Locomotion of Medusidæ

I DO not think that the following remarkable observation has hitherto been made—or at least recorded—by anyone ; but as I am at present deprived of access to books, it is possible that I may be mistaken upon this point. It will be observed that it tends experimentally to confirm the opinion of Agassiz, M'Crady, and Fritz Müller, as to the presence of ganglionic centres in the situations they describe.

Slabberia conica is, as its specific name implies, a medusid of a conical form, and its size is about that of a fully-developed acorn. Its polypite, which is of unusual proportional length, is highly contractile ; and its swimming-bell (*nectocalyx*) supports four short slender tentacles, which are likewise highly contractile. These tentacles take their respective origins from four minute vesicular-like bodies (*marginal vesicles*), which are so situated in the margin of the nectocalyx as to mark off this circular margin into four exact quadrants. If any one of these vesicular-like bodies be excised, immediate and total paralysis ensues in the segment of the cone in which it is situated ; *i.e.*, a fourth part of the entire animal ceases to contract. If two adjacent vesicles are excised, one half of the entire animal becomes paralysed, the loss of motion being quite as decided, and the area of its occurrence quite as well defined, as in the case of hemi-section of the spinal cord. If two opposite vesicles are removed, cross paralysis results ; if three of these bodies are cut out, only one quarter of the cone continues to contract ; and lastly, if they are all taken away, every vestige of contractility immediately disappears, not only in the nectocalyx, but also in the polypite. Now, as the bodies in question are not so large as are the dots over the letter "i" in this printed description, the extreme localisation of stimulating influence thus shown to exist cannot but be deemed a highly remarkable fact, more especially as no amount of mechanical or chemical irritation will cause the slightest contraction in any part of the animal subsequent to the removal of these four almost microscopical points ; while, contrariwise, so long as any portion of tissue (no matter how small) is left united to one of these points, it will continue its rhythmical movements for an indefinite period of time. Thus, for example, when a section is made through the equator of the animal, while the upper half at once ceases to move, the lower half—now converted into an open ring—continues its contractile motions for days with unimpaired energy, notwithstanding the thus mutilated organism is, of course, unable to progress.

It is well known that when the entire margin of the nectocalyx of a medusid is removed, the contractility of the remaining portion is destroyed. This fact is usually explained by supposing that the severance of all the contractile fibres produces what may be called mechanical paralysis, just as a man could not move his arm if all its muscles were divided. Experiments I have made on other species of *Medusidæ* have led me to doubt the truth of this explanation—at all events as the whole explanation ; but it is unnecessary to detail these at present. The instance above given is enough to show that in the case of this species, at any rate, such an explanation is clearly insufficient, and my object in now writing is to request that if any of your readers are acquainted with observations (whether published or not) similar to those described, they should kindly let me know, either through your columns, or by writing to Gonville and Caius College, Cambridge. GEORGE J. ROMANES

Dunskaith, Ross-shire

Suicide of a Scorpion

I SHALL feel obliged if you will record in NATURE a fact with reference to the common Black Scorpion of Southern India, which was observed by me some years ago in Madras.

One morning a servant brought to me a very large specimen of this scorpion, which, having stayed out too long in its nocturnal rambles, had apparently got bewildered at daybreak, and been unable to find its way home. To keep it safe, the creature was at once put into a glazed entomological case. Having a few leisure minutes in the course of the forenoon, I thought I would see how my prisoner was getting on, and to have a better view of it the case was placed in a window, in the rays of a hot sun. The light and heat seemed to irritate it very much, and this recalled to my mind a story which I had read somewhere, that a scorpion, on being surrounded with fire, had committed suicide. I hesitated about subjecting my *pet* to such a terrible ordeal, but taking a common botanical lens, I focused the rays of the sun on its back. The moment this was done it began to run hurriedly about the case, hissing and *spitting* in a very fierce way. This experiment was repeated some four or five times with like results, but on trying it once again, the scorpion turned up its tail and plunged the sting, quick as lightning, into its own back. The infliction of the wound was followed by a sudden escape of fluid, and a friend standing by me called out, "See, it has stung itself; it is dead ;" and sure enough in less than half a minute life was quite extinct. I have written this brief notice to show (1) That animals may commit suicide ; (2) That the poison of certain animals may be destructive to themselves.

