

several hours. Seen for the first time during this period, the patient seems to have little or nothing the matter with him. No pain nor tenderness, no disturbance of pulse or temperature. Everything is quiet under the sway of the "divine poppy." In many instances this lull in the symptoms is deceptive, as in from twelve to twenty-four hours they return with increased violence. This is usually the signal for calling the surgeon, and it goes without saying, that he should be prepared to operate at once if necessary.

(5) And, finally, we have the recurring cases of appendicitis to consider, which differ from the relapsing variety in the fact that patients are apparently well between the attacks. Recently a gentleman consulted the reader for the following symptoms: Five or six times during the past year, after a hearty meal he has been suddenly seized with a severe pain in the umbilical region, which gradually worked down into the vicinity of the appendix. The pain is accompanied by marked local tenderness and inability to stand erect. It lasts about twelve hours, but the tenderness persists for three or four days or even longer. He is weak and exhausted for several days — much more so than would be expected after an ordinary attack of colic or indigestion. This man is strong, robust, and is entirely well between these attacks. In the reader's opinion he is suffering from a mild form of recurring catarrhal appendicitis. Now comes the important question of treatment. Is an operation necessary, and if so, when shall it be performed? The temperament of the surgeon and of the patient is a factor in deciding these questions. If the attacks are increasing in frequency or in severity, there can be little doubt as to the necessity of an operation; and the sooner it is done the safer and better for the patient. On the contrary, if the intervals are increasing in length, and the symptoms becoming less severe and of shorter duration with each attack, it might be well to wait a while before resorting to a radical cure, as a certain number of these cases do eventually wear themselves out, so to speak, and entirely disappear, thus coming under the head of "appendicitis obliterans." In the opinion of the writer six attacks of appendicitis in one year, even if mild, are quite sufficient to justify an operation for the removal of the exciting cause.

Not a few physicians entertain the idea that there is no occasion for calling the surgeon until a tumor has formed, indicating that the inflammatory process is limited in extent and has ceased spreading. That this idea is erroneous and misleading, is abundantly proven by the fact that in very many cases no tumor is ever found, and yet the convalescence dates from the moment of operation. It is often impossible to detect a tumor, even when present, by reason of its depth in the pelvis, its shape and size, as well as the thickness and rigidity of the abdominal walls. The presence of a tumor does not of itself indicate an operation, nor does its absence preclude it. In fact, the indications for treatment are influenced very little by this symptom. A tumor shows the variety of the inflammatory processes going on in the peritoneal cavity, and also indicates the site of the incision. The plan of treatment is based upon other and more important factors in the condition of the patient. If he is growing steadily worse, radical means are called for, and the more rapid is the progress of the symptoms, the earlier are effective measures demanded.

In closing I can but repeat what has already been said, that from a surgical standpoint it seems wise and prudent that every case of appendicitis of any severity or duration should be seen in the early stages by one accustomed to operating for this affection, as well as to deciding the many difficult questions which are constantly arising throughout its course.

If the initiatory symptoms were severe; if they are steadily growing worse; if they relapse, or come to a stand-still; if the patient is sick, weak, irritable, impatient, restless; and especially if he cannot pass wind, or is inclined to nausea, vomiting, hiccough or delirium, — then I urge you to be vigilant and prompt in calling for surgical aid, for reasons already mentioned. You will never be criticised for calling it too early or too often. The serious character of the affection, the sudden onset, the insidious course, the rapid and unexpected variations, the startling collapses and excruciating pain liable to occur in this affection, as in almost no other, will protect you from these charges. And should the result be unfortunate, you and the friends will have the lasting satisfaction of knowing that you have done your whole duty in the matter, and are in no way responsible for the disastrous termination.

### Original Articles.

#### OBSERVATIONS ON BRAIN SURGERY SUGGESTED BY A CASE OF MULTIPLE CEREBRAL HEMORRHAGE.<sup>1</sup>

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THE patient, a young woman, was out riding horseback, when the horse became frightened and bolted, throwing the rider headlong, the right side of her head striking against the lower rail of a fence. She was picked up and carried home in an unconscious condition.

About four hours later, Dr. Brooks was called to see her. At that time she was lying on her back, perfectly unconscious, breathing quietly and with a pulse of about 100. The face was flushed, the pupils were equal, somewhat dilated and reacted slowly to light. There was partial paralysis of the left side of the face, and complete paralysis of the left arm and leg. She had vomited once or twice since the accident.

