caused much local and general irritation. As the benefits derived from the operation seemed now to have ceased and the aneurysm was again enlarging, it was evident that something more must be done. Two methods of further treatment suggested themselves as worthy of consideration—either to excise the aneurysm, tying the branches which entered it, or else to cut down on the distal side and ligature all the arteries entering it from below. As the original size and position of the swelling suggested adhesions to the peritoneum above, and to the vein on the inner side, the first method did not seem advisable and I therefore had recourse to the second, the only objection to it being the fact that the previous application of distal pressure had caused considerable irritation of the skin and induration of the subjacent parts and had thus rendered both asepsis and any operation more difficult. On Jan. 26th, 1896, I cut down on the distal side of the aneurysm at about a finger's breadth to the outer side of the line of the superficial femoral artery, this being the point where the pulsation in the arteries supplying the aneurysm was most marked, the incision being about four inches in length. The dissection was somewhat difficult on account of the indurated condition of the tissues. The superficial femoral artery did not pulsate but a ligature was applied, and somewhat deeper and to the outer side four arteries had to be ligatured each about the size of the posterior tibial—one of these was apparently the external circumflex—but still the pulsation in the aneurysm continued. I had, therefore, to seek further, and below the superficial femoral another large artery was discovered, apparently the internal circumflex or the continuation of the deep femoral. In order to expose and ligature this the superficial femoral had to be divided, another ligature being first applied. The pulsation in the aneurysm then entirely ceased. The wound was sutured and healed by first intention, with the exception of the upper angle. From this a slight sero-purulent discharge continued to exude, but everything seemed to be going on well until at the end of four weeks, when only a sinus remained, slight hæmorrhage took place. This at first seemed unimportant, and it was hoped that pressure would be sufficient to check it. It, however, occurred once or twice in the next few days, but only to a sufficient extent to slightly soil the dressings. About a week after its first appearance I was suddenly sent for on account of great local pain and rise of temperature. On examination I found at the upper part of the thigh a pulsatile and expansile swelling the size of a cocoa-nut. The skin covering it was dark purple in colour, and a clot of blood protruded from the sinus. One of the ligatured arteries had evidently given way and a traumatic aneurysm had formed. An hour later I again operated. There was nothing for it but to introduce my left forefinger through the sinus, feel for the probable source of the hæmorrhage, and with a probe-pointed bistoury lay the whole sac freely open. Profuse arterial hæmorrhage at once ensued and as soon as one bleeding point was secured with forceps another commenced, the whole of the tissues of the wound being infiltrated with blood and being of the consistence of a rotten apple. It was quite impossible to recognise any anatomical relations. In securing one bleeding point the femoral vein gave way and the wound was inundated with venous blood. Taken altogether it was as unpleasant a five minutes as could well be imagined; but finally, after apparently penetrating half through the thigh, all bleeding was arrested. As the state of the tissues and the depth of the wound precluded the possibility of ligaturing the arteries in detail, an aneurysm needle threaded with strong chromic catgut was passed round sections of tissue and these were ligatured. Primary union being impossible on account of the state of the tissues the wound was packed with iodoform gauze and allowed to heal from the bottom by granulation. This it gradually but slowly did, no bad symptoms of any kind occurring, although considerable anxiety was experienced regarding one slough, which was very long in separating and under which a large artery could distinctly be felt pulsating, but this ultimately came safely away, and on May 13th, six months after the first operation, the wound was soundly healed, with a firm depressed cicatrix, the site of the aneurysm being marked by a hard mass about the size of a walnut. When I last saw the patient on June 3rd he was walking about feeling perfectly well, except for a slight stiffness and weakness of the left leg.

The case seems to me instructive and worthy of being recorded, not only on account of the fact that full records of

such cases are somewhat rare, but, also, as illustrating that, notwithstanding the difficulties, dangers, and complications which may arise in the course of such a case, the ultimate result may be eminently satisfactory.

Edinburgh.

THE POISON-BEARING FISHES, TRACHINIS DRACO AND SCORPÆNA SCROPHA: THE EFFECTS OF THE POISON ON MAN AND ANIMALS AND ITS NATURE.

BY JAMES DUNBAR-BRUNTON, M.B., C.M. EDIN.

