21 30—Taken out and more chloroform given ; cap loosely applied ; cornea sensitive ; dog yelping.
 1 24 50—Cornea insensitive ; cap removed.
 1 25 30—Incision for exposing left vagus commenced.
 1 30 15—Respirations laboured, and during inspiration slight stertor ; dog coming out ; more chloroform.

H. M. S.

- 1 34 0—Cap removed.
 1 35 15—Vagus exposed.
 1 35 45—Tied in two places and divided.
 1 36 20—More chloroform ; cap loosely applied.
 1 37 15—Needle in heart ; movements vigorous.
 1 40 30—Needle stopped for a few seconds and commenced vibrating again. Respirations regular, but somewhat shallow.
 1 42 15—
 1 42 25—
 1 43 0—
 1 43 12—
 } Needle stopped.
 } Do.
 1 43 22—*Respiration stopped* ; cap removed.
 1 43 30—
 1 44 30—
 } *Vagus irritated* ; forty beats of needle.
 1 44 30—Needle vibrating more vigorously.
 1 45 0—Seven or eight shallow movements of abdomen and thorax.
 1 45 45—Needle movements feeble.
 1 46 0—Attempts at respiration stopped.
 1 46 20—Needle movements again vigorous.
 1 47 15—Needle movements stopped.
 1 47 30—
 1 47 50—
 } Needle movements commenced again ; ten beats during this time.
 1 48 0—Needle movements commenced again vigorously.
 1 48 18—Needle movements stopped.
 1 49 40—
 1 51 15—
 } Only three beats of needle.
 1 51 45—One beat of needle.
 1 52 15— Do.
 1 56 0—*Artificial respiration commenced*.
 2 4 0—*Artificial respiration stopped*.

Post-mortem.—About $\frac{1}{2}$ a drachm of blood found in the pericardium ; right auricle and ventricle filled with blood which continued running away for some time ; left ventricle contained little blood.

Remarks.—In this experiment, on two occasions before the respiration ceased, the needle movements stopped completely—on one occasion for 10 and the other for 12 seconds. The cardiac end of the left vagus was irritated 8 seconds after the respiration ceased, and the irritation continued for 1

minute. During this time there were only 40 beats of the needle. After the irritation the movements of the needle became more vigorous ; and though 7 or 8 shallow movements of the abdomen and thorax were afterwards noticed, no proper respirations ensued and the animal died. Artificial respiration was not commenced until 12m. 38s. after the respiration had ceased. Chloroform was given continuously from 1h. 25m. 30s. to 1h. 30m. 15s., when the respiration was laboured and when during inspiration stertor was noticed. It is probable that the small amount of blood in the pericardium in no way interfered with the animal's recovery.

EXPERIMENT XXII.

16TH APRIL 1892.—Weakly under-sized pariah dog.

H. M. S.

- 2 26 5—Dog in box with chloroform.
- 2 30 15—More chloroform ; dog sitting up.
- 2 35 0—More chloroform.
- 2 40 40—Fallen down.
- 2 42 0—Taken out ; cornea sensitive ; more chloroform on cap loosely applied ; dog yelping loudly.
- 2 44 12—Cornea insensitive ; dog still crying.
- 2 44 30—More chloroform.
- 2 45 0—Cap removed.
- 2 45 45—Incision commenced for exposing left vagus.
- 2 46 20—Cornea sensitive ; more chloroform ; dog crying loudly.
- 2 47 30—Cornea insensitive ; chloroform stopped.
- 2 47 45—
- 2 51 30—} Chloroform given off and on just to keep the dog under.
- 2 51 45—Left vagus cut.
- 2 52 40—Needle inserted ; beating vigorously ; more chloroform.
- 2 53 10—Respirations good and regular.
- 2 54 0—Respirations quick and shallow, little air entering chest.
- 2 55 25—Respirations shallow and jerky, nearly stopped.
- 2 56 0—More chloroform.
- 2 56 35—Respirations almost stopped.
- 2 57 45—Respirations chiefly abdominal, little or no air entering lungs.
Needle movements fairly vigorous.
- 2 59 0—More chloroform.
- 3 0 10—Respirations very shallow.

H. M. S.

3 0 30—*Respirations stopped.*

3 0 45—*Irritation of cardiac end of vagus until 3h. 1m. 45s. Sixty-four needle beats in the minute.*

3 2 0—*Vibrations of needle 92 in the minute.*

3 2 15—*Twitchings of nostrils.*

3 3 45—*Twitching of sterno-thyroid.*

3 4 5—*Needle barely moving.*

3 4 45—*Needle stopped.*

Post-mortem.—Right auricle and ventricle distended with fluid blood ; left ventricle contained about $\frac{1}{2}$ a drachm.

Remarks.—The cardiac end of the left vagus was irritated 15 seconds after the respiration had stopped and continued for 1 minute. During this time there were 64 beats of the needle. Chloroform all through was given gently, but the dog, which was weak and under-sized, did not recover.

EXPERIMENT XXIII.

17TH APRIL 1892.—Very savage, medium-sized pariah dog, whose vagus had been exposed on a former occasion on the left side.

H. M. S.

1 37 10—Dog in box with chloroform.

1 42 30—More chloroform.

1 44 30—Moving about.

1 46 10—Fallen down and taken out.

1 48 40—Cornea insensitive.

1 50 40—Twitching of mouth.

1 51 5—Respirations natural ; needle inserted ; movements vigorous.

1 51 10—Respirations deep and gasping.

1 52 50—More chloroform ; respirations deep ; dog yelping.

1 53 30—Struggling.

1 53 50—Needle movements vigorous ; respirations good.

1 54 40—Cap removed.

1 54 50—More chloroform ; struggling ; needle fairly vigorous.

1 56 50—Respirations good ; needle movements vigorous.

1 56 50—
2 11 0—
} Right vagus exposed.

2 11 0—Needle movements vigorous ; respirations good.

H. M. S.

- 2 11 30—Cell tested and found to be acting well.
 2 12 20—Needle movements vigorous ; respirations deep ; more chloroform.
 2 13 0—Needle movements vigorous ; respirations deep ; chloroform continued.
 2 14 5—More chloroform.
 2 15 0—Respirations deep and regular ; needle quick and fairly vigorous.
 2 18 55—Needle movements vigorous ; respirations growing slower.
 2 19 0—More chloroform ; respirations catchy ; needle vigorous.
 2 19 30—Respirations 20 and catchy ; needle vigorous.
 2 20 0—More chloroform.
 2 21 35—Respirations very slow ; needle vigorous.
 2 21 50—Respirations shallow, long intervals between each inspiration ; needle vigorous.
 2 22 0—More chloroform.
 2 23 0—Respirations regular ; needle vigorous.
 2 24 30—Respirations very slow ; needle still vigorous.
 2 25 50—Respirations very shallow, little air entering chest.
 2 26 20—More chloroform.
 2 27 0—*Respiration stopped.*
 2 27 10—*Irritation of cardiac end of vagus.*
 2 29 10—*Irritation stopped.*
 2 30 50—Needle movements vigorous ; gasping movements commenced.
 2 31 10—*Vagus irritated again.*
 2 32 10—*Irritation stopped.*
 2 34 30—Needle vibrating.
 2 34 48—Needle stopped.

Remarks.—Irritation was commenced 10 seconds after the respiration had stopped and continued for 2 minutes. No note was taken as to the effect of the stimulation on the needle beats, though when the poles were placed on the nerve before this the heart was stopped. The dog had had chloroform on a previous occasion and its left vagus had then been exposed and irritated. The needle continued beating for 7m. 48s. after the respiration had stopped.

EXPERIMENT XXIV.

17TH APRIL 1892—Medium-sized pariah dog.

H. M. S.

- 2 39 30—Dog in box with chloroform.
- 2 44 0—More chloroform.
- 2 45 0—Staggering.
- 2 47 10—Fallen down ; taken out of box ; cornea sensitive.
- 2 47 45—More chloroform.
- 2 48 10—Cap removed ; cornea insensitive. Incision commenced for exposing left vagus.
- 2 57 15—Left vagus exposed and tied.
- 2 57 45—Divided between ligatures.
- 2 58 20—Needle inserted ; movements vigorous ; respirations good.
- 2 58 30—Cornea sensitive ; struggling.
- 2 59 0—Respirations shallow and quick.
- 3 0 0—More chloroform.
- 3 0 10—Needle movements vigorous ; respirations quick.
- 3 1 12—Respirations shallow ; needle movements vigorous.
- 3 1 50—Respirations shallow and slow ; needle stopped for a few seconds.
- A. 3 2 0—*Respiration stopped* ; needle beating.
- 3 2 15—*Cardiac end of left vagus irritated*.
- 3 3 15—*Vagus irritation stopped*. Forty-five beats of needle during this minute.
- 3 3 45—Needle movements vigorous.
- 3 3 55—Respirations returned ; needle 60.
- 3 4 30—Respirations natural ; needle movements vigorous.
- 3 6 40—Cornea sensitive.
- 3 7 20—Pulse 112 ; respirations natural.
- 3 8 0—Cell tested and found to be working properly.
- 3 9 0—*Vagus irritated*.
- 3 10 0—*Vagus irritation stopped*. Thirty-two beats of needle during the minute.
- 3 10 25—Cornea sensitive ; more chloroform ; slight struggling.
- 3 11 30—Respirations regular ; needle movements vigorous.
- 3 11 55—Slight struggling.
- 3 12 0—More chloroform ; struggling.
- 3 12 45—Respirations quick ; needle movements vigorous.

H. N. S.

3 14 5—Respirations shallow.

3 14 35—Needle movements feeble and slow.

B. 3 15 25—*Respiration stopped.*

3 16 30—Needle still moving.

3 17 40—*Breathing recommenced.*

3 21 0—Cornea sensitive; breathing natural; needle movements vigorous.

3 22 45—Cap jammed over face with chloroform.

3 23 0—Struggling and holding breath.

3 23 0— } Only two beats of needle.
3 23 45— }

3 24 0—*Respiration stopped*; needle movements very feeble.

3 25 0—Needle vibrating; cap removed.

3 26 45—Needle stopped.

Remarks.—In this experiment A the cardiac end of the vagus was irritated 15 seconds after the respiration had stopped and the irritation continued for 1 minute. During this period there were only 45 beats of the needle and the dog recovered. Chloroform was eventually pushed to stoppage of respiration, the dog previously having recovered when left to itself. B It was observed that when chloroform was given while the animal was struggling at 2h. 58m. 30s.; the respirations shortly after this, *viz.*, at 3h. 1m. 50s., became slow and shallow, and the needle stopped completely for a few seconds. Also that at 3h. 23m. 0s., when the cap was tightly jammed over the face and the dog was holding his breath, there were only two beats of the needle seen for 45 seconds, *viz.*, from 3h. 23m. 0s. to 3h. 23m. 45s.

EXPERIMENT XXV.

18TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

1 10 30—Dog in box with chloroform.

1 15 50—More chloroform.

1 19 50—Moving about.

1 20 30—Fallen down.

1 22 0—Put on table; chloroform on cap.

1 22 10—More chloroform,

1 25 10—Cornea insensitive.

1 25 20—Needle inserted in heart.

H. M. S.

- 1 26 55—More chloroform.
- 1 27 0—Incision for exposing left vagus commenced.
- 1 27 20—More chloroform.
- 1 27 40—Cap removed ; cornea insensitive.
- 1 29 10—Needle 130 ; respirations 24.
- 1 29 30—Dog coming out ; more chloroform.
- 1 30 10—Cornea insensitive ; cap removed.
- 1 33 20—Dog coming out ; more chloroform.
- 1 34 40—Cap removed ; cornea insensitive.
- 1 36 0—Left vagus exposed.
- 1 37 5—Respirations natural ; needle feeble.
- 1 37 15—Vagus cut.
- 1 38 0—Respirations shallow but deep.
- 1 38 35—Respirations deep ; needle fairly vigorous.
- 1 39 0—Chloroform on cap loosely applied ; respirations natural ;
needle movements feeble.
- 1 40 0—Respirations natural ; needle feeble.
- 1 40 40—Respirations jerky ; needle movements still feeble.
- 1 41 50—More chloroform.
- 1 42 10—Respirations shallow ; needle movements feeble.
- 1 42 30—Little air entering chest ; needle flickering.
- 1 43 30—No air entering chest ; needle feeble.
- 1 43 40—More chloroform.
- 1 44 10—Needle movements more vigorous.
- 1 44 20—Respirations deeper ; cap removed in the interval.
- 1 45 10—More chloroform.
- 1 46 0—Respirations shallow ; needle movements very feeble.
- 1 47 0—*Respiration stopped* ; needle movements very feeble.
- 1 47 10— } *Vagus irritated* ; needle movements stopped completely for
- 1 48 10— } a few seconds and then became very quick, 107 beats
being counted in the minute. After the irritation the
needle movements became much more vigorous.
- 1 49 40— } *Vagus irritated*. Only one beat of needle during the minute.
- 1 50 40— }
- 1 52 0—External jugular vein opened.
- 1 53 5—*Artificial respiration commenced*.
- 1 54 55—*Artificial respiration stopped*.

H. M. S.

1 56 2—*Artificial respiration commenced again.*

1 56 25—*Artificial respiration stopped.*

Remarks.—In this experiment the needle movements were from the first extremely feeble, so much so that it was thought doubtful if the needle were actually in the heart. The effect of irritating the vagus was greatly to quicken the needle movements, though for a few seconds they were completely stopped. Venesection was performed 5 minutes after the respiration had stopped and 1m. 20s. after the heart ceased beating. Artificial respiration was commenced 6m. 5s. after the respiration had ceased, but the animal did not recover.

EXPERIMENT XXVI.

18TH APRIL 1892.—Very sickly, medium-sized pariah dog.

H. M. S.

2 0 0—Dog in box with chloroform.

2 4 40—More chloroform.

2 6 40—Staggering.

2 7 45—Fallen down.

2 8 10—Dog on table ; chloroform on cap.

2 9 20—Cornea insensitive.

2 9 30—Incision made for exposing left vagus and external jugular vein.

2 10 30—Dog coming out ; more chloroform.

2 11 30—Needle in heart ; movements vigorous.

2 12 15—Cornea insensitive ; cap removed.

2 13 5—More chloroform.

2 14 35—Cornea insensitive ; cap removed.

2 17 40—Vagus ligatured in two places and cut.

2 18 10—Vagus irritated for 10 seconds to test cell.

2 18 20—More chloroform ; dog coming out.

2 19 5—Cornea insensitive ; cap removed.

2 19 20—Respirations good ; needle movements vigorous.

2 19 50—More chloroform ; cap loosely applied.

2 20 50—Respirations good ; needle movements vigorous.

2 20 40—More chloroform.

2 22 50—Respirations slow ; needle movements vigorous.

H. M. S.

2 23 40—Respirations very shallow ; needle movements vigorous.

A. 2 24 0—*Respiration stopped ; vagus irritation commenced.*2 26 0—*Irritation stopped ; one respiratory movement observed when the dog ceased breathing again.*2 26 30—*Vagus irritation commenced.*2 26 55—*Vagus irritation stopped.*

2 27 10—Respirations good ; needle movements vigorous.

2 30 5—Chloroform pushed with cap loosely applied ; dog crying.

2 30 30—*Vagus irritation commenced.*2 31 30—*Vagus irritation stopped.*

2 31 35—Respirations very slow ; needle movements vigorous.

2 33 5—Respirations very slow ; needle movements vigorous.

2 34 6—*Respirations stopped ; needle movements vigorous ; cap removed.*

2 35 0—Gasping ; 32 a minute.

2 37 55—Gasping movements.

2 37 30—
2 37 45—
} *Vagus irritated.*

2 38 10—Cornea sensitive ; more chloroform.

2 38 30—Respirations good ; needle movements vigorous.

B. 2 41 40—*Respiration stopped.*2 42 10—
2 44 10—
} *Vagus irritated ; needle movements vigorous and respiration returned.*

2 44 10—Breathing stopped again ; needle movements fairly vigorous.

2 45 55—Needle movements very feeble.

2 46 5—Twitching of muscles.

2 48 55—Needle movements stopped.

2 50 5—*Jugular vein opened.*2 51 15—*Artificial respiration commenced.*2 53 0—*Artificial respiration stopped.*2 53 15—*Artificial respiration again commenced for a short time.*

2 53 20—Dog removed.

Remarks.—In A the vagus was irritated 30 seconds after the respiration had stopped, and the irritation was continued for 25 seconds. The animal recovered. In B the vagus was irritated 30 seconds after the respiration had ceased and the irritation continued for 2 minutes ; and though the animal breathed again he did not eventually recover. Venesection performed 10 seconds after the needle movements had stopped, and artificial respiration 2m.

25s. afterwards had no effect in recovering the animal. No very marked slowing was produced by irritation of the vagus, except in the last experiment when it was slowed for a few seconds. Needle movements were vigorous up to the time of stoppage of respiration.

EXPERIMENT XXVII.

18TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 2 55 0—Dog on table ; chloroform given on cap.
- 2 56 5—Struggling and holding breath.
- 2 56 10—Needle inserted ; movements vigorous.
- 2 56 55—More chloroform.
- 2 57 20—Struggling ; needle stopped for a few seconds.
- 2 57 50—Cornea insensitive.
- 2 58 30—Incision commenced for exposing left vagus and jugular.
- 2 58 35—More chloroform.
- 3 0 30—Crying out ; more chloroform.
- 3 1 45—Vagus exposed.
- 3 1 55—Tied in two places and cut.
- 3 2 20—Cap removed ; cornea insensitive.
- 3 2 30—Vagus irritated and cell found working.
- 3 3 0—Chloroform on cap loosely applied.
- 3 3 20—Struggling ; needle stopped for a short time and then commenced again.
- 3 4 40—Respirations natural ; needle movements feeble.
- 3 4 55—More chloroform.
- 3 5 20—Respirations good ; needle movements slow.
- 3 7 10—More chloroform.
- 3 9 8—Respiration sluggish.
- 3 9 10—*Respiration stopped* ; cap removed.
- 3 9 15—} *Vagus irritated.*
- 3 10 15—}
- 3 10 35—Gasping.
- 3 11 0—Respirations returned ; needle movements feeble.
- 3 11 30—Needle movements quick but feeble.
- 3 12 20—*Jugular vein opened.*
- 3 12 50—Vein clamped.

H. M. S.

3 13 5—Needle movements feeble.

3 13 40—Needle vibrating.

3 13 50—*Jugular vein opened again.*

3 14 25—Needle movements almost stopped.

3 14 30—*Artificial respiration commenced.*

3 17 40—*Artificial respiration stopped*; needle was thrust several times into the heart and no vibration was seen.

Remarks.—On two occasions while the animal struggled the needle stopped completely. Chloroform in this case was given throughout while the animal was on the table. The vagus was irritated 5 seconds after the respiration had ceased and continued for 1 minute without producing any obvious alteration in the needle movements. Venesection was commenced when the movements of the needle had almost stopped, and had no effect in recovering the animal though artificial respiration was afterwards also employed.

EXPERIMENT XXVIII.

19TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

1 45 20—Dog in box with chloroform.

1 50 0—More chloroform.

1 52 15—More chloroform.

1 52 40—Dog fallen down.

1 54 0—Dog on table ; chloroform on cap ; cornea sensitive.

1 54 25—Struggling.

1 55 5—Cornea insensitive ; cap removed.

1 55 20—More chloroform.

1 55 52—Needle in heart ; movements vigorous ; more chloroform.

1 57 0—Cap removed.

1 58 5—Dog coming out ; more chloroform.

1 58 40—Cornea insensitive ; cap removed.

1 59 14—Dog coming out ; more chloroform.

2 0 40—Cornea insensitive ; cap removed.

2 2 40—Dog coming out ; more chloroform.

2 5 30—Cornea insensitive ; cap removed.

2 6 50—Vagus exposed ; needle movements vigorous.

2 7 10—Vagus ligatured and cut.

H. M. S.

- 2 8 10—Vagus irritated.
- 2 8 15—Needle movements stopped.
- 2 8 40—Vagus irritation stopped.
- 2 9 50—Vagus irritated.
- 2 9 55—Needle stopped.
- 2 10 0—Vagus irritation stopped.
- 2 10 20—Chloroform pushed ; cap loosely applied.
- 2 11 10—Respirations regular ; needle movements fairly vigorous.
- 2 12 20—Respirations natural ; needle movements feeble.
- 2 13 30—Respirations shallow ; needle movements feeble and slow.
- 2 14 20—Little air entering chest ; needle movements feeble.
- A 2 14 50—*Respiration stopped* ; needle movements feeble.
- 2 15 55—*Vagus irritation commenced*.
- 2 16 55—*Vagus irritation stopped*. During this time needle stopped completely for some seconds.
- 2 17 20—Needle movements much more vigorous.
- 2 17 30—Movements of abdomen and thorax.
- 2 17 40—Respiratory movement.
- 2 17 50—Respirations returned naturally ; needle movements fairly vigorous.
- 2 19 20—Cornea sensitive ; chloroform pushed again.
- 2 20 0—Respirations good ; needle movements vigorous.
- 2 22 30—Respirations fairly good ; needle vibrating.
- 2 22 50—More chloroform.
- 2 24 30—Respirations deeper ; needle movements more vigorous.
- 2 25 0—Jerking of limbs.
- 2 25 20—More chloroform.
- 2 27 0—Cap more loosely applied.
- 2 27 30—Needle movements fairly vigorous.
- 2 28 0—Little air entering chest ; needle movements feeble.
- B 2 29 55—*Respirations stopped* ; needle beats 64 a minute, stopped completely for a few seconds on vagus being irritated.
- 2 30 55—Vagus irritation stopped.
- 2 31 52—Needle stopped.
- 2 32 15—The needle was withdrawn and an attempt made to puncture right ventricle with a trochar and canula.
- 2 32 17—Venesection.

H. M. S.

2 32 20—Needle re-inserted ; movements feeble.

2 35 0—Chest opened.

2 39 40—*Post-mortem*. Right auricle and ventricle full of blood. No puncture of trochar was seen in its substance. Left ventricle flabby.

Remarks.—In A the cardiac end of the vagus was not irritated until 1m. 5s. after the respiration had ceased, and then the irritation was continued for a minute. During this time the needle movements were completely stopped for some seconds. At the time the respiration actually stopped the needle beats were very feeble and flickering. The dog recovered. In B the vagus was irritated immediately the respiration stopped, and the irritation continued for 1 minute, during which time the needle stopped beating for some seconds. Venesection was performed after the needle had apparently stopped and had no effect in recovering the animal.

EXPERIMENT XXIX.

20TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

2 45 30—Dog on table ; chloroform on cap held closely on face.

2 46 30—Struggling and holding breath.

2 48 25—Cornea insensitive ; cap removed.

2 48 50—More chloroform.

2 49 0—Incision commenced for exposing vagus and left jugular vein.

2 49 5—More chloroform.

2 49 55—Cap removed.

2 52 25—More chloroform.

2 54 30—Vagus exposed.

2 56 20—Needle inserted ; movements vigorous.

2 56 30—Vagus ligatured and cut ; chloroform pushed.

2 57 0—
2 57 20—} Cell found to be working.

2 58 40—Respirations shallow ; needle stopped until 2h. 58m. 50s.

2 58 50—Needle commenced beating ; respirations shallow.

3 0 10—*Respiration stopped* ; needle movements feeble ; chloroform stopped ; *vagus irritation commenced*.

3 1 10—*Vagus irritation stopped* ; 39 beats.

3 2 30—Needle movements feebler.

H. M. S.

3 3 30—Needle movements very feeble.

3 4 20—Needle movements stopped.

3 4 40—*Venesection*.3 5 50—*Artificial respiration commenced*.3 11 0—*Artificial respiration stopped*.

Remarks.—In this experiment the needle movements stopped for 10 seconds before the respiration finally ceased. The vagus was irritated immediately after the respiration stopped, and the irritation continued for 1 minute, which had the effect of slowing the needle movements to 39. Chloroform was given from the first to the dog on the table with the cap held closely to the face while the dog was struggling. Venesection was performed 10 seconds after the needle movements had ceased, and artificial respiration 5m. 40s. after breathing had stopped. The dog did not recover.

EXPERIMENT XXX.

15TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

3 14 30—Dog on table ; chloroform given on cap closely applied to face.

3 15 10—Struggling and holding breath.

3 16 30—Cornea insensitive ; cap removed ; yelping.

3 17 5—More chloroform.

3 17 10—Cap removed.

3 17 20—Incision made for exposing left vagus.

3 18 0—More chloroform.

3 19 5—Cap removed.

3 20 40—More chloroform.

3 23 30—Vagus exposed.

3 25 20—Ligatured in two places and cut.

3 26 5—Needle in heart ; movements fairly vigorous.

3 27 40	} Cell tried and found to be working.
3 27 5	

3 28 0—More chloroform ; cap loosely applied.

3 28 20—Respirations good ; needle movements vigorous.

3 30 40—More chloroform.

3 33 0—More chloroform.

3 33 20—Little air entering chest ; needle movements feeble ; chloroform stopped.

3 34 40—*Respiration stopped*.

H. M. S.

- 3 35 2—Vagus irritation commenced.
 3 36 2—Vagus irritation stopped; needle movements became more vigorous.
 3 36 20—Faint abdominal movements.
 3 37 10—Very faint movements of chest.
 3 38 5—*Respiratory movements stopped.*
 3 38 30—Mouth opened and tongue drawn forward.
 3 39 10—Needle movements feeble.
 3 40 0—Faint abdominal and thoracic movements recommenced.
 3 40 30—Stopped again.
 3 41 30—Needle movements stopped.
 3 41 40—*Venesection.*
 3 42 10—*Artificial respiration commenced.*
 3 46 5—*Artificial respiration stopped.*

Remarks.—Chloroform was administered throughout to the dog on the table, and at the commencement the cap was kept tightly applied to the face while he struggled and held his breath. Irritation of the cardiac end of the vagus was commenced 22 seconds after the respiration had ceased, but no note as to the effect of the irritation on the needle beats was made, although after the irritation was discontinued the needle movements became more vigorous. Venesection was performed 10 seconds after the needle had ceased beating and artificial respiration 7m. 30s. after the breathing had stopped.

EXPERIMENT XXXI.

21ST APRIL 1892.—Healthy medium-sized pariah dog.

H. M. S.

- 1 33 10—Dog in box with chloroform.
 1 40 30—More chloroform.
 1 41 22—Moving about.
 1 44 50—More chloroform.
 1 49 0—Fallen down.
 1 49 30—Taken out and placed on table; chloroform on cap.
 1 50 10—Yelping and struggling.
 1 51 50—Cornea insensitive.
 1 52 0—Needle in heart; cap removed.
 1 52 45—Yelping; more chloroform.

H. M. S.

- 1 53 10—More chloroform ; needle movements vigorous ; yelping.
 1 54 0—Cap removed ; respirations good ; needle movements vigorous.
 1 54 30—Chloroform on cap loosely applied.
 1 55 10—More chloroform.
 1 57 30—Respirations quick ; needle movements vigorous.
 1 58 30—More chloroform ; spasmodic movements of lower limbs.
 2 0 40—Respirations quick ; needle movements vigorous.
 2 1 30—More chloroform.
 2 2 20—Respirations quick and shallow ; needle movements vigorous.
 2 3 30—Respirations very shallow ; needle movements vigorous.
 2 4 45—Respirations shallower ; needle movements vigorous.
 2 6 20—More chloroform ; respirations quick ; needle movements vigorous.
 2 8 10—Little air entering chest ; needle movements vigorous.
 2 8 45—*Respiration stopped* ; no air entering chest ; faint abdominal movements ; needle movements vigorous.
 2 9 40—Cap removed ; needle stopped.
 2 10 20—One beat of needle.
 2 10 30—Another beat.
 2 10 45—Needle beating again vigorously.
 2 11 10—Twitching of muscles ; needle beats feeble.
 2 12 20—Needle beats nearly stopped.
 2 12 40—*Artificial respiration commenced*.
 2 14 20—Needle re-inserted and found beating.
 2 19 0—*Artificial respiration stopped* ; needle stopped.

Remarks.—In this experiment, at the time the respiration stopped, the needle movements were very vigorous, though, shortly after, they stopped completely for 55 seconds, and then recommenced at first somewhat spasmodically and then regularly and vigorously. At 2h. 11m. 10s. they again became feeble. Artificial respiration was commenced 3m. 55s. after the respiration had ceased, and when the needle was re-inserted the movements were found to be more vigorous than they were immediately before.

EXPERIMENT XXXII.

21ST APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 2 30 0—Dog in box with chloroform.
 2 34 30—More chloroform.
 2 39 0—Fallen down.
 2 39 10—Dog on table ; cornea insensitive.
 2 39 30—More chloroform.
 2 42 10—Cornea insensitive ; cap removed ; needle inserted.
 2 44 0—Cornea sensitive ; yelping and struggling hard ; prolonged expirations ; needle feeble. Animal allowed to come out and chloroform given with cap tightly jammed over face.
 2 45 10—Moving about ; cornea sensitive ; needle feeble.
 2 46 0—Cap jammed over face.
 2 47 0—Struggling hard ; needle completely stopped till 2h. 49m. 10s. ; respirations slow.
 2 49 10—Cap still jammed over face. Little air entering chest.
 2 50 0—More chloroform.
 2 52 0—*Respiration stopped*. As the needle had stopped for such a long time previously, it was re-inserted, when it was found to be beating very slowly.
 2 52 45—Needle movements more vigorous.
 2 54 0—Needle movements very irregular, but fairly vigorous.
 2 56 0—*Artificial respiration*.
 2 59 0—Needle re-inserted. *Artificial respiration stopped*.
 3 0 0—*Artificial respiration continued again*.
 3 1 45—*Stopped*.

Remarks.—In this experiment when the cap was purposely jammed tightly over the face, the needle stopped completely for 2m. 10s. and the respiration finally stopped very suddenly. The needle remained motionless so long that it was thought it must have slipped out of place when the animal was struggling ; it was therefore re-inserted, but it continued to vibrate extremely slowly.

EXPERIMENT XXXIII.

23RD APRIL 1892.—Large-sized pariah dog.

H. M. S.

- 1 19 0—Dog in box with chloroform.
 1 23 10—More chloroform.
 1 24 15—Dog struggling.
 1 26 0—More chloroform.
 1 29 45—Fallen down.
 1 30 5—Taken out, placed on table and chloroform given on cap ;
 struggling and holding breath ; cornea sensitive.
 1 30 55—Cornea insensitive.
 1 31 0—Cap removed.
 1 31 40—More chloroform.
 1 32 20—Needle inserted, beating vigorously.
 1 32 35—Chloroform on cap loosely applied.
 1 33 45—Respirations shallow ; needle movements feeble.
 1 34 30—Respirations very shallow ; needle movements irregular.
 1 35 45—Respirations slow and shallow ; needle vibrating irregularly.
 1 36 0—More chloroform.
 1 36 30—Respirations deeper.
 1 30 20—Respirations shallow ; needle vibrating.
 1 39 30—Little air entering chest ; needle still vibrating.
 1 40 10—More chloroform.
 1 42 55—More chloroform.
 1 44 0—Respirations shallow ; needle movements are more vigorous.
 1 45 25—Respirations stopping.
 1 45 35—*Respiration stopped* ; cap removed ; needle stopped.
 1 47 0—Needle withdrawn and re-inserted, beating vigorously.
 1 47 20—Needle movements slower.
 1 47 30— } 36 beats of needle.
 1 49 35— }
 1 49 35—*Artificial respiration commenced* ; needle withdrawn.
 1 53 0—Needle re-inserted ; no movements.

Post-mortem.—Punctures made by the needle seen in heart. Right side greatly distended. Lungs cherry red in color and congested.

Remarks.—Before respiration finally ceased the needle movements were so feeble and irregular that it was thought the needle could not be

in the heart. This was not the case as the punctures made were found *post-mortem*. A considerable time elapsed and a great deal of chloroform had to be used before all respiratory movements completely stopped. Needle continued vibrating 4m. 10s. after the respiration ceased. No recovery took place after artificial respiration, which was commenced 4 minutes after cessation of respiration.

EXPERIMENT XXXIV.

23RD APRIL 1892.—Full-sized pariah dog.

H. M. S.

- 2 2 0—Dog in box with chloroform.
- 2 5 25—More chloroform.
- 2 6 10—Fallen down.
- 2 7 0—Taken out ; cornea insensitive.
- 2 7 10—Coming out ; cornea sensitive ; more chloroform.
- 2 9 0—Needle in heart beating vigorously.
- 2 10 5—Respirations shallow ; needle movements vigorous.
- 2 10 40—Respiration almost stopped ; needle movements fairly vigorous.
- 2 11 45—Little air entering chest ; needle movements irregular.
- 2 12 5—Respirations almost stopped ; needle movements irregular.
- 2 15 10—More chloroform.
- 2 16 40—*Respiration stopped* ; needle stopped.
- 2 17 0 } 224 fairly vigorous beats of needle.
- 2 21 0 }
- 2 21 0—*Artificial respiration commenced* ; needle withdrawn.
- 2 22 30—Needle re-inserted ; no movement.
- 2 24 0—*Artificial respiration commenced with bellows*.
- 2 25 0—*Artificial respiration with bellows stopped*.

Remarks.—The respiration and needle movements apparently stopped at the same time, but 224 fairly vigorous movements of the needle were observed to take place afterwards from 2h. 17m. 0s. to 2h. 21m. 0s. Artificial respiration with hands was commenced 4 minutes after the respiration ceased and had no effect. An attempt was then made to force in air by means of bellows the nozzle of which was inserted into the larynx, but the lungs were not distended and air was accidentally forced into the stomach and intestines.

EXPERIMENT XXXV.

23RD APRIL 1892.—Sickly young pariah dog.

H. M. S.

- 2 31 20—Dog in box with chloroform.
 2 35 0—More chloroform.
 2 39 40—Fallen down.
 2 40 0—More chloroform.
 2 42 10—Taken out ; chloroform administered on cap.
 2 43 0—Cornea insensitive.
 2 43 5—Needle inserted ; beating vigorously.
 2 44 15—Respirations good ; needle movements vigorous.
 2 45 35—More chloroform.
 2 45 50—Respirations slow but deep ; needle movements vigorous.
 2 46 30—Respirations very slow ; needle movements vigorous.
 2 47 40—Respirations deeper ; needle movements vigorous ; more chloroform.
 2 48 30—Respirations shallow ; needle movements fairly vigorous.
 2 49 10—*Respiration and needle stopped.*
 2 49 15 }
 2 53 15 } 208 beats of needle which had recommenced vibrating.
 2 53 15—*Artificial respiration commenced.*
 2 58 15—*Artificial respiration stopped ; needle reinserted ; no beats.*

Remarks.—Artificial respiration commenced 4m. 5s. after the respiration had ceased was not successful. The needle apparently stopped simultaneously with the respiration, but recommenced beating.

EXPERIMENT XXXVI.

23RD APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 3 5 0—Dog in box with chloroform.
 3 6 40—More chloroform.
 3 8 50—Fallen down and taken out and placed on table.
 3 9 0—More chloroform.
 3 9 5—Struggling and yelping ; cornea sensitive.
 3 10 30—Cornea insensitive.
 3 10 35—Needle inserted, movements vigorous.
 3 11 0—Respirations good ; needle movements vigorous.
 3 11 45—Respirations shallow ; needle movements vigorous.

H. M. S.

- 3 12 0—Respirations chiefly abdominal ; little air entering chest ;
needle movements vigorous.
- 3 12 10—More chloroform.
- 3 14 0—Respirations chiefly abdominal ; little air entering chest ;
needle movements somewhat feeble.
- 3 15 10—More chloroform.
- 3 16 55—*Respiration stopped* ; needle movements fairly vigorous ; trachea
exposed.
- 3 18 0—Needle stopped for a few seconds and recommenced at
3h. 18m. 20s.
- 3 20 50—Needle stopped permanently.
- 3 20 55—*Artificial respiration with bellows for 10 minutes.*

Remarks.—Artificial respiration by means of bellows was commenced 4 minutes after the respiration had ceased. Lungs were well expanded. No recovery.

EXPERIMENT XXXVII.

23RD APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 3 33 0—Dog in box.
- 3 34 50—Chloroform.
- 3 39 30—More chloroform.
- 3 43 30— Do.
- 3 44 0—Fallen down.
- 3 45 5—Taken out ; cornea sensitive ; chloroform given on cap.
- 3 45 50—Needle inserted, movements vigorous ; cornea insensitive.
- 3 46 40—Respirations shallow ; needle movements vigorous.
- 3 47 5—Incision commenced for exposing trachea.
- 3 48 0—Respirations slow and deep.
- 3 48 10—Respiration stopped ; needle movements vigorous ; cap
removed.
- 3 48 30—Trachea exposed.
- 3 48 55—Abdominal respiratory movements recommenced.
- 3 49 0—More chloroform.
- 3 50 0—Respirations shallow ; needle movements vigorous.
- 3 50 30—More chloroform.
- 3 51 5—Respirations very shallow ; needle movements feeble.
- A 3 52 40—*Respiration stopped* ; needle movements slow.

H. M. S.

3 53 30—Needle movements quicker.

3 56 40—Needle movements fairly vigorous. *Artificial respiration commenced with bellows.*

4 0 30—Natural respirations returned.

4 1 45—Cornea insensitive.

4 3 0—Chloroform pushed ; struggling.

4 3 30—Needle re-inserted, movements vigorous ; dog struggling.

4 4 20—More chloroform ; respirations shallow.

B 4 5 0—*Respiration stopped* ; needle movements fairly vigorous.

4 5 45—One gasp taken.

4 6 0—Needle vibrating.

4 6 25—Gasp.

4 7 0—Gasp again.

4 7 5—More chloroform.

4 7 25—Gasp.

4 8 5—
4 9 50—} Needle vibrating ; ten gasps taken ; more chloroform.

4 11 0—Gasp.

4 11 30—Gasp ceased.

4 12 40—Needle movements fairly vigorous.

4 13 5—Spasmodic contractions of thoracic muscles ; no air entering chest ; needle movements slow.

4 15 0—Made four violent respiratory efforts when air was heard to enter chest.

4 15 20—Gasp ceased.

4 16 20—Needle stopped.

4 16 30—*Artificial respiration with bellows commenced and continued for 12 minutes.*

Remarks.—In A artificial respiration by means of bellows was commenced 4 minutes after the respiration had ceased and the dog recovered. In B artificial respiration with bellows was not commenced until 11m. 30s. after proper respiration had ceased. In the interval the animal took several deep gasps.

EXPERIMENT XXXVIII.

25TH APRIL 1892.—Large pariah dog.

H. M. S.

- 1 15 0—Dog in box.
- 1 15 50—Chloroform.
- 1 20 0—Chloroform.
- 1 25 0—Fallen down.
- 1 25 40—Placed on table ; chloroform on cap.
- 1 28 30—Cornea insensitive.
- 1 29 0—Yelping ; more chloroform.
- 1 30 0—Cap removed ; needle inserted, movements vigorous.
- 1 30 10—More chloroform ; cap loosely applied.
- 1 30 40—Respirations natural ; needle movements vigorous.
- 1 31 25—Respirations shallow ; needle movements vigorous.
- 1 32 15—Respirations shallower ; needle movements feebler.
- 1 33 10—More chloroform. Incision commenced for exposing trachea.
- 1 34 20—Respirations slow and shallow ; needle movements fairly vigorous ; trachea exposed.
- 1 35 0—Respirations chiefly abdominal ; needle movements fairly vigorous.
- 1 35 40—More chloroform.
- 1 37 30—*Respiration stopped.*
- 1 37 40—Needle stopped for 10 seconds and commenced beating again vigorously at 1h. 37m. 50s.
- 1 37 45—Trachea incised.
- 1 39 30—Needle still beating.
- 1 40 15—Needle stopped for about 15 seconds and commenced again.
- 1 41 30—*Artificial respiration commenced with bellows ; needle withdrawn.*
- 1 48 0—Artificial respiration stopped ; no needle movements.

Remarks.—Artificial respiration with bellows was commenced 4 minutes after the respiration had ceased and was unsuccessful. After the respiration had ceased, the needle stopped completely for 10 seconds on one occasion and for 15 seconds on another.

EXPERIMENT XXXIX.

25TH APRIL 1892.—Large-sized pariah dog.

H. M. S.

- 1 51 30—Dog in box with chloroform.
 1 53 5—More chloroform.
 1 57 45—Taken out ; more chloroform added on cap ; dog struggling and holding breath ; cornea sensitive.
 1 59 30—Cornea insensitive ; needle inserted, movements vigorous ; chloroform on cap loosely applied.
 2 1 0—More chloroform. Incision commenced for exposing trachea.
 2 1 40—*Respiration stopped* ; needle movements vigorous.
 2 1 50—Shallow respirations.
 2 3 0—Respirations deeper.
 2 3 45—More chloroform ; respirations deep ; needle movements vigorous.
 2 5 5—*Respiration stopped* ; needle movements vigorous.
 2 5 15—Breathing again.
 2 8 20—More chloroform.
 2 12 40—*Respiration stopped* ; needle movements fairly vigorous.
 2 13 5—Faint respirations commenced again and continued until 2h. 13m. 45s. when they stopped ; needle at 2h. 13m. 45s. stopped completely for 8 seconds.
 2 14 20—Breathing recommenced ; needle movements vigorous.
 2 15 45—*Breathing stopped* ; needle vibrating.
 2 17 50—Needle stopped until 2h. 18m. 55s. when there were two beats of needle.
 2 19 40—*Artificial respiration commenced with bellows.*
 2 24 0—Needle inserted and found to be beating.
 2 27 25—Needle in heart beating.
 2 33 40—Do.
 2 36 0—Do.
 2 37 0—Do.
 2 40 0—Artificial respiration with bellows continued.
 2 41 0—Needle still beating slowly. *Artificial respiration commenced with hands.*
 2 44 0—Artificial respiration discontinued ; needle in heart stopped.

