potassium chloride, which soon strengthened the contraction; these changes are all well seen at *a*.

At the point indicated by the arrow *a*, I added the sodium bicarbonate to the saline solution containing calcium chloride; but, some seconds elapsing before the bicarbonate could reach the ventricle, the trace at first grew smaller and smaller; but when the sodium bicarbonate reached the ventricle, a temporary strengthening of the contraction ensued, but it soon grew weak again. At the point indicated by the arrow *b*, I added to the circulating solution the potassium chloride solution, with the effect of speedily and considerably increasing the strength of the beat. The ventricle continued beating spontaneously; and, at the end of rather more than three hours, when I was obliged to discontinue the experiment, the heart gave the following trace.

The contractions after this long interval were as good as at the beginning of the experiment.

In this experiment, on the addition of potassium chloride, the strength of the contractions rapidly improved; but, in other cases, the recovery is much slower, and twelve to twenty minutes may elapse before the complete restoration of the ventricular contractions. I introduce this chart because it shows summarily the same changes which occur much more slowly in cold weather. This chart likewise shows that, although without lime no contraction of the muscular tissue is possible, yet, even with lime and sodium bicarbonate, in proper proportions, added to saline solution, the contractions ultimately grow weak, soon in hot weather, far more slowly in cold. But on the addition of potassium chloride (although the addition of this salt merely to the saline solution, or to saline solutions containing sodium bicarbonate, is quite unable to sustain contractility), the contractions at once grow stronger, and soon become normal, and the ventricle continues to beat naturally for hours.

Potassium chloride, or some potash salt, is essential, therefore, to the prolonged continuance of contractility. It would appear that, unless the dilatation of the ventricle be speedily and effectively performed, "exhaustion" sets in, and the ventricle contracts feebly, but, on facilitating the dilatation, the ventricle quite recovers.

The normal contraction of the ventricle, then, is the result of a mutual antagonism between calcium and sodium bicarbonate salts on the one hand, and potassium chloride on the other. We can modify, in various ways, the character of the contraction, indicated in the form of the trace, by altering the normal relative quantities of these salts. If we increase the quantity of lime chloride, or of sodium bicarbonate, we broaden the trace of each contraction round its top, and produce some degree of fusion; but we can obviate these effects by increasing the quantity of potassium chloride. If, on the other hand, we increase the quantity of potassium chloride, the trace of a contraction at first becomes sharper at its summit, and then it does not mount so high, indicating that the ventricle contracts only imperfectly; and these effects of potassium we can entirely remove by increasing the quantity of calcium chloride. There is, indeed, as I have maintained, a physiological antagonism between these salts, and on this physiological antagonism the proper contraction of the heart depends.

Season, or rather temperature, and the condition of the frog, so affect the muscular tissue of the heart, that at certain months, and with weak exhausted frogs, a circulating fluid is required of somewhat different composition.

Cold favours the effects of lime, whilst heat favours those of potassium. Cold, like lime chloride, makes the contraction slower, and the summit of the trace broader. Heat, like potassium chloride, shortens the duration of each beat, and makes the summit of the trace sharper. To obtain a complete and normal contraction in cold weather, more potash must be used; and, instead of 0.75 cubic centimetre of 1 per cent. solution to 100 cubic centimetres of circulating fluid, 1 cubic centimetre should be added. In summer, the potash solution may be reduced below 0.75 cubic centimetre per 100 cubic centimetres; but it is better to increase the lime chloride solution to 1.5 or 2 cubic centimetres of 1 per cent. solution to 100 cubic centimetres of circu-

lating fluid. There is no need to increase or diminish the amount of solution of sodium bicarbonate. With weak frogs, or those kept in confinement for some time, the solution must be modified. Exhaustion assists the effects of potash, for both lessen the amount of contraction, so that, in the case of exhausted frogs, the quantity of lime solution must be somewhat increased, in order to form, under these conditions, a fitting circulating fluid.