IN various parts of the globe, and especially distributed in the tropical seas, are fish which depend on defending themselves by means of a poisonous fluid introduced in an active manner and by will into the bodies of their enemies. This mode of defence serves the double purpose of causing the death of their enemies and preserving their own existence through the hesitation of other fish to touch them. The fish so armed are, as a rule, conspicuous by form and colour, and their special organ of defence consists of spines which to them are what the tooth is to serpents. These spines may be simply a modification of existing processes, such as a prolongation of the rays of a fin or may be a special spine attached to some part of its body. These spines have a poison-gland in connexion with them. The two fish which I propose to deal with in detail in this paper are both very poisonous and are found commonly on the shores of the Mediterranean. These fish are the sea dragon, *trachinis draco*, having as members of the same family *trachinis vipera* and *trachinis areneus*; and the scorpæna scropha, who has as corelatives in different parts of the world, *scorpæna porcus*, *scorpæna trusulata*, *scorpæna diabolus*, &c. These fish are only poisonous as a serpent is poisonous—i.e., by wounding. Their flesh is good and wholesome. Though they differ widely in appearance, yet the poison produces the same effects. Before, however, proceeding to the discussion of this poison it may be well to describe more exactly the poison apparatus which each fish possesses.

The *trachunis draco* is a handsome fish, striated with blue and brown and not unlike a trout in general appearance. Upon each of its gill covers there is situated the spine in connexion with the special gland. This spine is grooved and slightly erectile and is attached partly to the maxilla and partly to the under surface of the gill cover. It passes through the gill cover, where it shows as a sharp point, the length varying with the size of the fish. The spine is covered with a very fine membrane almost to its free extremity, and this membrane converts the grooves on the spine into little canals which open near the extremity of the spine near the point. At the base of this spine upon the upper surface lies the poison gland, under the gill cover and partly covered by the adductor muscle of the gill cover, which helps to compress the gland, forcing the fluid into the canals and at the same time erects the spine. When the spine enters another fish or an animal its membrane is stripped back and the poison enters at once into the wound. The gland is small, with nucleated colourless cells secreting a transparent fluid.

The *scorpæna scropha* is an unattractive-looking fish, squat of body, large of head, red in colour, having many protuberances on its skin and fins of an exaggerated character. The fins are peculiar also in that the rays project beyond the membrane. This fish may attain a large size, and is called by the French fisherman "le diable" and by the Italians "lo scorfano." The special organ in this fish is connected with the rays of the dorsal fin. The poison gland is connected with the first three of these rays, which project for a third of their length. The third ray is always the longest. In one fish examined it measured two and a half inches. The poison glands are attached to the spines on their posterior aspect. These rays or spines have three grooves running from base to tip and are covered with a fine membrane converting the grooves into conducting canals for the poison. The tips of these spines are very sharp and strong. This fish has also three stubby spines upon each gill

cover, the uppermost of which is the longest and the only one which has a gland attached. Describing the vulnerant fish in his atlas Savtschenko¹ says: "The poison of these fish which wound one always finds in a particular gland placed at the base of the dorsal or caudal fins. This gland communicates with the first or the last two rays of the fin. Similar glands one finds with some fish under the spines of the gills."

The Effect of the Poison on Small Animals.

A guinea-pig or rat being chosen for the subject of the experiment, one of these fish is grasped with a cloth and the spine is pressed against one of the animal's hind limbs till the point enters the skin. As the poison of the trachinis and that of the scorpena produce the same symptoms, these symptoms varying in intensity, sometimes more acute with the former, again more so with the latter fish, but producing the same train of symptoms, so have I grouped the effects under one heading. A few minutes after the animal has suffered this puncture from a recently-caught living or dead fish it gives a few gasps and squeals, at the same time twitching the injured limb; these symptoms of local pain and irritation advance within a varying period to more general ones. This is the period when the poison is distributed throughout the system. Great pain is exhibited, and though when undisturbed the animal is affected with tremors, yet if excited at this time convulsive movements and contortions are produced, accompanied by screams of fear and pain. The animal finds itself unable to run or escape and often falls over clawing the air with its forelegs; then, if left alone quietly, these pass and the animal drags itself along by the front legs, the hind-quarters being semi-paralysed. Any touching or handling of the injured limb intensifies the sufferings of the animal. At this time the place of puncture is intensely red and swollen, and this area extends almost half an inch round the wound. All the wool is shed from the skin, which exudes a reddish serum. Later, if the animal is still living, this part is gangrenous. Usually, however, from now the progress of the poison is very rapid, and the animal is in a condition of semi-paretic collapse. The pulse is small and the feet are cold. The urine and fæces are passed involuntarily, the urine dribbling away. The eyes are starting and the nostrils distended and respiration seems difficult. The animal is unable to move, the hind legs are stretched and flaccid, almost completely paralysed. This collapse becomes more profound and is soon followed by death. These symptoms and signs may be compressed into one hour or more depending on the concentration of the poison injected. In cases where the poison is in very small quantity the animal may live for fourteen or sixteen hours before death comes.

The Effect of the Poison on Man.