Bridge of Allan, N.B., Oct. 23 G. BIDIE

THE AMÚ EXPEDITION

WE give some extracts from a letter relating to the hydraulics of the Amú, sent us by an English engineer who was with the expedition ; the letter is dated "Nukus, at the head of Amú delta, Sept. 10, 1874 :"—

The expedition only arrived in the delta at the end of June ; it is impossible, therefore, to say at what date the first spring flood of the river takes place, but probably between the 1st and 15th of May. The level of the river on June 23 was what may be called a low-level full river : it fell about twelve centimetres till June 29, and then rose rapidly till July 11, when it was 145 centimetres above the level of June 23. It then fell fifty centimetres up to July 17, and rose again to nearly the previous height on Aug. 4. Since that date the river has fallen steadily, and is to-day some fifty centimetres below the level of June 23. I judge the heights of July 11 and Aug. 4 to be the extreme flood level of the Amú. At that flood level, the discharge at Toyu-boyin, "The Camel's Neck," 160 miles above the head of the delta, cannot be far short of 140,000 cubic feet per second. It is difficult to say what the low-water discharge is, but I should think it is at least 70,000 cubic feet per second.* On Aug. 25, by a rough observation, it was 110,000 cubic feet a second, the river then being 25 centimetres above the level of June 23. At Toyu-boyin the river has cut its way through a bed of shelly limestone of the age of the chalk. The limestone is very compact and hard, full of small shells, turritella and bivalves. Here the river is 1,000 ft. broad. The height to which the limestone bed has been tilted is about 25 ft. The river expands in breath immediately afterwards to 2,000 ft. or more, for about five miles ; it then begins to contract again, having on its left a high bank of hard clay passing almost into an argillaceous schist. This high bank extends for above five miles, and ends in an eminence of 50 or 60 ft. in height, crowned with sand. From Toyu-boyin downwards on the right bank, are ridges (of clay, I imagine) crowned with sand : no cultivation on that bank, but opposite and downwards from Toyu-boyin irrigation canals are taken off, excepting where the high clay bank occurs. At the eminence spoken of the river immediately widens to 5,000 ft. or so ; this is caused by the first *large* irrigation canal Polwán. As these canals have a great effect on the river all the way down to the delta, I will here try and explain my theory on the subject. As the Amú runs in a soft soil from the south to north nearly in the direction of the meridian, I imagine what the Russians call the law of Bär (from his observations on the Volga) comes into action. The stream has therefore the tendency to run along the right bank, and, as a matter of fact, the deep-water channel is there found. If, then, an irrigation canal be opened on the left bank, the stream is disturbed and a subsidiary deep channel is formed towards the head of the canal (Fig. 1.) The head of the canal is only open during flood, say half the year. When it is shut, the river will run as in Fig. 2 : silt will be found at the shaded parts. The river by Bär's law will edge away to the right and become broader, and if this process is continued

* Perhaps this is too high—I cannot make out from Wood's "Oxus" more than 45,000 cubic feet or so per second for winter discharge.

year after year, the river bed is filled with islands. The deep-water channel is generally found on the right bank, but of course circumstances occasionally cause it to pass between two islands. Figs. 3 and 4 are two rough cross sections of the river.

