

ORIGINAL COMMUNICATIONS.

EXPERIMENTS ON THE INFLUENCE OF THE POISONS OF THE COBRA, THE DABOIA, AND THE BUNGARUS, AND OF CERTAIN METHODS OF TREATMENT.

BY J. FAYRER, M.D., C.S.I.

Present: DR. FAYRER and MR. SCEVA.—July 10th, 1869.

EXPERIMENT No. 1.

A large and powerful pariah dog was bitten in the thigh, by a daboia russelli at 3-22 p.m., the dog shewed signs of pain when the fangs penetrated. 3-25.—Walks, but drags the bitten limb. 3-28.—Is lying down; on rousing the dog he is unable to stand; defecation and micturation occurred; shows no signs of suffering beyond occasionally a suppressed whine; tries to stand, but is unable to do so; contents of bladder dribbling away. 3-32.—Respiration hurried; pupils dilated; rolls his head uneasily, but keeps the neck turned more to one side; twitching of eyeballs; stretches out the fore-legs in a convulsive manner. Lies otherwise quite paralysed. 3-35.—Breathing regularly, but lies motionless. 3-38.—In the same condition; respiration 40 in a minute; slightly raises his head at intervals. 3-45.—Still breathing, but lies perfectly still, giving occasionally a low suppressed whine. 3-53.—In the same condition; has watery purging. 4 p.m.—In the same condition; respiration 45 in a minute. 4-7.—Can just raise its head when roused, the limbs seem quite paralysed. 4-9.—Muco-sanguineous purging: other symptoms the same. 4-18.—Still breathing; more muco-sanguineous purging. 4-20.—In the same condition. 4-40.—In the same position; lying on his side; legs extended; breathing still. 4-45.—Slight twitching of the muscles generally; respiration irregular, and feeble. 4-50.—Dead: a slight tremor, but no convulsive movement preceded death.—Bitten at 3-22 p.m.; dead at 4-50, or in 88 minutes. The body was examined one hour and twenty minutes after death. The lungs were not congested. The liver was darker colored than natural. The blood in the heart and great vessels was perfectly fluid, nor did it coagulate when collected and set apart.

I examined the blood at noon on the 11th July most carefully and deliberately under the microscope, with a high power. There was no change. The red and white corpuscles were in their natural relative quantities; a very few of the red ones were crenate. But there was not a trace of any new cell or molecular matter in the blood.

The perfect and permanent fluidity in the blood was remarkably illustrated in this experiment.

EXPERIMENT No. 2.

A pariah dog was bitten at 3-28 p.m. in the thigh by a large bungarus fasciatus said to be quite fresh, and about four and a half feet long; the bites drew blood. Walking about; drags the leg slightly. 3-34.—Looks depressed and is salivated. 3-36.—Walks about; looking scared. 3-40.—Bitten again in the thigh by the same bungarus; the dog evinced no sign of suffering. 3-42.—Looks dejected; foaming at the mouth; salivated. 4-7.—The dog is sick and vomited a quantity of frothy mucus; vomiting repeated directly. 4-10.—In walking he looks depressed, as though excessively nauseated, and limps in the bitten leg. 4-12.—Vomiting continues; lies down for the first time; breathing hurried. 4-17.—The nausea and vomiting continue; looks scared and depressed. 4-20.—Excessive vomiting of frothy mucus. Lies down; is convulsed in the hind legs; looks very ill. 4-29.—Hurried catching respiration; twitching of the hind legs. 4-32.—Walking slowly and feebly with a dejected look; vomits frequently, and

froths profusely from the mouth. 4-33.—Stands with his head drooping; still very sick; leans his body for support against the wall. 4-45.—No change. 5 p.m.—Appears better. 5-15.—Looks better; no vomiting; respiration more natural. 5-40.—Lying down; when raised on his feet, appears weak, but otherwise better. On lying down, arranged his legs in a natural position as if for sleeping. 6-10.—On being again roused, he walked about; his legs appeared feeble at first, but appeared to recover the use of them. 9-15.—Sleeping comfortably; on being roused, looks brighter and intelligent.

11th July, 6 a.m.—Remained during the night without changing his position; on being placed on his feet appears weak, particularly in the hind legs, he appears somewhat numb in the legs.