Remarks.—Artificial respiration with bellows was commenced 3m. 55s. after respiration had ceased and was unsuccessful. Considerable time was spent in completely stopping the respiration, as on four occasions it recommenced after it was thought to have stopped.

EXPERIMENT XL.

24TH APRIL 1892.—Emaciated small pariah dog.

- H. M. S.
- 2 47 0—Dog in box with chloroform.
- 2 55 50—More chloroform.
- 2 58 25—Taken out ; cornea insensitive.
- 2 59 0—Needle in heart, movements vigorous.
- 2 59 10—More chloroform.
- 3 1 25—Respirations natural ; needle movements vigorous.
- 3 2 45—Respirations slow ; needle movements vigorous.
- 3 2 50—More chloroform.
- 3 4 0—Respirations shallow ; needle movements very slow.
- 3 4 20—Abdominal movements only.
- A 3 4 45—*Respiration stopped* ; needle movements fairly vigorous.
- 3 6 0—Needle movements vigorous and regular.
- 3 7 45—*Artificial respiration commenced with bellows.*
- 3 12 20—Dog breathing naturally and whining ; artificial respiration discontinued.
- 3 13 50—More chloroform ; dog yelping, struggling and holding breath.
- 3 14 40—Needle in heart vigorous.
- 3 15 0—Cornea insensitive ; chloroform on cap loosely applied.
- 3 16 5—Respirations slow ; needle movements fairly vigorous.
- 3 18 30—Abdominal movements of respiration only.
- 3 19 0—Slight abdominal movements. No air entering lungs.
- B 3 19 5—*Respiration stopped* ; needle movements slow.
- 3 20 10—Needle movements slow.
- 3 23 5—*Artificial respiration with bellows* ; needle movements fairly vigorous.
- 3 26 30—Natural respirations restored ; dog recovering.
- 3 34 30—Dog struggling ; respirations natural.
- 3 34 45—More chloroform.
- 3 36 20—Respirations stopped and shortly after commenced again.
- 3 36 28—Needle in heart beating very slowly. Faint abdominal movements noticed, but no air entering lungs.
- C 3 39 0—*Respiration stopped* ; needle movements very slow.
- 3 43 10—Needle movements fairly vigorous.
- 3 44 10—*Artificial respiration with bellows.*
- 3 46 20—Artificial respiration stopped as the dog had recommenced to breathe.

H. M. S.

3 49 20—Cornea sensitive ; natural respirations returned.

3 49 25—More chloroform.

3 50 30—Cornea insensitive.

3 51 40—Respirations stopped and recommenced.

3 51 58—Needle slowly moving up and down, not vibrating.

3 52 10—Needle beats fairly vigorous again.

D 3 55 20—*Respiration stopped* ; needle movements slow.

3 58 50—Needle barely moving.

3 59 30—Needle beating at long intervals very feebly.

4 0 12—Needle stopped beating.

4 1 30—*Artificial respiration with bellows*.

4 5 15—Artificial respiration stopped.

Remarks.—In this experiment artificial respiration with bellows was performed successfully three times : in A 3 minutes, in B 4 minutes, and in C 5m. 10s. after the respiration had ceased, while in D artificial respiration with bellows performed 6m. 10s. after the respiration had ceased did not succeed in recovering the dog. Chloroform all through this experiment was given with the cap loosely applied.

EXPERIMENT XLI.

26TH APRIL 1892.—Large-sized pariah dog.

H. M. S.

1 13 30—Dog in box with chloroform.

1 15 5—More chloroform.

1 19 0— Do.

1 24 10—Dog fallen down, taken out and more chloroform given on cap loosely applied over face ; cornea sensitive.

1 24 45—Cornea insensitive.

1 25 50—Needle in heart beating vigorously ; respirations good ; chloroform pushed.

1 27 0—Incision made for exposing trachea.

1 28 20—Respirations shallow ; needle movements feeble.

A 1 29 30—*Respiration stopped*. Faint abdominal movements were seen for 10 seconds only, but no air entered the lungs.

1 30 0—Needle movements slow and feeble.

1 30 20 Trachea opened.

1 32 50—*Artificial respiration with bellows* ; needle movements fairly vigorous.

H. M. S.

1 34 45—Artificial respiration stopped.

1 35 0—Respirations commenced.

1 38 35—More chloroform on cap jammed over face ; dog struggling and holding breath ; needle movements very irregular ; stopped completely for 5 seconds and recommenced beating irregularly.

1 38 55—Abdominal movements of respiration only ; needle vibrating ; needle stopped temporarily for 5 seconds before respiration ceased.

B 1 40 20—*Respiration stopped* ; needle vibrating.

1 41 20—Pulse could be felt.

1 42 0—Needle withdrawn and re-inserted in another spot ; beating more vigorously.

1 44 0—Jactitation of muscles for 1m. 30s.

1 46 15—Needle movements very feeble ; intermittent, stopping.

1 46 45—*Artificial respiration with bellows*.

1 47 30—Artificial respiration stopped ; dog gasping.

1 48 0—Dog breathing—60 ; cornea sensitive.

1 52 25—Dog struggling ; more chloroform.

1 53 0—Needle in heart beating vigorously.

1 53 45—Respirations deep ; needle movements irregular ; stopped completely for 10 seconds at one time and 13 another.

C 1 54 40—*Respiration stopped* ; needle movements feeble but irregular.

1 57 0—Needle movements more vigorous.

1 59 40—Needle movements very feeble.

2 0 20—Needle just moving.

2 0 45—Needle stopped.

2 1 50—*Artificial respiration with bellows* ; needle withdrawn.

2 4 30—Needle re-inserted and found to be vibrating.

2 9 0—Artificial respiration stopped ; no needle movement.

Remarks.—In this experiment artificial respiration with bellows was performed and proved successful in A 3m. 20s. and in B 6m. 25s. after the respiration had ceased ; though in B the needle had stopped for 5 seconds temporarily before the respiration had ceased. In C artificial respiration with bellows was commenced 7 minutes after the respiration had ceased. Shortly before the respiration had stopped in this last experiment the needle stopped on two occasions for 10 and 13 seconds respectively.

EXPERIMENT XLII.

26TH APRIL 1892.—Large-sized healthy pariah dog.

H. M. S.

- 2 8 0—Dog in box with chloroform.
- 2 16 50—More chloroform.
- 2 19 30—Fallen down, taken out and placed on table ; cornea insensitive ; chloroform over cap tightly jammed over face.
- 2 20 45—Needle in heart beating vigorously.
- 2 21 25—Incision made for exposing trachea.
- 2 22 50—Respirations shallow.
- 2 25 10—Respirations very shallow ; abdominal movements only.
- 2 26 20—Needle movements slow ; respiratory movements deeper.
- 2 28 15—Respiration almost stopped ; needle movements slow and intermittent.
- 2 30 5—Respiration stopped ; needle stopped for 20 seconds and again for 22, then beat quickly.
- 2 33 5—Artificial respiration with bellows ; needle withdrawn ; tracheal canula withdrawn and re-adjusted.
- 2 38 0—Needle re-inserted ; no movement.
- 2 39 10—Artificial respiration stopped.

Remarks.—Chloroform was given with the cap tightly jammed over the face. Artificial respiration with bellows was commenced 3 minutes after the cessation of respiration and did not prove successful. Needle stopped on two occasions for 20 seconds and for 22 seconds when the respiration stopped.

EXPERIMENT XLIII.

26TH APRIL 1892.—Large-sized full-grown pariah dog.

H. M. S.

- 2 44 30—Dog in box with chloroform.
- 2 45 10—Fallen down.
- 2 46 20—Taken out and placed on table ; cornea insensitive.
- 2 46 45—Chloroform given gently.
- 2 47 10—Needle in heart beating vigorously.
- 2 48 0—More chloroform.
- 2 48 15—Incision made for exposing trachea.
- 2 50 20—Respirations shallow, chiefly abdominal ; needle movements slow.
- 2 51 30—Respirations deeper ; more chloroform.
- 2 54 15—More chloroform.

H. M. S.

- 2 56 0—Respirations very shallow ; no air entering lungs ; needle movements very slow.
- 2 57 10—*Respiration stopped* ; needle movements very slow and feeble.
- 2 59 55— }
3 0 10— } Two beats of needle.
- 3 0 10—*Artificial respiration with bellows* ; needle withdrawn.
- 3 6 0—Artificial respiration stopped.

Remarks.—In this experiment artificial respiration with bellows was commenced 3 minutes after the cessation of respiration and was unsuccessful. The needle stopped temporarily for 15 seconds after the cessation of respiration. Chloroform was given gently all through.

EXPERIMENT XLIV.

26TH APRIL 1892.—Large-sized full-grown pariah dog.

H. M. S.

- 3 9 30—Dog in box with chloroform.
- 3 11 30—More chloroform.
- 3 14 50—Fallen down.
- 3 15 30—Taken out and placed on table ; cornea insensitive ; chloroform on cap loosely applied.
- 3 16 30—Needle inserted, movements vigorous.
- 3 17 0—More chloroform.
- 3 17 35—Incision commenced for exposing trachea.
- 3 18 0—Respirations good ; needle movements feeble.
- 3 22 30—More chloroform.
- 3 23 0—Respirations deeper ; needle movements slow and feeble.
- 3 23 10—Respirations stopping.
- A. 3 23 45—*Respiration stopped* ; needle movements feeble.
- 3 24 30—Cap removed.
- 3 24 45—Trachea opened ; needle movements very feeble, almost stopping.
- 3 26 45—*Artificial respiration with bellows* ; needle withdrawn.
- 3 30 0—Needle re-inserted, beating vigorously.
- 3 32 0—Natural respirations returned ; artificial respirations stopped ; dog struggling.
- 3 37 5—More chloroform ; struggling and holding breath.
- 3 37 45—Cornea insensitive ; needle in heart beating vigorously.

H. M. S.

3 39 10—More chloroform.

3 40 0—Respirations shallow ; needle movements feeble.

3 40 55—*Respiration stopped* ; needle just moving.

3 41 35—Shallow gasping movements were now taken and continued until 3h. 46m. 45s. when respiration stopped again.

3 45 10—More chloroform.

B. 3 46 45—*Respiration stopped*.

3 48 20—Needle movements more vigorous.

3 48 45—Needle movements feeble, almost stopping.

3 49 45—*Artificial respiration with bellows*.

3 54 0—Needle in heart not beating.

3 54 30—Artificial respiration stopped.

Remarks.—In the first experiment A artificial respiration with bellows was commenced 3 minutes after the cessation of respiration, and for 3m. 45s. previous to this the needle movements were extremely slow and feeble. The dog recovered. In the second experiment B artificial respiration with bellows was commenced after the same interval but the dog did not recover.

EXPERIMENT XLV.

27TH APRIL 1892.—Thin but healthy full-grown pariah dog.

H. M. S.

1 18 10—Dog in box with chloroform.

1 23 20—More chloroform.

1 26 0—Fallen down.

1 26 15—Taken out and chloroform on cap loosely applied.

1 27 30—Cornea insensitive.

1 27 38—Needle inserted ; movements vigorous.

1 28 45—Respirations quick and shallow ; no air entering lungs.

1 29 15—Respirations deeper, not so frequent.

1 30 42—More chloroform.

1 32 0—Respirations shallow ; needle movements vigorous.

1 33 45—Abdominal movements only ; no air entering lungs.

1 34 0—Respirations deeper ; more chloroform.

1 36 55—*Respirations stopped* ; needle movements fairly vigorous.

1 37 40—Incision made for exposing trachea ; needle stopped vibrating for a few seconds and then recommenced vigorously.

H. M. S.

- 1 38 0—Needle action very intermittent, stopping for a few seconds at a time and then recommencing.
 1 39 55—*Artificial respiration with bellows* ; needle withdrawn.
 1 42 5—Needle re-inserted, beating.
 1 44 15—Needle stopped.
 1 47 30—Artificial respiration stopped.

Remarks.—Artificial respiration was commenced 3 minutes after the respiration had ceased but was not successful. The needle stopped temporarily on several occasions after the respiration had ceased and at the time the artificial respiration was commenced was not beating. Chloroform was given gently throughout.

EXPERIMENT XLVI.

27TH APRIL 1892.—Young pariah dog.

H. M. S.

- 1 47 30—Dog in box with chloroform.
 1 53 15—More chloroform.
 1 55 40—Fallen down.
 1 56 10—Taken out ; cornea sensitive ; more chloroform on cap loosely applied ; dog struggling and holding breath.
 1 57 25—Cornea insensitive ; needle in heart beating vigorously.
 1 58 0—Incision for exposing trachea commenced.
 1 59 25—More chloroform.
- A. 2 0 5—*Respiration stopped* ; needle stopped for 20 seconds and recommenced beating.
 2 0 45—Breathed again and kept on breathing up to 2h. 7m. 5s.
 2 1 40—Respirations chiefly abdominal ; needle movements slow but vigorous.
 2 2 55—More chloroform.
 2 4 30—Respiratory movements chiefly diaphragmatic ; no air entering lungs ; needle movements slow but vigorous.
- B. { 2 7 5—*Respiration stopped* ; needle stopped, and up to 2h. 9m. 5s.
 2 9 5 there were 83 beats of needle. In the first 30 seconds
 there were only four beats.
 2 9 5—*Artificial respiration with bellows*.
 2 12 45—Dog gasping.
 2 14 20—Natural respirations returned ; cornea sensitive.

H. M. S.

2 16 0—Dog struggling.

2 16 15—More chloroform on cap tightly jammed over face.

2 17 30—Respiration stopped, but afterwards a few shallow respiratory movements were noticed.

C. 2 18 5—*Respiration stopped.*

2 19 0—Needle movements vigorous.

2 19 35—Needle movements very slow but vigorous.

2 20 5—*Artificial respiration with hands commenced.*

2 22 0—Needle vibrating.

2 24 0—No vibrations of needle.

2 24 30—Artificial respiration stopped.

Remarks.—In A the needle stopped at the same time as the respiration, but after 20 seconds it recommenced again and the dog would probably have recovered naturally if more chloroform had not been added at 2h. 2m. 55s. In B artificial respiration with bellows was commenced 2 minutes after the respiration had ceased during which interval there were only 83 beats and for the first 30 seconds only 4 beats of the needle. The dog recovered. In C chloroform was given with the cap tightly jammed over the face when the animal was struggling, and artificial respiration with hands commenced 2 minutes after the respiration had ceased was unsuccessful.

EXPERIMENT XLVII.

27TH APRIL 1892.—Pariah puppy.

H. M. S.

2 28 15—Dog in box with chloroform.

2 30 40—More chloroform.

2 34 28—Fallen down.

2 36 40—Taken out and chloroform given on cap loosely applied; dog struggling.

1 38 50—Cornea insensitive; needle in heart beating vigorously.

2 39 55—Respirations shallow; needle movements vigorous.

2 40 0—Incision for exposing trachea commenced.

2 40 45—Dog whining; more chloroform.

2 41 30—Respirations quick and shallow; needle movements vigorous; pulse feeble.

2 41 40—Pulse stopped; needle movements fairly vigorous; respirations chiefly abdominal.

H. M. S.

- 2 42 15—*Respiration stopped* ; needle stopped and recommenced beating.
 2 44 25—Trachea opened ; *artificial respiration commenced with bellows* ;
 needle movements fairly vigorous.
 2 49 50—Needle beating.
 2 54 5—Needle faintly moving but not beating properly.
 2 55 45—Artificial respiration stopped.

Remarks.—In this experiment chloroform was given gently on the cap. Artificial respiration with bellows was commenced 2m. 10s. after the respiration had ceased but was not successful.

EXPERIMENT XLVIII.

27TH APRIL 1892.—Sickly pariah puppy.

H. M. S.

- 2 58 15—Dog in box with chloroform.
 3 0 28—More chloroform.
 3 4 4—Fallen down.
 3 4 20—Taken out ; cornea sensitive ; chloroform on cap loosely applied.
 3 5 2—Cornea insensitive.
 3 5 40—Needle in heart beating vigorously.
 3 6 18—Incision for exposing trachea commenced.
 3 6 25—More chloroform.
 3 8 20—Respirations deep ; needle movements vigorous.
 3 10 35—*Respiration stopped* ; needle movements vigorous.
 3 10 36—Respiration commenced again.
 3 10 48—Made a few gasps.
 3 11 5—Respiration stopped again ; needle movements fairly vigorous
 but slow ; trachea opened.
 3 12 15—Respirations began again.
 3 13 40—Abdominal movements only ; needle slow and feeble.
 3 13 50—*Respiration stopped completely* ; needle vibrating.
 3 15 50—*Artificial respiration with bellows* ; needle almost stopped.

Remarks.—Artificial respiration with bellows was commenced 2 minutes after the respiration had ceased but was unsuccessful.

Post-mortem.—Lungs found to be very emphysematous and a small quantity of blood in the pericardium. It is probable that too much force had been used with the bellows, because in addition to the lungs being very emphysematous, a considerable quantity of gas escaped on opening the abdomen.

EXPERIMENT XLIX.

28TH APRIL 1892.—Weakly full-grown pariah dog.

H. M. S.

- 1 15 30—Dog in box with chloroform.
 1 19 20—More chloroform.
 1 25 10—Sitting up.
 1 27 20—More chloroform.
 1 29 10—Taken out ; cornea sensitive ; more chloroform.
 1 29 40—Cornea insensitive ; needle in heart beating vigorously.
 1 29 55—Respirations shallow ; needle movements vigorous.
 1 30 0—Respiration stopped.
 1 30 24—Respiration commenced again.
 1 30 35—Trachea exposed.
 1 31 43—More chloroform.
 1 32 45—Little air entering lungs ; movements chiefly abdominal ; needle beating vigorously.
 1 34 10—More chloroform.
 1 37 40—*Respiration stopped* ; needle movements vigorous.
 1 39 10—
 1 39 40—} Only four beats.
 1 39 40—*Artificial respiration commenced with bellows.*
 1 42 12—Needle in heart, one beat.
 1 44 45—No movement of needle.

Remarks.—Artificial respiration with bellows commenced 2 minutes after respiration had ceased was unsuccessful.

EXPERIMENT L.

28TH APRIL 1892.—Sickly full-grown pariah dog.

H. M. S.

- 1 47 20—Dog in box with chloroform.
 1 50 10—More chloroform.
 1 53 15—Do.
 1 55 15—Fallen down and placed on table ; cornea sensitive ; dog struggling.
 1 55 30—More chloroform.
 1 56 38—Cornea insensitive.
 1 57 20—Needle inserted, movements vigorous.
 1 58 15—Respirations shallow ; needle vibrating rapidly.

H. M. S.

- 1 59 25—Respirations chiefly abdominal ; trachea exposed.
 2 0 10—More chloroform.
 2 1 55—Needle movements less strong.
- A. 2 3 50—*Respiration stopped*.
 2 4 15—Trachea opened.
 2 4 40—Needle intermittent and feeble.
 2 5 0—
 2 5 50—} Needle stopped.
 2 5 50—*Artificial respiration with bellows* commenced.
 2 8 35—Dog breathing ; artificial respiration stopped.
 2 9 0—Natural respirations returned ; pulse very good.
 2 9 40—Struggling.
 2 10 40—Chloroform on cap loosely applied.
 2 12 45—Cornea insensitive ; needle movements vigorous.
 2 13 5—Respirations slow ; needle movements intermittent.
 2 13 35—Abdominal movements only ; needle movements feeble.
 2 14 15—Little air entering chest ; needle movements feeble.
- B. 2 14 35—*Respiration stopped*.
 2 15 20—Needle movements feeble.
 2 16 35—*Artificial respiration with bellows* ; needle vibrating and withdrawn.
 2 18 4—Abdominal movements only.
 2 18 20—Respirations commenced.
 2 23 45—Dog struggling ; more chloroform on cap.
 2 24 40—Needle in heart vigorous.
 2 24 50—Respirations deep ; needle movements feeble.
 2 25 10—Respirations quick and shallow ; needle movements feeble.
 2 25 25—Abdominal movements ; no air entering chest ; needle movements fairly strong.
- C. 2 26 0—*Respiration stopped*.
 2 27 0—*Artificial respiration with hands*.
 2 32 0—Needle re-inserted ; movements vigorous.
 2 33 10—*Artificial respiration with bellows*.
 2 34 30—Needle in heart beating vigorously.
 2 39 20—Needle beating feebly.
 2 42 0—Needle stopped ; artificial respiration discontinued.

Remarks.—In A artificial respiration with bellows was commenced 2 minutes after the breathing had stopped, and in the interval the needle stopped

temporarily for 50 seconds. The dog recovered. In B also a recovery was observed, but the needle did not stop at all, and at the time artificial respiration was commenced it was beating regularly though not strongly. In C artificial respiration with the hands was commenced 1 minute after the respiration had ceased, and with the bellows 6 minutes after, but with no successful result.

EXPERIMENT LI.

28TH APRIL 1892.—Full-grown pariah dog.

H. M. S.

- 2 44 30—Dog in box with chloroform.
- 2 47 10—More chloroform.
- 2 53 0— Do.
- 2 54 5—Fallen down.
- 2 55 50—Taken out and more chloroform given on cap loosely applied ;
cornea sensitive.
- 2 56 10—Cornea insensitive.
- 2 56 15—Needle in heart fairly vigorous ; respirations shallow.
- 2 56 25—Respiration stopped.
- 2 57 45—Abdominal movements only ; needle movements fairly vigorous.
- 2 58 5—More chloroform ; trachea exposed and opened.
- 2 59 10—Respirations chiefly abdominal ; needle movements fairly vigorous.
- 3 0 0—More chloroform.
- 3 0 35—Respirations abdominal ; needle vibrating.
- 3 2 5—*Respiration stopped* ; needle movements fairly vigorous.
- 3 3 5—Body became rigid and convulsed.
- 3 3 40—Needle movements fairly vigorous.
- 3 4 5—*Artificial respiration with bellows.*
- 3 7 30—Needle in heart vibrating.
- 3 10 0—Needle in heart very feeble.
- 3 14 30—Artificial respiration stopped ; needle stopped.

Post-mortem.—Much blood was found in the pericardium slowly oozing from two punctures made by the needle in the left ventricle. Right side much distended. Lungs cherry red in color and congested in bases.

Remarks.—Artificial respiration with bellows was commenced 2 minutes after the cessation of respiration and, probably owing to the blood in the pericardium, was unsuccessful.

EXPERIMENT LII.

29TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 1 26 30—Dog in box with chloroform.
- 1 33 25—More chloroform.
- 1 36 10—Taken out and chloroform given on cap loosely applied ;
cornea insensitive.
- 1 36 40—Cornea insensitive ; needle inserted and movements vigorous.
- 1 37 45—Respiration chiefly abdominal ; needle movements vigorous.
- 1 39 35—More chloroform.
- 1 40 20—Respirations shallow ; needle movements fairly vigorous.
- 1 41 38—More chloroform.
- 1 42 50—*Respiration stopped* ; needle movements very feeble ; trachea
opened.
- A 1 43 50—*Artificial respiration* with bellows.
- 1 47 10—Breathing restored ; artificial respiration stopped.
- 1 47 36—Cornea sensitive ; struggling.
- 1 48 45—More chloroform on cap ; struggling and holding breath.
- 1 49 15—Needle re-inserted ; movements vigorous.
- 1 49 58—Respirations shallow ; needle slow but vigorous.
- 1 53 5—More chloroform.
- 1 53 50—Respirations chiefly abdominal ; little air entering lungs ;
needle movements vigorous.
- 1 54 15—*Respiration stopped* ; needle movements slow but vigorous.
- 1 55 10—Needle movements very slow but vigorous.
- B 1 56 15—*Artificial respiration* with bellows.
- 1 58 40—Needle in heart beating very faintly.
- 2 0 5—Needle in heart just moving.
- 2 0 43—Needle stopped moving ; artificial respiration stopped.

Remarks.—In A artificial respiration was commenced 1 minute after cessation of respiration and was successful. At the time it was commenced the needle was beating very feebly. In B artificial respiration was commenced 2 minutes after cessation of respiration when the needle was slow but more vigorous than when artificial respiration was commenced in A.

EXPERIMENT LIII.

H. M. S. 29TH APRIL 1892.—Large-sized pariah dog.

2 5 50—Dog in box with chloroform.

2 8 8—More chloroform.

2 10 25—Fallen down.

2 12 10—Taken out ; cornea insensitive ; needle inserted.

2 12 50—More chloroform.

2 13 5—Respirations deep ; needle movements vigorous.

2 15 0—More chloroform.

2 16 10—Faint abdominal movements only ; needle movements somewhat feeble.

2 17 0—Respirations deeper and slower ; needle movements vigorous.

2 18 10—More chloroform.

2 19 30—Respirations shallow ; needle movements slow.

2 21 15—More chloroform ; respirations still shallow.

2 22 5—*Respiration stopped* ; needle movements slow.

2 22 5—} Needle stopped completely for several seconds, only 12 beats
2 23 5—} during the minute.

A 2 23 5—*Artificial respiration with bellows commenced.*

2 25 20—Pulse fairly good.

2 29 5—Artificial respiration stopped.

2 29 20—Breathing naturally.

2 31 0—Cornea sensitive ; respirations deep.

2 31 50—Struggling.

2 32 0—More chloroform ; still struggling.

2 32 36—Needle re-inserted and vigorous.

2 33 40—Needle movements very irregular and intermittent.

2 34 10—More chloroform.

2 35 40—Respirations shallow ; needle movements irregular.

2 38 30—More chloroform.

2 39 15—*Respiration stopped.*

2 39 15—} Twelve beats only of needle.
2 40 15—}

B 2 40 15—*Artificial respiration with hands.*

2 45 0—Needle re-inserted, two vigorous beats ; needle withdrawn.

2 46 30—Artificial respiration stopped for a few seconds.

2 46 45—Resumed again ; little air heard entering chest.

2 47 15—Needle re-inserted ; no beat.

Remarks.—In A artificial respiration was performed successfully 1 minute after cessation of respiration, and during this interval the needle stopped for

several seconds and only 12 beats were observed. In B chloroform was given while the animal struggled, shortly after which the needle movements became very irregular and intermittent. Artificial respiration with hands was commenced 1 minute after the respiration had ceased, and during which interval only 20 beats of the needle were observed. No recovery.

EXPERIMENT LIV.

29TH APRIL 1892—Young pariah dog.

H. M. S.

- 2 53 10—Dog on table and chloroform given on cap ; struggling and holding breath.
- 2 54 20—Needle in heart beating vigorously.
- 2 54 30—Cornea insensitive.
- 2 54 45—No pulse or needle beat for a few seconds.
- 2 55 10—*Respiration stopped* ; needle movements more vigorous.
- A 2 56 20—*Artificial respiration with bellows* ; needle movements fairly vigorous ; needle withdrawn.
- 2 57 30—Artificial respiration stopped ; pulse very feeble.
- 2 57 45—Breathing commenced ; pulse stronger.
- 2 58 10—Natural respirations restored.
- 2 59 30—Cornea sensitive ; dog struggling.
- 2 59 30—Chloroform given in large dose purposely ; needle re-inserted.
- 3 4 0—Both respiration and heart stopped for about 20 seconds ; dog became convulsed.
- 3 5 10—Gasping ; still convulsed.
- 3 6 5—*Respiration stopped* ; needle vibrating.
- B 3 7 5—*Artificial respiration with bellows*.
- 3 10 0—Artificial respiration stopped ; needle stopped.

Post-mortem.—Pericardium found filled with blood caused by the two needle punctures. In A artificial respiration with bellows was commenced 1m. 10s. after the respiration had ceased and was successful. In B the dog did not recover when artificial respiration with bellows was commenced 1 minute after the respiration had ceased, probably because blood was effused in the pericardium.

EXPERIMENT LV.

29TH APRIL 1892.—Medium-sized pariah dog.

H. M. S.

- 3 20 0—Dog on table and chloroform given on cap ; holding breath.
 3 20 30—Struggling hard.
 3 21 0—More chloroform.
 3 21 10—Cornea insensitive.
 3 21 40—Needle in heart beating vigorously ; respirations deep.
 3 23 0—Respirations deep ; needle movements vigorous.
 3 23 30—Respirations chiefly abdominal ; needle movements vigorous ;
 more chloroform.
 3 24 20—Trachea exposed.
 3 24 45—Abdominal movements only ; needle movements vigorous.
 3 25 0—*Respiration stopped* ; needle movements vigorous.
 3 26 30—*Artificial respiration with bellows*.
 3 30 25—Artificial respiration stopped ; needle beating feebly and stopping.

Remarks.—In this experiment chloroform was given when the dog was struggling hard ; and after the respiration stopped the chloroform cap was accidentally left on a short time. Artificial respiration with bellows was commenced 1m. 30s. after the respiration had stopped.

EXPERIMENT LVI.

1ST MAY 1892.—Pariah puppy, 8 months old.

H. M. S.

- 3 0 30—Chloroformed on table with cap tightly applied ; struggling
 and holding breath.
 3 1 10—Needle in heart beating vigorously.
 3 2 20—*Respiration stopped* ; needle stopped.
 3 2 35—Needle recommenced beating.
 3 4 15—*Artificial respiration with bellows commenced*.
 3 8 0—Artificial respiration stopped ; needle not vibrating.

Remarks.—Chloroform was given to the dog on the table throughout and was pushed during struggling. The needle had apparently stopped with the respiration but recommenced beating after 5 seconds. Artificial respiration with bellows 1m. 55s. after the respiration had ceased was unsuccessful. A little time was lost in adjusting the nozzle of the bellows which did not at first accurately fit the trachea.

EXPERIMENT LVII.

- H. M. S. 2ND MAY 1892.—Full-grown pariah dog.
- 1 25 30—Dog in box with chloroform.
- 1 29 10—More chloroform ; dog sitting up.
- 1 33 45—More chloroform.
- 1 34 50— Do.
- 1 37 0—Fallen down, taken out ; cornea sensitive ; more chloroform given on cap ; struggling and holding breath.
- 1 39 40—Cornea insensitive.
- 1 40 0—Respirations deep ; needle inserted, movements vigorous ; chloroform cap loosely applied.
- 1 41 55—Sighing respirations ; needle movements vigorous.
- 1 43 30—Trachea exposed and opened.
- 1 44 10—Chloroform on cap close to face.
- 1 44 50—Respirations deep ; needle movements vigorous.
- 1 45 10—Respirations slow and sighing ; needle movements vigorous.
- 1 46 5—Prolonged expiration ; needle movements vigorous.
- 1 46 10—More chloroform.
- 1 47 15—Respirations slow and deep ; needle movements somewhat feeble.
- 1 47 20— } Eight breaths. During this period it was thought that the
- 1 51 45— } respiration had stopped.
- 1 52 0—Respirations very shallow ; needle vibrating.
- A 1 53 20—*Respiration stopped* ; needle stopped.
- 1 54 6—Needle beating.
- 1 54 25—*Artificial respiration with bellows* ; needle withdrawn.
- 1 56 30—Cornea sensitive ; breathing returned ; artificial respiration stopped.
- 1 59 55—Needle re-inserted, movements vigorous ; respirations good ; pulse vigorous.
- 2 0 45—Tracheal wound closed ; chloroform given in a large dose on cap tightly jammed over face ; dog struggling and holding breath.
- 2 2 20—Respiration stopped ; needle movements vigorous.
- 2 2 45—Spasmodic movements of abdominal muscles and attempts at respiration.
- 2 3 15—More chloroform ; needle movements fairly vigorous ; respirations shallow.
- 2 6 0—Very faint abdominal movements ; no air entering chest ; needle movements feeble.

H. M. S.

- B 2 6 55—*Respiration stopped*; needle stopped.
 2 7 55—*Artificial respiration with hands*. During the minute there were fourteen beats of needle.
 2 10 25—Needle vibrating.
 2 10 30—*Artificial respiration commenced with bellows*.
 2 14 0—Needle vibrating.
 2 21 30— Do.
 2 25 0—Needle stopped.

Remarks.—In A the needle stopped completely for 46 seconds during the interval which elapsed (1m. 55s.) between the cessation of natural and the employment of artificial respiration with bellows. In B chloroform in a large dose was given when the animal struggled and artificial respiration with hands was commenced 1 minute after the respiration had ceased, during which interval there were only 14 beats of the needle. Artificial respiration with bellows was commenced 3m. 35s. after the respiration had ceased and was unsuccessful.

EXPERIMENT LVIII.

2ND MAY 1892.—Pariah puppy.

H. M. S.

- 2 36 35—Dog in box with chloroform.
 2 39 40—More chloroform.
 2 40 10—Taken out and placed on table; struggling; large dose of chloroform on cap.
 2 40 25—Holding breath and struggling hard.
 2 41 40—Abdominal movements only; needle inserted, vibrating feebly.
 2 43 20—*Respiration stopped*; needle movements vigorous.
 2 44 20—*Artificial respiration with hands*.
 2 47 0—Needle in heart beating vigorously.
 2 49 35—Artificial respiration with bellows commenced.
 2 54 30—Artificial respiration stopped; needle stopped.

Remarks.—In this experiment a large dose of chloroform was purposely given when the animal was struggling, and the needle movements soon after, *viz.*, at 21h. 41m. 40s., became feeble. When respiration actually stopped the movements were vigorous. Artificial respiration with hands was commenced 1 minute, and artificial respiration with bellows 6m. 35s. after the respiration had ceased, but was not successful.

EXPERIMENT LIX.

2ND MAY 1892.—Full-grown unhealthy pariah dog.

H. M. S.

- 2 53 0—Dog in box with chloroform.
 2 57 10—More chloroform.
 3 1 0—Taken out ; chloroform on cap ; whining and struggling.
 3 1 55—More chloroform ; still whining.
 3 2 20—Cornea insensitive ; cap removed.
 3 3 0—Noisy expiration.
 3 3 20—More chloroform ; regular breathing.
 3 3 40—Needle inserted.
 3 4 0—Chloroform stopped.
 3 5 30—Coming out.
 3 5 45—More chloroform ; holding breath.
 3 6 5—Natural breathing.
 3 6 20—Cap removed.
 3 8 0—Chloroform ; natural breathing.
 3 8 45—Respirations slow.
 3 9 10—Chloroform ; one breath of air given.
 3 9 25—Shallow respirations.
 A { 3 10 10—*Respiration stopped* ; needle wagging vigorously.
 { 3 11 22—Respiration recommenced ; cap removed after first inspiration.
 3 12 0—Breathing fairly again.
 3 13 20—Very shallow abdominal respiratory movements.
 3 14 40—Natural breathing.
 3 17 15—Winking.
 3 19 20—Chloroform given gently while incision was commenced for
 exposing left vagus.
 3 21 20—Chloroform stopped.
 3 22 40—More chloroform ; natural breathing.
 3 22 45—Struggling ; more chloroform.
 3 23 15—Cap removed ; cornea insensitive.
 3 23 17—Vagus exposed and ligatured.
 3 23 45—Divided.
 3 24 48 } Time taken up in watching effects of vagus irritation on the
 to } needle movements which were not appreciably slowed.
 3 28 5 }
 3 28 5—Natural breathing.

H. M. S.

- 3 30 10 } Chloroform
 3 30 45 } Vagus irritation commenced } 39 beats of needle.
 3 31 30—Needle moving slowly.
 3 32 48—More chloroform.
 3 33 10—Irritation stopped ; cap removed.
 3 34 25—Irritation commenced }
 3 34 50—Irritation continued } 19 beats.
 3 35 5—Irritation stopped.

B 3 35 25—*No respiration* ; needle wagging.

3 36 10—Needle movements rapid and vigorous.

3 37 35—Beating again vigorously. { Respirations returned naturally.
 { In the interval chloroform given
 { gently.

3 42 30—Irritation commenced and chloroform.

3 42 55—Irritation stopped.

3 50 15—More chloroform. Natural breathing.

3 51 25—Respiration slow.

3 52 30—Respiration very slow.

C 3 52 48—More chloroform ; *respiration stopped*.

3 52 57—One gasp.

3 53 25— Do.

3 53 32— Do.

3 53 38— Do.

3 53 48— Do.

3 54 10—Needle wagging slowly.

3 54 30—Needle movements feeble.

3 54 45—Needle movements more vigorous.

3 55 50—Irritation commenced ; movements made much stronger.

3 55 25—Irritation stopped.

3 55 55—*Breathing naturally*.

3 56 20—More chloroform.

3 56 50—Very slow respirations.

3 57 0—*Respiration stopped*.

3 57 10—Needle movements vigorous.

3 57 25—Needle slowing.

3 57 55—Needle vibrating.

H. M. S.

3 58 15—Needle stopped.

3 58 35—Cap removed.

3 58 50—Needle stopped.

Remarks.—In this experiment the peripheral end of the cut vagus was irritated on several occasions, but no marked slowing of the needle was produced. The animal recovered three times naturally after the respiration had ceased.

EXPERIMENT LX.

3RD MAY 1892.—Large sized pariah dog.

H. M. S.

1 21 30—Dog in box with chloroform.

1 26 15—More chloroform ; sitting up.

1 31 30—Lying down.

1 33 10—Taken out ; cornea sensitive ; struggling ; chloroform on cap loosely applied.

1 35 45—Cornea insensitive.

1 36 10—Needle inserted, vibrating vigorously.

1 37 10—More chloroform.

1 38 0—Respirations sighing ; needle movements vigorous.

1 39 10—Respirations good ; needle movements vigorous.

1 40 5—Respirations shallower ; needle movements vigorous.

1 40 40—More chloroform.

1 41 0—Respirations quick and shallow ; needle movements vigorous.

1 42 50—Respirations slow ; little air entering lungs ; needle movements still vigorous.

1 44 15—Respirations deep and laboured ; snoring ; needle movements fairly vigorous but slower.

1 45 30—Cap removed ; dog allowed to come out.

1 47 10—Cornea still insensitive.

1 53 0—Needle found to be beating so very fast that an observation was made comparing the pulse to the needle beats when it was found that they did not correspond.

1 54 10—Cornea sensitive.

1 55 50—Dog struggling on table.

1 57 5—A large dose given on cap tightly jammed over the face ; struggling hard.

H. M. S.

- 1 57 15—Holding breath. Needle stopped.
 1 57 45—Needle beating again.
 1 58 30—Cornea insensitive ; deep snoring ; needle vibrating.
 1 59 0—Abdominal movements only ; no air entering chest ; needle vibrating.
 1 59 50—*Respiration stopped* ; needle stopped.
 2 0 0—Needle moving.
 2 0 45— „ „
 2 1 20—Artificial respiration with hands.
 2 11 20— „ „ stopped.

Remarks.—In the first experiment, when chloroform was given gently with the cap loosely applied, the needle never stopped vibrating. In the second, when the animal was allowed to come out and a large dose of chloroform was given with the cap tightly jammed over the face while he was struggling, the needle stopped suddenly for 30 seconds. The respiration ceased very abruptly and the needle also at the same time, but the latter recommenced vibrating. Artificial respiration with hands was commenced 1m. 30s. after the respiration had ceased, and proved unsuccessful.

EXPERIMENT LXI.

3RD MAY 1892.—Healthy large-sized pariah dog.

H. M. S.

- 2 15 0—Dog in box with chloroform.
 2 19 0—More chloroform.
 2 24 5—Taken out and allowed to come out.
 2 24 45—Needle in heart vibrating vigorously.
 2 25 15—Respirations slow ; needle movements slow and vigorous.
 2 25 20—Struggling ; cornea sensitive.
 2 25 30—Needle movements feeble.
 2 27 5—Needle movements slow.
 2 28 30—Respirations deep ; needle movements fairly vigorous.
 2 30 5—Large dose of chloroform given ; cap tightly jammed over face ; struggling and holding breath.
 2 30 45—Needle stopped. } Six beats of needle.
 2 31 15— }

H. M. S.

- 2 31 20—Needle movements feeble; respirations shallow; little air entering chest.
- 2 31 45—Respirations deep and gasping; needle vibrating.
- 2 32 30—Snoring; needle vibrating.
- 2 34 0—Abdominal movements only; needle movements more vigorous.
- 2 34 35—More chloroform.
- A 2 35 30—*Respiration stopped*; needle movements fairly vigorous.
- 2 35 50—Trachea exposed.
- 2 36 0—Needle movements feeble and intermittent.
- 2 36 55—*Artificial respiration* with bellows.
- 2 37 45—Dog gasping. Artificial respiration stopped.
- 2 38 5—Artificial respiration commenced again as the gasping became fainter and stopped.
- 2 39 40—Artificial respiration stopped. Thought to be dead.
- 2 39 45—Needle in heart vibrating.
- 2 39 50—*Respirations recommenced spontaneously*.
- 2 43 10—Cornea sensitive.
- 2 45 30—Whining.
- 2 45 45—Chloroform pushed again on cap tightly held over the face.
- 2 47 10—Respirations abdominal; needle in heart vibrating slowly.
- 2 48 30—More chloroform.
- 2 49 40—Abdominal movements only; needle movements rapid, but feeble.
- B 2 50 50—*Respiration stopped*; needle stopped; cap removed.
- 2 50 50 } Eighteen beats of needle.
- 2 52 0 }
- 2 52 0—Gasped.
- 2 52 50—Gasping stopped again.
- 2 53 0—*Artificial respiration with bellows*.
- 2 55 40—Needle in heart beating feebly.
- 2 58 20—Artificial respiration stopped; needle stopped.

Remarks.—In this experiment A, when a large dose of chloroform was given with the cap tightly jammed over the face while the animal struggled, the needle stopped completely for some time, and for 30 seconds there were only six beats. Artificial respiration with bellows was commenced 1m. 25s. after respiration had ceased, and the dog recovered. B. The dog was afterwards purposely killed with an over-dose of chloroform.

EXPERIMENT LXII.

3RD MAY 1892.—Medium-sized pariah dog.

H. M. S.

3 23 0—Dog in box with chloroform.

3 27 0—More chloroform.

3 30 20— Do.

3 21 0—Fallen down.

3 26 46—On table.

3 33 22—Chloroform on cap tightly jammed over the face ; struggling and holding breath.