In the latter case the river has a breadth between its banks, sometimes from 5,000 ft. to 8,000 ft., especially opposite New Urgens and Shah Abbas Wali. The state of matters described has the effect of turning the river into a series of large pools, connected by short portions of stream; and this again probably has the effect of causing irregular floods in the river; for as the quantity of water decreases and the velocity also decreases, silt is deposited and a *quasi* natural dam (Fig. 5) is formed, until

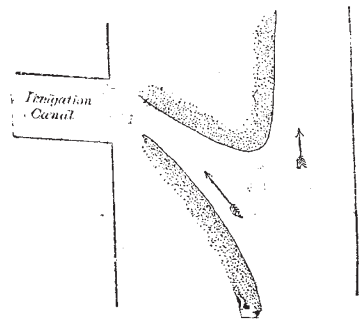

FIG. 1.

such time as sufficient water has been dammed up to burst through and sweep away this silt dam. Of the 140,000 cubic feet of flood-discharge, it is probable that the irrigation canals take, at most, 30,000 cubic feet per second; so that at Khodjeili, the head of the delta, say of a high flood, 110,000 cubic feet arrive. Of this quantity, 30,000 cubic feet flow by Kuwar Jerma, 30,000 by Chertambye, 20,000 by the next two branches, and the balance by Taldik. But of the whole quantity not more probably than 60,000 cubic feet at the most reaches Aral. The remainder floods the delta and Abougir.* Of the winter discharge, I should suppose not more than 40,000 cubic feet passes Khodjeili. I cannot account for the difference, unless it is ponded up in the upper reaches of the river. The irrigation canals are closed in winter. About 12,000 pass along Kuwar Jerma, and the same quantity along Chertambye. The rest passes mostly along Taldik; not more than 1,000 cubic feet a second passes along Ulkun Darya from Kungrat. In winter there is ice to a thickness of 15″ on the

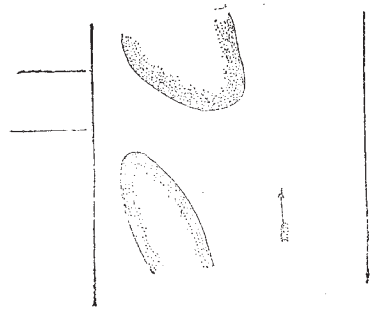

FIG. 2.

river, but certainly not everywhere; there is a thaw generally about the end of January, then a second severe winter in February. In the sketch (Fig. 6), 1, 2, 3, 4 are old branches of the river which flowed into the Caspian* at different times; 5 is an old bed which met a branch from Syr, on the east of Aral. These combined waters probably formed the delta Herodotus speaks of; but I am going to take a look at this during my ride across the steppe to Fort Peroffsky. The river, I believe,

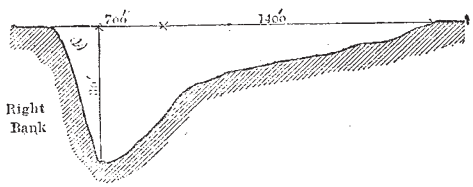

FIG. 3.—Ordinary Section—no irrigation canals.

will naturally flow to the Caspian if it is allowed to do so; but the questions concerned are too large to be more than alluded to here. The Russian idea, following Humboldt, is that the whole country east of the Caspian has been upheaved, and that this has

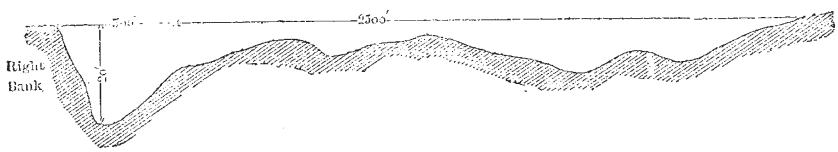

FIG. 4.—Ordinary Section, with irrigation canals.

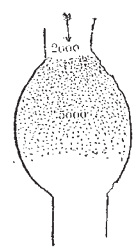

FIG. 5.

changed the course of the river. M. Barbot de Morny has recently examined the Usturt plateau, and, as far as I can gather, confidently asserts that Usturt has never been upheaved at all, but that it formerly formed an island in the united Caspian and Aral. As regards the eminences in the delta, and the ridge of Bish'yabye, which is a continuation of Shaikjaili to the north, along the right bank of the river, he also says that there is not the least trace of any geological action having taken place in recent or historic times, so that it seems probable that here is an additional laurel for Lyell, plucked from the brow of Humboldt. If, therefore, the river will flow naturally to the Caspian, what Russia must do is to take, say, two-thirds of the Amú water for a canal to the Caspian, running west from Toyu-boyin, for irrigating the country as well as for forming a line of water communication. The remaining third she must project along the old bed No. 5, or somewhere in that direction, to meet a branch from Peroffsky on the Syr. The water for this branch from Peroffsky must be obtained by reclaiming the swampy district of Karaouzak. This swamp was formed by the river breaking into an irrigation canal taken from the right bank. The water feeding the swamp is that which formerly fed the Djani Darya flowing south-west from Peroffsky towards the point where I suppose the old delta mentioned by Herodotus to have been.

