A CASE OF BERI-BERI (?) POSSIBLY DUE TO ARSENIC POISONING.

BY

SURG.-MAJOR RONALD ROSS, and ERNEST S. REYNOLDS,
F.R.C.S., F.R.S., University College, M.D.Lond., F.R.C.P., Assistant
Liverpool. Physician to the Manchester
Royal Infirmary.

It may, perhaps, be remembered that one of us (E.S.R.) in the *BRITISH MEDICAL JOURNAL*, 1900, vol. ii, page 1770, referred to the similarity of beri-beri to alcoholic neuritis, and, as much of the so-called alcoholic neuritis was really due to arsenical poisoning, it seemed possible that some of the beri-beri cases might also be caused by arsenic. The cases of arsenical poisoning which occurred at Chester were seen by one of us (R.R.), who was so struck with the likeness of them to cases of beri-beri seen by him in the East, that in the *Lancet*, 1900, vol. ii, page 1677, he also suggested that some beri-beri cases might have an arsenical origin.

Since then we have been on the look-out for a case of beri-beri, and in August, 1901, at Sierra Leone a lady was put in charge of one of us (R.R.) to be taken to England. She was suffering from a peripheral neuritis so similar to beri-beri and to arsenical neuritis that the diagnosis was reserved. On arrival in England she was placed in the Royal Southern Hospital, Liverpool, under the care of Dr. Macalister, and was seen by him and by Dr. Hill Abram, both of whom considered the case to be probably beri-beri, but they could not from the symptoms positively exclude arsenical poisoning.

For permission to see the case and to publish it, and also specially for the following notes we are very greatly indebted to Dr. Macalister.

The patient is a lady, M. H., aged 27, the wife of a missionary. She was born in Scotland and is of light complexion. She went to the West Coast of Africa in November, 1900, and when taken ill was thirty miles north of Bonthe, near Sherboro; she lived largely on canned foods, and especially fruits of American (Californian) origin. She was a total abstainer from alcohol. She had a feverish attack in May, 1901, but this was not a classical malarial attack; it lasted only a short time and was described as "low fever." Shortly after this there was pricking at the ends of the fingers and the legs became so weak that she felt unsafe when walking, especially down steps. At this time the patient was pregnant, and the difficulty of walking was attributed to this at first; but almost at the same time the forearms and hands became weak and wasted. The only alteration of sensation the patient remembers at this time was a feeling of great tiredness, but no actual pain. Her memory is deficient as to details of subsequent events so far as loss of power in the limbs is concerned, except that gradually there was total loss of power in the legs (below the knees), and in the arms and hands. Within about a week of the loss of power being complete she had well-marked oedema of the feet and legs and the hands, but not the arms. On July 7th, 1901, the patient was delivered of a dead child at full term; the paralytic symptoms then became worse and were most marked three weeks later. All this time the patient was still taking canned fruits. About August 18th she was taken to Freetown, and three days later started for England and at once began to improve. Patient states that during her illness the skin became darker in colour (but the pregnancy must be borne in mind), and that afterwards the skin (especially on the abdomen) desquamated. During the voyage there developed a marked erythema on various parts of the body, especially on the arms; this somewhat resembled prickly heat, but if so it was of a very exaggerated form, as small vesicles formed, some of which afterwards became pustular.

On admission to the Royal Southern Hospital, Liverpool, the patient was exhausted and hardly able to sit up from weakness of the trunk muscles. There was great wasting, especially of the limbs; the legs were curled up in bed and she was unable to move them; there was marked dropping of the feet and toes, the ankles and dorsa of the feet were cedematous; anæsthesia over the whole inside of the foot, extending up the inside of the leg, was present, but on the outer side of the feet and legs sensation was only delayed. There was great pain on pressure of the affected muscles. The

knee-jerks were absent. The skin of the soles was red and profusely sweating, the nails were thickened with transverse striations on them and so tender that she could not bear to have them cut.