In the right mastoid region, extending upwards and backwards, was a swelling, pressure upon which caused marked restlessness. The patient was immediately taken to the Massachusetts General Hospital. While in the ambulance she became somewhat restless; the right arm and leg were continually tossed about and there was apparently some evidence of returning consciousness, such as indistinct mutterings. The pulse was rapid and varied in strength; the respirations were shallow. The face grew pale and the extremities cool. There was incontinence of urine.

She was admitted to the hospital about five P. M. The hospital record of her condition at that time is as

<sup>1</sup> Read before the Boston Society for Medical Improvement, December 28, 1896.

follows: Pupils equal, somewhat dilated and reacting slowly to light; paralysis of left side of the face; left arm flexed and rigid; left leg rigid and paralyzed; patella reflexes normal. Large hematoma covering the right mastoid region, extending well into the occipital and parietal. Pulse 96, of fair quality but of irregular rhythm; respiration about 24, normal in character. Pressure over the hematoma caused the patient to move the right arm and leg violently.

The scalp was shaved and an ice-bag applied. She was given one-sixth of a grain of elaterium.

During the night the patient became very restless; the right arm and leg were constantly in motion. The left hand was moved a little. There was incontinence of urine. Temperature at one A. M. (rectal) was 102.4°; the pulse varied from 100 to 130; the respiration from 20 to 30. Patient still unconscious.

Second day. In the morning the pulse was more steady and of better quality; the temperature (rectal) was 97.2°. The patient was still very restless, with constant tossing of the right arm and leg. The left arm was moved quite freely when the hematoma was pressed, though both the arm and leg were still somewhat rigid. The bowels were moved after a drachm of jalap powder and a suds and glycerine enema.

In the afternoon the left arm and leg were somewhat less rigid, and the patient groaned when the right side of the head was pressed, at one time making a slight attempt at articulation. Up to this time improvement had been apparent; but in the evening the patient had hardly held her own, the rigidity and paralysis of the left side were quite well marked, and no response was made upon efforts to arouse her. With the advice of Dr. Walton, who had been following the case, it was determined to make an exploratory opening.

#### OPERATION.

A curved incision was made, extending from the external angle of the right orbit to one inch above and behind the mastoid, and a semicircular flap turned downward. The temporal muscles and pericranium were retracted. The surface of the skull was found to be in perfect condition, with no evidence of fracture. A small trephine was applied about two and one-half inches above the external auditory meatus. On removal of the trephine button, it was noticed that the dura (which was tense and non-pulsating) was slightly nicked on account of its closer approximation to the skull. A quantity of clear serum escaped from the opening. The dura was incised, about half an ounce of clear fluid spurting through the incision. The brain appeared somewhat edematous, but otherwise normal. Exploration under the dura revealed no sign of hemorrhage. The opening in the dura was closed by fine silk sutures, the pericranium was sutured across, and the skin wound drawn together with stitches of silkworm gut.

Recovery from the ether was marked by great restlessness and a weaker and more variable pulse, rising at one time to 150. The left arm and leg again became rigid.

Third day. No particular change; patient very restless, with variable pulse. In the evening the respiration became stertorous. The left arm and leg moved somewhat, and were much less rigid than the day before. The patella reflex was absent. A little milk and lime-water was taken by the mouth. The bowels were moved by croton oil, and nutritive enemata

given. The wound was dressed in the afternoon and looked well. There was considerable serum on the dressing. One stitch was removed and a gauze wick inserted.

Fourth day. The patient passed a fairly comfortable night, seeming rather more conscious in the morning and responding more readily to stimulation. The eyes showed a tendency to roll up. Sordes gathered on the lips and teeth. Some improvement appeared in the character of the pulse and respiration, and there was more motion and less rigidity in the left arm and leg. The patella reflexes had returned. In the afternoon the patient seemed more conscious than in the morning, and made some response to questions. The pulse was 96, and the respiration 20. There was less restlessness and less facial paresis. There was still incontinence of urine, a symptom which persisted throughout.

Fifth day. The patient was very restless and noisy all day, delirious and muttering incoherently. The general appearance, however, was much better, and an attempt was apparently made to respond to questions. The left side was used much better, and there was little, if any, facial paralysis.

Sixth day. Improvement continued. The patient, though still delirious, was much more quiet. Milk and lime-water were taken by the mouth.