I received the following report on the 13th July:—

"The dog died at about 10-30 p.m., of the 12th. Bitten at 3-28 p.m. of the 10th July; dead at 10-30 p.m. of the 12th, or in about 53 hours. Yesterday morning (the 12th) I observed that he was very weak. During the day, and up to the time of his death, he remained lying on one side, with the legs extended, passing at intervals muco-sanguineous matter. On opening the body this morning, I found the blood coagulated in the heart and great vessels. The blood sent to me on the 13th was firmly coagulated. Under the microscope, it presented innumerable needle-like crystals of hæmato-globulin. The red corpuscles visible were very few in number, and were not, so far as I could judge, changed in any way. But I would speak with reserve about the corpuscles of this blood, as the field was so entirely filled with the crystals that little else could be seen even after careful dilution with water and agitation. It is possible that new cell forms may have been there, and escaped detection. The mass of the red corpuscles seem to have been converted into crystals. In both this and the preceding case, the blood was examined some time after death, but I failed to detect any new cell growths."

EXPERIMENT No. 3.

A young cobra, about ten inches long, was bitten at 3-45 p.m., by a fresh full-grown cobra (keauteah) near the tail, so that the viscera might not be injured. The fangs were seen to penetrate, and no doubt could exist that the poison was fairly inserted. Being put on the ground, it crawled away vigorously, seemed unaffected by the bite. 5 p.m.—No change. 11th July, 6 a.m.—No change; it is quite well and active. On the 13th July, I saw it quite well. On the 17th, it was found dead; apparently it had been dead about 12 hours.

EXPERIMENT No. 4.

Another young cobra of the same brood as the last (No. 3) was bitten by a fresh daboia near the tail like the last. The fangs penetrated, and the poison was freely inserted. 5-10.—No change. 6-15.—No change, except that, when moving about, the end of the tail beyond the part bitten appears stiff, and does not move so freely as the rest of the body. This is accounted for by the nature of the wound inflicted by the formidable fangs of the viper. 11th July.—No change. 13th.—The snake is alive and apparently well. On the 17th, it was found dead, and decomposed; it had probably been dead three or four days. These two young cobras were of one brood; they were caught a few days ago, and are said by the snake-men to be about a fortnight or ten days old.

There could be no doubt about their having been fairly bitten by the cobra and the daboia; no evil result followed up to the 13th, though they died subsequently. Surely this is strong proof that the cobra is but little susceptible, if at all, to the poison of its own species. These snakes being so young may have died from want of food, and partly from the effects

of the wound, independent of the poison. They were alive on the 4th day after being bitten.

EXPERIMENT No. 5.

A white half-grown kitten was bitten by a bungarus fasciatus, said to be fresh, at 4-9 p.m., in the thigh. It seemed much excited shortly after. 4-25—Lying in the former position, stretching out the fore-leg in a convulsive manner. 5 p.m.—In much the same condition. 6-10.—It has been very restless; now seems inclined to sleep; appears to be free from pain. 9-15.—Does not appear now to be much affected by the poison.

11th July.—It seems better.

13th July.—The kitten was quite well.

It was evident in this case, that the animal was not mortally though thoroughly bitten, for the snake was made to close his jaws on the part and drew blood. This, I believe, is just the sort of case which probably frequently occurs when men or animals are accidentally bitten—enough venom is injected to cause symptoms of poisoning, but not enough to destroy life. And the man or animal recovers chiefly by his or its own inherent power of recovery. Had I administered any of the so-called antidotes, or injected any of the proposed remedies, the recovery might have been attributed to the means used.

That a man or animal so poisoned may be benefited by the use of stimulants, or other therapeutic measures, I do not for a moment deny, but, as I have before said, this is a very different matter to that of administering an antidote that shall neutralize the poison, and by so doing save life.

EXPERIMENT No. 6.

Another kitten of the same size and age, as that in experiment 5, was bitten by a cobra in the left thigh, at 4-16 p.m. The bite was very imperfect, and was repeated at 4-20 p.m.

At 4-24.—The kitten very restless, and springing about violently. 4-25.—Hurried breathing; restlessness. 4-45.—Getting weaker; respiration irregular. 5-5.—Convulsive movements generally. 5-20.—Dead in one hour and four minutes. 6-20.—Body opened one hour after death. Lungs natural; no congestion; the blood, on being removed from the heart and great vessels, soon coagulated firmly.

EXPERIMENT No. 7.