There was marked dropped wrist on both sides with oedema of the back of the hands and fingers; there was much loss of power of the upper arm muscles with wasting, and total loss of power with much atrophy (and pain on pressure) of all muscles below the elbow. There was persistent erythematous staining of the thenar and hypothenar eminences and of the pads of the fingers, but the centre of the hand was pale; sweating of the hands was present. There was slight pigmentation (especially round the hair follicles) on the abdomen with slight desquamation. The heart beats were of the foetal "tic-tac" character. The urine was normal. So far as could be ascertained there had not been any digestive or respiratory disturbances and no coryza.

Since admission to the Royal Southern Hospital the patient has been taking five minims of liquor strychninæ three times daily, and gradually improvement has set in, although most of the symptoms noted above were present when we saw her on September 12th, but the paralysis was somewhat less marked. She can now feed herself with the right hand with some difficulty, and can sit up; the sweating is less but still marked both in the hands and feet, and the oedema has almost disappeared.

We obtained a lock of her hair and gave it to Professor Dixon Mann who very kindly examined it for us, and he reports that in it he found

not a mere trace but a considerable quantity of arsenic. From 0.3 gram of the hair I got as much As_2O_3 as I did from the same weight in the general run of cases at the time of the outbreak [of epidemic arsenical poisoning]. You may accept it that the arsenic I found proved that a considerable quantity had been taken into the system of the patient, either by administration as medicine or in some other way.

Clinically the case exactly resembled the cases of arsenical neuritis in the recent epidemic, and was also similar to the paralytic form of beri-beri. Malarial neuritis, pure alcoholic neuritis, and the neuritis of pregnancy could be practically excluded; in fact, considering the large quantity of arsenic in the hair it seems unnecessary to suppose that it was anything but a case of arsenical neuritis. Possibly it had no connection with beri-beri, but it exactly resembled the cases thus named which arrive in this country supposed to be cases of beri-beri. The symptoms are not very uncommon amongst those who live on canned foods, but are not common among the natives of West Africa.

The patient herself says that so far as she knows no arsenic was administered to her as a medicine in West Africa, but she had quinine and strychnine. We would suggest that it is possible for the arsenic to be present in the canned foods either in glucose, in preservatives, or in the tin lining of the cans.

As bearing out the possibility of some cases of beri-beri being due to arsenical poisoning, it must be remembered that in the tropics, and especially in the East, very large quantities of tinned foods are consumed not only by Europeans, but also by natives. In some districts—as in Acheen—the Hon. W. C. Brown, M.D., has informed us that arsenic is spread on the rice fields to kill rats. One of us (R. R.) has heard that grain dealers in the East put arsenic into rice to preserve it from weevils. These instances would account for the theory that beri-beri is due to some form of food poisoning, as was supposed to be the case in the Japanese navy. In the *Indian Medical Gazette* for September, 1901, Major Anderson reports two outbreaks of beri-beri on board ship in which mouldy rice, heat, moisture, insanitary conditions, scurvy, and alcoholism could be excluded; but the epidemics were quite certainly traceable to supplies of food obtained from Bombay.

In tin mining districts, as was before pointed out by one of us (E. S. R.), there is more than a probability that arsenic is largely ingested by the beri-beri patients, and this is confirmed by the following statement by S. C. G. Fox, M.R.C.S., L.R.C.P., Acting State Surgeon, in his Perak Medical Report for 1900 (dated March 13th, 1901). He says:

"Attention is being paid to the fact that arsenic may be the cause of the neuritis in beri-beri. Dr. Conolly, District Surgeon, Batu Gajah, writes in his annual report: 'Up to the present, however, a chemical analysis of a not profound character it is true,' has failed to find arsenic in the urine of beri-beri patients.' In support of the arsenic theory I would point out that 95 per

cent. of beri-beri cases treated are Chinese, and quite 90 per cent. are miners by occupation. When we know that arsenic in combination with other metals is common in the soil where these Chinese have to stand for hours while searching for tin, we may regard the possibility of arsenic as a cause of beri-beri as being something more than problematic.