3 34 0—Whining.

A 3 34 10—*Respiration stopped.*

3 34 15—Needle inserted, feeble. Attempts made to respire.

3 34 55—Whining and gasping.

3 35 7—Chloroform added ; cap jammed on ; suffocated.

3 35 50—Needle movements intermittent ; respiration very much obstructed.

3 36 20—Respiration very slow but deep ; needle movements feeble and slow.

3 37 17—Chloroform added, one breath.

3 37 30—Respiration slow, 8 a minute ; very shallow.

B 3 37 53—*Respiration stopped.*

3 38 30—Needle movements slow.

3 38 40—Tracheotomy.

3 39 18—Tube inserted ; needle movements very slow and feeble.

3 39 25—Needle removed. *Artificial respiration with bellows commenced.*

3 40 3—Attempts at natural respiration. Artificial stopped.

3 40 15—Natural breathing

3 40 50—Stopped breathing.

3 41 2—Heart needle re-inserted, slow, vigorous movements.

3 41 23—Needle taken out. Artificial respiration by bellows commenced again.

3 42 0—The femoral pulse now felt ; moving lips.

3 42 38—Artificial respiration stopped.

3 42 50—Pulse intermittent.

3 42 57—One breath taken ; needle inserted, movements very vigorous.

3 43 10—Natural breathing.

3 44 0—Cornea sensitive.

H. M. S.

- 3 46 0—Chloroform given with plenty of air.
 3 47 30—Needle in heart moving vigorously.
 3 48 45—Chloroform given through tracheal opening.
 3 49 25—Respiration shallow ; needle movements vigorous.
 3 49 35—Respiration very shallow.
 3 49 55—More chloroform.
 3 50 15—Respiration sighing and irregular ; needle movements vigorous.
 3 51 0—Respiration slow but deep ; needle movements slow but vigorous.
 3 51 15—Respiration shallow ; needle movements slow.
 3 51 30—Respiration abdominal ; needle movements slow but vigorous.
 3 51 46—No air entering chest.
 3 53 52—More chloroform.
 3 54 30—Needle slow ; respiratory movements barely visible.
 3 55 43—Respiration stopped ; needle movements very slow ; cap removed.
 3 57 0—Breathing returned.
 3 57 30—Pulse felt, very feeble.
 C 3 58 20—*Respiration stopped* ; needle movements vigorous.
 3 58 40—Needle movements fairly vigorous.
 3 59 0—Breathing again.
 3 59 15—Breathing feeble.
 4 0 0—Cornea sensitive.
 4 2 0—Chloroform pushed to death.
 4 5 10—Respiration stopped ; needle movements still fairly vigorous.
 4 5 30—Needle movements feeble.
 4 6 10—Needle stopped.

Remarks.—In A chloroform was given during the struggling stage with the cap tightly jammed over the face. The respiration stopped very soon afterwards, the needle beats at this time being feeble. The dog recovered naturally. In B chloroform was given as before. Artificial respiration with bellows was commenced 1m. 32s. after the respiration had stopped, and was successful. At the time artificial respiration was commenced, the needle beats were slow but vigorous. In C chloroform was given with plenty of air. At the time the respiration stopped the needle was beating vigorously, and the dog recovered naturally. In this experiment all attempts made to permanently stop the heart with large doses of chloroform before the respiration failed.

EXPERIMENT LXIII.

4TH MAY 1892.—Medium-sized pariah dog.

H. M. S.

- 1 37 20—Dog in box with chloroform.
 1 42 50—More chloroform.
 1 46 30— Do.
 1 54 40— Do.
 2 3 5— Do.
 2 4 15—Fallen down and placed on table ; cornea insensitive.
 2 5 10—Needle inserted ; movements vigorous ; respirations irregular and gasping.
 2 6 45—Dog coming out ; whining ; cornea sensitive.
 2 7 30—Large dose on cap ; chloroform pushed.
 2 7 45—Struggling and holding breath.
 2 7 50—Needle vigorous.
 2 8 10—Respirations deep ; needle movements vigorous.
 2 8 30—Respirations shallower ; needle movements vigorous.
 2 9 5—Needle fairly vigorous ; respirations slow.
 2 10 0—*Respiration stopped* ; needle movements vigorous.
 2 11 0—*Artificial respiration with bellows commenced*.
 2 15 5—Needle just vibrating.
 2 22 30—Artificial respiration stopped ; needle stopped.

Remarks.—In this experiment a large dose of chloroform was given during struggling, and the needle movements at this time became exceedingly irregular. Artificial respiration with the bellows was commenced 1 minute after respiration had ceased and was unsuccessful.

EXPERIMENT LXIV.

4TH MAY 1892.—Very large pariah dog.

H. M. S.

- 2 27 30—Dog in box with chloroform.
 2 28 0—More chloroform.
 2 32 30— Do.
 2 34 40—On table yelping ; cornea insensitive.
 2 35 10—Breathing regular ; needle inserted, movements vigorous.
 2 38 45—More chloroform.

H. M. S.

- 2 39 10—Cap removed ; respirations regular ; needle movements vigorous.
 2 40 10—Animal allowed to come well out.
 2 41 30—Respirations good ; needle movements vigorous.
 2 45 10—Cornea sensitive ; respirations quick.
 2 47 0—Needle movements vigorous ; respirations quick.
 2 48 50—Large dose of chloroform on cap tightly applied ; struggling.
 2 49 30—Needle movements vigorous.
 2 49 50—Respirations quick ; needle stopped for 20 seconds.
 2 50 40—Respirations snoring and laboured ; needle movements slow but vigorous.
 2 51 10—Respirations shallow ; little air entering chest ; needle movements slow.
 A 2 51 15—*Respiration stopped* ; needle movements slow but vigorous.
 2 52 15—*Artificial respiration with bellows commenced*.
 2 57 30—Pulse vigorous.
 2 59 10—Sudden yelp ; artificial respiration stopped ; natural breathing.
 3 2 30—More chloroform ; cap loosely applied ; yelping and holding breath ; needle movements irregular.
 3 3 10—Respirations quick and sighing ; needle movements vigorous.
 3 4 30—More chloroform.
 3 5 0—Respirations shallow ; needle movements feeble.
 3 5 45—Respirations deep ; needle movements feeble ; no pulse.
 3 6 30—More chloroform.
 3 7 0—It was thought respiration had stopped ; needle vibrating.
 3 7 30—One gasp ; needle movements more vigorous.
 3 8 20—Respirations very shallow ; needle vibrating.
 3 9 8—*Respiration stopped* ; needle movements fairly vigorous.
 3 10 8—*Artificial respiration with bellows commenced*.
 3 15 20—Needle re-inserted, movements very feeble.
 3 20 0—Needle stopped ; artificial respiration stopped.

Remarks.—In A a large dose of chloroform was given while the animal struggled, during which time the needle stopped completely for 20 seconds. Artificial respiration with bellows was commenced 1 minute after respiration had ceased and was successful. In B chloroform was given with the cap loosely applied, though not removed, when the animal struggled. Artificial respiration with bellows was commenced 1 minute after the respiration had ceased, but was unsuccessful.

EXPERIMENT LXV.

5TH MAY 1892.—Temperature 92° F.—Healthy pariah dog.

H. M. S.

- 1 38 50—Dog in box with chloroform.
- 1 42 40—More chloroform.
- 1 44 20— Do.
- 1 44 30—Struggling.
- 1 44 50—Dog fallen down.
- 1 44 55—Dog on the table.
- 1 45 0—More chloroform.
- 1 45 40— Do.
- 1 46 0—Cornea insensitive ; cap removed.
- 1 47 0—Respiration good ; needle inserted, movements vigorous.
- 1 47 30—Incision begun for exposing the trachea.
- 1 48 0—Respirations good ; needle movements vigorous ; cap removed ;
trachea exposed.
- 1 49 30—Cornea sensitive.
- 1 51 30—Large dose of chloroform ; cap jammed over the face.
- 1 52 0—Animal struggling ; respirations quickened ; needle movements
vigorous and fairly regular.
- 1 52 30—Respiration shallow.
- 1 52 50—Respiration very shallow.
- 1 53 0—*Respiration stopped* and the needle stopped for some seconds
at 1h. 53m. 25s.
- 1 54 0—*Artificial respiration with bellows.*
- 1 57 0—Needle re-inserted, movements fairly vigorous.
- 1 57 30—Needle removed.
- 1 59 10—Needle re-inserted, still beating somewhat feebly.
- 1 59 20—Needle removed.
- 2 1 43—Needle re-inserted, movements very feeble.
- 2 3 40—Needle re-inserted, just vibrating.
- 2 3 55—Needle removed.
- 2 5 30—Needle re-inserted, movements stopped ; artificial respiration
stopped.

Remarks.—In this experiment a large dose of chloroform was given when the animal was struggling, the cap being tightly jammed over the face. The needle stopped for some considerable time shortly after all movements had

ceased, and artificial respiration by means of bellows 1 minute afterwards was unsuccessful. At the time artificial respiration by bellows was commenced the needle had recommenced beating and the movements were then fairly vigorous.

At the *post-mortem* no blood was found in the pericardium and the right side of the heart was found to be enormously distended.

EXPERIMENT LXVI.

5TH MAY 1892.—Large-sized pariah dog.

H. M. S.

- 2 14 10—Dog in box with chloroform.
- 2 14 20—Struggling.
- 2 15 30—Struggling violently.
- 2 15 40—More chloroform.
- 2 16 3—Dog fallen down ; taken out and placed on table.
- 2 17 0—Cornea insensitive.
- 2 17 20—Respirations regular ; needle inserted, movements fairly regular.
- 2 18 10—Incision commenced for exposing trachea.
- 2 18 30—Respirations deep ; needle movements vigorous.
- 2 19 15—More chloroform.
- 2 19 23—Trachea exposed and incised.
- 2 20 0—Animal struggling ; large dose of chloroform ; cap jammed over face.
- 2 20 30—Holding breath, needle movements regular.
- 2 21 0—Respiration quick.
- 2 21 15—Respiration slow ; needle movements vigorous.
- 2 21 50—Respiration deep ; needle movements feeble.
- 2 22 0—Respiration shallow ; needle movements feeble.
- 2 22 20—*Respiration stopped* ; needle movements feeble ; cap removed.
- 2 22 30—Began breathing ; cap re-applied.
- 2 23 30—*Respiration stopped* ; needle movements very feeble.
- 2 24 30—Needle movements somewhat feeble ; *artificial respiration with bellows commenced.*
- 2 27 0—Pulse felt flickering.
- 2 28 30—No pulse.
- 2 28 35—Needle re-inserted, just moving.
- 2 30 50—Do. beating slowly and feebly.

H. M. S.

- 2 34 0—Needle re-inserted, beating irregularly.
- 2 34 30—Needle removed.
- 2 35 45—Needle re-inserted and vibrating.
- 2 37 0—Needle removed.
- 2 39 40—Needle re-inserted ; artificial respiration stopped ; needle just moving.
- 2 40 40—Needle stopped.

Remarks.—In this experiment chloroform in a large dose was given when the animal struggled. The needle movements during this time became feeble but never actually stopped. Artificial respiration by means of bellows 1 minute afterwards was unsuccessful.

EXPERIMENT LXVII.

6TH MAY 1892.—Temperature 92° F.—Medium-sized pariah dog.

H. M. S.

- 2 44 15—Dog in box with chloroform.
- 2 46 10—Struggling.
- 2 47 10—Chloroform.
- 2 49 20—Struggling.
- 2 50 0—Dog fallen down ; taken out and placed on table.
- 2 50 20—Cornea insensitive.
- 2 51 30—Respiration deep and slow ; needle inserted, movements vigorous.
- 2 51 50—Incision commenced for exposing trachea.
- 2 52 0—More chloroform ; cap loosely applied.
- 2 52 43—Respiration regular ; needle movements vigorous.
- 2 53 10—Trachea exposed and incised.
- 2 53 35—More chloroform ; cap loosely applied.
- 2 54 10—Respiration regular ; needle movements vigorous.
- 2 54 35—Respiration fairly regular ; needle movements vigorous.
- 2 55 15—More chloroform.
- 2 55 25—Respiration shallow ; needle movements vigorous.
- 2 56 25—More chloroform.
- 2 56 40—Respiration chiefly abdominal ; little air entering the chest ; needle movements vigorous.
- 2 57 40—Respiration shallow ; needle movements vigorous.

M. M. S.

2 57 50—Chloroform.

2 59 45—Abdominal movements only ; needle movements vigorous.

3 0 0—Chloroform.

A 3 1 10—*Respiration stopped*; needle movements vigorous.

33s { 3 1 35—Needle stopped
till
3 2 8—Needle beating fairly regularly.
3 2 10—*Artificial respiration with bellows commenced*.
3 4 30—Artificial respiration stopped ; natural breathing commenced.
3 5 20—Breathing regularly.
3 8 35—More chloroform ; cap loosely applied.
3 9 0—Needle re-inserted ; respiration deep and sighing and more
vigorous.
3 10 0—Respiration deep and regular ; needle movements vigorous.
3 10 40—More chloroform.
3 11 0—Respiration deep and regular ; needle movements vigorous.
3 12 5—More chloroform.
3 12 21—Respiration shallow ; needle movements fairly vigorous.
3 13 9—Respiration chiefly abdominal ; needle vibrating.
3 13 44—More chloroform.

B { 3 15 4—*Respiration stopped*; needle stopped
31s { till
3 15 35—Needle beating feebly.
3 16 4—*Artificial respiration with bellows commenced* ; needle feeble,
removed.
3 18 40—Needle re-inserted, beating feebly.
3 19 0—Needle stopped.
3 21 42—Needle re-inserted, vibrating.
3 24 0—Needle re-inserted, beating.
3 25 35—Needle stopped ; artificial respiration stopped.

Remarks.—In the first experiment A when the respiration was kept regular throughout the animal recovered with artificial respiration by means of bellows 1 minute after respiration had ceased : the heart stopping for 33 seconds in the interval. Artificial respiration was only necessary for 2m. 20s. In the second B, the needle was vibrating feebly for some time before respiration stopped and the needle stopped for 31 seconds in the interval which elapsed between stoppage of respiration and commencement of artificial respiration : the animal did not recover.

EXPERIMENT LXVIII.

7TH MAY 1892.—Temperature 94° F.—Medium-sized pariah dog.

H. M. S.

- 1 42 5—Dog in box with chloroform.
- 1 45 0—More chloroform.
- 1 48 45— Do.
- 1 52 50— Do.
- 1 53 40—Struggling.
- 1 54 44—Dog taken out and placed on table.
- 1 55 45—More chloroform on cap loosely applied.
- 1 56 10—Animal struggling ; cap loosely applied.
- 1 56 50—Cornea insensitive.
- 1 57 0—Respiration deep ; needle movements slow but vigorous.
- 1 57 10—Incision commenced for exposing trachea.
- 1 58 29—Respiration deep and slow ; needle movements vigorous.
- 1 58 55—Trachea opened.
- 2 0 40—Respiration deep ; needle movements vigorous.
- 2 4 30—Cornea sensitive.
- 2 7 44—Breathing quick ; needle movements vigorous ; struggling.
- 2 8 30—Big dose of chloroform given ; cap jammed over face.
- 2 9 30—Holding breath ; needle movements irregular.
- 2 10 15—Needle stopped for 5 seconds.
- 2 10 20—Needle movements irregular ; respirations very shallow ; needle beat feeble and intermittent.
- 2 10 25—Abdominal movements only.
- 2 10 30—*Respiration stopped* ; needle movements fairly regular.
- A 2 11 30—*Artificial respiration with bellows commenced* ; needle fairly regular.
- 2 12 45—No pulse.
- 2 14 40—Faint abdominal movements ; needle re-inserted.
- 2 15 14—Natural respiration commenced ; artificial respiration stopped ; movements vigorous.
- 2 15 26—Respiration deep and regular ; needle movements vigorous.
- 2 19 0—Respiration deep ; needle movements vigorous.
- 2 20 25—More chloroform.
- 2 20 48—Struggling.
- 2 21 50—Respiration deep ; needle movements vigorous.
- 2 22 0—More chloroform.

H. M. S.

- 2 22 40—Respiration shallow ; needle movements vigorous.
- 2 23 0—Respiration shallow and abdominal ; needle movements vigorous.
- 2 23 50—Respiration deeper.
- 2 24 5—More chloroform.
- 2 24 13—Respiration stopped ; needle movements vigorous.
- 2 26 0—Movements of chest commenced again.
- 2 26 20—More chloroform.

- B 2 26 30—*Respiration stopped* ; needle movements vigorous.
- 2 27 30—*Artificial respiration commenced* ; needle movements fairly vigorous.
- 2 28 14—Feeble pulse.
- 2 28 35—No pulse.
- 2 29 30—Pulse returned, quick.
- 2 30 25—Pulse strong, natural ; respiration commenced ; artificial respiration stopped ; cornea sensitive.
- 2 32 31—Big dose of chloroform ; cap jammed over the face ; needle movements vigorous.
- 2 33 0—Respiration deep ; needle movements irregular, stopping for a few seconds.
- 2 33 20—Needle stopped.
- 2 33 45—Needle movements very irregular.
- 2 34 0—Needle movements vigorous.

- C 2 34 55—*Respiration stopped*.

Even when the chloroform was pushed, the respirations were fairly regular.

- 2 37 40—Needle movements vigorous.
- 2 39 12—No pulse.
- 2 40 10—Needle feeble.
- 2 40 20—*Artificial respiration commenced with bellows*.
- 2 42 30—Needle vibrating.
- 2 43 44—Needle stopped.

Remarks.—In this experiment A a large dose of chloroform was given when the animal was struggling. Artificial respiration by means of bellows was commenced 1 minute after all movements had ceased and was successful. In the next experiment B chloroform was given gently throughout. Artificial respiration with bellows was commenced 1 minute after the cessation of the respiration and proved successful. In the third experiment C a large dose of chloroform was given. Artificial respiration with bellows was commenced 6m. 25s. after the cessation of respiration but was not successful.

EXPERIMENT LXIX.

7TH MAY 1892.—Temperature 94° F.—Large pariah dog.

H. M. S.

- 2 46 0—Dog in box with chloroform.
- 2 49 22—More chloroform.
- 2 51 20—Struggling.
- 2 51 50—Struggling still.
- 2 52 58—Dog fallen down.
- 2 54 0—Struggling violently.
- 2 55 8—More chloroform.
- 2 56 30—Dog taken out and placed on table.
- 2 57 35—More chloroform gently.
- 2 58 0—Incision commenced for exposing the trachea.
- 2 58 34—Cornea insensitive.
- 2 59 22—Trachea opened.
- 3 1 10—Cornea sensitive.
- 3 1 24—Respiration regular ; needle movements vigorous.
- 3 3 40—Struggling.
- 3 4 20—Big dose of chloroform ; cap tightly jammed over face.
- 3 4 35—Struggling violently ; holding breath.
- 3 5 12—Respiration gasping.
- 3 5 50—Needle movements irregular and feeble ; respiration quick and shallow.
- 3 6 32—Abdominal movements.
- 3 6 40—More chloroform ; gasping respiration ; needle moving very feebly.
- 3 8 0—More chloroform.
- 3 8 24—Respiration quick and shallow ; needle movements fairly vigorous but slow.
- 3 9 50—Abdominal movements only ; needle movements very feeble and irregular.
- 3 10 20—Needle movements very irregular.
- 3 11 0—More chloroform.
- 3 11 15—Faint abdominal movements.
- 3 11 46—Faint abdominal movements ; needle movements fairly vigorous but irregular.
- 3 12 38—More chloroform.
- 3 12 48—Respiration deeper.

H. M. S.

- A 3 13 13—Needle movements fairly vigorous ; *respiration stopped*.
- 43s. { 3 13 20—Needle stopped.
 3 14 3—Needle began to move again.
 3 14 13—*Artificial respiration commenced by means of bellows*.
 3 15 40—Natural respiration commenced ; respiration deep.
 3 17 45—Big dose of chloroform ; cap jammed over face.
 3 18 10—Struggling and holding breath ; needle movements vigorous.
 3 18 35—Needle vibrating.
 3 18 40—Needle stopped.
 3 18 55—Needle began beating again, feeble.
 3 19 36—Respiration shallow ; needle vibrating.
 3 20 0—Needle stopped.
 3 20 40—Respiration shallow ; needle just vibrating.
 3 21 5—More chloroform ; needle just vibrating.
 3 21 30—*Respiration stopped* ; needle stopped.
 3 22 0—Needle vibrating.
 3 22 15—Needle movements vigorous. Respiration began naturally.
- B { 3 22 40—*Respiration and needle stopped*.
 3 23 30—Needle began vibrating again.
 3 23 40—Artificial respiration began (bellows).
 3 27 31—Artificial respiration stopped ; the animal dead.

Remarks.—In the first experiment A a large dose of chloroform was given when the animal struggled violently, and artificial respiration with bellows was commenced 1 minute after the respiration had ceased, the needle completely stopping in the interval for 43 seconds. The dog recovered. In the second experiment B chloroform was given in the same way and artificial respiration with bellows commenced 1 minute after cessation of respiration. The needle stopped completely for 50 seconds and then recommenced vibrating. Artificial respiration was employed but the dog did no recover.

EXPERIMENT LXX.

7TH MAY 1892.—Temperature 94° F.—Medium sized healthy pariah dog.

H. M. S.

- 3 33 10—Dog in box with chloroform.
 3 35 10—More chloroform.
 3 36 50—Struggling.

H. M. S.

- 3 37 15—Dog fallen down.
- 3 37 40—Struggling violently.
- 3 38 0—Dog taken out of the box and placed on table.
- 3 38 30—More chloroform.
- 3 38 43—Cornea insensitive.
- 3 39 20—Incision commenced for exposing trachea.
- 3 40 40—Trachea laid open.
- 3 41 50—Needle in heart beating vigorously.
- 3 42 0—Big dose of chloroform ; cap jammed over face.
- 3 42 18—Struggling and holding breath.
- 3 43 0—More chloroform.
- 3 43 12—Respiration shallow ; needle movements fairly vigorous and regular.
- 3 43 34—Respirations abdominal ; needle movements very irregular and somewhat feeble.
- 3 44 1—*Respiration stopped* ; needle movements vigorous and irregular.
- 3 45 1—Artificial respiration begun (bellows) ; needle movements fairly vigorous.
- 3 47 55—Needle re-inserted, movements fairly vigorous.
- 3 50 0—Needle re-inserted, movements feeble.
- 3 51 45—Needle re-inserted, feebly moving.
- 3 53 25—Needle movements feeble.
- 3 54 30—Needle just vibrating.
- 3 55 40—Needle re-inserted, just vibrating.
- 3 57 45—Artificial respiration stopped ; needle stopped.

Remarks.—Chloroform was given in a large dose when the animal was struggling. Artificial respiration by bellows was commenced 1 minute after respiration had ceased. Though the needle at the time it was commenced was fairly vigorous the dog did not recover.

EXPERIMENT LXXI.

8TH MAY 1892.—Temperature 94° F.—Large pariah dog.

H. M. S.

- 1 19 0—Dog in box with chloroform.
- 1 22 10—More chloroform.
- 1 26 17— Do.

H. M. S.

- 1 27 20—Struggling.
- 1 28 0—Struggling violently.
- 1 29 50—Stopped struggling and fell down.
- 1 30 14—Dog taken out.
- 1 30 20—More chloroform.
- 1 31 0—Struggling slightly.
- 1 31 20—Cornea insensitive.
- 1 32 15—Respiration regular, somewhat slow ; needle inserted, movements vigorous.
- 1 33 0—Incision commenced for exposing left vagus ; more chloroform.
- 1 33 42—Slight struggling.
- 1 34 0—Respiration deep and regular ; needle movements vigorous.
- 1 35 40—More chloroform ; respiration deep and regular ; needle movements vigorous.
- 1 36 46—Respiration deep and regular ; needle movements vigorous.
- 1 37 20—More chloroform.
- 1 39 0— Do.
- 1 40 12—Left vagus exposed.
- 1 41 10—More chloroform and incision commenced for exposing the right vagus.
- 1 41 50—Respiration deep and regular ; needle movements vigorous.
- 1 42 10—More chloroform ; respiration rapid ; needle movements vigorous.
- 1 43 35—More chloroform.
- 1 44 6—Respiration slow and regular ; needle movements vigorous.
- 1 47 30—More chloroform.
- 1 48 10—Right vagus exposed.
- 1 49 0—Respiration regular ; needle movements vigorous.
- 1 49 22—Right vagus cut ; respiration deeper.
- 1 50 48—Left vagus cut ; respiration deeper ; needle movements vigorous.
- 1 51 20—More chloroform ; needle movements irregular.
- 1 52 0—Respiration very deep and sighing.
- 1 52 50—Respiration deep and slow ; needle movements vigorous.
- 1 53 40—Respiration very shallow ; needle movements still vigorous.
- 1 53 44—More chloroform.
- 1 54 30—Respiration deep and regular ; needle movements vigorous ; pulse vigorous.
- 1 55 30—Respiration slow ; needle movements somewhat feeble.

H. M. S.

- 1 56 8—More chloroform.
- 1 56 35—Respiration very slow and shallow ; needle movements feeble.
- 1 57 20—Respiration stopped.
- 1 57 22—Another respiration ; needle beating.
- A. 1 57 50—*Respiration stopped* ; needle beating.
- 1 58 30—Needle movements fairly vigorous.
- 1 58 50—*Artificial respiration commenced with bellows* ; needle movements stronger ; removed.

- 1 59 50—Pulse vigorous.
- 2 0 30—Deep respiration commenced ; pulse strong and quick.
- 2 1 42—Respiration deep and regular ; needle re-inserted, movements vigorous.
- 2 2 40—Cornea sensitive.
- 2 6 10—Respiration somewhat jerky ; needle movements vigorous ; dog moving.
- 2 8 0—Big dose of chloroform ; cap tightly jammed over the face.
- 2 8 10—Dog struggling hard.
- 2 8 30—Needle movements somewhat tetanic and irregular.
- 2 9 5—Respiration stopped ; abdominal movements only ; needle feeble.

- B. 2 9 50—*Respiration stopped* ; needle vibrating
- 2 10 30—Needle movements more vigorous.
- 2 10 50—*Artificial respiration commenced* with bellows.
- 2 11 20—Pulse feeble and quick.
- 2 12 10—Pulse very quick and fairly vigorous.
- 2 12 30—Natural respiration commenced.
- 2 12 50—Needle movements extremely quick.
- 2 13 8—Respiration very deep, gasping and slow.
- 2 14 30—Respirations deep and gasping ; needle movements vigorous but somewhat tetanic.
- 2 15 0—Pulse does not correspond to the needle beats and is considerably slower.
- 2 15 40—Respirations quick and deep ; needle movements quick and vigorous.
- 2 16 20—Cornea sensitive.
- 2 16 45—Big dose of chloroform ; cap tightly jammed.
- 2 17 0—Needle movements vigorous and quick ; respirations irregular.
- 2 17 40—Respiration stopped ; needle vibrating.

H. M. S.

- 2 18 5—Respiration commenced again.
 2 18 40—Respiration deep ; needle movements fairly vigorous.
 C. 2 19 40—*Respiration stopped* ; needle movements somewhat feeble.
 2 20 40—Needle movements stronger.
 2 21 0—Needle tetanic.
 2 21 40—Needle movements slow but fairly vigorous still.
 2 22 32—Needle movements very feeble.
 2 23 25—Needle stopped.

Remarks.—In this experiment both vagi were cut. At no time was any stoppage of the needle observed, though during the struggling stage the movements were, like the struggles, irregular. On section of the vagi the needle movements became quick and somewhat tetanic and the respirations deep and slow. Twice (in A and B) after respiration had ceased artificial respiration by bellows was successful, and in the last experiment C though the needle movements at 2h. 20m. 40s. were fairly strong, the dog did not recover.

EXPERIMENT LXXII.

8TH MAY 1892.—Temperature 94° F.—Young pariah dog.

H. M. S.

- 2 27 0—Dog in box with chloroform.
 2 28 45—More chloroform.
 2 31 15— Do.
 2 34 24— Do.
 2 36 20—Slight struggling.
 2 37 20—Struggling hard.
 2 39 0—Struggling still.
 2 40 16—More chloroform.
 2 40 30—Stopped struggling and fell down.
 2 41 19—More chloroform.
 2 41 35—Cornea insensitive.
 2 41 58—Needle inserted, movements vigorous ; respirations regular.
 2 42 15—Incision commenced for exposing the left vagus.
 2 43 5—More chloroform ; animal struggling ; needle movements vigorous.
 2 43 30—Respiration deep and regular ; needle movements vigorous.
 2 44 32—More chloroform.

H. M. S.

- 2 45 0—Respiration quick and regular ; needle movements vigorous.
 2 45 30—More chloroform.
 2 46 10— Do.
 2 47 40—Left vagus exposed.
 2 48 0—More chloroform ; respiration slow and regular ; needle movements vigorous.
 2 48 46—Respiration deep ; needle movements vigorous. Incision commenced for the right vagus.
 2 49 0—More chloroform.
 2 49 50— Do.
 2 51 0—Respiration slow and deep ; needle movements vigorous.
 2 52 12—More chloroform.
 2 53 0— Do.
 2 53 25—Respiration slow and deep ; needle movements vigorous.
 2 53 50—Right vagus exposed and cut.
 2 54 20—Left vagus cut ; movements of the needle quickened and respiration deeper.
 2 56 20—Respiration slow and gasping ; needle movements vigorous.
 2 56 42—Trachea incised.
 2 57 30—Chloroform given on cap loosely applied.
 2 57 50—Respiration slow ; needle movements vigorous and somewhat tetanic.
 2 58 18—Respiration very slow ; dog struggling ; needle movements quick.
 2 58 56—More chloroform.
 2 59 0—Respiration deep ; needle still somewhat tetanic and vigorous.
 2 59 30—Holding breath and struggling.
 2 59 45—Respiration very slow ; needle movements vigorous and tetanic.
 3 1 19—Respiration deep and very slow ; needle movements vigorous and tetanic.
 3 2 25—More chloroform.
 3 2 41—Respiration very shallow ; needle movements vigorous and quick.
 A. 3 3 30—*Respiration stopped.*
 3 3 45—Needle movements very quick.
 3 4 30—*Artificial respiration commenced with bellows.*
 3 5 0—Pulse quick and strong.
 3 5 20—Natural respiration commenced.

H. M. S.

- 3 6 5—Needle re-inserted, movements very vigorous.
- 3 7 25—Respiration regular; needle movements vigorous; cornea sensitive.
- 3 18 10—More chloroform gently.
- 3 20 10—Vagus irritation commenced and cell found to be working.
- 3 21 10—Irritation of the peripheral end of right vagus commenced, 36 beats in the minute. Needle stopped completely for about 30 seconds.
- 3 23 10—More chloroform.
- 3 23 58—Respiration deep; needle movements vigorous.
- 3 24 30—Respiration very shallow; needle movements vigorous.
- 3 24 50—More chloroform.
- B. 3 25 30—Respiration stopped. Irritation of the peripheral end of right vagus commenced.
- 3 26 30—Twenty-one beats a minute. Began breathing naturally. Needle stopped completely for a considerable time. Irritation stopped.
- 3 26 30—Needle movements very vigorous.
- 3 29 5—Cornea sensitive.
- 3 30 10—More chloroform.
- 3 30 30—Respiration deep; needle movements very vigorous.
- 3 31 20—Respiration slow; needle movements vigorous.
- 3 32 7—More chloroform.
- 3 32 25—Respiration deep; needle movements vigorous.
- 3 33 0—Respiration abdominal; no air entering the chest.
- 3 33 40—Respiration deep and slow; needle movements vigorous.
- 3 34 15—*Respiration stopped*; needle movements vigorous.
- 3 34 30—Began breathing again; needle movements vigorous.
- 3 35 25—More chloroform.
- C. 3 37 45—*Respiration stopped*; needle movements vigorous and very tetanic.
- 3 39 20—Needle movements slow.
- 3 39 55—Natural respiration recommenced; needle movements slow and irregular.
- 3 40 45—*Respiration stopped again*; needle movements slow.
- 3 41 20—Needle stopped.

Remarks.—The effect of cutting both vagi was to make the respiration deeper and the needle movements vigorous and tetanic in character. After both vagi had been cut, artificial respiration by means of bellows A was commenced

1 minute after cessation of respiration and was successful. When peripheral end of right vagus was stimulated B the needle stopped completely for a considerable time, and there were only 21 beats in the minute and natural respiration returned very quickly. Lastly C when vagus stimulation was omitted, though the needle movements were very vigorous and tetanic at the time, the animal did not recover although natural respiratory movements returned, but these soon subsided and the needle stopped finally 1m. 25s. afterwards.

No blood was found in the pericardium after death.

EXPERIMENT LXXIII.

9TH MAY 1892.—Young healthy pariah dog.

H. M. S.

1 31 35—Dog in box with chloroform.

1 35 35—More chloroform.

1 37 55— Do.

1 40 20—Dog fallen down and struggling.

1 41 0—More chloroform.

1 42 0—Cornea insensitive; moaning; respiration regular; needle inserted, movements vigorous.

1 42 40—More chloroform. Incision commenced for exposing the left vagus.

1 43 50—More chloroform.

1 44 45— Do.

1 45 50— Do.

1 47 21— Do.

1 47 30—Vagus (left) exposed.

1 48 30—Incision commenced for exposing the right vagus.

1 54 10—More chloroform.

1 54 30—Right vagus exposed.

1 55 20—Respiration deep and regular; needle movements vigorous.

1 55 40—Right vagus cut.

1 55 55—Left vagus cut.

1 56 35—More chloroform.

1 57 10—Respiration deeper and slow; needle movements quicker.

2 0 20—Vagus tied.

2 0 45—Respiration deep; needle movements very vigorous and somewhat tetanic.

2 0 47—More chloroform.

H. M. S.

- 2 1 20—Respiration deep ; needle movements vigorous.
 2 1 56—Respiration slow and deep ; needle movements somewhat irregular and vigorous.
 2 2 55—Vagus irritation tested.
 2 3 10—Respiration very slow, abdominal movements only ; needle movements slow.
 2 3 40—More chloroform.
 2 4 10—Needle movements very slow ; respiration deep.
 2 5 0—*Respiration stopped* ; needle movements somewhat slow ; *irritation commenced*.
 2 6 0—28 beats a minute ; irritation stopped.
 2 6 20—Needle movements becoming more vigorous.
 2 8 30—Respiration returned ; needle movements vigorous.
 2 8 58—Respiration shallow again.
 2 9 3—*Respiration stopped*.
 2 9 50—Needle movements feeble.
 2 10 10—Needle nearly stopped ; *artificial respiration commenced*.
 2 15 20—Artificial respiration stopped ; needle re-inserted ; all movements stopped.

Remarks.—In this experiment both vagi were divided and the cardiac end of the right was stimulated for 1 minute when respiration stopped. The needle stopped completely for some time during this interval, and there were only 28 beats in the minute. No natural recovery followed, and artificial respiration, tried 5m. 10s. after the respiration had stopped, was unsuccessful.

EXPERIMENT LXXIV.

9TH MAY 1892.—Temperature 95° F.—Medium-sized pariah dog.

H. M. S.

- 2 19 0—Dog in box with chloroform.
 2 21 40—More chloroform.
 2 27 20—Do.
 2 28 30—Animal struggling.
 2 32 10—Animal fallen down and taken out of the box.
 2 33 8—Needle inserted, movements vigorous ; respiration very slow.
 2 34 10—Chloroform gently given ; respiration regular ; needle movements vigorous.
 2 34 50—Respiration regular ; needle movements quick.

H. M. S.

- 2 35 34—More chloroform.
 2 36 10—Respiration stopped for 10 seconds ; needle movements slow.
 2 36 40—Respiration commenced.
 2 37 30—Respiration shallow ; needle movements slow and somewhat irregular.
 2 38 30—More chloroform.
 2 38 42—Respiration very slow ; needle movements fairly vigorous.
 2 39 15—Abdominal movements only ; needle movements fairly vigorous but slow.
 A 2 39 50—*Respiration stopped. Minims 20 of ether injected. I.*
 2 40 30—Needle very slow and irregular.
 2 40 40—Needle stopped for about 5 seconds and then recommenced beating.
 2 40 50—*Injection of another 20 minims of ether. II.*
 2 41 20—Needle quicker but the beats feeble.
 2 42 30—*Minims 20 ether injected. III.*
 2 43 10—Needle vibrating.
 2 44 10—Needle stopped.
 B 2 44 40—*Artificial respiration tried unsuccessfully.*

Remarks.—In this experiment A 60 minims of ether were injected subcutaneously after the breathing had ceased and artificial respiration B was commenced 4m. 50s. after the respiration had ceased. The dog did not recover.

EXPERIMENT LXXV.

9TH MAY 1892.—Temperature 95° F.—Large pariah dog.

H. M. S.

- 2 48 0—Dog in box with chloroform.
 2 53 44—More chloroform.
 2 54 30—Dog struggling violently.
 2 55 50—Dog fallen down and taken out of the box.
 2 56 30—More chloroform.
 2 56 50—Animal struggling and holding breath.
 2 57 30—Animal yelping.
 2 57 50—Needle movements feeble.
 2 58 40—Needle moving very feebly.
 2 59 25—Respiration shallow ; needle just moving ; cap jammed tightly over the face.

H. M. S.

- 3 31 30—More chloroform.
 3 34 0—More chloroform ; right vagus exposed.
 3 36 5—Left vagus cut.
 3 36 20—Animal struggling.
 3 36 40—Respiration deep ; needle movements irregular.
 3 36 50—More chloroform ; right vagus cut.
 3 37 10—Vagus irritation working. (Peripheral end of right stimulated.)
 A 3 37 20—*Vagus irritation commenced.*
 3 38 20—Fifteen beats.
 3 38 30—Respiration stopped. Irritation of peripheral end of right stopped.
 3 38 55—Respiration began again.
 B 3 41 0—*Vagus irritation commenced ; needle stopped.*
 3 41 30—Needle commenced beating again.
 3 41 30—Respiration deep and regular.
 3 42 2—*Respiration stopped.*
 3 43 10—Respiration commenced and vagus irritation stopped, 113 beats in 2m. 10s.
 2 45 40—More chloroform. (Big dose.)
 C 2 46 30—*Respiration stopped.*
 2 46 58—*Respiration recommenced.* Animal nearly coming out.
 2 48 20—More chloroform.
 2 49 41—Respiration stopped again ; needle beating fast.
 2 50 58—Very rapid beating of the needle, somewhat tetanic in character.
 2 51 55—Needle movements getting feeble and tetanic.
 2 54 0—Needle stopped.

Remarks.—~~When both vagi were divided no tetanic movement of the needle was observed.~~—In A, shortly before respiration stopped, the vagus was irritated for 1 minute, during which time there were only 15 beats of the needle, and 25 seconds after the respiration had stopped natural breathing began and the dog recovered. In B irritation was performed for 2m. 10s. and during this time the respiration stopped but recommenced again 1m. 10s. afterwards. (During irritation needle stopped for 30 seconds.) The animal was finally C killed by a large dose of chloroform, and it was only when the respiration had completely stopped that the needle movements became at all jerky or tetanic in character.

EXPERIMENT LXXVII.

- H. M. S. 12TH MAY 1892.—Temperature 95° F.—Small pariah dog.
- 1 12 30—Dog in box with chloroform.
 - 1 15 20—More chloroform.
 - 1 22 40— Do.
 - 1 27 0—Yelping ; more chloroform.
 - 1 29 40—Fallen down and taken out.
 - 1 30 30—Struggling.
 - 1 30 50—Chloroform on cap loosely applied ; yelping.
 - 1 31 35—Cornea insensitive.
 - 1 32 0—Respiration regular ; needle movements vigorous.
 - 1 32 5—Animal coming out ; respiration regular ; needle movements vigorous ; more chloroform.
 - 1 32 45—Needle slipped out and re-inserted.
 - 1 33 5—Needle stopped for a few seconds.
 - 1 33 10—Respiration regular ; needle movements irregular.
 - 1 34 30—Respiration regular ; needle movements vigorous.
 - 1 35 30—Respiration regular ; needle movements vigorous.
 - 1 36 10—Respiration shallow ; needle movements irregular ; pulse slow.
 - 1 36 20— } Needle stopping. } One beat.
 - 1 36 24— } }
 - 1 36 24 } } —One beat.
 - 1 36 28 }
 - 1 36 28 } } —One beat.
 - 1 36 32 }
 - 1 36 40 } } —Fourteen beats.
 - 1 36 40 }
 - 1 38 0—*Respiration stopped* ; needle movements irregular.
 - 1 38 10—*Injection of 30 minims of ether in thigh.*
 - 1 38 24—Needle vigorous but somewhat irregular.
 - 1 39 0—Needle beats more vigorously.
 - 1 39 15—Needle movements becoming quick.
 - 1 40 10—*Injection of 18 minims of ether into thigh.*
 - 1 41 45—Needle movements quick but feeble.
 - 1 42 10—Needle movements quicker and fairly vigorous.
 - 1 42 38—Needle stopped suddenly.

Remarks.—No recovery after injection of 33 minims of ether. A few drops were spilt owing to leakage of syringe. After the injection the needle movements became quicker, but whether due to the injection or not is doubtful. The needle finally stopped somewhat suddenly.

EXPERIMENT LXXVIII.

12TH MAY 1892.—Large sickly pariah dog.

