between the fractures of bones as found in children and in adults.

Fractures through the body of a healthy bone are not common in early life; by far the greater number of instances taking place in children who are the subject of rickets. In these cases, it is well known that the bones are readily fractured; and in the case represented by the drawing which I now hand round, the mother states that at least twenty different fractures have taken place. In such cases, repair of the fracture is, however, rapidly performed, one month or five weeks being generally amply sufficient to complete the process.

Incomplete, or so-called "green-stick" fractures, form another peculiarity of infant life; the second name of "green stick" explaining their true nature, the bone being fissured vertically into fibres, but not separated transversely, precisely in the same manner as a green stick. This form of fracture may be found in any long bone. I have seen it in the arm and forearm, and also in the thigh; but have never noticed it in the tibia or fibula.

The youngest patient that I have seen who was the subject of this injury was a boy aged one month. The fracture was in the centre of the humerus; it had taken place some time previously, and was supposed to have been produced at birth. The bone was readily restored to the right line and fixed in splints, a good recovery taking place.

CASE. A very severe instance of this incomplete fracture presented itself before me in the person of a male child aged eighteen months. The right femur was really bent at a right angle, the foot and leg presenting outwards. It was produced by an attempt to catch the child when falling from the arms of its nurse. The fracture was readily restored by manipulation, and fixed with millboard splints, the limb being well padded with cotton wool, and the splints maintained *in situ* by strapping.

Fractures of the Clavicle are also very common. My colleague, Mr. Forster, in his practical work on *The Surgical Diseases of Children*, believes this fracture frequently to be one of the incomplete form; but as this bone is one of the earliest which is ossified, and at birth is, therefore, one of the strongest in the body, this opinion appears somewhat improbable. I would rather believe that these so-called fractures more often belong to the next class of cases to which I shall allude; viz., the separation of the epiphysis; the body of the bone being separated from its sternal epiphysis.

This *Separation of a Bone at its Epiphysis*, from anatomical reasons, can only take place in early life. It is, therefore, a second point of difference between the cases of fracture of bones in the child and adult. It is a commoner form of injury at this time of life than a dislocation of a joint, and is, perhaps, more frequent than an ordinary fracture.

It is the most frequently found at the upper and lower part of the humerus and carpal extremity of the radius; but it may take place in any bone. Considerable care is required to diagnose with correctness the nature of these accidents. They are too frequently looked upon as cases of dislocation, and are, therefore, maltreated; the absence of a distinct crepitus being the principal cause of this difficulty. They are to be treated in the same way as a case of fracture; the epiphyses are to be returned to their normal position by manipulation, and splints applied, great care being observed that there is no undue pressure over the parts.

This leads me to say one word on the subject of dislocations, which are unquestionably cases of some rarity; the majority of the so-called cases being a separation or dislocation of the epiphyses, to which we have just alluded. The treatment of these injuries, however, are the same in the child as in the adult.

[*To be continued.*]

Original Communications.

OBSERVATIONS ON SOME OF THE EFFECTS OF THE APPLICATION OF THE CALABAR "ORDEAL BEAN" TO THE EYE.*

By JOHN W. OGLE, M.D., Assistant-Physician and Lecturer on Pathology at St. George's Hospital.

As the observations, first of all made by Dr. Fraser, and extended by Dr. Robertson, on the effects of the Calabar "ordeal" bean upon the eye will no doubt attract (and most deservedly so) very considerable attention, I have thought it might prove of interest to place on record the results of some of the experiments which I have been induced to make with the same agent. In the present communication, I will notice only the results which I have found to be produced by its application upon the *pupil* of the eye, not wishing to interpolate any mention of such effects upon the power of vision, the "accommodation of the eye," as were manifested at the same time.

I was, in the first place, naturally wishful to determine for myself the fact that the healthy and active pupil of the eye could be made, at will, to contract by the application of this agent; and the following experiments were therefore instituted at the onset.†

EXPERIMENT I. A young woman, aged 24; the sight of whose right eye was so far impaired that she could only distinguish light from darkness. The left pupil was of the ordinary size, and moderately active; the right one was very sluggish under the action of light, and much larger than its fellow.

I applied a single drop of my weakest solution (No. 1) of the Calabar bean between the eyelids of the right eye at 1.25 P.M. I found at 1.55 that the pupil, which before had been considerably larger than that of the other eye, had become so contracted that it was only of about half the size of the other one. How long it remained so contracted, I am unable to say.

EXPERIMENT II. A woman, aged 51, with both pupils equal, acting but sluggishly under light, and both of them smaller than natural and healthy pupils generally are. I applied one drop of my No. 1 Calabar bean solution between the lids of the right eye at 1.40 P.M.; and at 1.55, the pupil was only half as large as that of the other eye.