In conclusion, let me urge a practical suggestion, which seems to spring naturally from these experiments. In cases of profuse hæmorrhage, as in flooding, or in the excessive alvine discharges of cholera, it is of cogent importance that we should employ a fluid suitable to the life-or-death case. I think the foregoing inquiry points out that an effective injection should contain not only sodium bicarbonate, but likewise physiological quantities of salts of calcium and potassium.

DOMESTIC REMEDIES OF THE ARABIAN DESERT: WITH ETHNOLOGICAL NOTES, ETC.

By E. GORDON HULL, M.D., B.A., Dublin.

DURING the autumn and winter of 1883-4, while acting as honorary medical officer and assistant-geologist to an expedition sent out by the Palestine Exploration Fund, to Arabia Petrea and the Arabah Valley, I had an opportunity of making some notes on the common ailments and remedies of the Bedawin, and also some observations on their physical condition, which I will state as shortly as possible.

Physically, they are a small race, but their limbs and bodies are well formed and proportioned, and they are capable of enduring great fatigue on a diet consisting principally of boiled rice and butter, with unleavened bread, coffee, dates, and water. We came across two principal tribes, those of the Sinaitic Peninsular, and those who live east of the Arabah valley. The Towara, who live between the gulfs of Suez and Arabah, are more civilised than their eastern brethren, and indulge in a little agriculture, but they live chiefly by tending sheep and goats.

I measured twenty-six adult males, picked men of the tribe; taking three measurements, that is, height, chest round nipple, and length of right arm from acromion to top of middle finger. The average height was 5 feet 4½ inches; average chest-measurement, 31 inches; average length of right arm, 27.6 inches. The maximum chest-measurement in a man of 5 feet 11 inches was only 34½ inches, and the minimum in one of 5 feet was 30 inches. Yet, with such insignificant chests, they were splendid pedestrians and mountaineers, and did their day's march without a murmur. Certainly, they were all in very good condition, for I do not suppose there was an ounce of fat among the whole tribe. The next tribe with whom we came into contact were even of smaller make, averaging only 5 feet 2 inches in height. Their muscles, especially of the upper extremities, were very poorly developed, while they nearly all, except the sheik, exhibited marks of inferior intelligence; about five or six out of our twenty men were decidedly half-witted, and all of them had the habit, common among such people, of repeating over and over again everything that is said to them, or that they say to one another. They appeared half-starved, and used to chew continuously the dried beans provided for the camels. Like most wild animals, they have splendid teeth, very firmly fixed in the jaw, and their sight is remarkably keen. They nearly all turn in their toes when walking.

Owing, no doubt, to their habits, the Arabs seem to be most subject to the diseases due to exposure; but, as far as I could judge, these diseases have a tendency to the chronic or subacute form, rather than the acute. Two I particularly noticed as almost universal, that is, chronic bronchitis, of a dry kind, and without emphysema; and chronic articular rheumatism.

The first cannot fail to force itself on every traveller's attention, as it gives rise to a peculiarly irritating paroxysmal cough, rather canine in character, which, as the Arabs sat round our tents at night, often disturbed our slumbers. The second, that is, rheumatism, I noticed when taking the measurements of a series of the men; nearly all their shoulder-joints creaked and groaned as they raised them; and this will account for the curious inability of the Arabs to move about or do any work in the morning before they are "thawed," and rendered supple either by fire or by sun. It seems, at such a time, as if all their joints were temporarily ankylosed, so stiff and unpliant are they. Ophthalmia is common; it appears to begin usually as a purulent conjunctivitis, but is very liable to attack the cornea; and, in a great many cases, it proved to be really associated with granular lids. A great number of the Bedawin of the Peninsula had corneal opacities, but, amongst the wilder tribes of the east of the Arabah, I noticed