Seventh day. The patient was very quiet and drowsy most of the day, talking very little, but apparently understanding when spoken to. The whole appearance was more natural; the left side was moved freely.

Eighth day. No particular change. More nourishment taken by the mouth. Wound looks well.

Ninth day. Patient more quiet and somewhat harder to rouse. The stitches were removed and the wound found practically healed. The hematoma persisted. Over a quart of milk was taken during the day.

Tenth day. Unconsciousness was somewhat deeper, the patient being roused with difficulty. The hematoma was incised, and about half an ounce of dark blood expressed. The condition of the left side was about the same.

Eleventh day. Patient rather more easily roused to-day. The nutritive enemata were omitted, milk being taken freely by the mouth.

Twelfth day. Unconsciousness deeper. Rather more difficulty in swallowing appeared, but a quart of milk and several raw eggs were taken.

Fourteenth day. Patient less conscious and very quiet. No definite paralysis and no trace of rigidity in the left side, though comparatively little movement was made.

Fifteenth day. The temperature, pulse and respiration all rose suddenly; examination of the chest showing nothing abnormal excepting a few moist râles at the base. Strychnia, one-thirtieth of a grain, was ordered every three hours, subcutaneously, without any effect upon the pulse.

Sixteenth day. The patient has grown decidedly worse. The lungs are filling up. Oxygen, digitalis, and enema of salt solution produced no response. The patient died at 8.45 in the evening.

#### AUTOPSY, BY DR. WRIGHT.

Anatomical diagnosis: Trephination. Multiple cerebral hemorrhage with softening.

Body of tall, young woman. Slender build. Somewhat emaciated.

In scalp. Semicircular wound, nearly healed. Wound extended from right temporal region, over right parietal eminence, downward toward mastoid. Length of wound about twelve centimetres. Edges of wound adherent. No suppuration. Tissue in neighborhood of a dark-red color, evidently from diffused blood. In right mastoid region, subcutaneous tissue contained a flattened cavity about the size of a half-dollar.

In skull, in neighborhood of right parietal eminence, a circular hole, two centimetres in diameter. Through this the dura could be seen, with reddish exudation on its surface. On removing the calvarium, the dura was found to be moderately adherent, but there was no evidence of extra- or intra-dural hemorrhage. Exudation seen through the trephine opening did not extend any farther than the limits of the opening. There was no evidence of any fracture of the calvarium. The brain showed no evidence of meningeal hemorrhage, and externally showed nothing remarkable. On section, several hemorrhagic, softened areas were found in the following situations: In the left frontal, first convolution, about one centimetre from the surface, there was an ovoid area, the size of a common bean, of a dark, brownish-black color, soft consistency and indefinite margin. A similar area was also found in the white matter, about one centimetre anterior to the caudate nucleus. Another similar soft, dark brown area was found just beneath the floor of the right lateral ventricle, near the outer margin of the optic thalamus. In several places throughout the white substance of the brain, there were pin-head-sized, dark-brown areas which did not wash off. Careful inspection of the base of the skull revealed no fracture.

No cause of death was found in the viscera.

The atypical course of this case illustrates the difficulties occasionally encountered by surgeons and neurologists after blows and falls upon the head. The symptoms produced by meningeal hemorrhage, whether extra- or subdural, have been so fully illustrated and discussed of recent years that few surgeons would fail to recognize a typical case. The deepening unconsciousness passing into coma, with or without stertorous respiration, whether following directly the initial effects of the blow, or whether preceded by an interval of consciousness is certainly in itself suggestive of hemorrhage, and if accompanied by unilateral convulsions, paralysis, or both, the imperative demand for operation is generally recognized. It has even been noticed that this set of symptoms may be produced by a hemorrhage upon same side with the paralysis, an unusual condition, the pathology of which is obscure. Possibly in such cases we have to do with a failure of the pyramidal fibres to cross, or perhaps, as Dr. Putnam has suggested, the brain on the side of the hemorrhage becomes gradually accustomed to the pressure, but at a certain point the pressure on the other side becomes more sudden through edema and other pathological changes.

Whatever the pathology of this condition, this fact must be always borne in mind and the question considered, whether both sides should not be trephined in cases positively indicating hemorrhage, in case of failure to discover hemorrhage on the side of the brain opposite the convulsions or paralysis. One of the writers has had an opportunity to see this condition

verified by autopsy, in a case seen with Dr. Swan, of Cambridge.