When we remember how in the early days of the recent arsenical epidemic the presence of the skin eruptions was not noticed by competent observers, it seems doubtful in our opinion whether eruptions are so uncommon in beri-beri patients (who are most usually of dark or yellow complexions) as has been supposed. The pigmentation would, of course, be very easily overlooked, and various erythematæ, vesicles, bullæ, and keratoses might easily be attributed to something else.

We are quite aware that a single case is not sufficient to establish a theory, but we have put it on record as it is so suggestive; it is a case from the tropics exactly resembling beri-beri, but in which almost certainly the cause of the neuritis was arsenic. It does not prove that beri-beri is really arsenical poisoning, but it emphasises what we have before stated, namely, that beri-beri cases should be more scrupulously investigated from the arsenical standpoint.

If hair from beri-beri patients is sent to either of us we can arrange for it to be carefully analysed.

NOTE.

¹ Italics not in original.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, ETC.

HOUSE FLIES AND DISEASE.

I HAVE asked Dr. Dawson Williams whether it is generally known that the common house fly—just now ubiquitous—"blows" the bodies of infants as bluebottles "blow" meat, and that the children may thus become infested with maggots?

He has replied, "I do not think that the fact you mention is generally known, in fact I find no distinct reference to it in any book which I can consult. I send you an extract from Cobbold's *Parasites*.¹ The first sentence is grammatically incomplete but it is correctly copied.

In like manner a legion of cases in which the maggots of various *Muscidae* have been noticed, either in, upon, or from the human body. At a meeting of the American Academy in April, 1880, Dr. Leidy showed some larvæ of the bluebottle fly vomited by a child; five larvæ of the flower-fly (*Anthomyia*) from a physician's own person (which had produced choleraic symptoms); and nine examples of *Cuterebra noxialis*. I have myself encountered numerous insect larvæ in medical practice. Amongst others I have obtained the larvæ of *Anthomyia canticularis* in six or eight separate instances. One set of specimens, identified by Wunderlich, was sent to me by Dr. Brandt, of Oporto. Drs. Duffin, W. Fox, and Leared have supplied me with others. The larvæ described in Farre's case, not being setose, must be referred to one or other of the *Muscidae* proper. Mr. Hope gave nearly forty cases of this kind, referable to eight different species of fly, and, as already implied, I have myself collected a great variety of the maggots of *Muscidae* passed by the bowel, besides others obtained either from beneath the skin or from open ulcerations.

The flies hitherto noticed as supplying parasitic maggots in man are *Musca domestica*, *M. carnaria*, *M. larvarum*, *M. nigra*, and, perhaps, *M. citaria*, *M. stabulans*, and *M. Cæsar*. This last, a handsome fly, is the species which proves so troublesome to sheep. The habit which flies have of depositing their eggs in open wounds when the victims are asleep is a fertile source of this kind of parasitism. Some of the instances recorded by Kirby and Spence are revolting in the extreme. They quote the cases which came under Mr. Sell's notice in Jamaica. In one instance the flies were hatched in a neglected blister on the chest; in another from the gums and inside of the cheek; and in a third, from the nostrils of a negro, from whom 235 larvæ were expelled. The case of the Lincolnshire pauper, Page, who was literally eaten up by maggots, is almost incredible. An equally horrible instance, however, is recorded by Cloquet. It is said that in Jamaica cases were all due to the larvæ of the bluebottle fly (*M. vomitoria*). An instance of the same kind has been recorded by Mr. Knox (A.M.D.). Sufficiently revolting as these cases are, the horrors attending them are eclipsed by the habits of the larvae of *Lucilia hominivora*. The best accounts of its habits are those by M. Coquerel, M. Saint-Pair, and M. Vercammer. The insects lay their eggs in the mouth and nostrils, and when the larvæ escape they devour the tissues surrounding the buccal cavity, the pharynx, glottis, frontal and nasal sinuses, even reaching the sockets of the eye. Several Cayenne convicts have perished from the maggots of this fly, which is also prevalent in Mexico. These are, however, the only instances of maggots gaining access to the nasal chambers.