little or none, neither did any that I came across suffer from conjunctivitis or ophthalmia of any kind; and, partly on this account, and partly from the well known contagious nature of the granular lid, and the habits of the Arabs of wiping anything and everything, their own eyes and their children's, etc., on their never washed calico-shirts, I am rather disposed to look upon their ophthalmia as a contagious disease, acquired from contact with the fellahs of the cities of Egypt and Palestine, among whom it is almost universal. And in this opinion I am strengthened by the observations of Mr. Merrill, the American Consul at Jerusalem, who told me that there was no ophthalmia among the great tribes east of Jordan. Another argument against the opinion that their ophthalmia is due to the heat and sand of the desert, is that, while ophthalmia is prevalent among the Arabs inhabiting the comparatively elevated plateau and stony valleys of the Sinaitic Peninsula, those who live in the great deserts of Arabia Magna do not seem to suffer from it at all; and, at Akabah again, where a number of low class Arabs are crowded together in huts, ophthalmia was very prevalent. I believe that in this, as in most other cases, it is originally due to dirt and overcrowding, and is then spread by contagion.

Constipation is universal, and sometimes appears to simulate a false dysentery, with great pain in the bowels, which is relieved at once by a purge. They call a pain in the abdomen, or a colic, a "heart-ache," and I have removed many a "heartache" with a gamboge pill. Their habit of over-eating when they get the chance, alternating with more or less prolonged periods of semi-starvation, will account for the prevalence of this complaint.

Skin-disease is not so frequent as one would expect from their uncleanly habits, if we except phtheiriass; however, I saw two cases of impetigo, and I was given an account of a kind of moist purulent eruption, which, in the spring-time of the year, is apt to attack both men and camels, especially the latter. The hair falls off the places attacked, and the seat of the disease becomes covered with scabs; it also has a very unpleasant smell. They call it "jarrub," and believe it to be catching. Sulphur, externally and internally, made into a paste with butter, are the native remedies for this disease.

In certain districts, notably Akabah, they suffer from ague, but this disease is not common among the Arabs proper. The late Professor Palmer states that "they are sometimes visited by an epidemic, not cholera, probably the plague, which they call 'the yellow pest.' It comes with the hot winds, and strikes them down suddenly in the midst of their occupation, but it is said never to attack the country of our Lord Moses, where grow the shiah and the myrrh, that is, the elevated granite-region about Mount Sinai."

It will be seen from the above that the diseases to which the Arabs are subject are few; and if we except those infectious diseases which come to them from without, such as cholera and small-pox, they appear to be a very healthy people.

The remedies they are in the habit of using are not many in number, and are usually derived from those plants which are most widely distributed. As a diuretic, that is, for pains in the back, and gravel, they use the retem, or broom (*Spartium monospermum*) making a decoction of the top shoots in hot water, and drinking it; they say it is also purgative. This shrub, which provides them with fuel and their camels with a scanty nourishment, is almost universal; we saw it in flower on the way to Petra, and the inflorescence, which is purple and white, gives out an exceedingly sweet perfume. It has a very bitter taste.

Several species of wild melon, of the family *Bryonia*, allied to the elaterium (which also grows in these parts), are in common use as purgatives; the native method of using them is ingenious. A fruit is split into halves, the seeds scooped out, and the two cavities filled with milk; after allowing it to stand for some time, the liquid, which has absorbed some of the active principle of the plant, is drunk off. A milder remedy is camel's milk, which appears, under some circumstances, to be purgative to the Arabs.

The order *Compositae* furnishes several medicinal herbs of which the Arabs make use. The *Santolina fragrantissima*, a graceful plant of a sage-green colour, bitter taste, and strong fragrant smell, furnishes them, in the form of an infusion, with a carminative, good for colic and all painful affections of the abdomen. In the bazaars of Cairo, the fragrant dried heads are sold for the same purposes as camomile. I was told that there are no snakes in the districts where the plant grows; and the natives believe that the smell of the plant is sufficient to drive reptiles from a house, and it is used for this purpose in Cairo and other towns.

Another plant of the same order is an artemisia, or wormwood, with a very strong aromatic odour and bitter taste. The fellahs use it to put in their bedding to drive away vermin. This use of the plant

appears to be very universally known, witness the old English rhyme—

"When wormwood hath seed, get a handful or twain,
To save against March, to make flea to refrain:
Where chamber is swept, and wormwood is strewn,
No flea, for his life, dare bide, or be known!"