Another condition had to be borne in mind in our case, namely, that severe concussion of the brain sometimes produces, especially in young women, a condition allied to hysteria, a trance-like state following the unconsciousness of concussion. In such cases, the unconsciousness, instead of gradually deepening, gradually lessens, though its prolongation for a week or even more may cause the attending surgeon great uneasiness and even seem to demand operation.

In the case under consideration, the fact that the patient winced and showed other signs of pain, when the hematoma was pressed upon, on the night following the injury, rendered it possible that there was an element of this sort in the case. The improvement in the mental condition during the following day did not tend to dispel this possibility although the one-sided paralysis excited considerable apprehension, for it must be remembered that meningeal hemorrhage is sometimes followed by paralysis without convulsions. It was decided, however, that should the improvement cease or the unconsciousness deepen, operation was imperative. In point of fact on the night following the accident the condition seemed distinctly worse, rendering operation advisable and even imperative, although the case did not run the typical course of hemorrhage.

The operation, as is seen by the report, proved negative, excepting that a certain amount of pressure, which had rendered the dura tense and prevented pulsation, was relieved by an unusual flow of cerebro-spinal fluid. The improvement caused by this relief of pressure was only temporary, and in the course of the following week the patient on the whole steadily lost ground, and one week from the operation elevation of temperature, pulse and respiration showed that the disturbance was becoming profound. At this time operation was considered by Dr. Porter, to whose service the patient had passed.

The question was then considered whether it were not possible that meningeal hemorrhage was taking place upon the opposite side. The rarity of such a state of affairs, combined with the lack of symptoms pointing conclusively to meningeal hemorrhage, led to the conclusion on Dr. Porter's part that if the patient were to pull through at all, her chances would be as great without as with further operation, a conclusion justified by the autopsy, which revealed no lesion at the surface of either side—in fact, nothing tangible beyond two small hemorrhages in the left frontal region, far removed from the course of the motor fibres.

This case seems to us peculiarly instructive in view of its atypical course. With regard to the question of operative interference the deductions to be drawn, are, of course, purely negative. It emphasizes, however, the importance of remembering that a fatal result may follow severe concussion without tangible gross lesion, unless, indeed, the two small hemorrhages in the frontal lobe with subsequent softening are considered adequate cause for a fatal issue. Whether this be true or not, they were certainly insufficient to produce the paralysis.

The study of this case and the considerations thereby suggested show the complexity of the question from a modern standpoint, compared to the view of former times, when so crude a law obtained as that

unconsciousness of brief duration showed concussion, while protracted unconsciousness pointed to compression; in this case certainly the unconsciousness and death can hardly be attributed to this mechanism. As to the exact cause of the fatal issue we are still unfortunately in doubt.

Assuming that the brain was unable to recover from the general disintegration produced by the mere violence of the blow, we are still confronted by the question, Why should marked unilateral paralysis, including that of the face, be present? Experience certainly would tend to show that the force of so violent a concussion should produce some effect at least upon the opposite side. Great as is the advance in the modern study of cerebral trauma, we are still far from the solution of such pathological problems as these, although a careful study of the subject has led in individual cases to brilliant practical success. Among these cases the one here reported can unfortunately not be counted, but it is offered with the hope of adding something to the sum total of our knowledge of the subject.

It seems not improbable that the diagnosis, *cerebral edema*, will appear more prominently in the future than it has in the past. Attention has been for some time directed to edema as a cause for more or less transient paralysis in non-traumatic cases; and in traumatic cases Dr. Bullard has offered this pathological condition as an explanation of the lack of correspondence between the amount of hemorrhage found in given cases, and the extent of the paralysis. He combats the objection that post-mortem evidence has failed to justify this diagnosis, contending that this fact by no means establishes its absence during life. Our case certainly tends to corroborate this view, for the ante-mortem evidence of increased fluid was demonstrated at the operation, though none was found at the autopsy. That the pressure of this fluid played a part in the production of the hemiplegia can hardly be doubted in view of the disappearance of rigidity, and the improvement in motion following the relief of pressure by operation.

One of the writers, in presenting an argument for the vaso-motor theory of grand hysteria, has called attention to the possibility of localized edema in the brain as productive of so-called functional hemiplegia and monoplegia. We certainly have an analogous process in the peripheral swellings not infrequently found in hysteria, more particularly about the wrist- and ankle-joints.