EXPERIMENT III. A man, aged 53, paraplegic; with

* These observations were completed, though not communicated to this JOURNAL, before I had the opportunity of becoming acquainted with those which other experimenters (following Dr. Fraser and Dr. Robertson) have made, and placed on record.

† I have had four preparations of the Calabar bean made for me by Messrs. Bullock and Reynolds. First, a watery solution of a spirituous extract, of which one minim was equivalent to two grains of the bean (No. 1); secondly, a similar but stronger solution, in which one minim was equivalent to four grains of the bean (No. 2); thirdly, a strong spirituous extract, of which fifteen grains were equivalent to four hundred grains of the bean (No. 3). In the use of the former two, I dropped the solution, by means of a camel's-hair brush, between the eyelids: the latter (the extract) I used by first moistening it with water, and then smearing it over the inner surface of the lower lid. The fourth preparation of the bean which I have had made is a paper saturated with a solution, analogous to the atropine paper of Mr. Streatfeild. This Calabar bean paper I have not yet tried, or made use of.

the pupils of both eyes equal, of moderate size, acting well under light. I applied one drop of my No. 1 solution between the lids of the right eye at 1.32 P.M. No visible change in the left pupil was perceptible at 1.40. It had become slightly contracted at 1.55; and it was contracted to half the size of its fellow at 1.58. It was less than half as large as its fellow at 2 P.M.; and at 2.5 this pupil was only about equal to a pin's head in size, the pupil of the other eye having become larger than it previously had been.

Wishing to ascertain how long the contraction of the pupil produced by the Calabar bean would remain, when no means were used for again dilating it, I made the following observation.

EXPERIMENT IV. A boy, aged 5 years and 9 months, strumous, with both pupils equal, both very large and mobile under the action of light. I applied a single drop of the weakest solution (No. 1) of the bean between the lids of the right eye at 1.42 P.M. No visible change in the pupil had occurred at 1.50. At 1.62, the pupil had contracted to the size of a pin's head. I saw the boy again at 10.30 P.M., and found that the pupil was very contracted, but not to so great a degree as at the hour previously mentioned. On the following morning, at 10.30 A.M., I again examined the boy's eyes, and found that the pupil was still contracted, but only to a slight degree, and was almost as large as the pupil of the other eye.

Having thus added a proof, and as I think a satisfactory one, that we have a ready means in the Calabar bean of expeditiously, and with tolerable, but not very great, permanence, contracting the pupil, I made the following experiments, with a view of proving its power of effecting contraction of the pupil which had been previously decidedly dilated by atropine. This I was particularly desirous of doing, inasmuch as I have constantly felt the want of the means of contracting the pupil, after I have had it widened by atropine or belladonna for the purpose of ascertaining by the ophthalmoscope the state of the deep vessels of the eye in cases of albuminuria, supposed disease of the intracranial parts, etc.

EXPERIMENT V. The same patient as in the case of Experiment No. II, with naturally small pupils. Between the eyeball and the lower lid, I introduced a portion of Mr. Streatfeild's "atropine paper," equal to half a drop of the two-grains-to-the-ounce solution (*i.e.*, half of one of the squares) at 12.53 P.M. At 1.12, the pupil was very fully dilated. At 1.31, I applied a little of the strong extract of the bean (which I have before spoken of as No. 3). At 1.40, no contraction of the pupil had been produced, and I then applied some more of the strong extract. At 2.0, there was still no change in the pupil; but at 3.20, the pupil had become reduced to the same size as its fellow. Whether, and to what extent, it became still further contracted, I had no opportunity of judging.

EXPERIMENT VI. A man, aged 36, with both pupils equal, of natural size, acting well to light. I applied between the lids of the right eye one drop of the atropine solution (two grains to an ounce) at 12.7 P.M. At 12.30, the pupil was fully dilated, and I then smeared a little of the moistened extract of the bean on the lower lid. At 1.15, I found that the pupil was beginning to contract. At 1.30, as I found that contraction was not progressing at all quickly, I again applied some of the extract. At 2.0, the pupil was reduced in size to that of the opposite eye. I had no opportunity of ascertaining whether it contracted still further.

EXPERIMENT VII. A man, aged 36, whose pupils were of moderate size, and equal and acting well to light. I applied half a drop of the same atropine solution as in the former case, at 12.7, between the lids of the right eye. At 12.30, the pupil was fully dilated, and I then smeared on a little of the moistened extract of the bean. At 1.15, the pupil was beginning to contract; and at 2.0, the pupil was of the same size as its fellow. How long it so remained I know not.

EXPERIMENT VIII. A man, aged 40, with pupils equal, of moderate size, and acting well to light. I applied half a drop of the above used atropine solution at 12.10 P.M. At 12.30, the pupil was fully dilated. I then smeared on the lid some of the extract of the bean; and at 2.0 the pupil was so far contracted as to be almost, but not quite, as small as its fellow.