H. M. S.

- 1 50 10—Dog in box with chloroform.
 1 53 15—More chloroform.
 1 56 10— Do.
 1 57 45—Fallen down.
 1 58 5—Taken out ; cornea insensitive.
 1 58 50—Respirations regular ; needle in heart beating vigorously.
 1 59 15—Struggling slightly ; more chloroform.
 2 0 0—Respirations regular ; needle movements vigorous.
 2 1 7—More chloroform.
 2 1 10—Respirations regular ; needle movements vigorous.
 2 3 20—Respirations quick and regular ; needle movements vigorous.
 2 5 0—Respirations quick and shallow ; needle movements fairly vigorous.
 2 6 35—More chloroform.
 2 9 0— Do.
 2 10 5—Cap tightly jammed over face.
 2 10 35—Respirations slow and deep ; needle movements vigorous.
 2 10 50—More chloroform.
 2 10 58—Respiration stopped.
 2 11 4—Respiration recommenced.
 2 11 35—*Respiration stopped* ; needle movements vigorous.
 2 12 0—*Minims 30 ether injected subcutaneously* ; needle withdrawn ;
artificial respiration commenced with hands.
 2 12 35—*Second injection of 30 minims of ether.*
 2 13 55—Needle in heart beating fairly vigorously.
 2 14 30—No pulse.
 2 18 10—Needle re-inserted, no movement ; artificial respiration stopped.

Post-mortem.—Right side of heart much distended. Left side contained no blood at all. A little blood found in the pericardium.

Remarks.—Artificial respiration with hands commenced 25 seconds after the respiration had ceased combined with the injection of 1 drachm of ether subcutaneously was unsuccessful.

EXPERIMENT LXXIX.

13TH MAY 1892.—Temperature 96.1° F.—Young dog.

H. M. S.

- 1 32 50—Dog in box with chloroform.
- 1 36 50—More chloroform.
- 1 40 20— Do.
- 1 41 0—Struggling.
- 1 43 30—Struggling violently.
- 1 44 0—Fallen down.
- 1 44 22—More chloroform ; cap loosely applied ; struggling violently.
- 1 45 20—Cornea insensitive.
- 1 46 0—Respiration regular ; needle movements vigorous.
- 1 46 40—Respiration regular ; needle movements very quick, somewhat tetanic.
- 1 47 0—More chloroform.
- 1 47 22—Respiration regular ; needle movements still quick and somewhat tetanic.
- 1 48 10—Respiration slow and shallow ; needle movements quick and tetanic.
- 1 49 0—More chloroform.
- 1 49 31—Respiration slow and regular ; needle movements vigorous but slow.
- 1 50 25—Respiration shallow ; needle movements irregular, stopping for a few seconds occasionally.
- 1 51 0—Respiration chiefly abdominal ; needle movements feeble and somewhat intermittent.
- A 1 52 0—*Respiration stopped ; injection of 15 minims of ether in the thigh.*
- 1 53 0—*Second injection of 15 minims of ether.*
- 1 53 5—*Artificial respiration commenced with hands ;* needle removed.
- 1 54 10—Respiration commenced ; needle re-inserted, movements quick and flickering.
- 1 55 0—Natural respiration returned ; needle movements quick and flickering.
- 1 56 20—Respiration regular and quick ; needle movements quick and tetanic.
- 1 57 10—Cornea sensitive.
- 1 58 47—More chloroform.
- 1 59 40—Respiration regular ; needle movements slow and somewhat tetanic.

H. M. S.

2 0 30—More chloroform.

2 1 0—Respiration regular ; needle movements feeble.

2 1 50—Respiration shallow ; needle movements feeble.

2 2 30—Respiration deeper ; needle movements very feeble.

2 3 28—Respiration chiefly abdominal ; needle movements extremely feeble.

2 4 0—Needle re-inserted, movements more vigorous.

B 2 4 15—*Respiration stopped* ; needle movements fairly vigorous.2 4 40—Cap removed ; 15 *minims of ether injected in thigh*.

2 4 50—Needle movements extremely feeble.

2 5 0—Needle movements quick and fairly vigorous.

2 5 20—*Second injection of 15 minims of ether*.

2 5 50—Needle movements very quick and fairly vigorous.

2 6 20—Needle movements slow.

2 6 55—Needle movements stopped somewhat suddenly.

2 7 20—
2 8 20—} Needle recommenced beating 34 a minute.

2 10 0—Needle stopped abruptly.

Post-mortem.— $\frac{1}{2}$ drachm of blood in the pericardium ; right side distended with blood ; left side contains a little blood.

Remarks.—A Recovery after injection of 30 minims of ether combined with artificial respiration with the hands 1m. 5s. after respiration had stopped. Needle movements became quick and tetanic after the injection. B No recovery after simple injection (30 minims) the second time. Soon after injection, movements of needle became more vigorous and very quick.

EXPERIMENT LXXX.

13TH MAY 1892.—Temperature 96.1° F.—Full-grown dog.

H. M. S.

2 11 50—Dog in box with chloroform.

2 15 40—More chloroform.

2 17 30—Struggling.

2 18 30—Struggling violently.

2 19 40—Fallen down and struggling still.

2 20 20—Taken out of the box ; cornea insensitive.

H. M. S.

- 2 20 40—More chloroform.
 2 21 0—Needle inserted, movements vigorous.
 2 21 20—Respiration deep ; needle movements vigorous.
 2 22 0—Respiration slow ; needle movements fairly vigorous.
 2 22 40—Respiration deep and regular ; needle movements vigorous.
 2 22 55—More chloroform.
 2 23 18—Respiration shallow ; needle movements fairly vigorous.
 2 25 0—More chloroform.
 2 25 23—Respiration slow but deep and regular ; needle movements fairly vigorous.
 2 26 30—Respiration slow and shallow ; needle movements somewhat slow.
 2 27 0—Respiration chiefly abdominal ; needle movements intermittent.
 2 28 15—*Respiration stopped* ; needle movements very slow.
 2 28 30—*Minims 15 of ether injected subcutaneously.*
 2 28 56—Needle movements suddenly became very quick.
 2 29 45—*Second injection of 15 minims ether subcutaneously.*
 2 30 20—Needle movements very quick, somewhat tetanic and irregular.
 2 31 15—Needle beats still quick but feeble.
 2 32 5—Needle vibrating.
 2 32 20—Needle stopped abruptly.
 2 32 32—Needle commenced beating again.
 2 32 45—Needle feebly beating.
 2 32 50—Needle stopped.

Remarks.—No recovery after injection of 30 minims of ether subcutaneously. 35 seconds after the injection the needle movements became tetanic.

EXPERIMENT LXXXI.

13TH MAY 1892.—Temperature 96.1° F.—Medium-sized pariah dog.

H. M. S.

- 2 36 20—Dog in box with chloroform.
 2 39 55—More chloroform.
 2 44 20—Fallen down.
 2 45 5—Taken out of the box ; cornea insensitive.
 2 45 45—More chloroform.
 2 46 0—Yelping.
 2 47 0—Respiration irregular ; needle inserted, movements vigorous.

H. M. S.

- 2 47 30—Respiration shallow and laboured ; needle movements vigorous but somewhat irregular.
- 2 48 40—Respiration sighing ; needle movements vigorous but somewhat irregular.
- 2 49 35—More chloroform.
- 2 50 15—Respiration regular ; needle movements vigorous.
- 2 50 30—Respiration shallow ; needle movements vigorous.
- 2 50 50—Respiration very shallow ; needle movements vigorous but somewhat irregular.
- 2 52 20—Respiration slow with prolonged expiration ; needle fairly vigorous.
- 2 52 40—More chloroform.
- 2 53 12—Prolonged expiration ; needle movements fairly vigorous.
- 2 53 35—*Respiration stopped ; injection of minims 15 of ether.*
- 2 53 37—Needle stopped.
- 2 53 39—Needle beating again.
- 2 53 44—Respiration began again.
- 2 54 30—*Respiration stopped again ;* needle beating slowly.
- 2 55 15—*Second injection of minims 15 of ether* in the left thigh.
- 2 56 0—Needle movements vigorous but somewhat slow.
- 2 56 20—Needle movements quicker.
- 2 56 25—Needle movements quick but irregular.
- 2 56 27—Needle movements very quick.
- 2 57 4—Needle movements vigorous.
- 2 57 38—Needle movements becoming very feeble.
- 2 58 5—Needle stopped.
- 2 58 10—Needle began beating again feebly.
- 2 59 44—Needle stopped.

Remarks.—While the first minims 15 of ether were being injected respirations began again but soon stopped completely. After the second injection the needle movements were observed to become very quick and more vigorous, and the pulse during this time could be felt beating fairly strongly. However the needle stopped eventually 5m. 14s. after the last respiration.

In this experiment there was no recovery after injection of minims 30 of ether. The respiration at the time of injection had not stopped completely, and the needle movements were apparently made more vigorous and quickened by the ether injection.

EXPERIMENT LXXXII.

13TH MAY 1892.—Temperature 96° F.—Medium-sized pariah dog.

H. M. S.

- 3 3 30—Dog in box with chloroform.
- 3 8 30—More chloroform.
- 3 9 20—Struggling violently.
- 3 10 40—Fallen down and struggling still.
- 3 11 45—Taken out of the box.
- 3 12 0—Cornea insensitive ; more chloroform.
- 3 12 42—Needle in heart.
- 3 13 1—Respiration shallow, chiefly abdominal ; needle movements vigorous.
- 3 13 30—More chloroform.
- 3 13 48—Respiration deep; needle movements vigorous.
- 3 14 10—Respiration chiefly abdominal; needle movements vigorous.
- A 3 14 25—*Respiration stopped* ; needle movements somewhat feeble.
- 3 14 28—*Injection of minims 15 of ether subcutaneously.*
- 3 14 50—Needle movements slow.
- 3 14 59—*Respiration commenced.*
- 3 15 10—*Respiration stopped ; second injection of ether, minims 15.*
- 3 15 34—Needle movements fairly vigorous but slow.
- 3 16 20—Needle movements vigorous but slow.
- 3 17 5—Pulse slow.
- 3 17 20—Faint abdominal movements.
- 3 18 10—Abdominal movements becoming stronger ; needle movements vigorous but slow.
- 3 18 30—Respiration commenced.
- 3 18 40—Needle movements vigorous but slow; pulse strong.
- 3 20 10—Respiration deep and regular ; needle movements vigorous but somewhat slow.
- 3 21 40—Needle movements quicker but not so strong.
- 3 22 10—Pulse intermittent.
- 3 22 20—Respiration shallow ; needle movements intermittent.
- 3 23 18—Respiration shallow ; needle movements intermittent again.
- 3 24 10—Dog recovering.
- 3 24 44—More chloroform ; struggling slightly.
- 3 25 8—Respiration regular ; needle movements vigorous.

H. M. S.

3 25 52—Respiration shallow ; needle movements vigorous but irregular.

3 26 21—Respiration very shallow ; needle stopping for some seconds.

3 28 15—Respiration very shallow and slow ; needle movements fairly vigorous.

3 28 42—More chloroform.

3 29 0—Respiration chiefly abdominal ; needle movements fairly vigorous.

B 3 29 20—*Respiration stopped* ; needle stopped.

3 29 23—Needle beating again.

3 30 12—Needle movements slow but fairly vigorous.

3 30 30—Needle quicker.

3 31 0—Needle movements fairly vigorous.

3 32 0— Do. do.

3 33 25—Needle stopped.

Remarks.—No quickening effect was observed as the result of injecting minims 30 of ether. A. After the injection the animal recovered spontaneously when chloroform was pushed the second time. B. No natural recovery took place. And after the stoppage of the respiration the needle beats became quicker and shortly afterwards fairly vigorous.

EXPERIMENT LXXXIII.

14TH MAY 1892.—Temperature 96° F.—Weakly young pariah dog.

H. M. S.

1 14 30—Dog in box with chloroform.

1 19 20—Fallen down.

1 20 0—Taken out ; more chloroform on cap.

1 20 25—Needle in heart feeble.

1 21 0—Cornea insensitive.

1 21 5—Respiration regular ; needle movements feeble.

1 21 30—Needle re-inserted, movements still feeble.

1 21 45—Respiration shallow ; pulse cannot be felt ; needle movements feeble.

1 22 20—*Respiration stopped* ; needle stopped.

1 23 10—Needle re-inserted.

1 23 15—One beat.

1 23 18—Needle beating regularly and fairly vigorously.

1 24 0—*Injection of minims 10 of ether.*

1 24 10—Needle movements quicker.

H. M. S.

- 1 25 5—*Injection of ether, minims 20.*
- 1 25 34—Needle movements feeble and slow.
- 1 26 0—Needle just beating.
- 1 27 30—Needle still vibrating.
- 1 28 15—Needle stopped.

Remarks.—In this experiment minims 30 of ether were injected subcutaneously, but the dog did not recover. After the first injection (minims 10) the needle beats became quicker, and after the second (minims 20) feeble and slow.

EXPERIMENT LXXXIV.

14TH MAY 1892.—Temperature 96·4° F.—Full-grown pariah dog.

H. M. S.

- 1 31 45—Dog in box with chloroform.
- 1 35 59—More chloroform.
- 1 37 0—Struggling.
- 1 38 20—Fallen down.
- 1 38 40—Taken out of the box.
- 1 39 0—More chloroform.
- 1 40 0—Respiration slow.
- 1 40 20—Needle in heart ; respiration regular ; more chloroform ; needle movements vigorous.
- 1 41 0—Cornea insensitive.
- 1 41 35—Respiration shallow ; needle movements vigorous.
- 1 42 20—More chloroform.
- 1 42 35—Respiration slow but regular ; needle movements vigorous.
- 1 43 0—Respiration abdominal ; needle movements still vigorous.
- 1 43 20—Respiration deep ; needle movements vigorous.
- 1 43 40—More chloroform.
- 1 44 5—Respiration abdominal ; needle movements vigorous.
- A 1 44 25—*Respiration stopped ; needle movements still vigorous.*
- 1 44 30—*Injection of minims 15 of ether subcutaneously ; artificial respiration commenced with hands.*
- 1 45 10—*Second injection of minims 15.*
- 1 46 20—Needle in heart beating vigorously but slowly.
- 1 47 20—No pulse.
- 1 47 40—Natural respiration commenced ; artificial respiration stopped.

H. M. S.

- 1 48 10—Needle inserted, movements vigorous.
- 1 48 12—Respiration stopped again.
- 1 48 15—Respiration commenced again.
- 1 48 40—Cornea sensitive.
- 1 50 25—Respiration regular; needle movements slow and fairly vigorous; pulse intermittent.
- 1 51 21—More chloroform.
- 1 51 30—Respirations shallow; needle movements irregular.
- 1 51 55—Cornea insensitive; cap removed.
- B 1 52 0—*Injection of minims 20 of ether* into abdomen subcutaneously.
- 1 52 50—Needle movements vigorous but somewhat slow; respirations deep and regular.
- 1 53 25—Cornea sensitive; more chloroform; *minims 20 of ether again injected* subcutaneously into abdomen.
- 1 54 0—Respirations regular; needle movements vigorous.
- 1 54 40—Cap removed; respirations shallow; needle movements vigorous but intermittent.
- 1 55 39—Respiration regular; needle movements vigorous; cornea insensitive.
- 1 55 55—More chloroform; respiration deep and regular; needle movements vigorous.
- 1 56 18—Respirations somewhat deep; needle movements vigorous and intermittent.
- 1 57 23—Respiration stopped; cap removed.
- 1 57 44—Respiration commenced again; cap re-applied.
- 1 57 46—Respiration very shallow.
- 1 59 10—Respiration stopped; cap removed.
- 1 59 17—Needle movements fairly vigorous but slow.
- 1 59 54—Needle movements fairly vigorous.
- 2 0 30—Needle movements more vigorous and quicker.
- 2 1 40—Needle movements still vigorous and regular.
- 2 2 0—Needle movements feeble and intermittent.
- 2 2 45—Needle stopped.
- 2 3 0—One vigorous beat observed, then the needle stopped abruptly.

Remarks.—In experiment A minims 30 of ether were injected subcutaneously, and artificial respiration commenced 5 seconds after the respiration stopped. The dog recovered. In B minims 40 of ether were injected into

the abdomen subcutaneously, and chloroform pushed until the respiration stopped. The dog died. The injection of ether produced no obvious alteration either in the vigour or rate of the needle beat.

EXPERIMENT LXXXV.

14th MAY 1892.—Young healthy pariah dog.

H. M. S.

- 2 6 40—Dog in box with chloroform.
- 2 12 15—More chloroform.
- 2 13 10—Struggling.
- 2 13 30—Fallen down ; stopped struggling.
- 2 14 0—Taken out ; yelping ; more chloroform.
- 2 14 40—Cornea insensitive.
- 2 15 0—Respirations quick ; needle movements vigorous.
- 2 15 50—Respirations quick and shallow ; needle movements vigorous.
- 2 16 50—Respirations shallow ; needle movements vigorous but quick.
- 2 17 10—More chloroform.
- 2 18 5—Needle movements feeble ; respirations very shallow.
- 2 18 30—Needle re-inserted, movements more vigorous.
- 2 19 19—More chloroform.
- 2 19 40—*Respiration stopped* ; needle movements vigorous.
- 2 21 0—*Injection of minims 20 of ether into the thigh.*
- 2 21 25—Needle movements vigorous.
- 2 21 30—Needle movements quicker and vigorous.
- 2 22 0—Needle movements irregular and somewhat feeble.
- 2 22 33—Needle movements quick and very feeble.
- 2 23 0—Needle just vibrating.
- 2 23 30—Needle stopped, removed.
- 2 23 55—*Artificial respiration commenced with hands.*
- 2 25 30—Artificial respiration stopped ; needle re-inserted. All movements stopped.

Remarks.—No natural recovery after the injection of minims 30 of ether subcutaneously. The needle movements at the time of the stoppage of the respiration were vigorous. After the injection the needle beats became quicker for a short time. Artificial respiration was commenced 4m. 15s. after the respiration had ceased.

EXPERIMENT LXXXVI.

17TH MAY 1892.—Temperature 97° F.—Large healthy pariah dog.

H. M. S.

- 1 26 40—Dog on table ; ether given.
- 1 26 50—Struggling and holding breath.
- 1 27 55—Cornea insensitive.
- 1 28 12—Struggling.
- 1 28 50—Respiration regular and sighing.
- 1 29 0—Needle in heart.
- 1 29 30—Respiration regular ; needle movements fairly vigorous.
- 1 29 54—Two breaths of pure air given.
- 1 30 20—Cornea insensitive ; more ether; holding breath.
- 1 30 40—Needle stopped for some seconds.
- 1 31 20—Animal struggling and holding breath.
- 1 31 50—More ether.
- 1 32 20—Respiration deep.
- 1 32 50—Needle stopped for some seconds.
- 1 33 20—Respiration regular ; needle re-inserted, movements vigorous.
- 1 33 48—More ether.
- 1 34 0—Respirations regular ; needle movements vigorous.
- 1 34 50—Rattling of mucus in the trachea ; respiration regular ; needle movements vigorous.
- 1 35 40—Gums and tongue blue.
- 1 35 55—More ether; respiration regular; needle movements vigorous.
- 1 36 40—Respiration shallow ; needle movements vigorous ; rattling of mucus in the trachea.
- 1 37 38—Respiration laboured ; needle movements vigorous and quick.
- 1 38 30—More ether.
- 1 40 30—Respiration slow ; no air entering the chest.
- 1 40 52—Gasping movements ; needle movements irregular.
- 1 41 12—Needle stopped.
- 1 42 12—Thirty-five needle beats in a minute.
- 1 42 30—Cap removed.
- 1 42 45—*Last gasp taken.*
- 1 43 0—Needle movements very slow.
- 1 43 15—Needle vibrating.
- 1 43 40—Needle just vibrating.
- 1 44 5—Needle stopped.

Post-mortem.—Right side of the heart distended. Left side contains little blood. Both bases of the lungs congested.

ETHER.

Remarks.—The needle movements stopped 2m. 40s. after the last gasp. No natural recovery. Cap all through, except when removed, was kept tightly jammed over the face.

Respiration did not fail gradually. A considerable number of deep gasps, which were probably diaphragmatic, succeeded before the dog finally stopped breathing, and during this time the needle completely stopped for some seconds, only 35 beats having been observed in the minute, shewing that, when the respiration under ether is interfered with, the needle stops in the same way as it does under chloroform.

 EXPERIMENT LXXXVII.

17TH MAY 1892.—Temperature 97° F.—Sickly emaciated pariah dog.

H. M. S.

- 1 55 10—Dog in box with chloroform.
- 1 58 40—More chloroform.
- 2 1 0—Slight struggling.
- 2 2 8—More chloroform.
- 2 4 0—Taken out of the box and put on table.
- 2 4 35—Cornea insensitive.
- 2 4 55—Coming out ; more chloroform.
- 2 5 30—Cornea insensitive again.
- 2 6 0—Respiration regular and sighing.
- 2 7 0—Incision commenced for exposing thorax.
- 2 8 0—Dog winking ; more chloroform.
- 2 9 10—Cap removed.
- 2 9 45—Winking ; more chloroform.
- 2 10 40—Cap removed.
- 2 11 0—Winking ; more chloroform.
- 2 11 28—Cap removed.
- 2 12 10—Winking ; more chloroform.
- 2 12 38—Cap removed.
- 2 13 30—Coming out ; more chloroform.
- 2 14 30—Cap removed.
- 2 15 10—Coming out.
- 2 15 15—More chloroform.

H. M. S.

2 17 40—Gaspings.

2 18 30— Do.

2 18 33— Do.

2 18 40— Do.

2 18 50— Do.

} After each gasp the heart can be seen beating vigorously.

2 20 12—*Respiration stopped* ; heart beating vigorously.

2 21 0—The heart can be seen beating still somewhat feebly.

2 21 48—Heart stopped.

Remarks.—In this experiment a portion of the thoracic wall was removed, and the heart watched : no artificial respiration was employed. The heart continued beating for 1m. 36s. after the respiration had stopped.

EXPERIMENT LXXXVIII.

17TH MAY 1892.—Temperature 97° F.—Young healthy pariah dog.

H. M. S.

2 27 30—Dog in box with chloroform.

2 30 25—More chloroform.

2 35 30— Do.

2 36 10—Struggling violently.

2 37 0—Struggling still.

2 37 20—Stopped struggling, fallen down.

2 37 25—Taken out.

2 37 35—More chloroform.

2 38 7—Cornea insensitive.

2 38 15—Respiration regular ; needle in heart, movements vigorous.

2 39 0—Respiration slow but regular ; needle movements fairly vigorous.

2 39 49—Respiration regular ; needle movements quick and vigorous.

2 40 15—More chloroform.

2 40 30—Respiration shallow ; needle movements vigorous.

2 41 42—Respiration regular ; needle movements feeble.

2 42 12—Respiration shallow, chiefly abdominal ; needle movements feeble.

2 43 30—Faint abdominal movements only ; needle movements very feeble.

2 44 12—More chloroform.

2 45 45— Do.

2 46 0—Respiration shallow ; needle movements vigorous.

2 46 51—Abdominal movements only ; needle movements vigorous.

H. M. S.

- 2 47 40—Respiration deeper.
 2 47 51—*Respiration stopped.*
 2 47 53—Needle stopped until 2h. 48m. 55s.
 2 48 10—*Injection of minims 15 of ether subcutaneously.*
 2 48 30—*Second injection.*
 2 48 55—Needle began beating again.
 2 49 10—Needle beating more vigorously.
 2 49 40—Needle movements fairly vigorous.
 2 50 25—Needle stopped abruptly.
 2 51 0—*Artificial respiration commenced.*
 2 52 50—Needle re-inserted, no movements.
 2 53 10—Needle recommenced beating.
 2 55 10—Needle re-inserted, no movements; artificial respiration stopped.

Remarks.—In this experiment artificial respiration was commenced 3m. 9s. after the respiration had ceased. Two injections of ether, of minims 15 each, were administered. The needle at the time of the first injection had stopped completely for 17 seconds, but after the second began to beat more vigorously. It finally stopped abruptly. The dog did not recover.

EXPERIMENT LXXXIX.

17TH MARCH 1892.—Temperature 97° F.—Small pariah dog.

H. M. S.

- 2 57 0—Dog on the table with chloroform; struggling and holding
 breath.
 2 57 50—Winking.
 2 58 40—More chloroform.
 2 58 50—Cornea insensitive.
 2 59 20—More chloroform.
 2 59 30—Yelping.
 2 59 40—Needle in heart, movements vigorous.
 3 0 0—Respiration quick and regular; needle movements vigorous.
 3 1 10—Respiration shallow; needle movements fairly vigorous but
 slow; feeble pulse.
 3 2 35—Abdominal movements only; needle movements slow but
 vigorous.
 3 3 22— Do. do. do.

H. M. S.

- A { 3 3 40—Respiration stopped ; needle vigorous but slow.
 { 3 4 0—*Injection of minims 15 of ether.*
 { 3 4 5—*Artificial respiration commenced.*
 3 4 15—*Second injection of minims 15 of ether.*
 3 5 0—Pulse to be felt, regular.
 3 5 30—Needle in heart beating very vigorously.
 3 6 20—Pulse getting weaker.
 3 6 40—Pulse stronger again.
 3 7 10—Respiration returned ; artificial respiration stopped ; needle movements vigorous.
 3 9 0—Cornea sensitive.
 3 9 11—Respiration quick ; needle movements very vigorous.
 3 11 0—Dog coming out.
 3 11 15—More chloroform. Incision commenced for exposing the heart.
 3 12 20—Cap removed.
 3 13 20—Coming out ; more chloroform.
 3 14 0—More chloroform.
 3 14 20—Cap removed.
 3 15 12—Coming out ; more chloroform.
 3 16 10—Dog coming out and whining ; more chloroform.
 3 17 30—Thoracic wall laid open.
 3 19 0—Heart exposed.
 3 20 10—Gasping ; heart beating regularly.
 3 20 40—Gasping stopped ; heart beating regularly.
 3 21 21—Pericardium opened.
 3 22 0—Heart beating feebly.
 3 22 50—Feeble contractions of left auricle only.
 3 25 30—Right auricle contracting still.
 3 26 30—Auricle stopped contracting.

Remarks.—A. Artificial respiration was commenced 25 seconds after respiration had ceased, and minims 30 of ether were injected subcutaneously. The dog recovered.

B. Heart was exposed and continued beating for 1m. 20s. after the last gasp.

EXPERIMENT XC.

18TH MAY 1892.—Temperature 96·4° F.—Small healthy pariah dog.

H. M. S.

- 2 8 24—Dog in box with chloroform.
- 2 12 15—More chloroform.
- 2 13 30—Struggling.
- 2 15 20—More chloroform ; stopped struggling.
- 2 16 30—Yelping.
- 2 19 18—More chloroform.
- 2 19 55—Fallen down.
- 2 20 12—Struggling.
- 2 20 30—Taken out of the box.
- 2 21 21—More chloroform.
- 2 22 8—Yelping.
- 2 22 10—Respiration regular ; needle in heart, movements vigorous.
- 2 22 40—Cornea insensitive ; incision commenced for exposing the trachea.
- 2 23 10—Struggling and holding breath.
- 2 23 12—More chloroform.
- 2 23 44—Cap removed.
- 2 24 5—Struggling ; more chloroform.
- 2 24 52—Respiration regular ; needle movements vigorous, somewhat irregular.
- 2 25 8—Respiration shallow ; trachea exposed.
- 2 26 25—Respiration chiefly abdominal ; needle movements fairly vigorous.
- 2 26 55—Respiration stopped.
- 2 27 10—Breathing again.
- 2 28 12—Respiration slow ; needle movements feeble.
- 2 30 15—More chloroform.
- 2 30 38—Respiration very shallow ; needle movements somewhat feeble.
- 2 31 38—*Respiration stopped* ; needle movements somewhat feeble.
- 2 31 15—Needle movements fairly vigorous.
- 2 31 50—Needle movements somewhat irregular and flickering.
- 2 33 38—*Artificial respiration commenced by oxygen.*
- 2 36 18—Artificial respiration without oxygen commenced.
- 2 37 15—Needle re-inserted, movements somewhat feeble.
- 2 38 54—Needle re-inserted, vibrating.
- 2 39 50—Needle re-inserted, just vibrating.

H. M. S.

2 40 30—Artificial respiration stopped.

2 40 54—Needle in heart just vibrating.

2 42 0—Needle stopped.

Remarks.—In this experiment an attempt was made to blow in oxygen by means of bellows 2 minutes after the respiration had ceased, but the lungs were not properly distended and it is probable that little oxygen reached them. The dog did not recover.

EXPERIMENT XCI.

19TH MAY 1892.—Medium-sized pariah dog.

H. M. S.

1 46 20—Dog in box with chloroform.

1 48 50—More chloroform.

1 52 30— Do.

1 55 0— Do.

1 55 25—Struggling.

1 57 50—Fallen down.

1 58 20—More chloroform.

1 59 30—Cornea insensitive.

1 59 50—Respiration regular ; needle movements vigorous.

2 0 0—Incision commenced for exposing trachea.

2 0 40—Respiration regular ; needle movements vigorous.

2 0 50—Respiration snoring ; needle movements vigorous.

2 1 40—More chloroform ; trachea exposed.

2 2 5—Respiration regular ; needle movements vigorous.

2 2 30—Respiration slow but regular ; needle movements quick and somewhat feeble.

2 2 50—Respiration quick ; little air entering the chest ; needle movements vigorous.

2 3 10—Respiration shallow ; needle movements vigorous.

2 4 20—Respiration still very shallow ; needle movements vigorous but somewhat slow.

2 5 15—More chloroform.

2 5 54—Respiration deep and regular ; needle movements quick and fairly vigorous.

A 2 6 40—*Respiration stopped* ; needle movements vigorous.

2 7 20—Began breathing again ; recovering naturally.

H. M. S.

- B 2 7 30—*Respiration stopped*; needle stopped till
- 2 7 33—Needle beating again.
- 2 8 10—Needle beating strongly but somewhat irregular.
- 2 9 15—Respiration stopped; needle movements vigorous.
- 2 9 30—Gasping again.
- 2 9 55—Needle very quick.
- 2 10 35—Respiration stopped; needle movements vigorous.
- 2 11 5—Last gasp.
- 2 11 30—Another gasp.
- 2 11 40—Respiration stopped; needle movements vigorous.
- 2 12 0—Another gasp.
- 2 12 15— Do.
- 2 12 35—Respiration stopped; needle movements vigorous.
- 2 13 5—Another gasp.
- 2 13 30— Do.
- 2 13 45— Do.
- 2 14 0— Do.
- 2 15 10—More chloroform.
- 2 16 50—Respiration shallow.
- 2 19 20—*Respiration stopped*; needle movements vigorous.
- 2 19 50—Needle movements feeble.
- 2 20 40—Needle movements very feeble.
- C 2 20 50—*Artificial respiration commenced with bellows, oxygen being pumped in through the trachea.*
- 2 23 0—Needle in heart beating slowly; oxygen pumping stopped; artificial respiration with hands commenced.
- 2 27 0—Artificial respiration stopped; needle re-inserted, movements stopped.

Remarks.—In A after the respiration had ceased the dog recovered naturally. In B the needle stopped completely for 3 seconds when the respiration stopped but recommenced beating. The dog was not allowed to come completely out, and more chloroform had to be added to finally stop the respiration. In C oxygen was pumped into the trachea by bellows and artificial respiration commenced 1m. 30s. after the breathing had stopped. No recovery followed. The lungs in this experiment were not well expanded. 300 cubic inches of gas were used.

EXPERIMENT XCII.

19TH MAY 1892.—Big healthy pariah dog.

H. M. S.

- 2 31 0—Dog in box with chloroform.
 2 33 20—More chloroform.
 2 37 0—Fallen down.
 2 37 30—Taken out; cornea insensitive.
 2 38 0—Respiration regular; needle in heart, movements quick and vigorous.
 2 38 10—Incision commenced for exposing the trachea.
 2 38 42—More chloroform.
 2 40 12—Needle vigorous; respiration slow but regular.
 2 41 40—More chloroform.
 2 42 25—Respiration shallow; needle movements vigorous.
 2 45 0—Respiration shallow; needle movements vigorous.
 2 45 29—More chloroform.
 2 46 0—*Respiration stopped*; needle stopped till 2h. 46m. 50s.
 2 46 50—Needle beating regularly.
 2 47 30—Needle movement vigorous.
 2 47 44—Needle movements slow but vigorous.
 2 48 5—*Artificial respiration commenced with bellows (oxygen)*.
 2 49 40—Oxygen stopped. Artificial respiration with hands commenced.
 2 50 30—Needle re-inserted, movements stopped.

Remarks.—In this experiment oxygen was pumped into the trachea and artificial respiration commenced 2m. 5s. after the respiration had ceased. The heart needle stopped completely for 50 seconds when the respiration ceased, but recommenced beating vigorously. The lungs were not well distended and the dog did not recover. 250 cubic inches of oxygen used.

The lungs at the *post-mortem* had a peculiar brick red mottled appearance, but were otherwise perfectly normal. No blood was found in the pericardium. The right side of the heart was full; left side nearly empty.

EXPERIMENT XCIII.

19TH MAY 1892.—Temperature 95·4° F.—Old pariah dog.

H. M. S.

- 3 7 5—Dog in box with chloroform.
 3 10 20—More chloroform.
 3 13 20— Do.
 3 16 56— Do.
 3 18 40— Do.
 3 22 0—Fallen down.
 3 22 50—Taken out.
 3 23 6—More chloroform.
 3 23 24—Struggling.
 3 23 30—Cornea insensitive.
 3 24 10—Respiration somewhat shallow ; needle in heart, movements quick, somewhat tetanic.
 3 24 30—Incision commenced for exposing trachea.
 3 26 0—Trachea exposed.
 3 26 20—More chloroform ; respiration regular ; needle movements quick and fairly vigorous.
 3 28 0—Respiration regular ; needle movements quick and fairly vigorous.
 3 28 30—Respiration shallow ; needle movements quick and somewhat feeble.
 3 29 50—Respiration deep and regular ; needle movements quick and fairly vigorous ; pulse fairly strong.
 3 30 15—More chloroform.
 3 31 15—Respiration shallow ; needle movements quick and somewhat tetanic.
 3 33 20—*Respiration stopped* ; needle movements tetanic.
 3 33 40—Began breathing again.
 3 34 11—*Respiration stopped* ; needle beating very feebly.
 3 34 44—Needle beating very quickly and feebly.
 3 35 30—Artificial respiration (oxygen).
 3 39 0—Oxygen pumping stopped.
 3 39 38—Needle re-inserted, no movements. 400 cubic inches of oxygen.

Remarks.—An attempt was made to pump in oxygen into the lungs, but the apparatus was not in proper working order and the dog did not recover.

EXPERIMENT XCIV.

20TH MAY 1892.—Temperature 96° F.—Big healthy pariah dog.

H. M. S.

1 39 10—Dog in box with chloroform.

1 44 40—More chloroform.

1 47 30—Struggling.

1 48 35—More chloroform.

1 49 0—Struggling hard.

1 49 35—Fallen down ; struggling still.

1 50 30—Taken out.

1 50 55—More chloroform.

1 51 24—Respiration regular ; needle in heart, movements feeble.

1 51 55—Cornea insensitive.

1 52 5—Respiration very shallow.

1 52 8—Incision commenced for exposing trachea ; needle movements intermittent ; respiration shallow.

A 1 52 35—*Respiration stopped.*

1 52 40—Needle stopped (20 seconds).

1 53 0—Needle beating again.

1 53 35—*Artificial respiration commenced (oxygen).*

1 55 30—Natural respiration commenced ; needle movements vigorous.

1 57 0—Cornea sensitive.

1 58 0—Respiration regular ; needle movements vigorous, somewhat intermittent.

1 58 50—Struggling ; more chloroform.

1 59 10—Struggling and holding breath ; needle movements quick.

1 59 28—Respiration regular ; needle movements fairly vigorous and somewhat intermittent.

2 0 30—Respiration very shallow ; needle movements slow.

2 2 25—More chloroform.

2 3 20—Respiration very shallow ; needle movements fairly vigorous ; pulse very strong.

B 2 5 34—*Respiration and needle stopped (for 14 seconds).*

2 5 48—Needle beating again.

2 6 0—Needle movements vigorous but slow.

2 6 30—Needle movements vigorous ; pulse fairly strong.

2 7 10—*Natural respiration returned* and so more chloroform was added.

C 2 9 15—*Respiration stopped* ; needle movements fairly vigorous.

H. M. S.

2 10 0—Needle movements vigorous ; no pulse.

2 10 35—Needle stopped somewhat abruptly.

2 11 15—*Artificial respiration commenced with bellows (oxygen).*

2 13 40—Artificial respiration stopped ; needle re-inserted, no movements.

Post-mortem.—Lungs brick red in color. Left lower lobe somewhat airless. Right side of the heart distended ; left ventricle contains little blood.

Remarks.—In A artificial respiration was commenced and oxygen pumped in 1 minute after respiration had ceased, during which interval the needle stopped completely for 20 seconds. The dog recovered. Lungs at first were well expanded. 300 cubic inches of oxygen used. In B the needle stopped completely for 14 seconds at the same time as the respiration, but subsequently commenced beating vigorously. The dog recovered naturally.

In C artificial respiration was commenced and oxygen pumped in 2 minutes after the respiration had ceased. The dog did not recover. The needle had in fact stopped permanently before artificial respiration was commenced. 150 cubic inches of oxygen used.

EXPERIMENT XCV.

20TH MAY 1892.—Temperature 96° F.—Small pariah dog.

H. M. S.

2 24 12—Dog in box with chloroform.

2 27 35—More chloroform.

2 30 0—Struggling.

2 32 30—Fallen down.

2 33 20—Taken out ; more chloroform.

2 33 35—Struggling and yelping.

2 34 0—Cornea insensitive ; respiration regular ; needle movements vigorous.

2 34 20—Incision commenced for exposing trachea.

2 35 20—Respiration regular ; needle movements vigorous ; trachea exposed.

2 35 40—More chloroform.

2 36 25—Respiration regular but slow ; needle movements vigorous ; pulse fairly strong.

2 36 40—Respiration shallow ; needle movements vigorous.

2 37 25—Abdominal movements only ; needle movements vigorous ; pulse feeble.

H. M. S.

2 39 0—More chloroform.

2 39 10—Respiration shallow ; needle movements vigorous ; pulse fairly strong.

2 41 30—*Respiration stopped* ; needle movements slow but fairly vigorous.

2 42 10—Needle movements slow but vigorous.

2 42 30—*Artificial respiration commenced with bellows (oxygen).*

2 44 10—Artificial respiration stopped for some seconds ; needle in heart beating fairly vigorously.

2 46 0—Oxygen discontinued ; artificial respiration with hands continued.

2 47 0—Artificial respiration with hands stopped ; artificial respiration with bellows commenced.

2 49 0—Artificial respiration with bellows stopped ; needle re-inserted, just vibrating.

2 49 20—Artificial respiration began again.

2 49 50—Artificial respiration stopped.

At the *post-mortem* the lower lobes of both lungs were found to be congested and brick red in color.

Remarks.—Artificial respiration with oxygen was commenced 1 minute after the respiration had ceased, but was shortly afterwards discontinued, as it was thought, the dog being small, very little gas would be required. 200 cubic inches were used altogether. The lungs at first were well expanded. The dog did not recover.

EXPERIMENT XCVI.

20TH MAY 1892.—Temperature 96° F.—Small pariah dog.

H. M. S.

2 53 0—Dog in box with chloroform.

2 57 0—More chloroform.

2 57 30—Struggling.

2 58 40—Fallen down.

2 59 30—Taken out.

2 59 35—Cornea insensitive.

3 0 30—Respiration shallow ; needle in heart, movements vigorous.

3 1 0—More chloroform ; incision commenced for exposing trachea.

3 2 15—Respiration regular ; needle movements vigorous.

3 2 30—Trachea exposed and incised.

3 3 0—More chloroform.

H. M. S.

- 3 3 40—Respiration regular ; needle movements vigorous.
 3 6 0—More chloroform.
 3 8 50—*Respiration stopped* ; needle movements fairly vigorous.
 3 9 40—Needle stopped.
 3 9 45—Needle beating again very feebly.
 3 9 50—*Artificial respiration commenced (oxygen)*.
 3 13 10—Oxygen stopped ; artificial respiration with bellows continued.
 3 15 0—Needle re-inserted, beating feebly ; artificial respiration stopped.
 3 15 20—Artificial respiration with bellows (oxygen) recommenced.
 3 16 20—Artificial respiration stopped for some seconds ; needle inserted, just beating.
 3 17 35—Artificial respiration stopped ; needle re-inserted, just vibrating.
 3 18 0—Needle stopped.

Remarks.—Oxygen pumped in by means of the bellows 1 minute after respiration had ceased was unsuccessful in restoring the animal. 400 cubic inches used.

EXPERIMENT XCVII.

20TH MAY 1892.—Temperature 96° F.—Pariah puppy.

H. M. S.

- 3 21 10—Dog in box with chloroform.
 3 24 0—More chloroform.
 3 27 0—Fallen down.
 3 27 10—Taken out.
 3 27 30—More chloroform.
 3 27 45—Yelping.
 3 28 25—Cornea insensitive.
 3 28 30—Respiration regular ; needle in heart, movements vigorous.
 3 28 35—Incision commenced for exposing trachea.
 3 29 20—Trachea exposed.
 3 29 50—Respiration shallow ; needle movements vigorous.
 3 31 30—Respiration shallow ; needle movements irregular, fairly vigorous.
 A 3 32 8—*Respiration stopped*.
 3 32 50—Needle movements strong but slow.
 3 33 8—*Artificial respiration commenced with bellows (oxygen)*.
 3 34 40—Natural respiration returned ; artificial respiration stopped.
 3 37 30—Cornea sensitive ; dog struggling.

H. M. S.

3 37 40—More chloroform.

3 39 50—Respiration very slow but regular ; needle movements slow but vigorous.

B 3 40 30—*Respiration stopped* ; needle movements fairly vigorous but intermittent.

3 41 5—Needle movements vigorous.

3 41 55— Do. do.

3 42 30—*Artificial respiration commenced with bellows and oxygen.*

3 45 10—Needle re-inserted, movements fairly vigorous.

3 45 20—Oxygen stopped ; artificial respiration with bellows continued.

3 47 15—Needle re-inserted, vibrating.