It is not uncommon in children to find localized paralysis following blows upon the head, closely simulating the results of hemorrhage, but completely disappearing in the course of a week or two, a fact which has to be borne in mind in making the diagnosis of middle meningeal or other hemorrhage in early life. The case here reported, together with others which have been called to our attention, would seem to indicate that a similar condition may obtain in adult life. Whether this pathology is accepted or not, the practical bearing of such cases upon our experience is to throw a certain weight in favor of conservatism in doubtful cases, though by no means lessening the demand for operation in the typical case.

It is of the utmost importance that we learn, if possible, to recognize the class under consideration. Towards this result we have only the following suggestions to offer, based upon our own experience. In the

first place, in all of the cases of hemorrhage which we have seen, the unconsciousness, after once appearing, has steadily increased.

The other symptoms have shown, as a rule, steady and continuous progression. The cases simulating hemorrhage, on the other hand, have run a comparatively irregular and atypical course. The insensibility to pain has also been profound in cases of hemorrhage, after reaching the point of unconsciousness. In the cases like the subject of this paper, however, pressure over the hematoma has given rise to signs of discomfort long after the unconsciousness was so profound that no response to questions could be elicited. The so-called pressure pulse has also been absent, though this sign is often wanting in meningeal hemorrhage, probably on account of the laceration, active congestion and other irritative lesions tending to increase the pulse-rate.

Apart from general scientific interest, to the practising surgeon and neurologist the pathological diagnosis of those cases becomes one of sufficient importance to demand discussion. Few more serious questions confront the surgeon than that of operative interference in this class of cases. Notwithstanding the relative innocuousness of trephining, as adduced by some authorities in favor of free exploration in doubtful cases, occasional unhappy results follow this operation, especially if the dura is incised and the brain substance explored. Even were this not the case, the antipathy of the family and friends to opening the cranial cavity presents a serious obstacle, except when the surgeon can promise relief.

The first question to be decided is whether hemorrhage is present. If this question is answered in the affirmative, we have still to consider whether the flow has ceased. If it has not ceased, has enough blood escaped, or is enough blood likely to escape to cause immediate danger, or to result in permanent symptoms? If, on the other hand, the hemorrhage has ceased, will the symptoms disappear on absorption of the clot, or will a cyst be formed, which may give rise to future trouble? These questions we do not propose to discuss at this time, having rather to do with cases in which we are not sure that hemorrhage exists.

The points of diagnosis occurring to the writers, apart from the classical symptoms of hemorrhage, have been already mentioned; we would only add here, that when the surgeon thoroughly familiar with the subject feels himself in doubt, the chances are on the whole against hemorrhage, though the case reported by Mr. Hutchinson offers a remarkable exception to this rule. The following is a brief abstract:

Fracture of the right parietal bone, involving base of skull, rupture of middle meningeal artery; death on the ninth day from erysipelas and pyemia.<sup>2</sup>

The man had fallen head first, with a severe laceration of the scalp over the right parietal bone; exposure of the bone showed no fracture. He was conscious, answered questions, put out his tongue, etc. Was not paralyzed. Six hours later his general condition became worse. Pulse 84, soft and deliberate. Pupils rather small, equal. Left limbs moved much less vigorously than right. Complained when irritated but would not answer questions. Somnolent. Mr.

<sup>2</sup> Mr. Hutchinson's lectures on "Compression of the Brain," London Hospital Reports, vol. iv, p. 11, et seq; quoted by Jacobson, Guy's Hospital Reports, vol. xliii.

Hutchinson considered the condition, for the most part, severe concussion in the stage of partial recovery from collapse; but he had one symptom which did not fit with mere concussion, that is, partial paralysis of the left arm and leg. Several of the general symptoms of compression, however, were absent.

The man was not insensible, the pulse not impaired, the pupils not dilated, the breathing not stertorous. Mr. Hutchinson suggested the possibility of contusion of the right middle lobe of the brain in addition to concussion, and advised trephining if the paralysis increased and the patient became insensible. On the following day the hemiplegia had disappeared and consciousness returned. The patient had been restless during the night, and had twice got out of bed, but was unable to stand without assistance. Respiration tranquil, pulse 80. Patient was absolutely deaf, a condition which Mr. Hutchinson explained by some central hemorrhage implicating the auditory ganglia. On the third day erysipelas of the scalp appeared and spread to the face; on the sixth day symptoms of pyemia appeared; and the patient died on the ninth day. The only new symptom pointing to middle meningeal hemorrhage was dilatation and immobility of the right pupil.