EXPERIMENT IX. A strumous boy, aged 19, with pupils equal, of moderate size, and acting well under light. I applied one drop of a solution of atropine of the strength of two-thirds of a grain to an ounce of water between the lids of the left eye, at 12.16 P.M. At 12.47, the pupil was considerably, but not fully, dilated, and at 12.58 it was fully dilated; I then smeared on some of the extract of the bean. At 1.25, the pupil had not become at all altered, and I then applied more of the extract. At 1.45, both pupils were equal.

EXPERIMENT X. A young man, with pupils equal, moderately large, and acting well under light. I applied one drop of the atropine solution (two-thirds of a grain to an ounce) at 12.30 P.M. At 12.47, the pupil was beginning to dilate, and at 1.25 it had become much dilated. I then applied some of the extract of the bean over the inner surface of the lower lid, and at 2.38 both pupils were quite equal again.

I was now anxious to know if it would be easy, by means of the Calabar bean, to control the pupil which had been for some time left in a state of dilatation produced by atropine, and for this purpose made the following observations.

EXPERIMENT XI. A middle-aged man, with pupils equal, moderate as to size, and acting well under light. I applied one drop of the atropine solution (two grains to an ounce) between the lids of the right eye at 1 P.M. At 1.30, the pupil was fully dilated. At the end of a week, I found that the pupil was still very greatly dilated; and at 1.5 P.M. I applied some of the extract of the bean. At 1.20 the pupil was contracted to the size of a pin's head. I then applied one drop of the atropine solution (two grains to the ounce) between the lids, and at 2.31 both pupils were again equal.

EXPERIMENT XII. A middle-aged woman, with pupils active, equal, of ordinary size. The pupil of one eye was widely dilated with one drop of the atropine solution (two grains to an ounce); and, after the lapse of a week, the pupil was found to be still freely dilated, though not so widely as in the week previously. At 1.15 P.M., some of the extract was applied between the eyelids. At 1.20, the pupil was contracted to the size of a pin's head.

EXPERIMENT XIII. A middle-aged woman, with pupils of equal size, larger than usual, and active. I fully dilated the pupil of the left eye with one drop of the stronger solution of atropine (two grains to an ounce). At the end of a week, the pupil of this eye was still about one-third more dilated than its fellow. At 1 P.M., I applied some of the extract of the Calabar bean on the inner surface of the lower lid. After the lapse of only *twenty minutes*, the pupil of this eye had become reduced in size to that of a pin's head. Possibly this effect was produced much earlier, but I was unable to ascertain how much sooner it had followed the application of the extract, as the patient had left me and did not return earlier.

The following experiments show how readily the pupil, after being contracted by the Calabar bean, becomes again dilated on the application of the atropine solution.

EXPERIMENT XIV. A young woman, the same as mentioned in Observation No. 1, had the stronger aqueous solution of the bean, before described as No. 2, applied between the lids of the right eye at 1.53 P.M. I did not see her until 2.20, when I found the pupil of this eye reduced to the size of a pin's head. At 2.30, I applied one drop of the atropine solution (two grains to an

ounce). At 2.43, no alteration of the pupil had followed; but at 2.50, the pupil had become much dilated; and at 3.5, still more dilated. At the end of a week, the pupils were found to be equal in size.

EXPERIMENT XV. A woman, of middle age, with pupils equal, moderate in size, but rather inactive on application of light, having the arcus senilis in both eyes. Between the lids of the left eye, a drop of the weaker solution of the bean (No. 1), which was now some days old, was applied at 12.56 P.M. At 1.12, no change had occurred; and a drop of the stronger solution (No. 2), which was more recently made, was applied. At 1.16, the pupil was slightly contracted; and at 1.36, very much so. At 1.40, I applied one drop of the stronger portion of atropine (two grains to an ounce); and at 2.10, the pupil was becoming decidedly larger in size. At 2.15, it had attained the same size as its fellow.

In one or two other experiments, which I need not detail, I found that contraction of the pupil which had been dilated by atropine did not at all, or only very partially, follow the application of the Calabar bean solution. In some cases this might be explained by the fact of the iris having been at a previous occasion the subject of disease, and the muscular fibres having thus become altered in character; but I am inclined to think that it was owing to greater disproportion having existed between the strength or quantity of the solutions of atropine and Calabar bean which were used. It appeared to me that some of the Calabar solution, which was a simple watery one, was decidedly weaker in action after having been made some time.