3 48 25—Artificial respiration stopped ; needle re-inserted, no movements.

Remarks.—In A artificial respiration with bellows (oxygen) was commenced 1 minute after the respiration had ceased and the dog recovered. 150 cubic inches of gas used. In B artificial respiration with bellows (oxygen) was commenced 2 minutes after the respiration had ceased, but there was no recovery. Actual amount of gas used in this second experiment is doubtful, but ^{probably} about 450 cubic inches ~~must have been used~~.

EXPERIMENT XCVIII.

21ST MAY 1892.—Temperature 96° F.—Big healthy pariah dog.

H. M. S.

2 8 30—Dog in box with chloroform.

2 11 5—More chloroform.

2 11 40—Struggling slightly.

2 13 50—Struggling violently.

2 14 5—More chloroform.

2 14 8—Fallen down and struggling.

2 14 50—Taken out.

2 15 10—More chloroform ; struggling violently and yelping.

2 16 0—Struggling and holding breath.

2 16 25—Cornea insensitive.

2 16 35—Respiration regular ; needle in heart, movements very rapid.

2 16 45—Incision commenced for exposing trachea.

2 18 20—Respiration shallow.

2 19 20—Trachea opened.

H. M. S.

- 2 19 40—More chloroform ; respiration shallow ; needle movements vigorous.
- 2 21 50—Respiration chiefly abdominal ; needle movements vigorous and very quick.
- 2 21 55—More chloroform.
- 2 24 0—Respiration stopped.
- 2 24 20—Gaspings.
- 2 25 0—*Respiration stopped.*
- 2 25 35—Needle movements fairly strong.
- 2 26 10—Needle movements somewhat feeble.
- 2 26 38—Needle stopped. Before this note was made the needle had already stopped for some considerable time.
- 2 26 40—Needle beating again.
- 2 27 0—*Artificial respiration commenced with bellows (oxygen).*
- 2 29 50—Needle inserted, stopped ; artificial respiration (oxygen) stopped.

Post-mortem.—Little blood in the pericardium. Lungs ordinary cherry color ; bases congested. Right side enormously distended ; left side full.

Remarks.—Oxygen (325 cubic inches) pumped in with bellows 2 minutes after respiration had ceased was unsuccessful. In this case the lungs were well expanded by the artificial respiration. The dog was removed too soon from the box, and chloroform had to be administered to him while he was struggling violently.

EXPERIMENT XCIX.

21ST MAY 1892.—Temperature 96° F.—Young healthy pariah dog.

H. M. S.

- 2 33 30—Dog in box with chloroform.
- 2 34 50—Fallen down.
- 2 35 50—More chloroform.
- 2 36 45—Cornea insensitive.
- 2 37 7—Respiration sighing but regular ; needle in heart, movements vigorous.
- 2 37 42—Incision commenced for exposing the trachea.
- 2 39 40—More chloroform.
- 2 40 0—Respiration slow but deep ; needle movements vigorous.
- 2 40 20—Respiration deep and regular ; needle movements vigorous.
- 2 40 48—Respiration shallow ; needle movements fairly vigorous.

H. M. S.

2 41 18—*Respiration stopped* ; needle movements vigorous.

2 43 18—*Artificial respiration commenced with bellows (oxygen).*

2 45 52—Needle re-inserted, beating very feebly.

2 48 0—Needle stopped ; artificial respiration stopped.

Post-mortem.—Lungs of a light red color ; little blood in the pericardium. Right side of the heart distended ; left contains little blood.

Remarks.—Oxygen pumped with bellows 2 minutes after cessation of respiration was unsuccessful. 275 cubic inches of gas were used. In this case the lungs were well expanded.

EXPERIMENT C.

21ST MAY 1892.—Temperature 96° F.—Small pariah dog.

H. M. S.

3 1 35—Dog in box with chloroform.

3 4 40—More chloroform.

3 10 10—Fallen down.

3 10 50—More chloroform.

3 11 0—Needle in heart, movements vigorous ; respiration regular.

3 12 10—Respiration shallow ; needle movements vigorous.

3 12 35—Incision commenced for exposing trachea.

3 13 58—More chloroform.

3 14 10—Respiration deep and regular ; needle movements vigorous.

3 14 50—Respiration shallow ; needle movements vigorous.

A 3 16 25—*Respiration stopped* ; needle movements vigorous.

3 17 25—*Artificial respiration commenced with bellows (oxygen).*

3 19 54—Pulse vigorous.

3 21 20—Pulse somewhat feeble.

3 21 40—Natural respiration commenced ; artificial respiration (oxygen) stopped.

3 25 40—Cornea sensitive.

3 26 0—More chloroform.

3 26 20—Needle re-inserted ; respiration shallow ; needle movements quick, somewhat feeble.

3 28 30—More chloroform.

3 30 0—More chloroform ; respiration shallow ; needle movements quick and fairly vigorous.

H. M. S.

3 31 10—Respiration chiefly abdominal ; needle movements feeble and quick.

B 3 33 20—*Respiration stopped* ; needle movements fairly vigorous.

3 34 0—Needle vibrating.

3 34 20—*Artificial respiration commenced with bellows (oxygen).*

3 35 20—Gasping ; artificial respiration stopped (oxygen discontinued).

3 38 20—Cornea sensitive ; struggling.

3 39 0—More chloroform.

3 39 15—Needle re-inserted, movements quick and somewhat feeble.

3 41 30—Respiration deep and regular ; needle movements quick and somewhat feeble.

3 45 50—More chloroform.

3 48 15— Do.

C 3 50 30—*Respiration stopped* ; needle movements vigorous.

3 51 0—*Injection of $\frac{1}{30}$ gr. of strychnine.*

3 51 40—Needle movements vigorous.

3 52 20—*Respiration commenced.*

3 52 40—*Respiration stopped again.*

3 53 0—Needle movements feeble.

3 53 25—Needle stopped.

Remarks.—In A oxygen was pumped in with bellows 1 minute after the respiration had ceased and the dog recovered. 200 cubic inches used. In B oxygen was pumped in with bellows 1 minute after the respiration had ceased and the dog recovered. 100 cubic inches were used. In C $\frac{1}{30}$ gr. strychnine was injected subcutaneously 1m. 20s. after cessation of respiration. No recovery.

EXPERIMENT CI.

23RD MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

1 17 40—Dog in box with chloroform.

1 21 20—More chloroform.

1 26 2— Do.

1 29 0—Slight struggling.

1 32 1—More chloroform.

1 32 25—Fallen down and struggling violently.

H. M. S.

- 1 33 45—Taken out.
- 1 34 12—More chloroform ; struggling.
- 1 34 35—Struggling and holding breath.
- 1 34 48—Respiration regular ; needle movements vigorous.
- 1 35 0—Cornea insensitive.
- 1 35 5—Incision commenced for exposing the trachea.
- 1 36 35—Respiration deep and regular ; needle movements vigorous but slow.
- 1 36 55—More chloroform.
- 1 37 22—Respiration shallow ; needle movements slow but vigorous.
- 1 37 50—Respiration very slow and chiefly abdominal ; needle movements slow but vigorous.
- 1 39 20—More chloroform.
- 1 39 35—Respiration very shallow ; needle movements vigorous but slow.
- 1 40 40—Abdominal movements only ; needle movements vigorous.
- 1 41 30—Trachea opened.
- 1 43 5—More chloroform.
- A 1 45 40—*Respiration stopped* ; needle movements vigorous.
- 1 46 28—Respiration commenced again ; needle movements vigorous.
- B 1 48 15—*Respiration stopped ; needle stopped.*
- 1 48 25—Needle commenced beating again slowly but vigorously.
- 1 50 15—*Artificial respiration commenced with bellows (oxygen).*
- 1 52 30—Artificial respiration stopped ; pulse cannot be felt ; needle re-inserted, movements feeble.
- 1 52 45—Artificial respiration recommenced.
- 1 55 0—Needle re-inserted, just moving ; artificial respiration stopped.
- 1 55 30—Needle stopped.

Post-mortem.—Lungs of a bright brick red color and the bases much congested. Half a drachm of blood in the pericardium ; right side of the heart enormously distended ; left empty.

Remarks.—In A the dog recovered naturally after the respiration had ceased. Needle at time of stoppage of respiration was beating vigorously. In B oxygen was pumped in with bellows 1 minute after respiration had ceased. 200 cubic inches were used, but the dog did not recover. Lungs were well expanded.

EXPERIMENT CII.

23RD MAY 1892.—Temperature 93° F.—Small puppy.

H. M. S.

- 1 59 35—Dog in box with chloroform.
 2 1 40—Struggling.
 2 2 10—Fallen down.
 2 2 35—Taken out.
 2 2 50—More chloroform.
 2 3 5—Struggling and holding breath.
 2 3 40—Yelping and holding breath.
 2 4 5—Cornea insensitive.
 2 4 40—Respiration shallow ; needle in heart, movements vigorous but somewhat irregular.
 2 5 15—Respiration quick and shallow ; needle movements vigorous.
 2 6 0—Abdominal movements only ; needle movements quick and vigorous.
 2 7 20— Do. do. do.
 2 7 30—More chloroform.
 2 8 40—Respiration fairly regular ; needle movements vigorous.
 2 10 30—Respiration very shallow ; needle movements very vigorous.
 2 11 0—Needle stopped ; *respiration stopped*.
 2 11 20—Needle beating again, movements slow and regular.
 2 11 40—Needle movements vigorous.
 2 13 10—*Artificial respiration commenced with bellows (oxygen)*.
 2 16 8—Needle re-inserted, beating very slowly but vigorously.
 2 18 40— Do. just vibrating.
 2 19 0— Do. do.
 2 22 30—Oxygen stopped ; needle re-inserted, just vibrating.

Remarks.—Oxygen blown in 2m. 10s. after the respiration had ceased was unsuccessful. Needle at time of commencement of artificial respiration was beating vigorously but slowly.

EXPERIMENT CIII.

23RD MAY 1892.—Large healthy pariah dog.

H. M. S.

- 2 25 0—Dog in box with chloroform.
 2 30 0—Fallen down ; placed on table ; struggling.
 2 30 37—More chloroform ; struggling.
 2 31 10—Yelping.

H. M. S.

- 2 31 35—Cornea insensitive ; respiration regular ; needle in heart, movements vigorous.
- 2 32 0—Respiration very shallow.
- 2 32 50—Respiration very shallow and quick ; needle movements very irregular, stopping for some seconds completely.
- 2 33 50—Respiration shallow ; needle movements very feeble.
- 2 34 20—Respiration fairly regular but somewhat shallow ; needle movements fairly vigorous but still irregular.
- 2 35 0—More chloroform.
- 2 35 30—Respiration regular but somewhat shallow ; needle movements fairly vigorous and somewhat irregular.
- 2 38 35—Abdominal movements only ; needle movements vigorous.
- 2 39 20—*Respiration stopped* ; needle movements vigorous.
- 2 40 0—*Injection of $\frac{1}{25}$ gr. of strychnine.*
- 2 40 20—Needle movements vigorous.
- 2 40 48—Quivering of tongue and lips.
- 2 41 20—Needle movements very quick and somewhat tetanic.
- 2 44 30—Needle just vibrating.
- 2 45 0—Needle stopped.

Remarks.—The effect of injecting $\frac{1}{25}$ gr. of strychnine was to make the needle movements quick and tetanic. No recovery took place.

EXPERIMENT CIV.

23RD MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

- 2 47 0—Dog in box with chloroform.
- 2 48 40—Struggling.
- 2 49 30—Struggling violently.
- 2 50 0—Struggling very violently.
- 2 51 0—Fallen down and stopped struggling.
- 2 51 40—Taken out.
- 2 52 0—Chloroform.
- 2 52 40—Cornea insensitive ; respiration regular ; needle in heart, movements irregular but vigorous.
- 2 52 50—Respiration shallow ; needle re-inserted, movements vigorous but irregular.
- 2 54 10—Respiration shallow but regular ; needle movements fairly vigorous.

H. M. S.

- 2 54 30—*Respiration stopped* ; needle feeble.
 2 55 0—*Injection of $\frac{1}{50}$ gr. of strychnine.*
 2 55 30—Needle movements vigorous and regular.
 2 56 0—Needle movements quick and somewhat feeble.
 2 57 38—Needle movements quick but feeble.
 3 2 0—Needle stopped.

Remarks.—Dog struggled violently while in the box which contained a great deal of chloroform vapour, and the breathing very soon ceased after he was taken out. The needle movements during this time were exceedingly irregular, stopping off and on for some seconds. No recovery took place after injection of $\frac{1}{50}$ gr. strychnine, though shortly after the needle movements became vigorous.

EXPERIMENT CV.

23RD MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

- 3 5 10—Dog in box with chloroform.
 3 6 40—Yelping.
 3 7 40—Struggling.
 3 8 10—Fallen down.
 3 8 15—Taken out ; yelping and struggling very violently.
 3 8 40—More chloroform.
 3 9 25—Cornea insensitive.
 3 9 45—Respiration quick and regular ; needle movements quick and vigorous.
 3 10 20—Respiration very shallow ; needle movements vigorous.
 3 11 33—More chloroform.
 3 13 30—Respiration chiefly abdominal ; needle movements vigorous.
 3 16 10—More chloroform.
 3 17 10—Needle movements vigorous.
 3 17 35—*Respiration stopped* ; needle stopped for 15 seconds.
 3 18 20—Needle movements vigorous.
 3 18 50—Needle movements very vigorous.
 3 18 55—Shallow respiration.
 3 19 20—Respiration stopped again.
 3 20 0—Jaw pushed forward ; needle movements feeble.

Remarks.—In this experiment chloroform was given with the cap loosely applied (while the dog struggled violently) until the respiration stopped. The needle stopped for 15 seconds when the respiration stopped. No natural recovery.

EXPERIMENT CVI.

23RD MAY 1892.—Temperature 93° F.—Small puppy.

H. M. S.

- 3 24 0—Dog in box with chloroform.
- 3 27 40—Fallen down.
- 3 27 45—Taken out.
- 3 28 25—Yelping ; respiration regular ; needle movements vigorous.
- 3 29 0—Cornea insensitive.
- 3 29 50—Respiration regular ; needle movements vigorous.
- 3 31 40—Respiration shallow ; needle movements vigorous.
- 3 32 15—Abdominal movements only ; needle movements fairly vigorous.
- 3 32 28—*Respiration ceased* ; needle movements fairly vigorous.
- 3 34 40—Needle movements quick and feeble.
- 3 36 40—Needle stopped.

Remarks.—Chloroform was given continuously with plenty of air during the struggling stage. No natural recovery. Needle at time of stoppage of respiration was beating fairly vigorously.

EXPERIMENT CVII.

25TH MAY 1892.—Temperature 93° F.—Large sickly pariah dog.

H. M. S.

- 1 50 0—Dog in box with chloroform.
- 1 54 10—More chloroform.
- 1 58 15— Do.
- 2 3 20—Struggling and yelping.
- 2 4 30—Fallen down.
- 2 4 40—Taken out.
- 2 5 0—More chloroform ; yelping.
- 2 5 25—Cornea insensitive.
- 2 5 55—Respiration regular ; needle in heart, movements vigorous.
- 2 6 22—Incision commenced for exposing the left vagus.
- 2 8 0—Coming out ; more chloroform.
- 2 9 0—Cornea insensitive ; cap removed.
- 2 9 30—Respiration regular ; needle movements vigorous.
- 2 10 30—Coming out ; more chloroform ; vagus exposed.
- 2 12 0—Cornea insensitive ; cap removed.
- 2 13 5—Left vagus cut.

H. M. S.

- 2 14 30—More chloroform ; respiration regular ; needle movements vigorous.
- 2 15 5—More chloroform; respiration regular; needle movements vigorous.
- 2 15 35—Pulse 96 a minute, strong ; respiration very shallow ; needle movements vigorous.
- 2 16 10—Abdominal movements only.
- A 2 17 5—*Respiration stopped.*
- 2 17 30—Respiration commenced again.
- 2 18 20—Respiration deep ; needle movements slow but vigorous.
- B 2 19 10—*Respiration stopped.*
- 2 19 28—*Vagus irritation commenced.*
- 2 19 40—Respiration commenced again.
- 2 20 28—Vagus irritation stopped.
- 2 20 45—Respiration shallow.
- 2 21 10—Needle movements vigorous ; respiration very shallow.
- 2 22 30—Respiration deeper ; needle movements vigorous.
- 2 24 0—Incision commenced for exposing the right vagus.
- 2 25 0—Respiration slow and shallow but regular.
- 2 25 30—Respiration stopped. During this interval the needle stopped completely for a few seconds.
- 2 25 50—Respiration returned ; needle beating again.
- 2 26 20—Respiration very jerky.
- 2 26 40—Needle beating fairly vigorously.
- 2 27 0—Respiration stopped.
- 2 27 15—Respiration returned again, very jerky.
- 2 28 30—Gasping respirations ; needle movements very vigorous.
- 2 30 10—Jaw pushed forward ; tongue drawn out.
- 2 30 50—Respiration very slow and gasping ; needle movements vigorous.
- 2 31 25—Regular respiration ; needle movements vigorous.
- 2 31 30—Cornea sensitive.
- 2 32 0—Noisy expiration.
- 2 35 20—More chloroform.
- 2 37 20—Cornea insensitive ; cap removed.
- 2 39 0—Right vagus exposed and cut ; more chloroform.
- 2 39 40—Respiration regular ; needle movements vigorous.
- 2 40 50—More chloroform ; coil tested and found to be working.
- 2 41 45—Respiration very slow ; needle movements vigorous.
- 2 42 20—Respiration regular ; needle movements vigorous.

H. M. S.

- C 2 43 0—*Respiration stopped*; needle movements somewhat tetanic; peripheral end of right vagus irritated.
- 2 44 0—Vagus irritation stopped, 67 beats a minute; needle stopped completely for 10 or 15 seconds.
- 2 44 40—Natural respiration commenced.
- 2 45 30—Respiration natural; needle movements vigorous.
- 2 46 20—Cornea sensitive.
- 2 48 40—Coming out; more chloroform.
- 2 48 55—Respiration regular; needle movements vigorous.
- 2 49 40—Respiration very deep and regular; needle movements very vigorous.
- 2 51 0—Respiration very deep; needle movements very vigorous.
- 2 52 10—Respiration still deep; needle movements still vigorous.
- 2 52 30—Respiration shallow; needle movements vigorous.
- 2 52 45—Abdominal movements only; needle movements not as vigorous as before.
- 2 53 20—Respiration very shallow; needle movements vigorous.
- 2 54 15—More chloroform.
- D 2 54 20—*Respiration stopped*; needle movements feeble; *peripheral end of right vagus irritated*.
- 2 55 20—32 beats a minute; needle stopped completely for about 30 seconds; irritation stopped.
- 2 55 25—Needle movements feeble.
- 2 55 50—Needle movements fairly vigorous.
- 2 57 0—*Natural respiration recommenced*.
- 2 58 0—Respiration jerky and irregular; strong pulse.
- 2 59 25—Needle movements very vigorous; respiration stopped.
- 3 1 35—Respiration 4 in a minute, very deep; needle movements very vigorous.
- 3 2 0—Cornea sensitive.
- 3 2 30—Respiration regular but somewhat slow; needle movements very vigorous.
- 3 4 0—Respiration quite regular and deep; needle movements very vigorous.
- 3 4 30—More chloroform.
- 3 5 0—Vagus irritation commenced.
- 3 6 0—Vagus irritation stopped; 56 beats in the minute; heart stopped completely for about 10 or 15 seconds.

H. M. S.

- 3 8 0—Respiration deep and regular ; needle movements very vigorous.
 3 9 0— Do. do. do. do.
 3 9 35—Large dose of chloroform.
 3 9 45—Respiration somewhat shallow ; needle movements vigorous.
 3 10 5—Respiration deeper ; needle movements still vigorous.
 3 10 40—Respiration deep but slow ; needle movements still vigorous.
 E 3 10 55—*Respiration stopped* ; needle movements vigorous.
 3 11 10—Needle movements somewhat feeble.
 3 11 50—Shallow respiration recommenced.
 3 12 20—*Respiration stopped* ; needle movements vigorous.
 3 12 55—Respiration began again.
 3 13 30—*Respiration stopped again* ; needle movements quick and fairly vigorous.
 3 14 5—Needle movements feeble.
 3 14 28—Needle vibrating.
 3 14 40—Needle movements slow, but feeble and intermittent.
 3 14 43—Needle stopped.
 3 15 2—Needle beating again.
 3 17 20—Needle stopped.

Remarks.—In A the dog recovered naturally. In B the peripheral end of left vagus was irritated 18 seconds after stoppage of respiration, and the irritation continued for 1 minute. The needle was not stopped completely but simply slowed. The animal recovered slowly. In C the needle was stopped completely for about 10 or 15 seconds, and the animal recovered very quickly. The peripheral end of right vagus was irritated immediately after the respiration ceased and the irritation continued for 1 minute. In D the needle was stopped for about 30 seconds, when the vagus was irritated and the animal also recovered very quickly. In E no natural recovery took place, though the needle at the time respiration stopped was vigorous. After both vagi had been cut, although chloroform was used very freely, no stoppage or anything approaching to feebleness of the needle beats was observed. In fact after the section the beats were extremely vigorous. Dog was under chloroform for 1h. 27m. 20s.

EXPERIMENT CVIII.

25TH MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

- 3 32 30—Dog in box with chloroform.
- 3 33 0—Slight struggling.
- 3 37 40—Fallen down.
- 3 38 10—Taken out.
- 3 38 30—More chloroform ; yelping.
- 3 40 3—Do. do.
- 3 40 20—Incision commenced for exposing the left vagus.
- 3 40 25—Cornea insensitive ; needle in heart, movements vigorous.
- 3 46 0—Vagus exposed.
- 3 46 5—Dog coming out.
- 3 46 55—More chloroform.
- 3 47 0—Slight struggling.
- 3 48 20—Cornea insensitive ; cap removed.
- 3 48 25—Left vagus cut.
- 3 49 10—Incision commenced for exposing the right vagus.
- 3 50 0—Struggling ; more chloroform.
- 3 50 0—Cap removed.
- 3 53 10—More chloroform.
- 3 54 0—Right vagus exposed and cut ; cap removed.
- 3 55 25—*Respiration stopped*; needle vigorous ; *vagus irritation commenced*.
- 3 56 25—Vagus irritation stopped ; needle stopped for 15 seconds, 32 beats a minute.
- 3 57 20—Respiration regular ; needle movements very vigorous and regular.
- 3 58 0—Cornea sensitive.
- 3 58 10—Respiration regular ; needle movements very vigorous.
- 3 58 30—More chloroform.
- 3 58 45—Respiration shallow ; needle movements very vigorous.
- 3 59 0—Respiration deep and regular ; needle movements very vigorous.
- A 3 59 30—*Respiration stopped* ; needle movements vigorous ; *vagus irritation commenced*.
- 4 0 30—Natural respiration recommenced ; irritation stopped, 30 beats in a minute.
- 4 1 0—Respiration regular ; needle movements vigorous.
- 4 3 30—Respiration regular ; needle movements very vigorous.
- 4 3 50—More chloroform.
- 4 4 14—Respiration deep and regular ; needle movements very vigorous.

H. M. S.

- 4 5 0—Respiration regular ; needle movements very vigorous.
 4 7 5—Respiration very slow and deep ; needle movements very vigorous.
 4 7 40—More chloroform.
 4 8 12—Respiration shallow ; needle movements still very vigorous.
 B 4 10 10—*Respiration stopped* ; needle movements quick and vigorous ;
vagus irritation commenced.
 4 11 10—Natural respiration returned ; vagus irritation stopped, 16 beats
 a minute. One beat in 12 seconds ; another in 10 seconds.
 4 12 30—Respiration shallow ; needle movements somewhat feeble.
 4 12 50—Respiration stopped ; needle movements feeble.
 4 13 40—Needle vibrating.
 4 14 15—Needle just vibrating.
 4 14 48—Needle stopped.

Remarks.—In this experiment both vagi were divided and the needle beats were very vigorous all the time until 4h. 12m. 30s. when the respirations became very shallow. In A the peripheral end of the right vagus was irritated for 1 minute immediately after the respiration stopped, and during this time the needle beats were not stopped entirely, but slowed to 30 per minute. The dog recovered. In B the peripheral end of the right vagus was irritated for 1 minute immediately after the respiration ceased, and during this time the needle beats were slowed to 16 per minute. The dog did not recover.

EXPERIMENT CIX.

26TH MAY 1892.—Temperature 93° F.—Large healthy pariah dog.

H. M. S.

- 1 15 40—Dog in box with chloroform.
 1 20 30—Struggling.
 1 22 50—Fallen down.
 1 23 0—Taken out ; more chloroform ; yelping and struggling.
 1 24 10—Cornea insensitive.
 1 24 30—Respiration regular ; needle in heart, movements fairly
 vigorous.
 1 24 40—Cap removed ; respiration somewhat shallow ; needle movements
 vigorous.
 1 25 30—Incision commenced for exposing right vagus.
 1 27 10—Respiration regular ; needle movements vigorous.
 1 29 0—More chloroform.
 1 30 0—Cornea insensitive ; cap removed.

H. M. S.

- 1 32 30—Right vagus exposed.
- 1 33 40—Respiration regular ; needle movements vigorous ; right vagus tied and cut.
- 1 34 0—More chloroform ; incision commenced for exposing left vagus.
- 1 36 45—Over ; cap removed.
- 1 41 30—Left vagus exposed.
- 1 42 40—Left vagus cut.
- 1 43 8—Large dose of chloroform ; cap tightly jammed over face.
- 1 43 25—Shallow respiration ; needle movements vigorous.
- 1 43 48—Respiration deep ; needle movements vigorous.
- 1 44 0—Respiration deep and slow ; needle movements vigorous.
- 1 45 40—Respiration shallow ; needle movements somewhat feeble.
- A 1 46 15—*Respiration stopped* ; needle movements regular and fairly vigorous.
- 1 47 18—*Vagus irritation commenced*, peripheral end of right.
- 1 48 18—Vagus irritation stopped, 39 beats a minute ; needle movements vigorous but slow.
- 1 48 30—Respiration returned. For the first 12 seconds there were only 2 beats.
- 1 49 20—Deep respiration ; needle movements somewhat feeble.
- 1 49 45—Respiration deep, somewhat gasping ; needle movements vigorous.
- 1 50 45—Cornea sensitive ; needle movements tetanic.
- 1 53 30—One ounce of chloroform ; cap jammed over the face.
- 1 53 55—Respiration regular and somewhat gasping ; needle movements vigorous.
- 1 54 18—Respiration deep and very slow.
- B 1 54 30—*Respiration stopped* ; cap removed.
- 1 55 18—*Vagus irritation, peripheral end of right, commenced* ; needle stopped for 13 seconds.
- 1 56 18—28 beats in a minute ; took 3 breaths.
- 1 56 40—Respiration stopped again.
- 1 56 50—Respiration recommenced.
- 1 57 0—Natural respiration returned ; needle movements vigorous.
- 1 58 20—Cornea sensitive.
- 1 59 20—Respiration regular ; needle movements and pulse very vigorous.
- 2 0 40—Respiration very deep ; needle movements and pulse very vigorous.
- C 2 3 15—*Injection of 25 minims of chloroform* under the skin of right thigh.
- 2 4 10—More chloroform.
- 2 4 20—Second injection of 25 minims of chloroform into right thigh.

H. M. S.

- 2 4 30—Respiration regular ; needle movements vigorous.
 2 5 30—Respiration regular ; needle movements and pulse vigorous.
 2 5 40—Respiration shallow ; needle movements vigorous.
 2 13 10—Third injection of 25 minims of chloroform into muscle of right thigh.
 2 14 58—Respiration shallow ; needle movements fairly vigorous.
 2 16 20—Needle movements fairly vigorous.
 2 16 42—Another injection of 25 minims of chloroform into muscle of right thigh.
 2 16 45—Gasping.
 D 2 17 40—*Respiration stopped* ; needle movements very vigorous.
 2 18 50—Pulse fairly strong ; needle movements fairly vigorous.
 2 19 50—Respiration returned ; needle movements fairly vigorous.
 2 20 10—Respiration stopped again ; needle movements vigorous.
 2 20 45—Needle movements feeble.
 2 21 40—Needle just vibrating.
 2 21 46—Needle stopped.

Remarks.—In experiment A the peripheral end of right vagus was irritated 1m. 3s. after respiration had ceased and the irritation was continued for 1 minute, during which time there were only 39 and for the first twelve seconds only 2 beats of the needle. The dog recovered. In B an enormous dose (1 ounce) of chloroform was given during the time the animal was breathing deeply. No effect, however, on the needle beats was produced by this dose. 48 seconds after the respiration had ceased the peripheral end of right vagus was irritated as before for 1 minute, during which time there were only 28 beats and the needle stopped completely for 13 seconds. The dog recovered. In C chloroform was injected subcutaneously into the thigh muscle four times in doses of 25 minims each ; the effect of this was to produce a temporary rigidity.

EXPERIMENT CX.

26TH MAY 1892.—Temperature 93° F.—Medium-sized pariah dog.

H. M. S.

- 2 23 0—Dog in box with chloroform.
 2 32 40—More chloroform.
 2 41 50—Do.
 2 42 20—Fallen down.
 2 43 20—Taken out ; cornea insensitive.
 2 45 0—Respiration regular but slow ; needle in heart, movement vigorous.

H. M. S.

- 2 45 20—More chloroform. Incision commenced for exposing the left
vagus.
- 2 47 40—Cornea insensitive ; cap removed.
- 2 55 10—More chloroform ; left vagus exposed and cut.
- 2 56 40—Cornea insensitive ; cap removed. Incision commenced for ex-
posing the right vagus.
- 3 1 20—Right vagus exposed and cut.
- 3 2 30—Respiration regular ; needle movements vigorous ; cornea sensi-
tive.
- 3 2 45—More chloroform.
- 3 3 50—Respiration deep but slow ; needle movements vigorous.
- 3 6 50—Respiration regular ; needle movements vigorous.
- 3 6 55—More chloroform.
- 3 8 0—*Respiration stopped.*
- 3 8 40—Needle movements vigorous.
- 3 9 10—Needle movements vigorous ; pulse fairly strong.
- 3 11 20—Movement of jaws.
- 3 12 18—Needle movements somewhat feeble.
- 3 13 30—Needle stopped.

Remarks.—In this experiment both vagi were cut, and the needle movements remained quite vigorous up till 4m. 18s. after the respiration had ceased. The dog did not recover naturally.

EXPERIMENT CXI.

27TH May 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

- 1 52 40—Dog in box with chloroform.
- 1 54 53—More chloroform.
- 1 59 3—Do.
- 1 59 50—Fallen down.
- 2 0 10—Taken out ; cornea insensitive.
- 2 0 30—More chloroform.
- 2 1 35—Respiration regular ; needle in heart, movements vigorous.
- 2 1 50—Incision commenced for exposing the left vagus.
- 2 10 0—More chloroform.
- 2 11 45—Cornea insensitive ; cap removed ; left vagus cut.
- 2 12 40—Incision commenced for exposing the right vagus.

H. M. S.

2 16 22—More chloroform.

A 2 18 10—*Respiration stopped ; artificial respiration with hands commenced.*

2 21 50—Natural respiration returned.

2 25 50—Right vagus cut ; respirations slow and deep ; needle re-inserted ; movements vigorous.

2 26 20—Struggling ; more chloroform.

2 27 40—Respiration deep and regular ; needle movements vigorous.

2 28 18—Cell tested and found to be working.

2 28 40—Respiration slow but regular ; needle movements very vigorous.

2 30 46—More chloroform.

B 2 31 10—*Respiration stopped ;* peripheral end of right vagus irritated. Needle stopped completely for 12 seconds.

2 32 10—Needle vigorous but slow ; twitching of the muscles of left thigh and face ; vagus irritation stopped ; 13 beats a minute during irritation.

2 34 20—Needle feeble and flickering ; pulse feeble ; movements of the facial muscles stopped.

2 34 55—Respiration returned.

2 35 18—Needle feeble ; respiration feeble.

2 35 40—Respiration stopped ; needle movements very feeble.

2 36 35—Needle stopped.

Remarks.—In A artificial respiration with hands was commenced immediately after the respiration ceased and was successful. In B the peripheral end of the right vagus was irritated for 1 minute immediately after the respiration ceased, during which time the needle stopped completely for 12 seconds, and there were only 13 beats during the minute. The dog did not recover.

At the *post-mortem*, which was made about 20 minutes after death, the right side was found filled with partially clotted blood, the left side nearly empty. About $\frac{1}{2}$ drachm of blood was found in the pericardium.

EXPERIMENT CXII.

27TH MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

2 47 15—Dog in box with chloroform.

2 50 50—More chloroform.

2 52 50—Struggling.

2 53 30—Fallen down and stopped struggling.

H. M. S.

- 2 53 40—Taken out ; more chloroform ; struggling.
 2 54 30—Yelping.
 2 55 40—Cornea insensitive ; cap removed.
 2 56 0—Respiration regular ; needle movements vigorous.
 2 56 10—Incision commenced for exposing the left vagus.
 2 56 30—Struggling ; more chloroform.
 2 57 0—Cornea insensitive ; cap removed.
 2 57 50—More chloroform.
 2 58 35—Cornea insensitive ; cap removed.
 3 0 10—Left vagus cut ; respiration regular ; needle movements vigorous but slow.
 3 0 20—Incision commenced for exposing the right vagus.
 3 6 0—More chloroform.
 3 6 30—Struggling.
 3 7 0—Cornea insensitive ; cap removed.
 3 7 50—Struggling ; more chloroform. Needle stopped for a few seconds completely and was again re-inserted.
 3 8 20—Respiration regular ; *needle re-inserted* ; movements vigorous.
 3 9 20—Right vagus cut.
 3 9 54—Respiration deep ; needle movements quick and somewhat feeble.
 3 10 20—Respiration very slow and deep ; needle movements quick and somewhat feeble.
 3 10 30—*Respiration stopped ; vagus irritation (peripheral end of right)*.
 3 11 30—Vagus irritation stopped ; needle completely stopped for 17 seconds, 22 beats a minute during irritation.
 3 11 40—Respiration returned ; needle movements feeble.
 3 12 30—Needle movements vigorous.
 3 13 15—Deep respiration ; needle movements feeble.
 3 13 50—Respiration shallow.
 3 14 0—Respiration stopped.

Remarks.—The peripheral end of right vagus was irritated for 1 minute immediately after the respiration ceased, and during this time there were only 22 beats and the needle stopped completely for 17 seconds. The dog did not recover. After being removed from the box the dog struggled considerably ; chloroform was given with the cap loosely applied.

At the *post-mortem* the pericardium was found filled with clotted blood. The right side was distended and the left nearly empty. When an incision was made into the right ventricle, it began to contract again vigorously.

EXPERIMENT CXIII.

28TH MAY 1892.—Small sickly pariah dog.

H. M. S.

- 1 18 30—Dog in box with chloroform.
- 1 22 30—More chloroform.
- 1 27 0— Do.
- 1 29 30—Fallen down in box ; taken out and placed on table.
- 1 30 40—Respiration regular ; needle movements vigorous ; more chloroform on cap.
- 1 31 45—Cornea insensitive.
- 1 32 5— } Four punctures made in heart with needle.
- 1 32 15— }
- 1 32 30—Respiration regular ; needle movements vigorous.
- 1 32 45—A few more punctures made with needle.
- 1 34 0—Some more punctures made.
- 1 34 10—Respiration regular.
- 1 34 45—Respiration regular ; needle movements somewhat feeble and flickering.
- 1 35 20—More punctures made into the heart.
- 1 35 50—Cap removed.
- 1 36 40—More punctures made in the heart.
- 1 37 20— Do. do.
- 1 38 5—Respiration regular ; needle movements vigorous.
- 1 39 48—Winking.
- 1 40 0—More punctures made.
- 1 40 10—Respiration regular ; needle movements vigorous.
- 1 40 50—More punctures made.
- 1 41 30—Cornea insensitive.
- 1 41 40—Respiration regular ; needle movements vigorous but somewhat irregular.
- 1 43 10—More punctures made in the heart.
- 1 44 20—Needle removed ; incision made with a scalpel.
- 1 44 28—Needle re-inserted.
- 1 45 0—Respiration regular ; needle movements very large and irregular.
- 1 46 0—More punctures made.
- 1 46 25—Respiration regular ; needle movements vigorous but irregular.
- 1 47 20—More punctures made.
- 1 48 10—Needle removed ; another incision made.
- 1 48 20—Needle re-inserted.

H. M. S.

- 1 49 5—Respiration regular ; needle movements tetanic.
- 1 52 15—More punctures made.
- 1 53 10— Do.
- 1 53 20— Do.
- 1 54 10—Incision enlarged and needle re-inserted.
- 1 54 15—More chloroform.
- 1 55 0—Respiration regular, somewhat shallow ; needle movements still vigorous.
- 1 56 10—Cornea insensitive ; cap removed.
- 1 56 30—Needle movements very feeble ; pulse very feeble.
- 1 57 10—More punctures made.
- 1 57 40—Respiration regular ; needle movements and pulse feeble.
- 1 58 42—More punctures made.
- 1 59 0—Respiration regular ; needle movements still feeble.
- 1 59 30—Respiration deep and regular ; needle movements vigorous.
- 2 0 50—More punctures made.
- 2 2 0— Do.
- 2 2 35—Respiration regular ; needle movements vigorous but somewhat irregular.
- 2 3 20—More punctures made.
- 2 3 50—Respiration regular ; needle movements vigorous but irregular.
- 2 4 55—More chloroform.
- 2 5 5—Respiration regular.
- 2 5 30—Respiration slow.
- 2 6 10—More punctures made.
- 2 6 30—Cap removed.
- 2 6 55—More punctures made.
- 2 7 35—Respiration quick and regular ; needle movements fairly vigorous.
- 2 9 20—Heart punctured with a scalpel.
- 2 12 0—Respiration irregular and gasping ; needle movements still vigorous but irregular.
- 2 12 12—Animal gasping.
- 2 12 30—Respiration very shallow ; needle movements still vigorous but irregular.
- 2 13 20—Animal gasping irregularly.
- 2 14 30—Abdominal movements only ; no air entering the chest ; cornea sensitive.
- 2 15 45—Needle beating ; spasmodic movements of the jaws.

H. M. S.

2 16 45—Needle movements vigorous.

2 17 0—Respiration stopped ; needle vibrating.

2 18 10—Needle just vibrating.

Post-mortem.—Right side of the heart contains a little blood. Pericardium filled with clotted blood.

Remarks.—In this experiment an attempt was made to fill the pericardium with blood and watch the effects on the needle beat. Though the movements became exceedingly irregular at times, the heart never once stopped completely until after the respiration had ceased. The breathing all through was kept absolutely regular.

EXPERIMENT CXIV.

28TH MAY 1892.—Temperature 93° F.—Big healthy pariah dog.

H. M. S.

2 30 10—Dog in box with chloroform.

2 34 0—More chloroform.

2 38 30— Do.

2 38 40—Fallen down.

2 38 50—Taken out ; more chloroform.

2 40 10—Cornea insensitive ; cap removed ; respiration shallow ; needle in heart, movements vigorous.

2 41 0—Incision made into the heart substance ; needle removed.

2 41 10—More chloroform.

2 41 40—Respiration regular ; needle movements vigorous.

2 47 18—Respiration stopped ; needle stopped completely for 25 seconds before the stoppage of respiration.

2 49 20—Respiration returned.

2 49 40—Animal gasping.

2 50 4—Respiration stopped ; needle movements feeble.

2 50 25—Cap removed ; needle movements feeble.

2 51 0—Needle just vibrating.

Post-mortem.—Pericardium contained clotted blood.

Remarks.—In this experiment an incision was made into the heart cavities, and the pericardium filled with blood purposely, with the object of watching the effect on the heart beat. The needle stopped completely for 25 seconds before the respiration, but subsequently recommenced and continued after stoppage of the respiration.

EXPERIMENT CXV.

28TH MAY 1892.—Temperature 93° F.—Small healthy pariah dog.

H. M. S.

2 57 0—Dog in box with chloroform.

3 0 40—Struggling.

3 1 20—More chloroform; struggling violently.

3 1 30—Yelping.

3 2 10—Fallen down; stopped struggling.

3 2 20—Taken out; cornea insensitive.

A 3 2 30—*Respiration stopped.*

3 2 35—*Artificial respiration with hands commenced.*

3 4 40—Natural respiration returned; artificial respiration stopped;
needle in heart, movements vigorous.

3 4 52—Incision commenced for exposing the left vagus.

3 8 0—Left vagus cut.

3 8 8—Incision commenced for exposing the right vagus.

3 10 12—More chloroform.

3 11 10—Cornea insensitive; cap removed.

3 12 18—Right vagus cut; more chloroform.

3 13 0—Cell tested and found to be working.

3 13 40—Respiration regular; needle movements vigorous.

3 14 10—Respiration very slow and deep; needle movements vigorous.

3 15 10—Regular breathing 20 times a minute.

3 15 40—Respiration shallow; needle movements vigorous.

3 16 10—Respiration shallow.

3 16 40—Respiration very shallow.

3 18 50—More chloroform; respiration very shallow; needle movements
vigorous.

B 3 19 10—*Respiration stopped.*

3 19 25—*Peripheral end of right vagus irritated.* The needle stopped
completely for 10 seconds.

3 20 25—Vagus irritation stopped; 30 beats a minute during the irritation.

3 20 35—Needle movements vigorous.

3 22 0—Jaw pulled forward.

3 22 20—Needle movements stopped.

Remarks.—In experiment B there was no recovery on stimulating for one minute the peripheral end of right vagus 15 seconds after stoppage of respiration. During this time the needle stopped completely for 10 seconds and there were only 30 beats. The animal previously had an overdose (A) given to it while in the box and had to be recovered by artificial respiration.

EXPERIMENT CXVI.

30TH MAY 1892.—Tempr. 90° F.—Big but very sickly and emaciated pariah dog.