The autopsy showed fracture of the base, with two lines passing forwards across the petrous bone and meeting in the top of the sphenoid. On both sides the cavity of the tympanum was full of blood-clots, the membrane being unbroken. This explained the absence of bleeding and the complete deafness. On the right side of the skull a fissure passed forwards through the sphenoid and temporal bone into the parietal. By this fracture the middle meningeal artery had been torn, and a large effusion of blood between the bone and dura mater had followed. The clot was an inch thick, and consisted probably of two or three ounces.

It will be noted that Mr. Hutchinson, in explaining paralysis, made the diagnosis *local contusion*. This term, as well as that of *laceration*, is not infrequently used. Post-mortem examination, however, is strikingly negative as regards laceration, except where the brain had been torn up by actual hemorrhage. In our own case, in which a certain degree of laceration was almost taken for granted, the macroscopical examination failed to show any trace of this lesion, either at the operation or at the autopsy. It seems to us more probable that in such cases, local edema, resulting from contusion, is a not unreasonable diagnosis. Dr. Bullard has already called attention to such edema accompanying hemorrhage, but mere bruising might well suffice for its production.

Suppose we have made a diagnosis of local cerebral edema, ought we to operate? If it be determined that such local edema cannot produce paralysis, a negative answer is in order; and even assuming that edema has produced paralysis, is it worth while to remove the fluid, or ought we not rather to wait patiently for its absorption? In considering this question, it seems to us that if the brain injury is so profound that the circulation is unable to re-establish itself and carry off the fluid, the patient is beyond help from operation or other treatment. Our tendency, therefore, in case we were assured that edema was the only lesion, would be to leave the patient alone.

It may be objected that the mere temporary pres-

ence of edema may prove disastrous; but here again we should say, if the patient is so low that temporary local edema will precipitate a fatal issue, he is too low to react from operation. If operation is decided upon, however, and only edema found, the surgeon should not feel that a mistake has been made, for in any such case he could never have been *sure*, without operation, that no hemorrhage existed. In other words, in a case of local paralysis, it can never be a mistake to operate provided the patient is growing worse or has even ceased to improve. In such a case the point of election might seem to be the anterior branch of the middle meningeal artery. Jacobson has, however, called attention to the advisability, in case trephining at this point proves negative, of making another opening in the region of the posterior branch of the same artery. It seemed to us in our case preferable to select a point between the two branches, from which the bone could be removed in either direction by the Rongeur forceps, particularly as the point we selected brought us in the neighborhood of the facial centre, at a place where hemorrhage from the middle cerebral artery (sub-dural) would be likely to show itself, for the symptoms of hemorrhage from this artery are nearly identical, so far as the paralysis is concerned, with those of the hemorrhage of the middle meningeal.

It is desirable that careful reports of similar cases be collected, in order that general rules may be formulated, to aid in the diagnosis of this important and often puzzling variety of trauma.

#### ARE ESPECIAL HOSPITALS OR HOMES FOR CONSUMPTIVES A SOURCE OF DANGER TO THEIR NEIGHBORHOOD?

BY EDWARD O. OTIS, M.D., BOSTON.

ALL authorities agree that consumption or pulmonary tuberculosis is infectious or communicable only through the dried sputum. When this becomes de-iccated the infecting micro-organism, the tubercle bacillus, is set free in the air and enters the respiratory tract through inhalation. The larger the air space and the more frequently and constantly this changes, the less likelihood is there that any given portion of this space will contain the germs although they may be present somewhere in the given area; hence the chance of becoming infected out of doors is exceedingly small in comparison with the danger in a confined space, like a room occupied by a consumptive or any enclosed space where there are likely to be one or more consumptives and where the sputum is not safely disposed of. Further, air and light—the condition out of doors—are inimical to the life of the tubercle bacillus. Ransome and Professor Delépine communicated to the Royal Society of England in May, 1894,<sup>1</sup> the results of their experiments “to determine how short a period of exposure to air and light would suffice to destroy the virulent action of the microbe.” They found that all specimens of dried sputum exposed to both air and light even for two days only, and for one hour of sunshine, had entirely lost their power for evil.

In concluding his remarks on these experiments Dr. Ransome says, “that where tuberculous sputum

<sup>1</sup> Published in Vol. lvi of the Proceedings; quoted in “The Treatment of Phthisis,” by Arthur Ransome, 1896.