For illustration of the course of symptoms I propose to take the case of a man who has been bathing and been unfortunate enough to strike against one of these fish with his foot. This commonly happens with the trachini who are fond of concealing themselves in the sand. On the other hand, the cases which most frequently occur with the scorpenæ are cases where a fisherman or cook has touched these fish incautiously. At the moment of puncture only the sharp prick is felt at the place of contact with the spine. In a few minutes, however, the part commences to burn and itch and then becomes acutely painful with sudden stabbing pains. These pains increase in violence and shoot from the foot, passing up the leg in lightning darts, which force the person to lie down and writhe. Then a feeling of suffocation is felt and pain over the heart. From this time commence those cries of anguish which can always be recognised as caused by the acutest torture and fear. These cries are continuous and beads of sweat stand on his brow. The hand is put to the throat and heart, as if the action could relieve the feeling of suffocation, which now becomes stronger. Flashes of light pass before his eyes and the pulse is found to beat intermittently. The sufferer, moaning and imploring for aid, gradually seems to lose sight of the bystanders, and a delirium sets in where only the cries persist accompanied by convulsions. This state may pass on to collapse and death, or may, after lasting for many hours, gradually subside leaving a malaise which is very difficult to get rid of. In one case which I saw of a man who had been poisoned in the above manner this subsequent malaise persisted for nearly two months. During that time

the man was under constant treatment the shock having been so great; the wound on the foot at the same time was very reluctant to heal.

The local appearance of the injured part at this time shows as follows. At the moment of puncture there is seen only a small hole in the skin, which may be pigmented by the membrane from the spine. This puncture does not bleed. Round the puncture is an area of about half an inch in diameter, where the skin seems whiter than the surrounding parts. Outside this is an area of redness more or less diffuse. A little later this redness encroaches on the white central part where the puncture is, and soon all is of the same colour. Next the red increases in hue from light to dark and then from dark red to black. When this occurs there is considerable œdema and oozing from the wound which now opens. This part in a day or two may become gangrenous and slough off, leaving an irregular wound, or the gangrene may burrow to deeper parts and affect the joints. In some cases it becomes necessary to amputate the foot. The inflammation, even when much milder, is difficult to heal, and this I put down to the injury of the trophic nerves by the local action of the poison. In other cases boils and phlegmonous bullæ appear on the affected limb, and this may be accompanied by a phlebitis. Describing the effect of this poison on man P. Savtschenko² says: "At the place of puncture at the moment when the fish has wounded with the aid of one or more of the rays of the dorsal, caudal, or stomach fins or with the spines which some fish have on the gill covering there is produced a great pain which extends in rays around the place that has been punctured. At the same time the wounded person is subject to a sensation of fear and anguish, followed by a faint, which is preceded or accompanied by nausea and general collapse. The wound at the moment of puncture shows only the form of the spine which has produced it. Its circumference, pale at first, reddens afterwards, becoming more and more pronounced, finally engorged and black. The sick man at the same time is taken with a fever more or less strong, depending on the force of the wound and on the quantity and property of the injected poison in the skin, on the place and on the sensibility more or less of the person wounded. According to natives these, like wounds, have often the most sad endings, the attention not being given in time or by incompetent persons."

The treatment of such cases can be said to be twofold—to prevent the poison as much as possible from entering into the general circulation and to combat subsequent symptoms as they arise. If the wound be treated at once with a caustic or corrosive solution the major part of the general symptoms of poisoning may be averted or very much modified. Natives in the Mediterranean use blue-stone for this purpose, but it is usually applied too late or insufficiently. The cautery simple or galvanic should be applied or the wound well opened and washed with a strong solution of corrosive sublimate. The absorption of this poison is very rapid and the means at hand are generally the best to commence with. Thus it is better to open the wound and allow of free bleeding rather than wait for caustic or cautery. At the same time the patient must not be neglected. Brandy and sal volatile given frequently as in snake poisoning are of the greatest benefit. When there is much pain morphine injections may be given, and these pains are amongst the most acute, so that quite a considerable amount of morphine will be required to alleviate these symptoms. Alcohol is valuable, as it also deadens the pains, and it may be given up to the semi-intoxication of the sufferer. The ammonia stimulates the heart against the effect of the poison. As soon as the acute pains are passed and the sufferer is more comfortable twenty grains of bromide of potassium with ten grains of bromide of ammonium may be given combined with the liquor ammoniæ acetatis. This will give the patient a calm night and sleep. The subsequent treatment depends on the individual case. The malaise which follows lasts for a considerable time and is often complicated by the slow-healing wound in the foot or hand. In every case absolute rest should be enjoined.