¹ *Parasites: A Treatise on the Entozoa of Man and Animals, including Some Account of the Ectozoa*. By T. Spencer Cobbold, M.D., F.R.S., F.L.S., Honorary Vice-President of the Birmingham Natural History and Microscopical Society. London: 1879, pp. 271, 272.

It is therefore seasonable to record the following case:

On September 9th I was asked to see an infant who was "always crying"; its drum-like belly suggested improper feeding, but an altered diet failed to produce improvement. On my next visit the mother said she was sure there were "maggots coming out of the child;" and certainly there were maggots in superabundance! I found tiny creatures, about one-sixteenth of an inch long, singly and in masses all over its clothes, in the folds of the neck, about its mouth, nose, nates, etc., whilst the curd vomit seemed alive with them. They might easily have escaped observation, however, as it required close attention to see they were really moving. A lens revealed a horrible state of things; almost every crevice in the infant's body was infested with either eggs or larvæ. The mother was sure they were coming out of the infant's skin and with its urine, but this was easily disproved, whilst that the larvæ were those of the common house fly was as easily proved by placing some of the infested curd in a bottle and watching their development. The symptoms in the infant were the constant crying, vomiting, and diarrhœa. Although no larvæ are now vomited it appears to be dying.

I have long waged war against flies, believing that they play a far more important part in the spread of infectious diseases than is generally believed. We are constantly at fault in endeavouring to trace the cause of diphtheria. May not the household fly play a big part?

Saddleworth.

COLIN CAMPBELL.

CASE OF MEMBRANOUS DYSMENORRHOEA IN A MULTIPARA ASSOCIATED WITH MEMBRANOUS COLITIS.

MRS. H., aged 41, presented the following:

Previous History.—Menstruation appeared at 14, and reappeared every twenty-eight days. It was scanty, and only lasted twenty-four hours. Pain in the small of the back and both iliac regions was experienced for six days prior to each period. It ceased after the flow had been established about twelve hours. There was anæmia but no vomiting. She was married at 21. Her first child was born two and a-half years afterwards. Labour was normal but convalescence tedious. The dysmenorrhœa became aggravated from this time, and had always been worse for about a year after the birth of a child. It was following upon her first confinement that it was discovered she was suffering from membranous dysmenorrhœa. The condition had continued now for sixteen and a-half years, and a uterine cast more or less complete was shed at every period. It came away about twelve hours after the establishment of the menstruation, which was over, as stated, in about twenty-four hours.

The second child was born two and a-half years after the first, and the third eleven years after the second. The patient stated that some displacement was found after the birth of the first and second children, and she wore a pessary for a long period.

Present Condition.—The patient is a plump, healthy-looking woman, but has a dragged appearance and dark lines under the eyes, and a poor pulse when in her attacks of pain from whatever source. She is very introspective and neurotic, and leads the life of a semi-invalid. When I am summoned one of these uterine casts has been saved for my inspection. Floated upon water it does not present a perfect specimen such as I once saw, with a smooth interior, shaggy exterior, and the three openings, which I then mistook for evidence of abortion. It is incomplete, represents about half of the uterine surface, in the longitudinal axis, and is smooth, thin, and semitransparent. This casting off of the endometrium is a regular occurrence, but the portions so shed vary considerably in size. Sometimes there is a complete cast, at others large fragments, and, again, occasionally one could only describe the condition as "shreddy menstruation." Vaginal examination revealed only a copious cervical and vaginal leucorrhœa and cicatrices from the cauterisation of old adenoid proliferation around the os. The sound passed the normal distance and in the proper axis. There was tenderness and some displacement of the left ovary.

Remarks.—The case presents two unusual features: (1) The patient is not sterile. The writer in the gynecological volume of Allbutt's *System* says, "The patients are sterile,