From the seed of some of the kinds of artemisia, which grow in these parts, santonine appears to be obtained. In the wilderness of Judaea, near to Beersheba, we found a pretty little calendula, or marigold, very common. It became extremely abundant along the Mediterranean sea-board, and is used by the natives as a sort of tea for flatulence and pain in the abdomen. Knowing how largely a liniment derived from this plant was advertised by homœopaths, I tried to find out if they used it as an external application, but they did not know of its virtues as such. One of the commonest desert-plants is the zygophyllum, so called from the leaves being composed of short succulent jointed segments; these, bruised in water, form a mucilaginous liquid, of which the Arabs are very fond as an application for sore eyes. It has an exceedingly nauseous taste, but this fact only appears to commend it to the notice of the camel, who devours it greedily. A curious tropical plant, which we found in the Ghor, at the south end of the Dead Sea, is the osher (*Callotropis gigantea*), a large tree-like asclepiad, containing simply enormous quantities of milky acid juice. Its properties are stated by Endlicher to be powerfully purgative and emetic; but the natives use it to give to women whose milk is scanty, probably in accordance with the doctrine of signatories. Here, also, grows the castor-oil plant, but its virtues are unknown to the natives. A very striking plant, which, perhaps, I should have mentioned before, and which often hangs in graceful dark green festoons from the granite walls of the gorges of Arabia Petrea, is the caper plant (*Capparis spinosa*). The natives are very fond of the fruit, which has a warm aromatic taste, and they stroke the region of the epigastrium appreciatively after eating one or two. The cortex of the root is said to be aperient and diuretic. Another fairly common plant is a hyoscyamus, called by the natives sekharan, with fleshy leaves and purple flowers. The dried leaves are used by the natives to smoke, and produce a kind of intoxication or delirium; and an infusion of the fresh leaves possesses strong narcotic properties. It is nearly allied to the mandragora, which becomes common on the limestone downs in the south of Judaea. The Arabs are extraordinarily susceptible to narcotics. Our tobacco they could not smoke at all; a few whiffs make them giddy, and give them a headache; even a "Richmond Gem" cigarette is too much for them. Only two mineral substances appear to be regarded by the Bedawin as medicinal. One of them, sulphur, I have already mentioned; the other is a kind of common red coral, found on the shores of the Red Sea and Mediterranean, and sold in the bazaar at Gaza. As far as I could gather, they only use this as a charm.

In conclusion, I may mention that the few drugs which are really useful on an expedition of this sort, can be carried in a small tin box a few inches square. And a little doctoring is greatly appreciated by the natives. Purgative pills, quinine, some preparation of opium, a bottle of nitrate of silver and atropine drops for sore eyes, and some strong ammonia and powdered ipecacuanha for bites and stings, will go a long way. I took a good deal more than this, as I had a large party to "keep in repair," but the above list contains the drugs most generally useful.

A NEW SPLINT FOR THE TREATMENT OF TALIPES.

By F. T. PAUL, F.R.C.S.,

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It has always appeared to me, as a general surgeon, that, in our ordinary hospital-practice, cases of confirmed talipes frequently do not obtain the full amount of benefit that is possible; more frequently, I mean, than other varieties of remediable defect. I suppose that this would be explained, if it be really a fact, in different ways by different surgeons. The explanation that has occurred to me is simply that the mechanical treatment following any operative procedure needs to be so prolonged and so assiduous during the whole time, that the careful patience of either the surgeon or the patient often breaks down before the cure has been effectually and permanently established. I have been in the habit of using sheet-iron side-splints, with a foot-piece, fixed on by first firmly strapping the foot to the foot-piece while the foot is in its deformed position, and then forcing the side-splint to the leg, and so reducing the deformity. The plan answers well enough if the splint be refixed every few days for six or twelve