The nature of this poison approaches that of snakes. It is alkaloidal, very quickly decomposed, and intensely rapid in its action. It is secreted by the fishes in larger quantities at the spawning season and is most active in the male fish. It is a poison of which the smallest quantity introduced into the skin of an animal produces the greatest

¹ P. Savtschenko: Atlas des Poissons Vénéneux, St. Petersburg, 1886

² Ibid.
1 2

general effects, so much so that these vulnerant fish might well be called the snakes of the sea. The poison is clear, transparent, and very slightly acid, and not at all viscid. It is only forced into the canals of the spine at the moment of use; at other times it lies in the gland. In any case it is only secreted in the smallest quantity, but this secretion goes on more rapidly in the summer when the spawning season is on hand. This animal-chemical alkaloidal poison introduced locally produces within a few hours necrotic changes and a dead area follows. This is caused by its special action on the trophic nerves. Indeed, its special action seems to be on nerve tissue, as witness the general effects apart from local changes—pains, intense stabbing sensations, tremors, convulsions, delirium. Then the heart is much inhibited, and this gives rise to feelings of suffocation and impending death.

This alkaloid has not yet been isolated, and if it should be done will be found to be more or less of the same group as the snake alkaloids.

Galashiels, N.B.

CASE OF LOCALISED DYSTROPHIC (?) RHEUMATOID ARTHRITIS.

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A MAN aged thirty-five years was admitted into Queen's Hospital, Birmingham, on Jan. 1st, 1896. He was a worker in brass, and was in the habit of working with his arms on a shelf nearly as high as his shoulders—a forced position, which frequently caused cramp in his arms. Also for some reason in the course of his work he frequently put the metal into his mouth to moisten it, and in consequence had a constant metallic taste. His family history is good, with the exception that his mother (aged sixty-five years) is slightly rheumatic. He had always enjoyed good health until his present illness. Nine years ago he had severe rheumatic pains in his right elbow, the whole arm becoming weak and painful on movement. His right shoulder gradually became stiff until in the course of three or four years the limb could not be moved from his side. Meanwhile, the muscles about the right shoulder wasted. He had occasional pains in other joints, but only temporarily, without causing further trouble. He then went to a bone-setter, who forcibly wrenched the joint about and secured much more mobility. His after-treatment consisted of daily local massage and manipulation, under which he rapidly regained, not only more movement, but the muscles around the joint much increased in size. A month later an abscess formed under the joint and burst into the armpit. This continued to discharge for a year, healed for three months, then discharged for another nine months, when it finally healed. During the latter year the shoulder again became stiff, with renewed rapid wasting of the muscles, and the arm at this joint had been helpless ever since. On admission the right shoulder exhibited the appearance shown in the accompanying illustrations, taken from photographs. The deltoid, supra-, and infra-spinatus muscles were atrophied beyond recognition, and gave no response to electrical stimulation, whether constant or interrupted. The biceps and pectoral muscles were slightly atrophied (probably from disuse), but gave normal electrical reactions. The right shoulder-joint was ankylosed, but on firmly grasping the scapula very slight movement was obtainable, suggesting a fibrous union. No deformity or marked bony outgrowth could be detected. The nutrition of the right forearm was normal, and its circumference was half an inch greater than that of the left, while the movements and power of the right forearm and hand were perfect. Nothing abnormal about any other joint or muscle was observed. The right knee-jerk was obviously exaggerated. The teeth exhibited a greenish stain close to the edge of the gums, the tongue was broad and flabby, and indented by the teeth. The appetite was bad, flatulence occurred after meals, and the bowels were costive. The urine was normal.

Remarks.—I regard the above case as a typical instance of localised rheumatoid arthritis. Beyond a rather doubtful allusion to vague pains in some of the other joints for a short period during his illness there was no history of the systemic

and visceral disturbances which so commonly characterise chronic rheumatism and gout. The absence also of any symmetrical implication of the left shoulder strengthens the view that the arthritis is the result of local, rather than of general, disturbance. It is difficult to say whether the degenerative changes in the cartilages and bones (so characteristic of true rheumatoid arthritis) are present or not,

FIG. 1.

owing to the fact that the patient did not come under observation until ankylosis had been already established. Monarticular rheumatoid arthritis often dates, as is well known, from a local injury either to the joint itself or to the neighbouring structures. In the present instance no history could be obtained of any injury to account for the first onset of the joint trouble; but the very rapid

FIG. 2.

relapse of ankylosis and muscular atrophy which followed the bone-setter's violent manipulations leave little room for doubting the unfavourable influence of the local injuries then inflicted upon the joint structures. It is a noteworthy fact in this connexion that the supra-