H. M. S.

- 2 43 0—Dog in box with chloroform.
- 2 46 20—More chloroform.
- 2 50 5— Do.
- 2 51 20—Struggling.
- 2 53 40—Struggling violently.
- 2 54 0—Fallen down and taken out of the box ; cap loosely applied over face, but not removed while animal yelped.
- 2 54 10—Chloroform ; yelping.
- 2 54 40—Cornea insensitive ; respiration regular ; needle in heart, movements vigorous.
- 2 56 0—The needle stopped completely for 6, 8 and 5 seconds ; respiration very shallow.
- 2 58 30—Respiration regular ; needle movements vigorous ; animal coming out ; more chloroform.
- 2 59 10—Respiration regular ; needle movements vigorous and regular ; cornea insensitive.
- 2 59 50—Respiration regular ; needle movements irregular.
- 3 0 30—Respiration very shallow.
- 3 2 0—Needle beating 28 times a minute.
- 3 2 20—Respiration very shallow and slow.
- 3 3 30—Respiration deep and regular ; needle movements vigorous and regular.
- 3 4 30—Cornea sensitive ; more chloroform.
- 3 4 42—Respiration deep and regular ; needle movements vigorous and regular.
- 3 5 50—Respiration regular ; needle movements vigorous and regular.
- 3 6 20—Respiration shallow ; needle movements vigorous ; cornea insensitive.
- 3 6 40—Cap removed.
- 3 7 0—Respiration deep and regular ; needle movements vigorous but intermitting at every 3 beats.
- 3 7 50—Respiration deep and regular ; needle movements regular and vigorous.
- 3 8 10—More chloroform.
- 3 8 40—Respiration regular ; needle movements vigorous and regular.
- 3 9 25—Cornea insensitive.

H. M. S.

- 3 10 20—Respiration shallow ; needle movements vigorous but somewhat intermittent.
- 3 10 25—Cap removed.
- 3 11 7—More chloroform.
- 3 11 40—Respiration shallow ; needle movements vigorous but intermittent.
- 3 12 30—Respiration regular ; needle movements intermittent every 3 beats.
- 3 13 0—Pulse regular ; needle movements regular.
- 3 14 10—Needle stopped completely for 3 seconds.
- A 3 14 40—*Respiration stopped* ; needle movements slow and intermittent and vigorous ; cap removed.
- 3 16 10—Abdominal respiratory movements commenced.
- 3 17 0—Needle beating 28 times a minute.
- 3 17 50—Shallow respirations ; needle movements feeble.
- 3 18 55—Respiration still very shallow and chiefly abdominal ; needle movements still feeble.
- 3 20 15—Respiration deeper ; needle movements still feeble.
- 3 21 20—Respiration deep and regular.
- 3 22 0—Needle movements vigorous and regular.
- 3 24 10—Cornea sensitive ; more chloroform.
- 3 24 40—Cap removed ; respiration regular ; needle movements vigorous.
- 3 25 0—Cap re-applied.
- 3 25 17—Respiration regular ; needle movements vigorous.
- 3 25 24—Cornea insensitive ; cap removed.
- 3 26 35—Respiration regular ; needle movements vigorous.
- 3 26 48—Cap re-applied.
- 3 27 12—Cap removed.
- 3 27 22—Respiration regular and deep ; needle movements vigorous and regular.
- 3 28 32—More chloroform.
- 3 28 50—Cornea sensitive.
- 3 29 0—Cornea insensitive ; respiration regular ; needle movements vigorous ; cap removed.
- 3 29 30—Cap re-applied.
- 3 31 12—Respiration regular ; needle movements regular and vigorous.
- 3 31 28—Cap removed.
- 3 32 0—Respiration jerky and irregular ; needle movements regular.
- 3 32 40—Respiration very jerky and spasmodic ; needle movements vigorous.

H. M. S.

- 3 33 40—Respiration regular ; needle movements vigorous.
- 3 34 20—Dog coming out ; pupils dilated.
- 3 34 40—Respiration regular ; needle movements vigorous and regular.
- 3 35 10—Cornea sensitive.
- 3 36 40—Slight struggling ; more chloroform.
- 3 37 0—Respiration regular ; needle movements vigorous and regular.
- 3 37 20—Holding breath.
- 3 38 0—Respiration regular ; needle movements regular and vigorous.
- 3 38 20—Respiration very shallow ; cornea insensitive ; cap removed.
- 3 39 0—Shallow respirations ; needle stopped completely for 8, 6 and 5 seconds.
- 3 39 30—Respiration shallow ; needle movements very irregular and feeble.
- 3 40 28—Respiration stronger.
- 3 42 30—Respiration regular ; needle movements regular and vigorous.
- 3 43 0—More chloroform.
- 3 45 0—Cornea insensible ; cap removed.
- 3 45 40—Respiration regular but somewhat jerky.
- 3 47 0—More chloroform.
- 3 48 30—Respiration deep and regular ; needle movements vigorous.
- 3 48 40—Left vagus cut.
- 3 48 50—Cornea insensitive ; cap removed.
- 3 51 0—Right vagus cut ; respiration deep and slow ; needle movements fast.
- 3 51 50—Respiration very deep and regular ; needle movements vigorous and tetanic.
- 3 52 20—More chloroform.
- 3 52 30—Respiration very deep and regular ; needle movements very quick and vigorous.
- 3 53 40—Respiration deep and regular ; needle movements vigorous and regular.
- B 3 53 55—*Respiration stopped* ; needle movements very vigorous and regular.
- 3 55 10—Needle movements still vigorous and regular.
- 3 55 50—Abdominal movements commenced.
- 3 56 35—Natural respiration returned.
- 3 58 10—Respiration regular and deep ; needle movements vigorous.
- 3 59 50—Cornea sensitive.
- 4 0 0—Respiration regular ; needle vigorous.

H. M. S.

- 4 0 20—More chloroform; respiration deep and regular; needle movements vigorous and regular.
- 4 1 30—Respiration very shallow; needle movements vigorous and regular.
- 4 2 0—Abdominal movements only; needle movements vigorous and regular.
- C 4 2 40—*Respiration stopped*; needle movements vigorous and regular; cap removed.
- 4 3 40—Abdominal movements commenced.
- 4 4 40—Natural respiration returned; needle movements vigorous and irregular.
- 4 6 35—Cornea sensitive.
- 4 6 45—Big dose of chloroform; cap jammed over face.
- 4 7 0—Respiration shallow; needle movements vigorous.
- 4 7 20—Respiration regular; needle movements vigorous and regular.
- 4 7 30—Respiration shallow; needle movements vigorous.
- D 4 7 35—*Respiration stopped*; needle movements vigorous; cap removed.
- 4 8 0—Needle movements vigorous and regular.
- 4 8 30—Feeble abdominal movements commenced.
- 4 9 50—Abdominal movements ceased; needle movements vigorous.
- 4 10 30—Abdominal movements returned.
- 4 10 45— Do. ceased.
- 4 11 0—Needle movements vigorous.
- 4 11 30—Needle movements feeble.
- 4 12 30—Needle just vibrating.
- 4 13 20—Needle stopped.

Remarks.—A natural recovery. Needle very slow at time of stoppage of respiration. Immediately before respiration stopped the needle ceased beating for 3 seconds. During administration of chloroform it showed a great tendency to stop completely for several seconds when the respiration became at all shallow. Both vagi were now divided. Needle beats and the respiration became at once vigorous and regular. B. Natural recovery. C. Natural recovery. D. A big dose of chloroform was now given with the cap jammed over face. No effect whatever on the vigour of the needle beats was produced by this and it was not until nearly 4 minutes after the respiration had ceased that they became at all feeble. No recovery eventually. Although there was no natural recovery in D, the needle beats at the time of the stoppage of the respiration were distinctly more vigorous than they were in A before the vagi were divided. The animal was under chloroform for 1h. 30m. 20s.

EXPERIMENT CXVII.

31ST MAY 1892.—Temperature 89·4° F.—Big healthy pariah dog.

H. M. S.

- 1 36 50—Dog in box with chloroform.
- 1 43 5—More chloroform.
- 1 46 30— Do.
- 1 50 12— Do.
- 1 54 10— Do.
- 1 56 25—Fallen down.
- 1 56 45—Taken out ; more chloroform ; yelping.
- 1 57 32—Cornea insensitive ; cap removed.
- 1 57 55—Respiration sighing and regular ; needle in heart, movements vigorous.
- 1 58 10—Incision commenced for exposing the right vagus.
- 1 58 20—More chloroform ; struggling.
- 1 59 35—Cornea insensitive ; cap removed.
- 2 0 0—Respiration shallow ; needle movements vigorous.
- 2 3 50—Right vagus exposed.
- 2 4 55—Cell tested and found to be working.
- 2 6 0—Uncut right vagus irritated ; no stoppage of needle beat ; irritation stopped.
- 2 7 25—Right vagus cut.
- 2 7 30—Cornea sensitive ; more chloroform.
- 2 7 40—Struggling and holding breath.
- 2 8 20—Cornea insensitive ; cap removed.
- 2 8 50—Needle re-inserted ; respiration regular ; needle vigorous.
- 2 9 10—Vagus irritation (peripheral end of right vagus) tried ; no slowing effect on the heart ; the current feeble.
- 2 10 40—Current made stronger.
- 2 11 5—Vagus irritation (peripheral end of right vagus) tried ; no slowing effect on the heart still.
- 2 17 0—Current made still stronger.
- 2 17 18—More chloroform.
- 2 17 25—Struggling and holding breath.
- 2 18 0—Respiration regular ; needle movements vigorous.
- 2 18 5—Cornea insensitive ; cap removed.
- 2 18 10—Vagus irritation commenced ; the heart stopped completely for 7 seconds.

H. M. S.

- 2 18 20—Vagus irritation stopped.
- 2 18 50—Vagus irritation commenced ; the heart stopped completely for the first 5 seconds during irritation.
- 2 19 50—Vagus irritation stopped ; 77 beats in a minute during irritation.
- 2 20 0—Incision commenced for exposing the left vagus.
- 2 23 50—Left vagus cut ; more chloroform.
- 2 24 8—Struggling and holding breath.
- 2 24 50—Deep respirations.
- 2 25 0—Cornea insensitive ; cap removed ; left uncut vagus irritated.
- 2 25 32—The heart stopped completely for 7 seconds.
- 2 26 5—Vagus irritation stopped.
- 2 27 18—Vagus irritation commenced ; the heart stopped completely for 6 seconds.
- 2 29 0—Vagus irritation stopped ; heart beating 90 times a minute.
- 2 29 30—More chloroform.
- 2 30 50—Cornea insensitive ; cap removed.
- 2 31 30—Left vagus tied.
- 2 31 50—Uncut left vagus irritated ; the heart stopped completely for 10 seconds.
- 2 32 50—Vagus irritation stopped.
- 2 33 40—Vagus irritation commenced again.
- 2 34 0—Vagus irritation stopped ; animal coming out.
- 2 34 5—More chloroform.
- 2 35 50—Respiration very shallow ; needle movements vigorous.
- A 2 36 10—*Respiration stopped.*
- 2 36 15—*Vagus irritation (peripheral end of right) commenced ; the heart stopped completely for 15 and 8 seconds in the beginning.*
- 2 37 15—Vagus irritation stopped ; 14 beats in the minute of irritation.
- 2 37 25—Needle movements vigorous ; abdominal movements commencing.
- 2 37 50—Respiration returned.
- 2 38 0—Respiration regular ; needle movements vigorous.
- 2 40 40—Do. do. do.
- 2 41 10—Vagus irritation (peripheral end of right) commenced.
- 2 42 10—Vagus irritation stopped, 75 beats a minute.
- 2 43 30—More chloroform.
- 2 43 45—Respiration regular ; needle movements vigorous.
- 2 44 15—Needle movements vigorous and regular.

H. M. S.

2 45 20—Respiration somewhat shallow ; needle movements vigorous and regular.

2 45 40—Respiration shallow ; needle movements vigorous and regular.

2 46 25—Respiration regular and fairly deep ; needle movements regular and vigorous.

2 46 45—Respiration chiefly abdominal ; little air entering the chest ; needle movements vigorous.

2 47 50—More chloroform.

2 47 54—Respiration stopped ; needle movements vigorous.

2 48 20—Respiration commenced.

2 48 40—Respiration slow and irregular.

B 2 49 20—*Respiration stopped ; vagus irritation commenced.*

2 49 35—Vagus irritation stopped ; battery not working properly.

2 50 10—Needle movements fairly vigorous.

2 51 0—Needle movements feeble.

2 51 30—Needle movements very feeble.

2 52 15—Needle vibrating.

2 53 0—Needle stopped.

Remarks.—In experiment A the peripheral end of the right vagus was irritated for 1 minute, during which time there were only 14 beats of the needle, which completely stopped for 15 seconds and 8 seconds during this period. Irritation was commenced 5 seconds after the respiration had ceased. The dog recovered. In B irritation of the peripheral end of right vagus was commenced immediately the respiration ceased, but the battery was not working properly, and so irritation was discontinued. The dog did not recover.

EXPERIMENT CXVIII.

31ST MAY 1892.—Temperature 89·4° F.—Small healthy pariah dog.

H. M. S.

2 55 45—Dog in box with chloroform.

2 59 30—More chloroform.

3 3 20—Fallen down.

3 3 30—Taken out ; more chloroform.

3 10 30—More chloroform.

3 10 40—Struggling slightly.

3 10 50—Needle in heart, movements regular.

H. M. S.

- 3 11 15—Cornea insensitive ; cap removed.
- 3 11 30—Cap re-applied.
- 3 11 45—Incision commenced for exposing the right vagus.
- 3 15 34—More chloroform.
- 3 16 30—Right vagus tied and cut.
- 3 17 15—Respiration regular ; needle movements vigorous and regular.
- 3 17 40—More chloroform.
- 3 18 5—Cornea insensitive ; cap removed.
- 3 18 50—More chloroform.
- 3 19 0—Cornea insensitive ; cap removed.
- 3 19 30—More chloroform.
- 3 31 40—Cell tested and found to be working.
- 3 33 20—More chloroform.
- 3 33 42—Respiration regular ; needle movements vigorous.
- 3 34 0—Struggling.
- 3 35 10—Respiration shallow ; needle movements vigorous.
- 3 36 0—Respiration shallow ; needle movements still vigorous.
- 3 36 35—Respiration stopped.
- 3 36 45—Another respiration.
- 3 37 10—Respiration very slow and deep.
- 3 38 40—*Respiration stopped* ; cap removed.
- 3 39 0—Needle movements vigorous.
- 3 39 40—Twitching of the jaw muscles.
- 3 39 50—Needle movements vigorous.
- 3 40 40—Needle movements feeble.
- 3 41 18—Needle vibrating.
- 3 42 10—Needle stopped.

Remarks.—In this experiment it was intended to stimulate the peripheral end of the cut vagus immediately after the respiration stopped, but the battery did not work, and so the attempt was not made. There was no natural recovery, though at time of stoppage of respiration needle was vigorous.

EXPERIMENT CXIX.

1ST JUNE 1892.—Temperature 88° F.—Small healthy pariah dog.

H. M. S.

- 1 46 10—Dog in box with chloroform.
- 1 51 30—More chloroform.
- 1 54 40—Fallen down ; cornea insensitive.
- 1 55 0—Taken out.
- 1 56 0—Respiration regular ; needle in heart, movements regular and somewhat feeble.
- 1 56 54—Incision commenced for exposing the left vagus.
- 2 1 10—Dog coming out ; more chloroform.
- 2 3 0—Cornea insensitive ; cap removed.
- 2 4 40—More chloroform.
- 2 5 58—Left vagus tied and cut.
- 2 7 0—Respiration regular ; needle movements vigorous and regular.
- 2 7 30—Cell tested and found to be working.
- 2 8 0—Vagus irritation (peripheral end of left) commenced ; needle stopped completely for 5 seconds.
- 2 9 0—Vagus irritation stopped.
- 2 9 30—Vagus irritation commenced again ; needle stopped.
- 2 10 30—Vagus irritation stopped ; needle beating 35 times a minute during the irritation.
- 2 11 25—Vagus irritation commenced ; needle stopped completely for 4 seconds.
- 2 12 25—Vagus irritation stopped, 89 beats a minute. The needle did not stop at all.
- 2 13 30—Cornea sensitive ; more chloroform.
- 2 14 10—Vagus irritation commenced ; needle stopped for 6 seconds.
- 2 14 30—More chloroform.
- 2 15 10—Vagus irritation stopped.
- 2 15 30—More chloroform.
- 2 16 0—Respiration regular ; needle movements somewhat feeble but regular.
- 2 16 48—More chloroform.
- 2 18 4—Respiration shallow ; needle movements regular but somewhat feeble.
- 2 18 30—*Respiration stopped.*
- 2 18 40—*Vagus irritation commenced.*

H. M. S.

- 2 19 40—Vagus irritation stopped ; needle beating 60 times a minute during irritation.
- 2 20 0—Needle movements regular but somewhat feeble.
- 2 21 30—Slight twitching of tongue.
- 2 22 25—Tongue movements ceased ; needle movements regular but somewhat feeble.
- 2 23 20—Needle stopped.

Remarks.—In this experiment the peripheral end of the left vagus was irritated 10 seconds after the respiration had ceased and continued for 1 minute; during this time there were 60 beats of the needle. The dog did not recover. The object of the experiment was to determine for how long a period the heart could be stopped by irritating the vagus, and this was found in this case to be 6 seconds. It was observed that the longer the irritation was continued the less effectual it seemed to be.

EXPERIMENT CXX.

1st JUNE 1892.—Temperature 88° F.—Young healthy pariah dog.

H. M. S.

- 2 30 0—Dog in box with chloroform.
- 2 33 10—More chloroform.
- 2 37 10—Slight struggling.
- 2 37 50—More chloroform.
- 2 39 45—Struggling violently.
- 2 36 5—Taken out.
- 2 36 48—More chloroform ; yelping.
- 2 37 12—Needle in heart, movements quick and tetanic.
- 2 37 25—Cornea insensitive ; cap removed.
- 2 37 35—Respiration shallow ; needle quick and somewhat tetanic.
- 2 37 48—Incision commenced for exposing the left vagus.
- 2 40 0—More chloroform.
- 2 41 0—Cornea insensitive ; cap removed.
- 2 47 20—Vagus irritation (peripheral of left) commenced ; the heart stopped completely for 3 seconds.
- 2 48 20—Irritation stopped ; needle beating 60 times a minute during irritation.
- 2 49 30—More chloroform ; respiration regular ; needle movements vigorous.
- 2 50 0—Respiration shallow ; needle movements feeble.

H. M. S.

- 2 50 10—Cap removed.
- 2 50 30—Respiration quick and regular ; needle movements somewhat feeble.
- 2 51 0—More chloroform.
- 2 51 35—Vagus irritation recommenced ; the heart completely stopped for 8 and 10 seconds.
- 2 55 35—Vagus irritation stopped.
- 2 56 0—Respiration regular ; needle re-inserted, movements more vigorous.
- 2 57 25—Vagus irritation commenced ; the heart stopped completely for 5 seconds.
- 2 58 25—Vagus irritation stopped ; needle beating 46 times a minute.
- 2 58 30—Respiration regular ; needle movements vigorous.
- 2 59 20—Vagus irritation commenced.
- 3 0 20—Vagus irritation stopped ; needle beating 49 times a minute.
- 3 2 0—76 beats a minute.
- 3 2 10—Cornea sensitive ; more chloroform.
- 3 3 5—Cornea insensitive ; cap removed.
- 3 3 20—Vagus irritation commenced.
- 3 4 20—Vagus irritation stopped ; needle beating 42 times a minute.
- 3 5 0—More chloroform.
- 3 5 20—Respiration shallow ; needle movements vigorous and irregular.
- 3 6 22—Respiration slow and somewhat irregular ; needle movements vigorous.
- A 3 8 20—*Respiration stopped ; twitching of abdominal muscles.*
- 3 8 25—*Vagus irritation commenced.*
- 3 9 25—Vagus irritation stopped ; deep respiration returned.
- 3 11 0—Needle beating 132 times a minute.
- 3 18 28—Cornea sensitive.
- 3 18 35—Struggling ; more chloroform.
- 3 19 30—Cornea insensitive ; cap removed.
- 3 20 15—Vagus irritation commenced ; needle stopped completely for 10 seconds (one feeble beat took place in this time).
- 3 21 15—Vagus irritation stopped.
- 3 21 45—Vagus irritation commenced ; needle stopped completely for 4 seconds only.

H. M. S.

- 3 22 45—Vagus irritation stopped ; needle beating 53 times a minute during irritation.
- 3 23 30—More chloroform.
- 3 24 0—Respiration shallow and irregular.
- B 3 24 40—*Respiration stopped* ; cap removed ; needle, just before respiration ceased and for a few seconds after, stopped completely.
- 3 24 45—Needle movements regular but somewhat feeble.
- 3 26 0—One respiration.
- 3 26 5—Another respiration ; needle, just before respiration ceased and for a few seconds after, stopped completely.
- 3 27 0—Natural respiration recommenced.
- 3 34 10—Cornea sensitive.
- 3 34 30—Big dose of chloroform ; cap jammed over face.
- 3 34 40—Struggling and holding breath.
- 3 35 0—Respiration regular ; needle movements vigorous.
- 3 35 40—Respiration shallow and irregular ; needle movements feeble and irregular.
- 3 37 5—Respiration deep and regular ; needle movements feeble.
- 3 38 22—Respiration stopped ; needle vibrating.
- 3 39 0—Respiratory movements returned ; cap still kept on.
- 3 40 20—Respiration stopped again ; needle just vibrating ; cap removed.
- 3 42 40—Needle just vibrating.
- 3 44 20—Needle stopped.

Remarks.—In experiment A the peripheral end of the left vagus was irritated 5 seconds after the respiration ceased and continued for 1 minute. (~~By an omission no note was taken of the effect produced on the needle by the irritation during this time.~~) The dog recovered. In B the needle stopped completely for a few seconds, during which time the respiration stopped. The dog recovered naturally. The peripheral end of the left vagus was irritated several times during anæsthesia ; and on all occasions the needle beats were very markedly slowed and in some cases completely stopped. The longest period in which the needle completely stopped was 10 seconds. The fact that the heart was stopped on several occasions in no way appeared to interfere with the animal's recovery.

EXPERIMENT CXXI.

13TH JUNE 1892.—Healthy pariah dog.

H. M. S.

- 1 43 5—Dog in box with chloroform.
- 1 48 0—More chloroform.
- 1 48 23—Walking about.
- 1 48 58—Fallen down.
- 1 49 35—Dog taken out.
- 1 49 50—Cornea sensitive.
- 1 50 10—More chloroform ; struggling and holding breath.
- 1 50 40—Cap loosely applied.
- 1 50 50—Cornea insensitive ; cap removed.
- 1 51 30—Incision commenced for exposing trachea.
- 1 51 50—More chloroform.
- 1 52 45—Cornea insensitive ; cap removed.
- 1 53 10—Respiration regular ; trachea exposed.
- 1 53 50—Trachea incised.
- 1 54 45—Tube inserted into the trachea.
- 1 55 40—Incision commenced for exposing the heart.
- 1 56 45—Cornea insensitive ; cap removed.
- 1 57 20—More chloroform.
- 1 59 10—Cornea insensitive ; cap removed.
- 1 59 30—Respiration deep and quick.
- 2 1 0—Tube taken out.
- 2 2 5—More chloroform.
- 2 3 0—Cornea insensitive ; cap removed.
- 2 4 30—More chloroform.
- 2 5 25—Cornea insensitive ; cap removed.
- 2 6 30—Artificial respiration commenced.
- 2 12 10—*Chloroform (20 minims) injected in the left ventricle ; heart's action increased during interval.*
- 2 12 20—Heart stopped.
- 2 12 28—Heart beating again.
- 2 12 35—Gasping.
- 2 14 30—Still gasping.
- 2 14 35—Heart's action intermittent.
- 2 15 10—Heart's action irregular but vigorous.
- 2 16 5—Heart's action intermittent and feeble.

H. M. S.

2 18 25—Heart's action 13 times a minute.

2 19 10—Injection of chloroform (20 minims) in right ventricle.

2 19 45—Heart's action feeble, 4 beats a minute ; heart stopped soon after last note.

2 23 10—Artificial respiration stopped.

Post-mortem.—The lungs normal in colour and collapsed. Right side of the heart distended, containing cherry red blood ; left side contains little cherry red blood. Muscle flabby on both sides.

Remarks.—The object of this experiment was to observe what effect the injection of chloroform into the heart cavities would have, while artificial respiration was kept up by air blown into the trachea by means of bellows. After the injection of first 20 minims, the heart's action became much more vigorous for a short time, then stopped completely for 8 seconds, and finally became intermittent and feeble. During the operation for exposing the heart there was some unavoidable hæmorrhage. After each gasp the heart's action became stronger. The lungs could be seen to be only partially expanded by the artificial respiration.

EXPERIMENT CXXII.

13TH JUNE 1892.—Healthy pariah dog.

H. M. S.

2 35 30—Dog in box with chloroform.

2 39 20—More chloroform.

2 41 0—Struggling.

2 42 40—Dog fallen down.

2 42 48—Dog taken out.

2 43 30—More chloroform ; struggling and holding breath.

2 44 5—Cornea insensitive ; cap removed.

2 44 30—Incision commenced for exposing trachea.

2 45 15—Respiration shallow.

2 45 35—Trachea exposed and incised.

2 46 40—Tube inserted into trachea.

2 47 0—More chloroform.

2 48 15—Incision commenced for exposing the heart.

2 48 20—Tube taken out.

2 49 15—Cornea insensitive ; cap removed.

2 53 40—Tube re-inserted in the trachea.

2 54 10—Thorax opened.

H. M. S.

- 2 54 25—Dog struggling.
- 2 54 38—More chloroform.
- 2 55 20—Struggling violently.
- 2 56 30—Cornea insensitive ; cap removed.
- 2 56 40—Tube re-inserted.
- 2 57 10—Artificial respiration commenced.
- 2 57 40—Heart's action vigorous and quick.
- 2 58 10—Injection of chloroform (20 minims) into cavity of right ventricle.
- 2 58 30—Heart's action feeble and intermittent.
- 2 58 50—Heart's action feeble.
- 2 59 10—Right auricle only beating.
- 2 59 30—Gasp.
- 2 59 40— Do.
- 2 59 55—Whole heart beating.
- 3 0 5—Pericardium opened.
- 3 0 30—Heart's action feeble and intermittent.
- 3 1 35—Right auricle beating.
- 3 1 50—Whole heart contracting feebly.
- 3 2 30—Heart still beating.
- 3 2 55—Heart stopped.
- 3 3 57—Artificial respiration stopped.

Post-mortem.—Right side of the heart enormously distended with clotted blood, muscle flabby ; left side blood more liquid, but small in quantity.

Remarks.—After the injection of (20 minims) chloroform into the heart's cavities its action became feeble and intermittent, but it continued beating for 4m. 45s. after the injection. The lungs in this experiment were only partially expanded by the artificial respiration.

EXPERIMENT CXXIII.

13TH JUNE 1892.—Healthy pariah dog.

H. M. S.

- 3 14 50—Dog in box with chloroform.
- 3 15 40—Dog fallen down.
- 3 15 55—Dog taken out.
- 3 16 20—More chloroform ; struggling and holding breath.
- 3 19 40—More chloroform added.

ii. m. s.

- 3 19 58—Cap removed ; incision commenced to expose the trachea.
 3 20 0—More chloroform.
 3 20 45—Trachea exposed and incised.
 3 20 53—Cornea insensitive ; cap removed.
 3 22 0—Incision commenced for exposing the heart.
 3 22 25—More chloroform.
 3 22 35—Rapid breathing.
 3 24 10—Respiration rapid, but shallow.
 3 24 15—Cornea insensitive ; cap removed.
 3 24 45—Respiration quick and shallow.
 3 25 10—Tube inserted into trachea.
 3 26 0—Thorax opened.
 3 26 10—Artificial respiration commenced.
 3 26 35—Gasping ; heart vigorous.
 3 26 50—Chloroform injected (20 minims).
 3 27 10—Heart's action intermittent.
 3 27 30—Heart feeble, but regular.
 3 27 58—Heart's action regular, but feeble.
 3 28 55—Chloroform injected (20 minims) into cavity of right ventricle.
 3 30 0—Heart feeble.
 3 30 40—Artificial respiration stopped ; heart stopped.
 3 30 50—
 3 30 55—
 } Beats again.
 3 31 10—Heart stopped ; artificial respiration recommenced.
 3 32 0—Artificial respiration stopped.

On *post-mortem* examination lungs cherry red in colour, right side of the heart contains quantity of clotted blood, left side contains small amount of clotted blood.

Remarks.—In this experiment the lungs were very well distended by the artificial respiration. When chloroform was injected in the cavities of the heart, its action became feeble and soon after stopped entirely.

EXPERIMENT CXXIV.

14TH JUNE 1892.—Medium-sized unhealthy looking pariah dog.

H. M. S.

- 1 29 40—Dog in box with chloroform.
1 33 0—More chloroform.
1 35 10—Dog moving about.
1 35 43—Fallen down.
1 36 0—Struggling violently.
1 36 30—Taken out.
1 37 0—More chloroform ; cap loosely applied.
1 37 30—Incision commenced for exposing trachea.
1 37 56—More chloroform ; yelping and whining.
1 38 30—Cornea insensitive.
1 39 0—Incision commenced for exposing the heart.
1 40 6—Dog coming out ; more chloroform.
1 40 50—Cornea insensitive ; cap removed.
1 41 35—Trachea opened.
1 45 5—More chloroform.
1 46 40—Artificial respiration with bellows commenced.
1 46 42—Heart exposed, beating vigorously.
1 46 40—Animal breathing naturally and the lungs expanding well.
1 48 20—Pericardium opened.
1 48 58—Needle in heart ; minims 20 of chloroform injected into the
heart cavities.
1 49 20—No apparent effect on the heart movements.
1 50 0—Artificial respiration with bellows stopped ; animal gasping.
1 50 20— Do. recommenced.
1 50 40—Right ventricle contracting ; left stopped.
1 51 0—Minims 20 of chloroform injected in right ventricle.
1 51 20—Right ventricle quivering.
1 52 0—Occasional feeble contractions of right ventricle.
1 53 0—A few quivering movements of the muscles of the right ventricle,
but no beat.
1 53 20—Artificial respiration stopped.

Post-mortem.—Right ventricle flabby, filled with partially clotted blood. Left ventricle feels firmer than right, contains a little partially clotted blood; muscles on both sides are quite lax. Lungs lying collapsed in the thorax, normal in color and to all appearances quite healthy.

Remarks.—In this experiment 40 minims of chloroform were injected into the cavities of the heart in doses of 20 minims each. No immediate effect was noticed after the first injection, though soon after the left ventricle ceased to beat entirely, while the right merely quivered. The lungs were well expanded.

EXPERIMENT CXXV.

14TH JUNE 1892.—Medium-sized healthy pariah dog.

H. M. S.

- 2 3 45—Dog in box with chloroform.
 2 7 58—More chloroform.
 2 10 30—Dog moving about.
 2 11 15—Dog fallen down.
 2 11 45—Dog taken out.
 2 12 20—More chloroform ; cap loosely applied.
 2 12 30—Yelping.
 2 13 5—Incision commenced for exposing trachea.
 2 13 45—Cornea insensitive.
 2 15 15—Cap removed.
 2 15 35—Trachea exposed and opened.
 2 16 15—Incision commenced for exposing the heart.
 2 17 20—Respiration shallow.
 2 18 40—Respiration sluggish ; blood in the trachea.
 2 19 5—Artificial respiration commenced.
 2 19 50—Respiration regular ; cornea sensitive ; artificial respiration stopped.
 2 20 10—More chloroform.
 2 20 30—Rapid respiration.
 2 21 50—Struggling and very rapid breathing.
 2 23 30—Cornea sensitive.
 2 23 50—Cornea insensitive ; breathing shallow.
 2 24 25—Cap removed.
 2 24 45—Thorax opened.
 2 24 58—Tube inserted and artificial respiration commenced.
 2 26 40—Heart beating vigorously.
 2 27 5—Pericardium opened.
 2 28 15—Injection of chloroform (minims 20) into substance of right ventricle in two places.
 2 28 30—Heart's action vigorous.
 2 29 20—Heart's action feeble.
 2 29 25—Heart stopped.
 2 29 28—
 2 29 33—
 2 29 35—
 } Beats again.

H. M. S.

- 2 29 40—Heart's action feeble.
 2 30 30—Heart's action vigorous.
 2 30 45—Injection of chloroform (minims 20) in left ventricle in three places.
 2 31 15—Heart stopped.
 2 31 18—
 2 31 25—
 2 31 31—
 2 31 4—
 2 31 40—
 2 31 50—Spasmodic contractions of the heart.
 2 32 10—Gasping.
 2 32 45—Heart's action vigorous ; gasping.
 2 33 0—Injection of chloroform (minims 15) in right ventricle in two places.
 2 33 30—Heart's action vigorous.
 2 34 0—Heart's action feeble.
 2 35 10—Heart stopped.
 2 35 13—
 2 35 17—
 2 35 30—Heart's action vigorous and regular.
 2 36 15—Heart's action feeble.
 2 36 25—Heart's muscle contracting ; no regular beats.
 2 36 35—Heart stopped.
 2 36 50—Artificial respiration stopped.

Post-mortem.—Right side of the heart much distended with clotted blood, muscle flabby ; left side firmly contracted, contains small quantity of partially clotted blood ; lungs congested at the bases, cherry red in colour ; right lower lobes airless.

Remarks.—In this experiment minims 55 of chloroform were injected into the substance of the ventricles. After the first injection (minims 20) the heart's action remained vigorous, then became feeble, and then stopped for 3 seconds ; it then began to beat somewhat feebly at first and then vigorously. After the second and third injection the same effect was produced, but after the latter the heart stopped completely.

EXPERIMENT CXXVI.

14TH JUNE 1892.—Small-sized healthy pariah dog.

H. M. S.

- 2 46 40—Dog in box with chloroform.
 2 49 0—More chloroform.
 2 53 20— Do.
 2 57 18— Do.
 3 1 15— Do.
 3 1 50—Dog fell down.
 3 2 5—Dog removed from the box.
 3 3 30—Respiration shallow; cornea insensitive.
 3 3 48—Incision commenced for exposing trachea.
 3 6 30—Trachea opened and incised.
 3 6 58—Incision commenced for exposing heart.
 3 8 40—More chloroform.
 3 9 10—Stopped chloroform.
 3 9 50—More chloroform.
 3 11 11—Chest was opened.
 3 11 15—Chloroform stopped; artificial respiration commenced with bellows.
 3 11 45—Heart beats vigorously.
 3 13 10—Pericardium opened.
 3 13 25—Chloroform minims 15 injected in the walls of left ventricle in two places.
 3 14 40—Heart beats vigorously.
 3 14 50— Do.
 3 16 5—Chloroform minims 20 injected in the right ventricle in two places.
 3 16 40—Heart beats vigorously.
 3 16 55—Heart beats feebly.
 3 17 10—Heart stopped.
 3 17 40—Another beat.
 3 18 55—Heart beats 90 per minute, five gasps were taken.
 3 19 58—Heart beats feebly.
 3 20 30—Right ventricle beats vigorously and left feebly.
 3 20 40—} Both stopped for 30 seconds; another beat, began beating
 3 21 10—} again.
 3 22 50—Stopped.

H. M. S.

- 3 23 5—Another beat. Right ventricle only beats; left motionless.
 3 24 30—Right ventricle stopped.
 3 24 40—Artificial respiration stopped.

Post-mortem.—Right ventricle enormously distended by partially clotted blood. Left ventricle contains less blood, firmly contracted; no rigidity of heart muscle. Lower lobe of the left lung congested and airless; right, cherry red in colour, otherwise normal.

Remarks.—After the injection of the first minims 15 into the walls of the left ventricle, the heart continued to beat vigorously as before. After the injection of the next minims 20 into the walls of the right ventricle, no immediate effect was produced, though shortly afterwards the beats became feeble and extremely intermittent, and at one time stopped completely for 30 seconds. Finally the left ventricle stopped, while the right continued beating.

EXPERIMENT CXXVII.

15TH JUNE 1892.—Large frog.

Thoracic cavity opened and heart excised.

H. M. S.

- 1 26 40—A few drops of chloroform placed on cotton wool in the test tube underneath which the heart is placed.
 1 27 58—Chloroform dropped on the heart.
 1 27 20—Heart beats vigorously, no apparent effect produced.
 1 28 10—More chloroform, 3 or 4 drops.
 1 29 40—Heart beats 100 times per minute.
 1 30 40—Chloroform minims 4 injected into the substance of the heart.
 1 30 58—Still beats vigorously.
 1 31 50—Heart beats 100 times per minute.
 1 34 25—Chloroform minims 4 injected into the left ventricle.
 1 35 20—Heart beats vigorously.
 1 37 10—Chloroform minims 10 poured into the test tube and tube placed over heart.
 1 37 50—Heart beats 38 times per minute.
 1 38 40—Ventricle stopped beating.
 1 40 5—Ventricle commenced beating again.

H. M. S.

- 1 40 40—Left auricle beats.
- 1 41 25—The test tube removed.
- 1 42 10—Left auricle beats feebly.
- 1 44 20—Ventricle commenced.
- 1 44 30—Ventricle stopped.
- 1 45 20—Auricles and ventricles beat more vigorously.
- 1 46 20—Ventricles hardly moving ; auricles move vigorously.
- 1 47 40—Auricles beat vigorously.
- 2 1 5—Auricles still beating.
- 2 9 30—Auricles beat 25 times per minute.
- 2 14 10—A few drops of chloroform dropped on to both auricles.
- 2 14 55—Both auricles stopped beating.

Remarks.—In this experiment the thoracic cavity was laid open and the heart exposed. Cotton wool was placed on the top of a large test tube, the mouth of which was kept over the frog's heart. Chloroform was at first dropped on the cotton wool and the tube placed in position, and it was then dropped on to the surface of the heart itself. In neither experiment was any obvious effect produced at first. Minims 4 was then injected into the substance of the ventricle and afterwards minims 10 poured into the test tube which was again applied over the heart. It was now found that the beats had slowed to 38 per minute. Afterwards the action of the ventricle became feeble and intermittent. Chloroform was now dropped slowly on to the auricles, and soon after their action somewhat abruptly ceased. It was noticed that the ventricle became white and curled up at the apex as a result of the action of the chloroform.

EXPERIMENT CXXVIII.

16TH JUNE 1892.—Big frog.

H. M. S.

- 1 58 40—Heart beats vigorously.
- 1 58 50—Chloroform minims 60 in the test tube, the tube placed over the heart.
- 1 59 30—Heart beats vigorously ; no apparent effect.
- 2 0 30—Heart beats vigorously.
- 2 1 50—Tube removed.
- 2 2 5—Chloroform minims 40 added.
- 2 2 20—Ventricle not beating so vigorously.
- 2 3 40—Auricles beat vigorously ; left feebly.

H. M. S.

- 2 4 35—Ventricles stopped ; auricles still beating.
 2 6 10—Auricles beating very feebly.
 2 8 11—Right auricle stopped ; left still beating.
 2 8 30—Left auricle stopped.
 2 8 40—Tube removed.

Remarks.—There was no immediate effect noticed on the heart as the result of its exposure to the chloroform vapour ; but the beat of the ventricles soon after became less vigorous ; the auricles continued to beat for some considerable time. The ventricle became somewhat white in colour, and though contracted when its action ceased, was not rigid.

EXPERIMENT CXXIX.

16TH JUNE 1892.—Large frog.

A.

H. M. S.

- 1 37 5—Decapitated and needle thrust into spinal canal.
 1 38 55—Incision commenced to expose the heart.
 1 39 23—Heart exposed and found beating vigorously.
 1 40 30—Heart beating 56 a minute.
 1 42 35— Do.
 1 44 45—Heart beating 48 a minute.
 1 45 20—Tube containing 30 drops of chloroform inverted over the heart.
 1 47 25—Heart beating 44 a minute, not so vigorous as before.
 1 49 5—Ventricles beating very freely and becoming white and congested.
 1 50 15—Heart beating 40 a minute.
 1 51 10—Only auricular contraction ; ventricle motionless.
 1 52 20—Auricular contraction just visible.
 1 53 25—Auricles stopped beating.
 1 54 20—Left auricle commenced beating very freely.
 1 54 30—Left auricle stopped.

EXPERIMENT CXXX.

16TH JUNE 1892.—Large frog.

B.

H. M. S.

- 1 37 35—Decapitated and needle thrust into the spinal column.
 1 39 10—Incision commenced to expose the heart.
 1 44 30—Heart exposed and found beating vigorously.

H. M. S.

- 1 44 45—Heart beating 48 a minute.
- 1 47 25—Heart beating 44 a minute.
- 1 47 30—Heart beating vigorously still.
- 1 49 5—Heart beating vigorously.
- 1 50 15—Heart beating 48 a minute.
- 1 54 55— Do.
- 1 59 15—Heart beating still vigorously.
- 2 18 10—Heart beating 36 a minute.
- 2 18 15—Ventricular contraction often feeble for 4 or 5 beats then it again becomes as vigorous as ever.
- 2 42 5—Heart vigorous for 6 beats and feeble for 14.
- 2 43 0—A few drops of hydrochloric acid dropped on to the heart.
- 2 44 25—Heart feeble.
- 2 44 45—A few more drops of hydrochloric acid dropped on the heart.
- 2 46 0—Ventricular contraction very feeble ; auricular contraction fairly vigorous.
- 2 46 50—A few more drops of hydrochloric acid dropped on the heart.
- 2 47 20—Ventricular contraction ceased ; left auricle beating feebly.
- 2 50 10—A few more drops of hydrochloric acid dropped on the heart.
- 2 52 15—The whole movements of the heart ceased.