A bungarus fasciatus was fairly and deeply bitten by a fresh cobra, at 4-27 p.m., near the tail; no doubt of the penetration of the fangs and inoculation of the poison. No effect was produced. The bungarus was well and active on the 16th, five days after the bite.

EXPERIMENT No. 8.

A bungarus fasciatus was thoroughly bitten by a fresh daboia, at 4-32 p. m., near the tail.

No evil result followed; the bungarus remained unaffected; on the 16th July was in its normal condition.

Several facts of importance are proved, or their probability confirmed, by the preceding experiments.

In death by poisoning by the daboia, and therefore, probably by all the viperine order—viperidæ and crotalidæ, the coagulability of the blood is generally destroyed. I say, generally, because though frequently, it is not invariably so. In the experiment on the fowl, it was found that the blood had coagulated. It remains fluid after death on exposure to the air.

The most careful and protracted microscopic examination could detect no structural change in the corpuscular elements of the blood. Death is more protracted, but the deadly effects of the poison are even more quickly manifested than in death from cobra-poisoning.

In point of lethality both appear equally dangerous.

In death by cobra-poisoning, the blood coagulates firmly after and even before death, as *post-mortem* examinations made

at all periods, from immediately to an hour or more after death, have shewn the blood to be coagulated firmly. No changes in the corpuscular elements have been seen in any of the microscopic examinations I have made.

The poison of the bungarus is less deadly than that of the cobra or daboia, but it is very dangerous. It also does not destroy the coagulability of the blood. Perhaps, this may prove to be the case with all the poisonous colubrine snakes. No change was observed in the corpuscular elements, *i.e.*, of such as remained. But the red corpuscles had passed in the case of the blood of the dog that died from a bungarus bite, into a state of excessive crystallization of a needle-like and long tubular form, though it is slow in producing its worse effects.

It is very doubtful if the cobra and daboia are affected by each other's poison; but the evidence on this point is not yet complete.

The bungarus is also less susceptible to the poison of the daboia and cobra than *innocuous* snakes, if, indeed, it be affected at all.

Death was not caused by asphyxia in any of these cases. Everything tends to show that it is due to direct exhaustion from paralysis of the nerve-centres.

EXPERIMENTS ON THE USE OF THE LIGATURE AND CARBOLIC ACID IN THE TREATMENT OF SNAKE-BITES.

By J. FAYRER, M.D., C.S.I.

Present :—DR. FAYRER and MR. SCEVA.—July 17th, 1869.

EXPERIMENT No. 1.

A large and powerful pariah dog was bitten in the thigh, at 2-45 p.m., by a fresh cobra (keautiah). The hair had been previously removed from the part in order that the puncture of the snake's fangs might be distinctly seen. The moment the fangs were withdrawn, the punctures were scarified, and carbolic acid at once applied, and well inoculated into the bites. The tissues were whitened, and the blood coagulated by the acid. 2-53 p.m.—The dog looks depressed and dejected; hanging his head. 3-12.—Lying down; looks dejected, but perfectly intelligent. 3-15.—Respiration hurried. 3-23.—Pupils widely dilated. In convulsions, rolled over on the other side; respiration irregular and catching. 3-27.—Violently convulsed. 3-30.—Respiration has ceased, but the heart still beats distinctly. 3-31.—Dead in forty-six minutes. The carbolic acid was evidently of no service in this case.

Post-mortem examination at 5 p.m. Blood coagulated; no crystallization under microscope.

EXPERIMENT No. 2.

A fowl had the feathers removed from the thigh, so that the bites might be seen, and was then bitten there at 2-54 p.m. by a daboia. The wounds were immediately scarified, and the carbolic acid thoroughly applied to the bites. The fowl fell over in convulsions when released, and was dead in less than sixty seconds. The body was opened at 3-35, or in about 40 minutes after death, and the blood was found to be coagulated in the heart and great vessels; some fluid blood escaped into the thorax. The lungs were not in the least congested. The condition of the blood was particularly noted, as it has generally been found fluid in the mammals dead from the daboia-bite.

Post-mortem examination of dog, experiment No. 3.

Blood examined at 5 p.m.: fluid when removed, but coagulated on exposure to the air.

Microscopical examination: no crystals; no change.

EXPERIMENT No. 3.

The poison of a fresh cobra (gokurrah) was taken from the snake in my presence, and ten drops of it immediately