It may then be gathered from the above experiments, that we have in the Calabar bean a ready and effective agent for producing contraction of the natural pupil; and also of neutralising the effects on the pupil produced by the application of atropine or belladonna to the eye (which generally remain for a great length of time, and frequently prove a subject of much complaint, by the resulting interference with vision and disfigurement—or, as some would say, the improvement—of countenance.) A little trouble and attention will be required in adjusting the strength of the Calabar bean solution on the one hand, and the atropine solution on the other; but when the proportionate strength of the two antagonising solutions has been determined as nearly as possible, making allowance for individual differences as regards the relative strength of the sphincters and dilators of the iris, dilatation for ophthalmoscopic and other purposes may be at any time resorted to with the certainty of a speedy return of the pupil to its natural state. I am convinced that, for ordinary ophthalmoscopic purposes, one quarter of a square of Mr. Streatfeild's atropine paper introduced beneath the lower lid is sufficient to effect the required purpose, and this should be removed as soon as dilatation commences.* But even if, from want of due adaptation, the contraction of the pupil should have been too vigorously carried out by the Calabar bean preparation as counteractive of the atropine dilatation, experiment shows me that this state of contraction is much less troublesome to the patient, and also lasts a much shorter space of time than does the dilatation from atropine or belladonna.

I hope shortly to adduce the results of further experiments concerning the effect of this agent, not only when used in reference to the eye, but also when resorted to in a more general way. Especially, I hope for the opportunity of testing its power of antagonising certain spasmodic conditions of the muscular system artificially produced.

POSTSCRIPT. As I find so many inquiries made by medical friends as to what the Calabar bean really is, I will here state concisely what I find to have been made known regarding it. The papers which I have consulted have been: first, a communication by Dr. Christison to the Royal Society of Edinburgh, Feb. 5, 1855, On the Properties of the Ordeal Bean of Old Calabar (*Edinburgh Medical Journal*, March 1855, and in the *Pharmaceutical Journal and Transactions*, vol. xiv, 1854-55, p. 470); and secondly, a communication in the *Transactions* of the Royal Society of Edinburgh, read Jan. 16, 1860, entitled, a Description of the Plant which produces the Ordeal Bean of Calabar, by Dr. Balfour of Edinburgh.

In the paper by Dr. Christison, after alluding to the custom among the negro tribes of Western Africa of using the ordeal by poison as a mode of trial for heinous offences, and describing the use, as an ordeal-poison, of the bark of certain trees, he proceeds to give a notice of the "ordeal-nut," of which Dr. Daniell had given a short account in the *Edinburgh New Philosophical Journal*, 1846, p. 319. Dr. Christison, it seems, had had the opportunity of investigating the action and chemical constitution of some of the seeds, which he had obtained from a missionary and merchant trading with Old Calabar; some of the seed having been also cultivated by Professor Syme and Dr. Balfour. It proved to be a perennial creeper of the family of *Leguminosæ*. Dr. Christison found that its active properties could be concentrated in an alcoholic extract "which constitutes 2·7 per cent. of the seed; and that this extract does not yield a vegetable alkaloid by the more simple of the ordinary methods of analysis." As respects the effects of the bean on the animal body, he found them to be "energetic, and in some respects peculiar, as it seems to affect directly and violently the functions of the heart and the exercise of volition over the muscles." Dr. Christison details the effect produced by fatal doses on the lower animals, from which it is clear that it is a poison of great intensity of action; and also records the effect produced in his own person by what proved to be a dangerous quantity of the bean taken internally. Omitting the details given, the conclusion arrived at was, that "one principal action of this extraordinary poison, and the immediate cause of death in fatal cases, is depression, ending in paralysis of the heart." He goes on to observe, "I think it may also be inferred, that another action is paralysis of the voluntary muscles, attended with suspension of the influence of volition"—a peculiar torpidity, like to that which attends the action of opium or Indian hemp. During this action the integrity of the mental faculties was most remarkable; and throughout there seems to have been a peculiar immunity from any bodily uneasiness (excepting sickness, the relics of the action of the emetic which was resorted to), merely a sense of sinking vitality being experienced. It appeared likely that twelve grains might, if retained on the stomach, have proved fatal.

From Professor Balfour's paper above-mentioned, it appears that Dr. Sharpey found by experiments on the frog, that it "paralyses the action of the lymph heart, does not impair circulation in the vessels, appears to suspend the influence of volition over the muscles, does not affect the direct excitability of the muscular fibre, and apparently also leaves the muscles excitable by stimuli conveyed along the nerves, other than volition; at least by electricity." Professor Balfour describes the experience as given to him by several missionaries, who witnessed the effects of the bean upon natives in the Calabar country. The entire plant is fully described by Professor Balfour in this paper.*

I may say here that Sir W. Hooker informs me that at Kew he is trying to rear one or two living plants. He gives to them the name of *Physostigma venenatum*.

* Sometimes a little vascularity of the conjunctiva follows this use of the atropine paper; but it only remains a short time, and is not worthy of mention, being quite confined to the parts with which the paper is in contact.

* I have to thank Professor Balfour, and also my friend Sir W. Hooker, for kindly forwarding to me some of the beans for experimental purposes.