Remarks.—In these experiments two frogs of nearly similar size were taken A and B. In both the hearts were exposed. A to chloroform vapour and B to air. The heart's action ceased much sooner in A than it did in B. It was found that the chloroform vapour made the ventricle contract and curl up at the apex, and produced a whitish appearance. The action of the auricles in both A and B continued much longer than that of the ventricles. In B it was found that the heart's action remained vigorous for a very considerable time, but that when hydrochloric acid was dropped on to its surface, the ventricular beats became very feeble and soon ceased entirely and at the same time the ventricle itself became contracted. The final action of chloroform vapour on the heart was no doubt to enfeeble and finally to stop its beats, as the table shows that the heart which had been simply exposed to the air, continued beating for a longer period than that which had been exposed to chloroform ; but hydrochloric acid when dropped on to the surface of the heart in B produced exactly the same result as that of chloroform vapour in A, except that in the former case the action was more rapid.

The heart's muscle in both cases was contracted but in no sense rigid.

EXPERIMENT CXXXI.

17TH JUNE 1892.—Medium-sized pariah dog.

H. M. S.

- 1 46 0—Dog in box with chloroform.
 1 49 56—More chloroform.
 1 53 52— Do.
 1 56 41— Do.
 1 59 10—Dog fallen down.
 1 59 53—Dog placed on table; chloroform on cap loosely applied over face.
 2 0 30—Struggling.
 2 0 50—Cornea insensitive; cap removed.
 2 1 20—More chloroform.
 2 1 25—Incision commenced for exposing trachea.
 2 1 51—Cornea insensitive; cap removed.
 2 2 30—Chloroform.
 2 3 10—Trachea exposed; cap removed; cornea insensitive.
 2 3 44—Trachea opened.
 2 4 28—Incision commenced for exposing heart.
 2 10 1—Artificial respiration commenced.
 2 10 13—Heart exposed and found beating vigorously.
 2 16 51—Pericardium opened and heart found beating vigorously.
 2 17 40—Two drachms of chloroform poured into the pericardium.
 2 18 10— Do. do. do.
 2 18 30—Thirty drops do. do.
 2 18 50—Two drachms do. do.
 2 19 0—Two drachms of chloroform again poured into the pericardium which is now filled completely.
 2 20 10—Lungs well expanded; no effect on heart which still beats vigorously.
 2 20 50—More chloroform.
 2 21 19—Cap removed.
 2 21 32—Heart still beating vigorously.
 2 22 21—More chloroform on cap.
 2 22 50—Cornea insensitive; cap removed.
 2 23 30—Heart beating somewhat slowly and not so vigorously as before.
 2 24 10—Heart beating very slowly but vigorously.
 2 25 35—Heart beating 70 a minute and vigorous.

H. M. S.

- 2 26 30—Heart as vigorous as ever; the chloroform still in the pericardium.
- 2 28 29—Heart still vigorous.
- 2 29 0—Vapour of chloroform blown into the lungs through the bellows for a few minutes.
- 2 30 1—Heart beating 88 a minute.
- 2 31 30—Heart beating slowly.
- 2 32 0—Two drachms of chloroform again poured into the pericardium.
- 2 33 1—Heart beating quickly.
- 2 33 10—Another 2 drachms of chloroform poured into the pericardium.
- 2 33 40—Dog gasping.
- 2 33 50—Another gasp.
- 2 34 0—Heart beating 110 a minute; very vigorous.
- 2 34 5—Another gasp.
- 2 36 5—Lungs cherry red; colour of the heart unaltered; heart still as vigorous as ever.
- 2 37 35—Gasping.
- 2 38 40—Heart beating vigorously.
- 2 39 10—Artificial respiration stopped.
- 2 39 30—Movements of thorax and diaphragm continued.
- 2 40 0—Heart very slow.
- 2 40 10—Heart 28 beats and feeble.
- 2 40 21—Artificial respiration recommenced.
- 2 40 50—Heart still feeble.
- 2 41 50—Heart beating 28 times a minute; feeble.
- 2 42 40—Heart beating 68 times a minute, but very intermittent.
- 2 44 20—Heart getting feebler.
- 2 44 45—Heart beating 16 times a minute; feeble.
- 2 45 30—Heart very feeble.
- 2 46 15—Heart beating 12 times a minute.
- 2 47 35—Heart stopped.
- 2 47 37—Artificial respiration stopped.

Post-mortem.—Lungs filled with cherry red blood, otherwise normal. Heart muscle pale on both sides and very flabby. Right ventricle filled with maroon colored blood. Left ventricle contains very little maroon colored blood.

Remarks.—In this experiment $12\frac{1}{2}$ drachms of chloroform were poured into the pericardium from time to time, while artificial respiration was kept up

by pumping in air with bellows. The heart continued beating vigorously for 21 minutes, and though the pericardium was filled with chloroform, no obvious alteration in the vigour of the heart beat was observed. Immediately the artificial respiration was discontinued, the heart beats became feeble and very much slowed and soon stopped.

EXPERIMENT CXXXII.

17TH JUNE 1892—Frog No. 1

Heart immersed in chloroform at—

H. M. S.

3 15 10—Not beating vigorously.

3 23 0—Stopped beating.

7 minutes 50 seconds.

No. 4.

H. M. S.

3 24 55—Heart immersed in chloroform.

3 34 0—Heart beating slowly.

3 38 0—Auricle stopped ; ventricle still beating.

3 39 15—Heart still.

14 minutes 20 seconds.

No. 7.

H. M. S.

3 47 20—Heart immersed in muriatic acid, diluted 1—6.

3 47 50—Very slow beats.

3 48 15—Heart still.

55 seconds.

No. 3.

H. M. S.

3 18 50—Heart immersed in water.

3 54 30—Twelve beats a minute.

4 0 0—Stopping.

41 minutes 10 seconds.

17TH JUNE 1892—Frog No. 2.

Heart immersed in ether at—

H. M. S.

3 14 10—Heart beating vigorously.

3 24 30—Heart stopped.

10 minutes 20 seconds.

No. 5.

H. M. S.

3 32 5—Heart immersed in ether.

3 35 0—Heart beating very slowly.

3 37 10—Ventricle stopped.

3 39 5—Heart still.

7 minutes.

No. 8.

H. M. S.

3 55 15—Heart immersed in acid muriatic, diluted 1—20.

3 56 15—Fifty-two beats a minute.

3 56 50—Stopping.

3 57 10—Heart still.

1 minute 55 seconds.

No. 6.

H. M. S.

3 34 25—Heart immersed in water.

3 54 30—Beating 38 times a minute, not so strongly as No. 3.

4 0 0—Almost stopped ; shrivelled at apex.

35 minutes 35 seconds.

Remarks.—Hydrochloric acid : hearts very pallid and shrivelled. Ether : hearts pallid and blood clotted brown ; shrivelled. Chloroform : hearts not

pallid, blood clotted red ; not shrivelled. Water : hearts not pallid ; blood clotted red, *vide* Note in No. 6.

The table shews the length of time which elapsed before frogs' hearts finally stopped beating when immersed in chloroform, ether, hydrochloric acid and water.

EXPERIMENT CXXXIII.

20TH JUNE 1892.—Large-sized pariah dog.

H. M. S.

- 1 55 10—Dog in box with chloroform.
- 1 59 30—More chloroform.
- 2 3 35— Do.
- 2 3 45—Moving about.
- 2 5 7—Dog fallen down, convulsed.
- 2 5 20—Dog on the table and cornea insensitive.
- 2 7 1—Incision commenced for exposing trachea.
- 2 8 5—More chloroform on the cap.
- 2 8 35—Trachea exposed and opened.
- 2 9 16—Incision commenced for exposing heart.
- 2 10 5—Struggling and more chloroform.
- 2 11 35—Chloroform given gently from time to time.
- 2 13 30—Artificial respiration commenced.
- 2 14 40—Heart exposed and found beating vigorously but somewhat irregularly.
- 2 18 0—Chest fully exposed.
- 2 18 15—Incision made into the pericardium.
- 2 18 50—Forty minims of ether poured into the pericardium.
- 2 19 0—Forty minims more.
- 2 19 5—Another 20 minims.
- 2 19 30—Another 20 minims poured into the pericardium.
- 2 19 40—Lungs well expanded.
- 2 21 55—Heart beating 137 a minute.
- 2 22 20—Dog gasping.
- 2 22 40—Pericardium empty.
- 2 23 0—More chloroform given through bellows.
- 2 23 20—Chloroform stopped.
- 2 23 40—Canula slipped out and artificial respiration stopped for a few seconds ; heart stopped for a few seconds.

H. M. S.

- 2 23 42—Heart beating irregularly.
- 2 24 10 Do.
- 2 24 30—Two drachms of ether poured into pericardium.
- 2 24 50—Heart vigorous.
- 2 25 0—Another 1 drachm.
- 2 26 0—Heart beating 188 a minute.
- 2 26 25—Another drachm of ether.
- 2 26 50—Heart beating vigorously and irregularly.
- 2 27 30—Heart 212 a minute.
- 2 27 10—Heart's action feebler.
- 2 28 15—One drachm of ether poured in.
- 2 29 30—Dog gasping occasionally.
- 2 29 45—Heart getting feebler.
- 2 30 0—Lungs well expanded.
- 2 31 5—Chloroform given through the bellows.
- 2 32 40—Chloroform stopped ; heart feebler.
- 2 33 0—Pericardium empty.
- 2 33 20—Two drachms of ether poured in.
- 2 34 35—Heart beating 152 a minute.
- 2 35 40—More chloroform given through the bellows.
- 2 36 20—Cornea insensitive and cap removed.
- 2 37 30—Heart beating 152 a minute.
- 2 38 20—Gasping occasionally.
- 2 40 0—Heart rather more vigorous and cornea sensitive.
- 2 40 30—Pericardium empty.
- 2 40 58—Two drachms of ether poured in.
- 2 41 15—Another 2 drachms.
- 2 41 30—More chloroform through the bellows.
- 2 42 0—Ether flowed out of pericardium when dog moved ; two more
drachms poured in.
- 2 42 30—Cornea insensitive ; cap removed.
- 2 44 15—Right auricle becoming bright in colour.
- 2 44 40—Heart more vigorous.
- 2 45 0—Pulse fairly strong.
- 2 45 50—Cornea sensitive.
- 2 45 58—More chloroform given through the bellows.
- 2 46 40—Cornea insensitive and cap removed.

H. M. S.

2 47 40—Heart stopped for some seconds and then became intermittent.

2 47 50—Cap removed.

2 48 15—Heart's action feebler and intermittent.

2 49 30—Two drachms of ether poured in.

2 49 32—Dog gasping occasionally.

2 50 10—Heart's beats very intermittent.

2 50 50—Heart beating 61 a minute, fairly regular and vigorous.

2 53 2—Stopped gasping.

2 53 55—Heart's beatings feebler.

2 54 2—Heart stopped and artificial respiration stopped.

Post-mortem.—Heart muscle very flabby ; right side contains a little blood ; left hardly any blood ; cherry red in colour on both sides. Lungs contain a little cherry red blood ; otherwise normal.

Remarks.—The pericardium in this experiment was filled with ether, 17 drachms being poured in from time to time. The heart continued beating for 35m. 12s. ; though in this case the heart continued to beat for a longer time than in the similar experiment under chloroform (where artificial respiration was stopped when the heart was vigorous) and more ether was used. ~~the~~ The final effect was the same, namely feeble and intermittent action and then stoppage. In the case of ether the heart beats were more rapid than they were in the chloroform experiment. In both, the heart muscle was found to be pale and flabby.

EXPERIMENT CXXXIV.

20TH JUNE 1892.—Medium-sized pariah dog.

H. M. S.

3 2 30—Dog in box.

3 7 35—Dog fallen down.

3 7 50—Dog on the table and chloroform on cap.

3 7 58—Yelping.

3 8 0—Incision commenced for exposing trachea.

3 9 30—Trachea exposed and opened.

3 10 3—Incision commenced for exposing heart.

3 12 10—Thorax opened.

3 12 30—Artificial respiration commenced by means of bellows.

3 13 0—Lungs well expanded and heart beating fairly vigorously.

H. M. S.

- 3 14 20—Chloroform given through the bellows.
- 3 14 30—Injection of 20 minims of ether into substance of heart; syringe leaked and some ether escaped.
- 3 15 0—Cornea insensitive ; cap removed.
- 3 16 1—More chloroform.
- 3 16 10—Heart beating vigorously ; lungs well expanded.
- 3 16 50—More chloroform.
- 3 17 10—Another 20 minims of ether into substance of heart (some escaped).
- 3 17 20—Cap removed.
- 3 19 3—More chloroform given through the bellows.
- 3 19 50—Cap removed ; cornea insensitive.
- 3 21 20—(1st) Ten minims of ether injected into the substance of heart.
- 3 22 19—Heart irregular.
- 3 23 28—Heart 93 ; pulse 75 in half a minute. Heart is so irregular that it is very difficult to count the beats.
- 3 25 25—(2nd) Another 10 minims of ether injected into the well of left ventricle.
- 3 25 50—Gasping.
- 3 26 15—Heart's beats very quick and feeble.
- 3 27 0—Pulse almost imperceptible.
- 3 28 50—Gasping occasionally.
- 3 29 20—Heart more vigorous and pulse improving.
- 3 29 50—(3rd) Another 10 minims of ether injected into the substance of heart.
- 3 30 40—Heart much feebler and quicker ; pulse uncountable.
- 3 31 51—Artificial respiration stopped.
- 3 32 10—Movements of diaphragm.
- 3 32 15—Gasping.
- 3 32 45—Artificial respiration by bellows recommenced.
- 3 33 50—Heart beating feebly and very quickly ; pulse uncountable.
- 3 34 52—(4th) Another 10 minims of ether injected into the substance of heart.
- 3 35 10—Animal gasping.
- 3 35 50—Heart beating very feebly.
- 3 36 20—Heart stopped.
- 3 36 30—Two or 3 beats.
- 3 36 35—Stopped.

H. M. S.

- 3 36 48—Another beat.
- 3 36 53—Another feeble beat.
- 3 37 10—Heart just flickering.
- 3 37 15—Gasping.
- 3 37 20—Another gasp.
- 3 38 30—Slight contraction of wall of heart but no actual beat.
- 3 47 3—Auricle still beating.
- 3 48 4—Artificial respiration stopped.
- 3 48 10—Left auricle contracting spasmodically ; ventricle still.

Post-mortem.—Ventricles commenced beating when an incision was made into them. Left side (ventricle) contains a little clotted blood ; heart muscle normal.

Remarks.—In this experiment 80 minims of ether were injected into the substance of the heart, but owing to the leaking of the syringe, probably only about 40 or 50 minims were actually injected. The effect on the heart was to produce a very rapid and irregular action, so irregular that it was very difficult to count the beats properly. The pulse after the third and fourth injection became quick and very feeble. The final effect of the injection of ether was exactly the same as that of chloroform, only in the case of the latter the action was more rapid.

EXPERIMENT CXXXV.

23RD JUNE 1892.—Medium-sized pariah dog.

H. M. S.

- 1 24 30—Dog in box with chloroform.
- 1 28 40—More chloroform.
- 1 32 50— Do.
- 1 35 30—Dog taken out of the box.
- 1 37 10—More chloroform.
- 1 37 25—Cornea insensitive.
- 1 37 30—Respirations regular.
- 1 37 50—Incision commenced for exposing trachea.
- 1 38 55—More chloroform.
- 1 39 25—Whining ; chloroform stopped.
- 1 39 30—Trachea exposed and incised.
- 1 40 10—Incision commenced for exposing heart.

H. M. S.

- 1 40 35—Yelping.
- 1 40 50—More chloroform.
- 1 42 25—Stopped.
- 1 42 35—Chest opened.
- 1 42 55—Artificial respiration commenced.
- 1 44 30—Artificial respiration stopped temporarily.
- 1 44 55—Artificial respiration recommenced.
- 1 45 15—Heart beating vigorously and pericardium opened.
- 1 45 50—Gasping ; heart's action vigorous.
- 1 45 55—Chloroform.
- 1 46 15—Stopped.
- 1 46 55—Heart vigorous.
- 1 47 5—More chloroform.
- 1 47 25—Stopped.
- 1 48 30—Heart still vigorous.
- 1 48 40—Gasping ; more chloroform.
- 1 49 5—Chloroform stopped.
- 1 50 0—Gasping ; more chloroform.
- 1 50 20—Gasping stopped.
- 1 50 30—Chloroform stopped.
- 1 51 20—Heart still vigorous.
- 1 53 30—Heart vigorous, 178 beats per minute.
- 1 53 45—Gasping ; more chloroform.
- 1 54 30—Heart vigorous, 184 beats per minute.
- 1 55 10—Chloroform stopped.
- 1 57 25—Artificial respiration stopped.
- 1 57 30—Heart vigorous.
- 1 58 5—Heart feebler and artificial respiration commenced.
- 1 58 35—Heart vigorous.
- 1 59 40—More chloroform.
- 2 0 15—Heart still vigorous.
- 2 1 30—Heart vigorous, 174 beats per minute.
- 2 1 50—Chloroform stopped.
- 2 4 30—Heart vigorous.
- 2 5 0—More chloroform.
- 2 6 5—Cornea sensitive.
- 2 6 25—Heart still vigorous.

H. M. S.

- 2 7 20—Cornea insensitive.
- 2 8 5—Heart vigorous, 180 beats per minute.
- 2 8 10—Chloroform stopped.
- 2 8 35—Artificial respiration stopped.
- 2 8 45—Heart vigorous ; gasping ; right side of the heart distended.
- 2 9 30—Artificial respiration continued.
- 2 9 10—Heart intermittent and vigorous ; right side not distended.
- 2 10 55—Heart vigorous.
- 2 11 20—Artificial respiration stopped.
- 2 11 40—Gasping.
- 2 12 0—Right side now becomes enormously distended ; heart stopped beating.
- 2 12 20—Artificial respiration commenced ; heart recommenced beating feebly.
- 2 13 5—Heart beating vigorously ; no distension.
- 2 13 45—Heart still vigorous.
- 2 14 40—Artificial respiration stopped.
- 2 15 5—Gasping.
- 2 15 15—Right side of heart again distended.
- 2 15 30—Beating irregularly.
- 2 16 20—Heart vigorous, 36 beats per minute.
- 2 17 15—Gasp.
- 2 17 30—Heart feeble.
- 2 18 15—Artificial respiration commenced with chloroform.
- 2 18 35—Cornea insensitive.
- 2 19 5—Distension subsided ; heart beating irregularly.
- 2 19 30—Chloroform stopped.
- 2 20 15—Heart beating vigorously but irregularly.
- 2 20 30—More chloroform.
- 2 21 0—Gasping.
- 2 21 23—Heart vigorous but still irregular.
- 2 22 30—Heart's action feeble.
- 2 22 40—Chloroform stopped.
- 2 23 25—Heart more vigorous.
- 2 24 5—Heart as vigorous as ever.
- 2 24 15—More chloroform.
- 2 24 35—Heart still vigorous as ever.
- 2 24 55—Gasping.

H. M. S.

- 2 25 50—Heart feebler and cornea insensitive.
- 2 27 45—Heart more vigorous.
- 2 28 15—More chloroform.
- 2 28 40—Heart still vigorous.
- 2 29 0—Heart feebler.
- 2 29 10—Chloroform stopped.
- 2 30 0—Heart feeble.
- 2 30 50—Heart more vigorous and gasping.
- 2 31 20—Cornea sensitive.
- 2 31 30—Heart as vigorous as ever.
- 2 31 45—More chloroform.
- 2 32 15—Heart still vigorous.
- 2 33 35—Heart feebler.
- 2 34 45—More chloroform.
- 2 35 25—Heart feeble.
- 2 36 45—Veins on surface of right ventricle now become prominent.
- 2 36 50—Chloroform stopped.
- 2 38 35—Veins becoming less prominent ; heart more vigorous.
- 2 40 0—Right ventricle smaller than it was at 2h. 36m. 45s.
- 2 41 0—More chloroform.
- 2 41 30—Heart still vigorous.
- 2 43 25— Do.
- 2 44 15—More chloroform.
- 2 45 20—Contractions feebler.
- 2 45 55—Ventricle not distended.
- 2 47 5—More chloroform ; cap jammed over tube in bellows.
- 2 48 40—Contractions feebler and veins more prominent.
- 2 50 42—Chloroform stopped.
- 2 52 30—Beats very feeble and intermittent.
- 2 52 50—Artificial respiration stopped and heart stopped.
- 2 53 0—Heart commenced beating and artificial respiration commenced again.
- 2 54 25—Heart beating more vigorously and regularly.
- 2 56 0—Veins still prominent.
- 2 57 25—Heart beating feebly.
- 2 58 30—Heart beating very feebly.
- 2 58 35—Artificial respiration stopped.

H. M. S.

2 58 50—Artificial respiration commenced.

2 59 25—Each time artificial respiration continued heart stopped and when discontinued heart beat again.

3 2 35—Heart stopped and artificial respiration stopped.

Post-mortem.—Auricles still contracting. Muscles on both sides flabby and somewhat pale. Right side not distended and contains two or three drachms of maroon colored blood ; left ventricle nearly empty.

Remarks.—The object of this experiment was to see for how long the heart would continue beating after the thorax had been opened and artificial respiration was kept up by means of bellows. As long as simple artificial respiration was kept up, with occasional doses of chloroform, it was found that the heart beats were vigorous and the contractions seemed likely to go on indefinitely. On the other ^{hand} immediately artificial respiration was stopped, the right side was seen to ~~be~~ ^{become} enormously distended and the veins on the surface of the ventricle to be very prominent while the beats became feeble very quickly. Each time chloroform was pumped in by the bellows, the contractions after a time became distinctly feebler and when the chloroform was discontinued they became more vigorous. When chloroform was given with the cap tightly jammed over the mouth of the bellows, the veins on the surface of the ventricle became very prominent, and at the same time the ventricular muscle became relaxed and the beats had more resemblance to a flap than a true contraction. When the thorax was opened there was a considerable amount of unavoidable hæmorrhage.

EXPERIMENT CXXXVI.

28TH JUNE 1892.—Large size frog.

H. M. S.

1 59 10—Heart immersed in chloroform, beating vigorously.

2 0 40—Heart beating 32 a minute.

2 1 45—Heart beating 24 a minute, still vigorous.

2 3 10—Apex of the ventricle is corrugated.

2 3 50—Heart beats feebly and at long intervals.

2 4 45—Heart beats 10 times a minute.

2 6 5—Ventricular beat very feeble.

2 8 10—Auricles beating ; *ventricle stopped*.

2 9 0—Auricles still beating but feebly.

2 9 30—Auricles stopped beating.

Remarks.—Ventricle pale and corrugated ; muscle firm ; blood clotted red.

The auricles continued beating for 10m. 20s. after immersion in chloroform. The ventricle for 9 minutes. After immersion the beats were slowed and became feeble.

EXPERIMENT CXXXVII.

28TH JUNE 1892.—Large frog.

H. M. S.

- 2 17 10—Heart beating vigorously, immersed in chloroform.
- 2 18 30—Twenty-four per minute, intermittent but vigorous.
- 2 19 30—Twenty per minute, feeble.
- 2 21 30—Sixteen per minute, auricular but fairly vigorous ; ventricular beat very feeble.
- 2 23 30—Only small portion of ventricle contracting 16 per minute.
- 2 25 0—Eight per minute, very feeble.
- 2 26 0—Ventricular beat only just perceptible.
- 2 27 20—*Ventricle stopped* ; auricles beating feebly.
- 2 30 0—Auricles stopped.

Remarks.—Ventricle pale ; muscle firm ; blood cherry red. The ventricles continued to beat for 10m. 10s. after immersion ; the auricles for 12m. 50s. After immersion the beats gradually became slow and feeble.

EXPERIMENT CXXXVIII.

28TH JUNE 1892.—Large frog.

H. M. S.

- 1 46 20—Heart removed and immersed in chloroform, beating vigorously.
- 1 48 0—Ventricle becoming pale at tip ; beats becoming feeble ; auricular beat vigorous.
- 1 50 0—Ventricular beat only just perceptible ; auricular beat feeble.
- 1 53 30—*Ventricular beat stopped* ; auricular beat very feeble.
- 1 54 32—Auricular beat stopped ; heart quite still.

Remarks.—Ventricle pale and slightly curled up at apex ; blood clotted red. The ventricles continued beating for 7m. 10s., and the auricles 8m. 12s. after immersion.

EXPERIMENT CXXXIX.

28TH JUNE 1892.—Large frog.

H. M. S.

- 1 55 40—Heart immersed in chloroform, beating vigorously.
 1 56 30—Beating vigorously, 56 per minute.
 1 58 0—Feebler, 48 per minute ; ventricle becoming pale and corrugated.
 2 0 0—Portion only of ventricle contracting ; auricles fairly vigorous,
 28 per minute.
 2 2 0—Twenty-eight per minute.
 2 4 30—Twenty per minute. *No true beat of ventricle.* Auricles very feeble.
 2 8 30—Heart still.

Remarks.—Ventricle pale ; muscle firm, not rigid ; blood clotted cherry red.

Ventricles after immersion continued to beat for 8m. 50s. the auricles for 12m. 50s.

EXPERIMENT CXXXX.

28TH JUNE 1892.—Large frog.

H. M. S.

- 2 32 30—Administration of chloroform on cap.
 2 34 0—Cap removed for a few seconds.
 2 35 40—Cornea insensitive ; cap removed.
 2 37 5—Mouth opened in order to ensure regular breathing.
 2 38 30—Chest laid open and heart exposed.
 2 39 0—Struggling.
 2 39 5—Lungs greatly expanded.
 2 39 10—Heart beating very slowly and feebly.
 2 39 30—Cap removed.
 2 41 10—Heart beating 24 per minute.
 2 42 25—Heart beating more vigorously.
 2 43 0—Pericardium opened.
 2 43 5—Moving about and heart beats becoming extremely intermittent.
 2 45 0—Heart beating very vigorously ; lungs well expanded.
 2 46 0—Lungs moving ; heart beating more vigorously.
 2 47 30—Lungs becoming smaller and redder in colour.
 2 47 35—Cornea sensitive.
 2 48 10—More chloroform on cap.

H. M. S.

- 2 48 40—Lungs expanding well ; heart vigorous.
 2 49 0—Lungs brick red in colour ; cornea insensitive and cap removed.
 2 50 0—More chloroform.
 2 50 30—Heart vigorous ; breathing rapid.
 2 51 10—Heart 52 a minute.
 2 51 50—Heart vigorous.
 2 52 45—Cap removed.
 2 58 50—Cornea sensitive.
 3 14 40—Heart removed and immersed in chloroform.

Remarks.—Chloroform in this experiment was administered to the frog on blotting paper. When the cornea became insensitive a portion of the thoracic wall was removed and the heart exposed. When the animal struggled the heart was seen much distended, and its beats at the same time to become feeble and intermittent. An attempt was made to make the frog inhale chloroform regularly and to watch the effects on the heart, ~~but no true respiratory movements were noticed after the thoracic cavity had been well laid open.~~ The heart was subsequently removed and exposed to the action of chloroform.—*Vide Experiment 141.*

EXPERIMENT CXLI.

28TH JUNE 1892.—Large frog.

H. M. S.

- 3 11 10—Heart immersed in chloroform, barely beating when removed from the thoracic cavity ; stopped very shortly.
 Fresh heart excised.—(*Heart from Experiment 140.*)
 3 14 40—Heart immersed, beating very slowly and feebly, not vigorously.
 3 16 0—28 per minute, not vigorous.
 3 17 0—28 do.
 3 18 0—24 do.
 3 19 0—20 do.
 3 20 0—20 beats, very feeble.
 3 21 0—16 beats, very faint.
 3 22 0—A few flickering movements perceptible ; no contractions to count.

Remarks.—This heart had been exposed in a previous experiment at 2h. 38m. 30s., in which case the frog had had chloroform administered on blotting paper.

Muscle slightly pallid and curled up at apex ; no rigidity whatever.
The heart continued beating 7m. 20s. after immersion.

EXPERIMENT CXLII.

H. M. S. 28TH JUNE 1892.—Large frog.

3 29 0—Heart removed ; 48 per minute before immersion in chloroform.
3 29 15—Immersed in chloroform.
3 30 15—28 per minute.
3 31 15—16 do.
3 32 15—16 do.
3 33 15—16 do.
3 33 50—20 do.
3 34 15—20 do.
3 35 15—20 do.
3 36 15—Top side of heart red, under side pallid.
3 37 15—16 per minute.
3 38 15—12 do.
3 39 15—12 beats, feeble.
3 40 15—Beats stopped.

Remarks.—Muscle pallid when it was immersed ; apex not curled up or corrugated. The heart continued beating for 11 minutes after immersion.

EXPERIMENT CXLIII.

H. M. S. 28TH JUNE 1892.—Large frog.

3 15 0—Heart immersed in chloroform, vigorous.
3 15 15—56 per minute, vigorous.
3 16 45—36 per minute ; ventricular beat feebler.
3 17 45—28 ; ventricle becoming pale and corrugated ; auricles feeble.
3 18 45—16 ; ventricle only contracting partially.
3 20 0—*Ventricle stopped.*
3 21 0—Auricles feeble.
3 22 15—Auricles stopped.

Remarks.—Muscle firm, pale ; ventricle curled up at the apex ; blood cherry red. The ventricles continued to beat for 5 minutes and the auricles 7m. 15s. after immersion.

EXPERIMENT CXLIV.

28TH JUNE 1892.—Large frog.

Heart excised and exposed to air.

H. M. S.

- 3 45 50—120 per minute.
 3 46 50—100 do.
 3 47 50— 90 do.
 3 48 50— 84 do.
 3 49 50— 80 do.
 3 50 50— 80 do.
 3 51 50— 80 do.
 3 52 50— 56 do.
 3 53 5—Ventricle contracts feebly.
 3 53 50— 28 per minute.
 3 54 30—Ventricle contracts very feebly and intermittently ; auricles beat fairly vigorously.
 3 55 20—Ventricle stopped beating.
 3 55 50—Auricles beat 44 per minute.
 3 56 50— Do. 32 do.
 3 57 50— Do. 40 do.
 3 58 50— Do. 36 do.
 3 58 55—Ventricle commenced beating 36 per minute.
 3 59 50—Ventricle beats 18 per minute.
 4 1 20—Ventricle stopped beating.
 4 1 50—Ventricle commenced beating feebly, 20 per minute.
 4 2 50—Auricles beat 36 beat.
 4 3 50—Ventricle's beat intermittent; auricles beat 30 per minute.
 4 4 50—Ventricle stopped beating.
 4 5 50—Auricles beat 28 per minute.
 4 6 50— Do. 24 do.
 4 7 10—Ventricle beat commenced.
 4 8 5— Do. stopped.
 4 8 50—Auricles beat 24 per minute.
 4 9 50— Do. 20 do.
 4 10 50— Do. 20 do.
 4 11 50— Do. 16 do.
 4 12 50— Do. 8 do.
 4 13 35—Auricles and ventricle contract 8 per minute.
 4 14 50—*Ventricle stopped beating.*

H. M. S.

4 15 50—Auricles beat 4 per minute.

4 16 50—Do. 32 do.

4 17 50—Do. 12 do.

4 18 35—Auricles stopped beating.

Remarks.—The ventricle continued to beat for 29 minutes and the auricles 32m. 45s. after the heart was removed from the thorax and exposed to the air.

EXPERIMENT CXLV.

28TH JUNE 1892.—Large frog.

H. M. S.

3 34 0—Heart exposed to air, vigorous, 56 per minute.

3 35 30—Vigorous, 56 per minute.

3 36 30—72 per minute, vigorous.

3 37 30—68 do. do.

3 40 45—56 do. feebler.

3 41 30—56 do. do.

3 43 30—52 do. do.

3 45 45—48 do. do.

3 46 30—52 do. ventricular beat feeble.

3 47 15—48 do.

3 49 0—44 do.

3 51 0—48 do. beats becoming still feebler.

3 55 30—32 do. do. do.

3 57 30—36 do. do. do.

3 58 0—32 do. do. do.

4 0 0—24 do. do. do.

4 2 30—20 do. do. do.

4 4 30—12 do. do. do.

4 5 30—10 do. do. do.

4 6 30—12 do. do. do.

4 8 30—8 per minute; beats very irregular, 30 seconds sometimes elapsing between them.

4 12 30—4 per minute.

4 15 50—Auricles stopped.

4 19 30—Heart stopped.

Remarks.—Auricles stopped before the ventricle. Heart beat for 45m. 30s. after it was exposed.

EXPERIMENT CXLVI.

29TH JUNE 1892.—Large frog.

H. M. S.

- 11 20 10—Frog placed in a large jar ; chloroform administered on blotting paper.
- 11 20 30—Frog quiet ; breathing rapidly.
- 11 22 10—Breathing stopped ; muscles quite relaxed.
- 11 24 15—Moving about ; no respiratory movements to be seen.
- 11 25 40—Quite still.
- 11 30 30—Frog removed ; *heart excised* ; auricles and ventricle distended ; beating slowly and feebly.
- 11 32 0—24 per minute ; more vigorous.
- 11 34 0—24 do.
- 11 35 0—28 do. vigorous.
- 11 36 0—20 do. do.
- 11 37 0—24 do. auricles vigorous ; ventricle somewhat feeble.
- 11 40 0—24 do.
- 11 42 0—20 do.
- 11 45 0—28 do.
- 11 51 0—Ventricular beat feeble but quite distinct ; auricles vigorous.
- 11 55 0—24 per minute ; ventricular beat feebler ; auricles vigorous.
- 12 10 0—Ventricular beat barely perceptible ; auricles vigorous.
- 12 13 0—20 per minute.
- 12 14 0—24 per minute ; auricles still vigorous ; ventricle barely perceptible.
- 12 31 0—*Ventricle stopped ; auricles vigorous.*
- 1 18 45—Ventricle again observed after an interval and found to be beating vigorously ; auricles vigorous.
- 1 26 0—Beats vigorous.
- 1 27 0—28 per minute.
- 1 28 0—28 do. vigorous.
- 1 30 12—28 do. do.
- 1 31 30—24 do. do.
- 1 33 35—Auricles beating more vigorously than ventricle.
- 1 36 45—28 per minute.
- 1 40 10—28 do.
- 1 46 45—28 do.
- 1 51 30—28 do.

H. M. S.

1 56 0—36 per minute ; more vigorous.

2 2 0—36 do.

2 7 45—32 do. vigorous still.

2 14 0—32 do.

2 20 25—Action of ventricle intermittent.

2 23 45—24 per minute.

2 24 15—*Heart stopped.*

Remarks.—Chloroform was administered to the frog in a bell jar on blotting paper, and when the animal was dead the heart was removed. It continued to beat for 2h. 53m. 45s. after it was excised.

EXPERIMENT CXLVII.

29TH JUNE 1892.—Large frog.

H. M. S.

1 40 0—Frog in bell jar with chloroform.

1 40 30—Breathing rapidly ; moving about.

1 41 30—Breathing stopped ; cornea insensitive ; quiet.

1 42 55—Frog removed.

1 46 0—Heart exposed.

1 49 45—Heart excised and placed on a table.

1 50 10—Heart placed in a porcelain dish and found beating vigorously.

1 51 45—Heart beating 32 times a minute.

1 52 30—Heart somewhat feeble.

1 53 15—Heart 24 per minute.

1 54 30—Auricles stopped beating.

1 54 50—Ventricle beating 20 per minute.

1 55 30—Auricles again beating.

1 55 40—Heart beating 20 per minute.

1 57 20—Sixteen beats per minute and very feeble.

2 0 0—Heart beating 16 per minute.

2 3 0—Heart still beating 16 per minute but very feebly.

2 5 0—Auricles beating 16 per minute. In ventricle there is only flickering movement but no actual contraction, 16 per minute.

2 12 10—*Ventricle stopped beating altogether.*

2 13 0—Auricle still beating 16 per minute.

2 15 0—Auricles beating 20 per minute.

2 18 45—Feeble movement again seen in the ventricle.

H. M. S.

- 2 19 50—Heart beating 16 per minute.
 2 21 50—Auricles only beating 16 per minute.
 2 24 30—Auricles beating 12 per minute.
 2 27 0— Do. 12 do. very feeble.
 2 30 0—Auricles still 12 per minute.
 2 34 0— Do. 12 do.
 2 36 0—Auricles 12 do. very feeble.
 2 38 0—12 per minute.
 2 41 0— 8 do.
 2 43 0— 8 do.
 2 47 0— 8 do.
 2 52 0—Still 8 do.
 2 55 0—12 per minute.
 2 55 30—12 do.
 2 0 10—Auricles beating 11 times per minute.
 3 7 0— Do. 12 do.
 3 9 0— Do. 12 do.
 3 13 0— Do. 12 do.
 3 15 15—Only a portion of the auricle contracting, all the rest still.
 3 19 0—Bit of auricle contracting, 19 per minute.
 3 22 0—A mere flicker.
 3 24 30—Auricle and ventricle commenced to contract rythmically and regularly.
 3 29 0—Auricular and ventricular rythmical contractions still continue, 21 per minute.
 3 34 30—22 per minute ; auricle more vigorous and general beats.
 3 40 0—21 per minute.
 3 45 0— Do.
 3 55 0—Ventricular beats becoming very feeble ; whole auricle still vigorous ; ventricle becoming dry, 21 per minute.
 4 0 0—20 per minute.
 4 5 0—21 do.
 4 10 0—Very slight contractions seen low down on right side of ventricle, both regular and rythmical.
 4 14 40—Ventricle stopped.
 4 15 0—22 per minute ; auricles only contracting.
 4 20 0—Auricles still vigorous, 20 per minute.
 4 25 0— Do. do. 30 do.

H. M. S.

4 30 0—Auricles feeble, 27 per minute.

5 24 0—Auricular beat only just perceptible.

5 26 0— Do. stopped.

Remarks.—In this experiment chloroform was administered to a frog on blotting paper placed underneath a bell jar. When the frog was dead the heart was excised. The ventricle continued to beat for 12m. 25s., after which they remained quite motionless for 1h. 12m. 20s. They then recommenced beating regularly and rhythmically for 50m. 10s.

EXPERIMENT CXLVIII.

29TH JUNE 1892.—Large frog.

H. M. S.

1 50 30—Heart excised and exposed to air.

1 51 25—Heart vigorous.

1 53 10— Do. 56 per minute.

1 56 10—Still vigorous, 60 do.

1 57 10— Do. 56 do.

2 0 40—Heart feeble, 44 do.

2 3 5—Heart feebler, 40 do.

2 9 0— Do. 32 do.

2 12 15—Heart very feeble, 28 do.

2 13 55—Still feeble, 28 do.

2 17 5—Still 28 per minute, and heart feebler.

2 19 50—Heart very feeble, 24 per minute.

2 23 30—Action of the ventricle is intermittent.

2 25 15—Heart's action very feeble, 20 per minute ; ventricle still intermittent.

2 25 50—*Ventricle stopped* beating.

2 27 15—Auricles beating 20 per minute.

2 33 25— Do. still beating feebly, 20 per minute.

2 42 15— Do. beating 16 per minute.

2 49 35— Do. do. 12 do.

2 51 25— Do. do. 12 do.

2 56 15—Still do. 12 do.

3 0 5—Do. do. 12 do.

3 7 25—Do. do. 12 do.

H. M. S.

3 10 40—Auricles beating 8 per minute.

3 17 40— Do. very feeble.

3 20 30—Heart still.

Remarks.—The ventricle continued to beat for 35m. 20s. and the auricles for 1h. 30s. after the heart was excised and exposed to the air.

EXPERIMENT CLIX.

29TH JUNE 1892.—Large frog.

H. M. S.

1 59 10—Frog in bell jar with chloroform ; jumping about, breathing rapidly.

2 0 10—Quiet ; breathing stopped.

2 1 50—Breathing recommenced ; respirations rapid, 72 per minute.

2 2 0—Respirations 36 per minute.

2 4 0— Do. 64 do. eyelids twitching spasmodically.

2 5 10—More chloroform placed in bell jar.

2 6 30—Breathing shallow.

2 6 45—Breathing stopped ; frog removed from bell jar. Heart excised from thoracic cavity and exposed on table.

2 11 10—Beating vigorously.

2 12 0—44 per minute ; vigorous.

2 13 0—40 do. do.

2 14 0—36 do. ventricle less forcible.

2 15 0—36 do.

2 17 0—32 do. auricles vigorous ; ventricle feeble.

2 19 0—24 do. ventricle very feeble ; auricle vigorous.

2 20 0—Ventricle feeble ; auricle vigorous, 20 per minute.

2 22 30—20 per minute.

2 25 0—28 do. ventricular beat barely perceptible ; auricles vigorous.

2 26 45—24 do.

2 28 0—21 do. auricles still vigorous ; ventricular beat just perceptible.

2 29 0—20 do.

2 34 50—Ventricle stopped ; auricles still vigorous, 20 per minute.

2 36 50—Auricles beat 24 per minute.

2 37 50— Do. 20 do.

H. M. S.

2	38	50—Auricles beat 20 per minute.		
2	39	50—Do.	16	do.
2	40	50—Do.	16	do.
2	41	50—Do.	12	do. very feeble.
2	42	50—Do.	16	do. do.
2	43	50—Do.	16	do. do.
2	44	50—Do.	16	do. do.
2	45	50—Do.	16	do. do.
2	46	50—Do.	16	do. do.
2	47	50—Do.	16	do. do.
2	48	50—Do.	16	do. do.
2	49	50—Do.	12	do. do.
2	51	50—Do.	14	do.
2	52	50—Do.	14	do.
2	55	50—Do.	13	do.
2	57	50—Do.	14	do.
3	1	50—Do.	14	do.
3	4	50—Do.	12	do.
3	6	50—Do.	12	do.
3	8	50—Do.	12	do.
3	9	50—Do.	12	do.
3	11	50—Do.	12	do.
3	14	50—Do.	12	do.
3	15	50—12 per minute.		
3	19	0—Still 12 per minute.		
3	22	0—Do. 12 do. but feeble.		
3	28	15—16 per minute.		
3	30	0—12 do.		
3	34	30—Still 12 per minute.		
3	36	0—11 a minute.		
3	40	0—11 do.		
3	45	0—11 do.		
3	50	0—Auricles 20 a minute ; more vigorous.		
3	55	0—27 a minute ; more vigorous.		
3	56	10—Ventricle quite dried up.		
4	0	0—31 a minute ; still more vigorous.		
4	5	0—33 do.		

H. M. S.

- 4 9 0—34 a minute ; more vigorous.
 4 10 0—34 do.
 4 15 0—35 do.
 4 20 0—36 do.
 4 25 0—Auricles 36 a minute.
 4 30 0—42 a minute ; still more vigorous.
 5 22 0—32 do. vigorous.
 7 18 30—Auricles still vigorous.
 8 0 0—Wall of auricles contracting spasmodically ; no true beat.

Remarks.—Chloroform was administered on blotting paper to a frog placed under a bell jar. When quite dead the heart was excised. The auricles continued beating without intermission for 5h. 48m. 50s. The ventricle continued to beat for 23m. 40s.

EXPERIMENT CL.

29TH JUNE 1892.—Large frog.

H. M. S.

- 2 47 50—Heart excised and exposed to air ; auricles and ventricle beating vigorously.
 2 49 50—64 per minute ; vigorous.
 2 51 25—64 do. do.
 2 54 45—48 do.
 2 57 10—36 do. ventricle less vigorous.
 3 0 40—Auricles very feeble.
 3 1 45—28 per minute.
 3 4 10—24 do.
 3 6 55—Ventricle very feeble.
 3 7 50—20 per minute ; auricles stopped.
 3 13 50—Heart stopped.

Remarks.—After the heart was excised and exposed to air, it continued to beat for 26 minutes. The auricles stopped before the ventricle.

EXPERIMENT CLI.

29TH JUNE 1892.—Large frog.

H. M. S.

- 3 32 50—60 per minute before removal of heart from body ; vigorous.
 3 33 30—Heart placed in dish and exposed to air.
 3 34 30—68 per minute ; vigorous.
 3 35 30—68 do. do.
 3 37 30—60 per minute ; ventricle still forcible.
 3 39 30—64 do. do.
 3 41 30—52 do. do.
 3 43 30—48 do. ventricle feeble, still fairly forcible.
 3 46 30—40 do.
 3 47 30—48 do.
 3 51 30—Ventricle beat very intermittent, 32 per minute.
 3 53 50—Ventricle stopped.
 3 54 15—Recommenced again.
 3 55 0—Ventricle 20 per minute, feeble and intermittent.
 4 0 0—Auricles only beating ; *ventricle stopped*.
 4 1 0—Auricles feeble, 24 per minute.
 4 1 40—Ventricle recommenced beating feebly.
 4 4 30—8 per minute.
 4 5 0—Auricles and ventricle very feeble, 2 per minute.
 4 7 0—Heart stopped.

Remarks.—The heart was excised and exposed to the air, and continued beating for 34m. 10s.

EXPERIMENT CLII.

30TH JUNE 1892.—Large frog.

H. M. S.

- 1 13 15—Frog in bell jar with ether.
 1 14 0—56 respirations ; moving about.
 1 15 0—Respirations uncountable ; moving about.
 1 16 0—Respirations 48 ; shallow ; quiet.
 1 16 45—More ether.
 1 17 0—Quiet.
 1 17 30—Frog removed.
 1 18 0—Faint respirations seen ; replaced under bell jar.

H. M. S.

- 1 19 20—Frog removed ; respirations ceased ; heart removed and exposed on dish.
- 1 26 0—24 per minute ; vigorous and regular.
- 1 27 30—60 do. do.
- 1 28 0—60 do. do.
- 1 29 0—60 do. do.
- 1 30 0—52 do. ventricle less vigorous.
- 1 32 0—48 do.
- 1 33 0—44 do. ventricle less vigorous.
- 1 34 15—48 do.
- 1 35 0—52 do. ventricle feeble ; auricles fairly vigorous.
- 1 37 0—48 do. do. do.
- 1 40 0—44 do.
- 1 42 0—20 do. ventricles feeble ; intermittent.
- 1 43 0—28 do. do. do.
- 1 44 0—28 do.
- 1 44 30 } Ventricle stopped during this interval, and then remained con-
1 45 10 } tracted.
- 1 46 15—Auricles only beating 56 per minute.
- 1 50 0—Heart turned over ; walls of ventricle spasmodically and rapidly contracting, not beating.
- 1 51 0—Auricles 48 per minute.
- 1 52 0—Ventricle commenced to contract spasmodically at its apex ; but its contraction is not rythmical, and is quite independent of auricular beat.
- 1 59 0—Auricles 32 per minute.
- 1 59 30—Ventricular contraction 128 per minute.
- 2 1 30—56 ; auricles very feeble and barely perceptible.
- 2 7 0—Auricular beat 36 ; very feeble and barely perceptible.
- 2 10 0—Auricles 24 ; ventricle quite motionless.
- 2 17 0— Do. 40 per minute.
- 2 22 0— Do. 28 do.
- 2 24 45— Do. stopped.

Remarks.—The frog was exposed to ether vapour underneath a bell jar, and when the animal was dead, the heart was removed and exposed to the air. The auricles continued to beat for 1h. 4m. 25s., and the ventricle for 25m. 50s. After the ventricle had ceased to beat, a very rapid twitching movement was

noticed at its apex ; but this was not rythmical, and was quite independent of the contraction of the auricles. Heart was kept moist with water all through the experiment. The ventricle was afterwards felt to be perfectly hard ; the muscle pale all over.

EXPERIMENT CLIII.

30TH JUNE 1892.—Large frog.

H. M. S.

Ether.

- 1 53 20—Frog in bell jar with ether.
- 1 55 0—Moving about ; 28 respirations a minute.
- 1 57 30—Respirations 28 a minute.
- 1 59 0— Do. 32 do.
- 2 0 30—More ether.
- 2 2 20—Respiration stopped and the frog taken out of the jar.
- 2 5 0—Thorax laid open and heart exposed.
- 2 6 30—*Heart excised and placed in a dish.*
- 2 8 15—Heart beating vigorously and 56 per minute.
- 2 10 30—48 per minute ; less vigorous.
- 2 11 0—A few drops of water were dropped over the heart to keep it moist.
- 2 12 15—44 per minute ; feeble.
- 2 12 30—Heart intermittent.
- 2 13 0—*Ventricle stopped beating.*
- 2 15 15—Auricles beating 44 per minute.
- 2 18 0—Auricles 44 per minute ; feeble.
- 2 19 0—40 per minute.
- 2 22 0—Auricles beating 40 per minute ; feeble.
- 2 25 0—Auricles 28 per minute ; very feeble.
- 2 28 0—24 per minute.
- 2 28 55—16 do. feeble contractions.
- 2 31 0—12 do. do.
- 2 32 45—8 do. do.
- 2 33 30—Heart stopped.

Remarks.—In this experiment ether was administered to a frog underneath a bell jar, and when the animal was dead, the heart was excised. The ventricles continued to beat for 6m. 30s. and the auricles for 27 minutes. Muscle not pallid, but firmly contracted.

EXPERIMENT CLIV.

30TH JUNE 1892.—Large frog.

Heart excised.

H. M. S.

- 2 20 0—64 per minute ; vigorous.
 2 21 0—Placed in ether solution.
 2 22 55—Heart's action feeble, 16 per minute.
 2 23 10—Heart stopped.

Remarks.—Ventricle rather pallid and corrugated, slightly curled at the apex, brown in colour ; muscle not rigid. In this experiment the heart was excised and placed in liquid ether. It continued to beat for 2m. 10s. after immersion. Both auricles and ventricle stopped at the same time.

EXPERIMENT CLV.

30TH JUNE 1892.—Large frog.

Ether.—Heart excised.

H. M. S.

- 2 31 5—Heart's action 60 per minute.
 2 32 30—Heart placed in liquid ether, beating vigorously.
 2 33 5—Heart's action 40 per minute ; vigorous.
 2 33 45— Do. feeble.
 2 34 0— Do. 28 per minute.
 2 35 0— Do. 32 do.
 2 35 30—Very feeble.
 2 36 0—Heart's action 24 times a minute ; very feeble.
 2 37 20—*Ventricle stopped beating.*
 2 37 30—Auricles 16 times.
 2 38 30—Auricular contractions very feeble.
 2 39 10—Auricle 16 times.
 2 40 10— Do. 12 do.
 2 41 0— Do. 12 do.
 2 42 15—Auricles feebly contracting ; no true beat.
 2 43 0—*Auricles stopped.*

Remarks.—Ventricle brownish red ; muscle moderately firm, not rigid ; blood brownish red. The auricles after immersion in ether continued to beat for 10m. 30s. ; the ventricles for 4m. 50s. After immersion the beats gradually became slower and feebler.

EXPERIMENT CLVI.

1ST JULY 1892.—Large frog.

H. M. S.

- 11 33 45—Frog placed underneath bell jar containing chloroform ; jumping about.
- 11 35 5—Quiet.
- 11 35 25—No respiratory movements.
- 11 37 0—Kicking about ; more chloroform ; slight respiratory movements recommenced.
- 11 37 45—More chloroform.
- 11 38 0—No respiration.
- 11 38 25—Taken out dead.
- 11 38 48—Thorax opened ; heart enormously distended ; motionless.

Remarks.—Heart, on opening thorax, was found quite motionless and enormously distended.

EXPERIMENT CLVII.

1ST JULY 1892.—Large frog.

H. M. S.

- 11 44 45—Frog in bell jar with chloroform.
- 11 46 30—Breathing stopped.
- 11 46 40—Taken out from bell jar ; thorax opened.
- 11 48 0—Kicking ; no respiration.
- 11 49 0—Replaced under bell jar with chloroform ; no respiration.
- 11 49 50—Taken out of bell jar again ; no respiration.
- 11 52 20—Heart excised and placed in dish.
- 11 52 45—40 per minute.
- 11 55 15—52 do.
- 12 0 0—Ventricular contractions very feeble.
- 12 2 0—Beats of auricle and ventricle very feeble.
- 12 3 0—60 per minute.
- 12 9 0—40 do.
- 12 10 0—40 do. feeble contractions of ventricles.
- 12 11 0—40 do.
- 12 39 20—Very feeble ; contraction of auricles and ventricle.
- 1 4 10—Ventricular contractions irregular.

H. M. S.

- 1 5 30—Ventricular contractions 20 per minute.
 1 6 40— Do. do. intermittent.
 1 8 30—No ventricular contractions.
 1 10 10—Ventricle commenced beating again.
 1 11 0—Contractions 11 per minute ; very irregular.
 1 13 40—*Ventricular contractions ceased.*
 1 14 0—Auricular contractions 36 per minute.
 1 30 0— Do. do. irregular.
 1 47 0—40 per minute ; irregular.
 1 56 0—Flickering.
 2 2 30—No contractions.
 2 9 0—Slight auricular contractions.
 2 10 5—Auricular contractions ceased.

Remarks.—In this experiment chloroform was administered to a frog under a bell jar, and when dead the heart was excised. The ventricle continued to beat for 1h. 21m. 20s. ; auricles 2h. 17m. 45s.

EXPERIMENT CLVIII.

1st JULY 1892.—Large frog.

H. M. S.

Chloroform.

- 2 9 50—Frog in bell jar with chloroform.
 2 10 30—Moving about.
 2 11 20—More chloroform.
 2 12 5—Respiration 32 per minute ; very shallow.
 2 12 40—Respiration stopped.
 2 13 40—Taken out apparently dead.
 2 16 45—Thorax laid open and heart exposed.
 2 17 0—Frog began to move its legs.
 2 18 5—Frog breathing again ; heart more vigorous.
 2 19 0—Frog again placed under bell jar with chloroform.
 2 22 40—Taken out dead.
 2 27 43—Heart excised and placed in a dish.
 2 28 45—Heart beating 20 per minute.
 2 29 50—Heart 16 per minute ; feeble.
 2 31 20—Ventricle intermittent.
 2 33 0—Heart beating 28 per minute.
 2 34 30—28 per minute ; very feeble.

H. M. S.

- 2 37 0—Only flickering movements in the ventricle.
 2 38 0—Heart beating 28 per minute (intermittent).
 2 40 0—Auricles beating 26 per minute ; ventricle stopped.
 2 45 0—Auricle 22 per minute.
 2 46 5—Heart turned upside down and ventricle again seen to beat.
 2 48 0—*Ventricle stopped beating.*
 2 52 20—Auricle still beating very slowly on one side.
 2 56 40—Auricle 32 per minute ; still feeble.
 2 59 20—24 per minute.
 3 0 35— Do.
 3 5 15—16 per minute.
 3 7 30—Auricles stopped.

Remarks.—In this experiment a frog was killed by chloroform and when dead the heart was excised. The ventricle continued to beat for 20m. 17s. ; auricles 39 minutes.

EXPERIMENT CLIX.

1ST JULY 1892.

A

B

H. M. S.

1 58 20—Heart excised and placed
in a dish ; beating vigorously.

2 0 0—Heart 62 a minute.

2 1 20—Auricle incised and heart
stopped immediately
afterwards for a short
time.

2 3 15—Heart recommenced beating,
44 per minute.

2 4 50—A portion of auricle excised ;
heart stopped immediately.

2 6 30—Heart commenced to beat
again but stopped again
after a short time.

H. M. S.

1 55 30—Heart excised. An incision
was made by mistake
into the auricle when
the heart was excised.

2 1 10—Heart 8 per minute.

2 6 30—Heart beating 4 per minute.

2 7 45—Heart stopped.

Remarks.—In this experiment two hearts were removed from the thoracic cavity, and the effect of removing a portion of the auricle was observed.

It was found that shortly after this was done the ventricles ceased to beat. In B a portion of the auricle was removed accidentally when the heart was excised.

EXPERIMENT CLX.

1ST JULY 1892.—Large frog.

H. M. S.

- 3 1 5—Frog placed under bell jar with one ounce of chloroform placed on the sponge underneath the jar.
 3 2 30—Respiration stopped.
 3 3 0—Taken out dead.
 3 4 0—Thorax opened.
 3 5 0—Heart found distended ; beating slowly.
 3 6 0—Heart 24 per minute.
 3 9 45—Heart excised, 24 per minute. Beats not so vigorous as the ether heart.
 3 11 20—32 ; feeble.
 3 12 30—Contractions very feeble.
 3 13 30—Feeble contractions of ventricular wall.
 3 15 15—Faint flickering.
 3 16 0—No movement perceptible. Muscle normal in colour.

EXPERIMENT CLXI.

1ST JULY 1892.—Large frog.

H. M. S.

- 3 0 10—Frog placed underneath bell jar with one ounce of ether on sponge.
 3 0 55—Turned on to back.
 3 1 45—Breathing rapid.
 3 2 22—88 per minute.
 3 3 15—Respiration stopped.
 3 3 30—Jumping about.
 3 4 0—Taken out dead.
 3 4 55—Thorax opened.
 3 5 57—Heart exposed.
 3 6 0—Heart 68 per minute.
 3 8 30—Heart excised, 52 per minute ; vigorous.
 3 11 55—56 per minute.
 3 17 30—56 ; not so vigorous.
 3 20 0—Ventricle stopped.
 3 30 0—Slight contractions of left auricle.
 3 34 0—Occasional feeble movements in auricle.
 3 35 0—Auricle 14 per minute.
 3 40 0—Auricle 8 per minute.
 3 45 10—Auricle stopped.
 4 24 20—Auricle beat barely perceptible.

Remarks.—The heart of the frog that was placed under ether beat for a longer period and more vigorously than that of the frog that was placed under chloroform.

EXPERIMENT CLXII.

1st JULY 1892.—Small frog.

H. M. S.

- 3 21 20—Into bell jar with
chloroform.
3 22 10—Respirations 36 in a
minute.
3 22 50—Respiration stopped.
3 23 5—Taken out dead.
3 24 40—Thorax opened ; heart
stopped and found to
be very much dis-
tended.

EXPERIMENT CLXIII.

1st JULY 1892.—Large frog.

H. M. S.

- 3 20 30—Into bell jar with one ounce
of ether on sponge.
3 21 30—Gasping and jumping.
3 22 25—Jumping about and gasp-
ing.
3 23 25—Lying on side ; gasping.
3 24 5—Jumping still.
3 24 50—Respiration stopped.
3 25 15—Taken out dead.
3 27 0—Thorax opened.
3 27 45—Heart beating 60 in a minute.
3 30 0—Heart in dish.
3 30 45—Beating 36 a minute and
vigorously.
3 35 15—48 a minute.
3 40 10—48 a minute ; less vigorous.
3 43 10—Ventricle stopped beating.
3 56 50—Auricles only beating, 40
per minute.
4 24 0—Auricles stopped.

EXPERIMENT CLXIV.

Heart of a large frog exposed.

H. M. S.

- 2 29 40—Heart beats vigorously, 60 per minute.
2 31 5—Heart excised ; 40 per minute ; vigorous.
2 32 20—Heart placed in a test tube containing chloroform.
2 33 5—Vigorous ; 60 per minute.
2 34 5—More chloroform.
2 34 15—52 per minute.
2 35 5—Ventricular beat feebler.
2 35 50—Ventricular beat more marked than auricular.
2 36 50—Ventricular beat feebler.

H. M. S.

- 2 37 20—Heart beats 40 per minute.
- 2 38 10—Ventricle contracting in part.
- 2 40 5—Auricles vigorous; ventricular beat just perceptible.
- 2 41 20—Heart's beats 48 per minute.
- 2 42 40—Ventricular beat very feeble.
- 2 44 0—Tube accidentally removed.
- 2 44 50—Tube again placed with chloroform over the heart.
- 2 46 35—More chloroform.
- 2 49 30—Heart very feeble.
- 2 50 45—Auricles stopped beating.
- 2 53 5—Tube removed.
- 2 53 15—Tube replaced; faint beating of left auricle.
- 2 54 50—*Ventricle stopped.*
- 2 55 25—Auricle stopped.

Remarks.—The muscle is rather pale and firm but not rigid. The ventricles continued to beat 22m. 30s. The auricle 23m. 5s. after being exposed to the action of chloroform vapour.



ABSTRACT OF EXPERIMENTS PERFORMED
WITH CHLOROFORM.

Abstract of Experiments performed with Chloroform.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892.											
Mar. 28	1	Large sized pariah dog ...	.....	.....	No	.....	.....	.....	.....	.....	No note was taken in this experiment as to when artificial respiration was commenced. Chloroform pushed while the animal was struggling.
Do.	2	Medium sized pariah dog	.....	.....	Yes	.....	.....	.....	.....	.....	Artificial respiration was commenced 6 seconds after the respiration had ceased. Chloroform pushed while the animal was struggling.
Do.	3	Small sized sickly pariah dog ...	.....	.....	A Yes	.....	.....	.....	.....	.....	A Artificial respiration was commenced immediately after the respiration had stopped. Chloroform pushed while the animal was struggling.
Do.	4	Small sized sickly pariah dog ...	.....	.....	C No	.....	.....	.....	.....	.....	C Artificial respiration was commenced 2m. 30s. after the respiration had ceased, and at the time it was commenced the needle had ceased vibrating.
Do.	5	.....	.....	.....	No	.....	.....	.....	.....	.....	Artificial respiration commenced 1m. 30s. after the respiration had stopped. Chloroform given on cap jammed over face while the animal was struggling.
April 2	6	Medium-sized pariah dog	.....	.....	No	.....	.....	.....	.....	.....	Artificial respiration commenced 3m. 45s. after all movements had ceased.
April 4	7	Do. do. ...	.....	A No	.....	.....	.....	.....	.....	.....	A Irritation of vagus 15 seconds after the respiration had ceased; was continued for 30 seconds. During this irritation no notes were taken of the state of needle movements.
Do.	8	Do. do. ...	.....	Yes	B No	.....	.....	.....	.....	.....	B Artificial respiration 2m. 15s. after the respiration had ceased.
Do.	9	Do. do. ...	.....	Yes	Yes	.....	.....	.....	.....	.....	Artificial respiration was commenced 2m. 5s. after the respiration had ceased, and the vagus was irritated 5 seconds after the respiration had ceased and continued for 35 seconds. During this time the pulse completely stopped.
Do.	10	.....	.....	.....	Yes	.....	.....	.....	.....	.....	Uncut left vagus irritated for one minute, immediately after the respiration ceased, followed by artificial respiration 3 minutes after.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892 April 15	19	Full-sized pariah dog	...	.....	No	.....	.....	.....	.....	.....	Commenced 10 seconds after the respiration had ceased. Needle movements slowed. Chloroform given while the animal struggled.
Do.	20	Do.	...	.....	No	.....	.....	.....	.....	.....	Commenced 1 minute after the respiration had ceased. Needle movements stopped completely. Chloroform given with the cap jammed over face while the animal struggled.
April 16	21	Do.	...	.....	No	.....	.....	.....	.....	.....	Irritation commenced 8 seconds after the respiration had ceased; forty needle beats observed during the minute that irritation was kept up. Artificial respiration was commenced 12m. 38s. after the breathing had ceased. Chloroform was given while there was stertorous breathing.
Do.	22	Do.	...	.....	No	.....	.....	.....	.....	.....	Commenced 15 seconds after the respiration had ceased and continued for 1 minute. During this time there were 64 beats of the needle.
April 17	23	Very savage, medium-sized pariah dog, experimented on before.	...	.....	No	.....	.....	.....	.....	.....	Commenced 10 seconds after the respiration had stopped and continued for 2 minutes. No note taken of state of needle during this time.
Do.	24	Medium-sized pariah dog	...	B Yes	A Yes	.....	.....	.....	.....	.....	A Cardiac end of vagus irritated (1 minute) 15 seconds after the respiration ceased. Forty-five beats of needle during the minute.
April 18	25	Do.	...	.....	No	.....	.....	.....	.....	No	Vagus irritated (1 minute) 10 seconds after the breathing had ceased. Needle movements stopped completely for a short time and were then very much quickened (107 beats in the minute). Venesection performed 1m. 20s. after cessation of heart's action. Artificial respiration 2m. 15s. after the heart ceased to beat.
Do.	26	Very sickly, medium-sized pariah dog	...	.....	A Yes	.....	.....	.....	.....	.....	A Commenced 30 seconds after the respiration had stopped and continued for 25 seconds. No very marked slowing of pulse produced.
					B No	.....	.....	.....	.....	No	B Commenced 30 seconds after the respiration had ceased and continued for 2 minutes. During this time needle was stopped for a few seconds and then recommenced vigorously. Both venesection and artificial respiration were commenced after the needle had ceased to beat.

Do.	27	Medium-sized pariah dog	...	.....	No	.....	.....	.....	.....	No	Vagus irritated (1 minute) 5 seconds after the respiration had ceased. No obvious effect produced on needle beat. Venesection was performed 3m. 10s. after the respiration had ceased, when the needle movements were very feeble. Artificial respiration commenced 5m. 20s. after the respiration had ceased.
April 19	28	Do.	do.	.....	A Yes	.....	.....	.....	.....	.....	A Commenced 1m. 5s. after respiration had ceased (1 minute). During interval needle stopped completely for some seconds.
April 20	29	Do.	do.	.....	B No	.....	.....	.....	.....	No	B Commenced immediately after respiration ceased (1 minute). Needle stopped completely for some seconds. Venesection performed after needle had apparently stopped.
Do.	30	Do.	do.	.....	No	.....	.....	.....	.....	No	Irritation commenced immediately after respiration had ceased (for 1 minute). Needle movements 39. Venesection commenced 10 seconds after needle movements had ceased. Artificial respiration 5m. 40s. after respiration had ceased.
Do.	31	Do.	do.	.....	No	.....	.....	.....	.....	No	Irritation commenced 22 seconds after respiration had ceased (for 1 minute). No note as to effect on needle. Venesection 10 seconds after needle had ceased beating, and artificial respiration 7m. 30s. after the breathing had stopped.
April 21	31	Do.	do.	.....	.....	.....	.....	.....	.....	.....	Artificial respiration commenced 3m. 55s. after the respiration had ceased. Natural inhibition took place for 55 seconds after the respiration had ceased.
Do.	32	Do.	do.	.....	.....	.....	.....	.....	.....	.....	Artificial respiration commenced 4 minutes after the respiration had ceased. Chloroform given when animal was struggling violently. Needle stopped completely for 2m. and 10s. while respiration continued.
April 23	33	Large-sized pariah dog	...	.....	.....	.....	.....	.....	.....	.....	Artificial respiration tried 4 minutes after cessation of respiration.
Do.	34	Full-sized pariah dog	...	.....	.....	No	.....	.....	.....	.....	Artificial respiration commenced 4m. 20s. after the cessation of respiration. With bellows 7m. 20s. Lungs not properly distended.
Do.	35	Young sickly pariah dog	...	.....	.....	No	.....	.....	.....	.....	Artificial respiration commenced 4m. 5s. after the respiration had ceased.
Do.	36	Medium-sized pariah dog	...	.....	.....	.....	.....	.....	.....	.....	Artificial respiration with bellows commenced after the needle had stopped permanently and 4 minutes after the respiration had ceased.
Do.	37	Do.	do.	.....	.....	A Yes	.....	.....	.....	.....	A Commenced 4m. after the respiration had ceased.
						B No	.....	.....	.....	.....	B Commenced 11m. 30s. after true respiration had ceased.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892											
April 25	38	Large pariah dog ...	.....	.....	.....	No	.....	.....	.....	.....	Artificial respiration with bellows commenced 4 minutes after the respiration had ceased, during which interval the needle stopped completely on two occasions for 10 and 15 seconds.
Do.	39	Large-sized pariah dog ...	.....	.....	.....	No	.....	.....	.....	.....	Commenced 3m. 55s. after the respiration had ceased.
April 24	40	Small emaciated pariah dog ...	.....	.....	.....	A Yes	.....	.....	.....	.....	A Commenced 3m. after the respiration had stopped.
						B Yes	.....	.....	.....	.....	B Do. 4m. do.
						C Yes	.....	.....	.....	.....	C Do. 5m. 10s. do.
						D No	.....	.....	.....	.....	D Do. 6m. 10s. do.
April 26	41	Large-sized pariah dog ...	.....	.....	.....	A Yes	.....	.....	.....	.....	A Do. 3m. 20s. after cessation of respiration.
						B Yes	.....	.....	.....	.....	B Do. 6m. 25s. do. Needle stopped temporarily for 5 seconds before the respiration.
						C No.	.....	.....	.....	.....	C Do. 7m. do.
Do.	42	Large-sized healthy pariah dog...	.....	.....	.....	No	.....	.....	.....	.....	Commenced 3 minutes after the cessation of respiration. Chloroform given, when the animal struggled with the cap tightly jammed over face.
April 26	43	Large-sized full-grown pariah dog.	.....	.....	.....	No	.....	.....	.....	.....	Commenced 3 minutes after cessation of respiration. Needle stopped for 15 seconds after respiration had ceased.
Do.	44	Do. do.	.....	.....	.....	A Yes	.....	.....	.....	.....	Commenced 3 minutes after cessation of respiration.
						B No	.....	.....	.....	.....	Do. do. do.
April 27	45	Thin but healthy full-grown pariah dog.	.....	.....	.....	No	.....	.....	.....	.....	Do. do. do.
Do.	46	Young pariah dog ...	A Yes	.....	.....	.....	.....	.....	.....	.....	A Respiration commenced again, but the animal was not allowed to come out. Needle stopped for 20 seconds at the time respiration stopped.
						B Yes	.....	.....	.....	.....	B Commenced 2 minutes after cessation of respiration.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892											
May 2	59	Full-grown unhealthy pariah dog	A Yes	.....	.....	.....	.....	.....	.....	.....	Vagus irritated several times during anesthesia and in c. after respiration had stopped. No marked effect produced on needle beats except in c. when they apparently became stronger.
May 3	60	Large-sized pariah dog	.....	.....	No	.....	.....	.....	.....	.....	Commenced 1m. 30s. after the respiration had ceased. Large dose of chloroform given while the dog struggled.
Do.	61	Healthy, large-sized pariah dog	.....	.....	.....	Yes	.....	.....	.....	.....	Commenced 1m. 25s. after the respiration had ceased. Chloroform was given in a large dose while the animal struggled.
Do.	62	Medium-sized pariah dog	A Yes	.....	.....	.....	.....	.....	.....	.....	A Large dose of chloroform given when the animal struggled.
						B Yes	.....	.....	.....	.....	B Commenced 1m. 32s. after the respiration had stopped.
			C Yes	.....	.....	.....	.....	.....	.....	.....	C Chloroform given on cap loosely applied.
May 4	63	Do.	.....	.....	.....	No	.....	.....	.....	.....	Commenced 1 minute after the respiration had ceased. Chloroform given in a large dose while the animal struggled.
Do.	64	Very large pariah dog	.....	.....	.....	A Yes	.....	.....	.....	.....	A Commenced 1 minute after the respiration had ceased. Chloroform given during struggling.
						B No	.....	.....	.....	.....	B Commenced 1 minute after the respiration had ceased.
May 5	65	Healthy pariah dog	.....	.....	.....	No	.....	.....	.....	.....	Commenced 1 minute after the respiration had ceased. Large dose of chloroform given when the animal struggled.
May 6	66	Large-sized pariah dog	.....	.....	.....	No	.....	.....	.....	.....	Commenced 1 minute after the respiration had ceased. Large dose of chloroform given when the animal struggled.
Do.	67	Medium-sized pariah dog	.....	.....	.....	A Yes	.....	.....	.....	.....	A Commenced 1 minute after the respiration had ceased. Heart stopped beating for 33 seconds in the interval. Chloroform was given gently.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892											
May 11	76	Medium sized pariah dog...	.....	.....	.....	.....	.....	.....	.....	.....	<i>A</i> Both vagi divided. Irritation was commenced shortly before respiration stopped and continued for 1 minute, during which period the respiration stopped, and after 25 seconds recommenced, while there were only 15 beats of the needle observed. Recovery. <i>B</i> Irritation for 2m. 10s. During this time the respiration stopped for 1m. 10s. Recovery. <i>C</i> Large dose of chloroform given.
May 12	77	Small pariah dog ...	<i>C</i> No	.....	.....	.....	No	.....	.....	.....	33 minims of ether injected subcutaneously after the stoppage of respiration. Needle movements quickened.
Do.	78	Large sickly pariah dog ...	.....	.....	No	.....	No	.....	.....	.....	One drachm of ether injected subcutaneously. Artificial respiration with hands commenced 25 seconds after the cessation of respiration.
May 13	79	Young pariah dog...	.....	.....	<i>A</i> Yes	.....	<i>A</i> Yes	.....	.....	.....	<i>A</i> Artificial respiration commenced 1m. 5s. after the respiration had ceased. 30 minims of ether injected.
Do.	80	Full grown pariah dog ...	.....	.....	.....	.....	<i>B</i> No	.....	.....	.....	<i>B</i> 30 minims of ether injected. Needle movements quickened in both <i>A</i> and <i>B</i> .
Do.	81	Medium sized pariah dog	.....	.....	.....	.....	No	.....	.....	.....	30 minims of ether injected subcutaneously.
Do.	82	Do. do.	<i>B</i> No	.....	.....	.....	<i>A</i> Yes	.....	.....	.....	30 do. do.
May 14	83	Sickly young pariah dog	.....	.....	.....	.....	No	.....	.....	.....	<i>A</i> 30 minims of ether injected subcutaneously. Needle movements not quickened.
Do.	84	Full grown pariah dog ...	.....	.....	<i>A</i> Yes	.....	<i>A</i> Yes	.....	.....	.....	30 minims of ether injected subcutaneously. After the injection of the first 10 minims the needle movements quickened, and after the second 20 minims the needle movements became feeble and slow.
Do.	85	Young healthy pariah dog	.....	.....	No	.....	No	.....	.....	.....	<i>A</i> Artificial respiration was commenced 5 seconds after the respiration had stopped. 30 minims of ether injected. Needle movements not quickened.
May 17	86	Large healthy pariah dog	No	.....	.....	.....	.....	.....	.....	.....	20 minims of ether injected subcutaneously. Artificial respiration commenced 4m. 15s. after the respiration ceased.
											Ether given throughout to dog on the table.

Do.	87	Sickly pariah dog ...	...	...	...	...	...	...	...	Heart exposed. Portion of thoracic wall removed. Heart continued to beat for 1m. 36s. after cessation of respiration.
Do.	88	Young pariah dog...	...	...	...	...	No	.....	.....	30 minims of ether injected subcutaneously.
Do.	89	Small pariah dog ...	...	...	A Yes	.....	A Yes	.....	.....	Artificial respiration was commenced 25 seconds after the respiration had ceased and 30 minims of ether injected subcutaneously.
May 18	90	Do. do. ...	...	...	.....	.....	.....	No	.....	An unsuccessful attempt was made to force in oxygen into the lungs.
May 19	91	Medium sized pariah dog	...	A Yes	.....	.....	.....	C No	.....	In B of this experiment the needle stopped completely for 3 seconds when the respiration ceased.
Do.	92	Large sized healthy pariah dog ...	...	.....	.....	.....	.....	No	.....	In C oxygen was pumped into the lungs through the trachea, but the lungs were not well expanded.
Do.	93	Old pariah dog ...	...	.....	.....	.....	.....	No	.....	Commenced 2m. 5s. after the respiration had ceased.
May 20	94	Large sized healthy pariah dog...	...	.....	.....	.....	.....	A Yes	.....	Apparatus for pumping in oxygen was not in working order.
			B Yes	.....	.....	.....	.....	.....	.....	A Oxygen pumped in 1 minute after the respiration had ceased. Needle stopped completely for 20 seconds during the interval.
Do.	95	Small sized pariah dog ...	...	.....	.....	.....	.....	No	.....	B Needle stopped beating for 14 seconds when the respiration ceased.
Do.	96	Small pariah dog ...	...	.....	.....	.....	.....	No	.....	C Oxygen pumped in 2 minutes after the respiration had ceased. The needle had stopped permanently previous to the commencement of artificial respiration.
Do.	97	Pariah pup ...	...	.....	.....	.....	.....	A Yes	.....	Oxygen pumped in 1 minute after the respiration ceased.
May 21	98	Large sized healthy pariah dog...	...	.....	.....	.....	.....	B No	.....	Commenced 1 minute after the respiration had ceased.
Do.	99	Young healthy pariah dog	...	.....	.....	.....	.....	No	.....	A Commenced 1 minute after the respiration had ceased.
Do.	100	Small pariah dog ...	...	.....	.....	.....	.....	A Yes	.....	B Commenced 2 minutes after the respiration had ceased.
				.....	.....	.....	.....	No	.....	Commenced 2 minutes after the respiration had ceased.
				.....	.....	.....	.....	No	.....	Commenced 2 minutes after the respiration had ceased.
				.....	.....	.....	.....	A Yes	.....	A Commenced 1 minute after the respiration had ceased.
				.....	.....	.....	.....	B Yes	.....	B Commenced 1 minute after the respiration had ceased.
				.....	.....	.....	.....	C No	.....	C $\frac{1}{2}$ grain injected 1m. 20s. after the respiration had ceased.

1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892											
May 23	101	Large sized healthy pariah dog...	A Yes	.....	.....	.....	.....	.....	B No	.....	B. Commenced 1 minute after respiration had ceased.
Do.	102	Small pariah pup ...	.....	.. ..	.....	.....	.....	.....	No	.....	Commenced 2m. 10s. after respiration had ceased.
Do.	103	Large sized healthy pariah dog...	.....	.....	.....	.....	.....	No	.....	.....	$\frac{1}{2}$ grain injected 40 seconds after respiration had stopped.
Do.	104	Do.	.....	.....	.....	.....	.....	No	.....	.....	$\frac{1}{2}$ grain injected 30 seconds after respiration had ceased.
Do.	105	Do.	No	.....	.....	.....	.....	.....	.....	.....	Needle stopped for 15 seconds after the respiration stopped and recommenced beating vigorously.
Do.	106	Small pariah pup ...	No	.....	.....	.....	.....	.....	.....	.....	Needle fairly vigorous when the respiration stopped.
May 25	107	Large sized somewhat sickly pariah dog...	A Yes	B Yes	.....	.....	.....	.....	.....	.....	B Irritation of peripheral end of left vagus commenced 18 seconds after respiration had ceased and continued for 1 minute. Needle slowed during interval.
				C Yes	.....	.....	.....	.....	.....	.....	C Irritation commenced immediately the respiration ceased and continued for 1 minute. Needle stopped for 30 seconds.
				D Yes	.....	.....	.....	.....	.....	.....	D Irritation commenced immediately after the respiration stopped and continued for 1 minute. Needle stopped completely for 30 seconds.
Do.	108	Large sized healthy pariah dog...	E No	.....	.....	.....	.....	.....	.....	.....	A Irritation commenced immediately after the respiration stopped and continued for 1 minute. Needle beats slowed.
				A Yes	.....	.....	.....	.....	.....	.....	B Irritation commenced immediately after the respiration stopped and continued for 1 minute. Needle beats slowed.
May 26	109	Do.	.....	A Yes	.....	.....	.....	.....	.....	.....	A Irritation commenced 1m. 3s. after the respiration had ceased and continued for 1 minute. Needle beats considerably slowed.
Do.	110	Medium sized pariah dog	No	B An enormous dose of chloroform was given. Irritation commenced 48 seconds after the respiration had ceased and continued for 1 minute.

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1	2	3	4	5	6	7	8	9	10	11	12
Date.	No.	Description of animal.	Natural recovery.	Recovery after irritation of vagus.	Recovery after simple artificial respiration.	Recovery after artificial respiration by means of bellows.	Recovery after injection of ether.	Recovery after injection of strychnine.	Recovery after blowing in oxygen by bellows.	Recovery after venesection.	REMARKS.
1892											
June 14	125	Medium sized healthy pariah dog.	.....	.....	.....	.....	.....	.....	.....	.....	Chloroform was injected into the substance of the ventricles and the effect observed.
Do.	126	Small sized healthy pariah dog...	.....	.....	.....	.....	.....	.....	.....	.....	Do. do. do.
June 15	127	Large frog ... ..	.....	.....	.....	.....	.....	.....	.....	.....	The thoracic cavity of the frog was opened and chloroform vapour applied to the heart by means of a test tube.
June 16	128	Do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Do. do. do.
Do.	129	Two large frogs ... ..	.....	.....	.....	.....	.....	.....	.....	.....	The relative effect of exposure to chloroform and air was observed on the hearts of two frogs.
	130	.....	.....	.....	.....	.....	.....	.....	.....	.....
June 17	131	Medium sized pariah dog...	.....	.....	.....	.....	.....	.....	.....	.....	The effect of filling the pericardium with chloroform was watched.
Do.	132	Hearts of eight large frogs ...	.....	.....	.....	.....	.....	.....	.....	.....	Immersed in chloroform, ether, hydrochloric acid and water and the results noted.
June 20	133	Large sized pariah dog ...	.....	.....	.....	.....	.....	.....	.....	.....	The effect of filling the pericardium with ether was watched.
Do.	134	Medium sized pariah dog...	.....	.....	.....	.....	.....	.....	.....	.....	Ether was injected into the substance of the heart and the effect watched.
June 23	135	Do. do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	The thorax was opened while the dog was kept alive through artificial respiration with bellows.
June 28	136	Large sized frog ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Heart removed and immersed in chloroform.
Do.	137	Do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Do. do. do.
Do.	138	Large frog ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Do. do. do.
Do.	139	Do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Do. do. do.
Do.	140	Do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Thoracic wall removed to expose heart, the beats of which were observed <i>in situ</i> .
Do.	141	Do. ... ..	.....	.....	.....	.....	.....	.....	.....	.....	Heart immersed in chloroform after removal.

Do.	142	Do.	...	...	...	...	...	...	...	Heart removed and immersed in chloroform.
Do.	143	Do.	...	...	...	...	...	...	...	Do.
Do.	144	Do.	...	...	...	...	...	...	...	do.
Do.	145	Do.	...	...	...	...	...	...	...	Heart removed and simply exposed to air.
June 29	146	Do.	...	...	...	...	...	...	...	Do.
Do.	147	Do.	...	...	...	...	...	...	...	do.
Do.	148	Do.	...	...	...	...	...	...	...	Heart removed and exposed to air.
Do.	149	Do.	...	...	...	...	...	...	...	Heart removed after animal had been killed by chloroform in a bell-jar.
Do.	150	Do.	...	...	...	...	...	...	...	Heart excised and exposed to air.
Do.	151	Do.	...	...	...	...	...	...	...	Do.
June 30	152	Do.	...	...	...	...	...	...	...	do.
Do.	153	Do.	...	...	...	...	...	...	...	Killed with ether and heart exposed to air.
Do.	154	Do.	...	...	...	...	...	...	...	Do.
Do.	155	Do.	...	...	...	...	...	...	...	do.
July 1	156	Do.	...	...	...	...	...	...	...	Heart excised and placed in liquid ether.
Do.	157	Do.	...	...	...	...	...	...	...	Do.
Do.	158	Do.	...	...	...	...	...	...	...	do.
Do.	159	Two large frogs	...	...	...	...	...	...	...	Killed in bell-jar with chloroform.
Do.	160	Do.	...	...	...	...	...	...	...	Killed in bell-jar with chloroform and heart excised and exposed to air.
161			...	...	...	...	...	...	...	Killed by chloroform and heart excised and exposed to air.
Do.	162	A small and a large frog...	...	...	...	...	...	...	...	Hearts removed from the thorax cavities. A portion of the auricles was removed from each and the effect observed.
163			...	...	...	...	...	...	...	Hearts exposed to ether and chloroform and the difference in effect observed.
Do.	164	Large frog	...	...	...	...	...	...	...	Hearts exposed to ether and chloroform and effect observed.
			...	...	...	...	...	...	...	Heart exposed to chloroform.