I can tell you nothing about Shaikjaili, as I could

* And is used in irrigation near Kungrat. In my opinion the level of the Aral is rising, but others say not.

* There is an old bed running due west to the Caspian from a point a little north of Tchardjui. A Russian officer, who spent many years between the Caspian and that place, is my informant. The river must have flowed in it before Arrian's day.

not find an opportunity of going there. However, M. Barbot de Morny is at the present moment on a visit to those hills. They are supposed to be of the same formation as the country adjacent to a place called, I think, Beresoff, in Siberia, where gold is found; perhaps this is the key to the problem of the Russian annexation of the Amú Darya district, which does not cost them less than 100,000*l.* per annum.

In Khiva, all along the left bank, and between Petro Alexandroskiya and Shah Abbas Wali on the right bank (Russian), there is a good deal of cultivation. Trees are cultivated all along the irrigation canals: willows, aspens, mulberries, planes, black poplars, apple-trees, peaches, &c., fruit of all kinds in great variety, and very good. Crops are maize, wheat, barley, cotton, madder, tobacco, poppy, lucerne, sesamum, &c. Everything is irri-

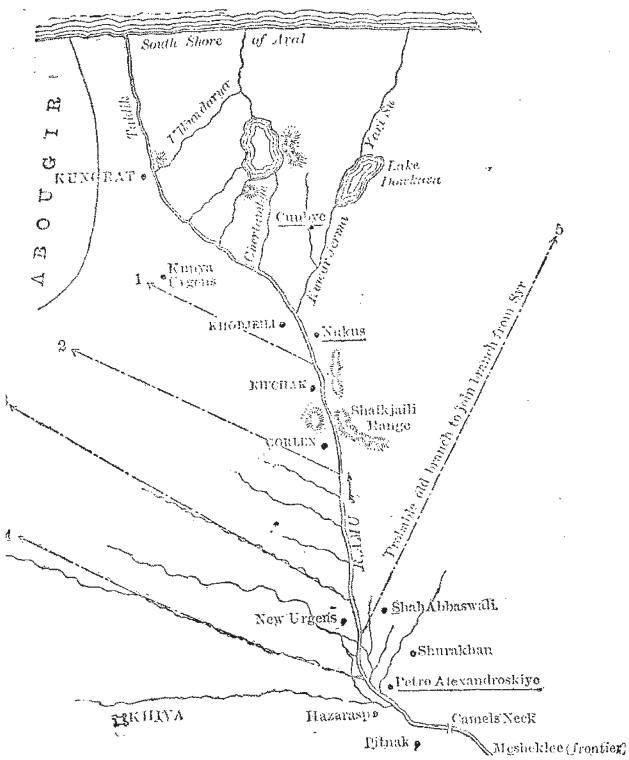

FIG. 6.

gated and raised with great labour. The islands in the river are grazed, the banks and islands are covered with the tall reedy grass (*Lasiagrostis splendens*), tamarisk, dwarf willow (*Elæagnus* * *hortensis*), an acacia, called, I think, *Halimodendron*, and a creeper. The sandy tracts on the right bank have a sparse vegetation of *Lycium*, *Halostachys*, and *Aristida pennata*. I do not think much of any consequence has been done in the botanical way. I found on an island in the central delta a fern which must have had its origin in some distant glen of the north slope of the Hindoo Koosh. M. Smyrnoff, the botanist of Kazan University, found a specimen of Sak Saul further to the south than it was supposed to grow. The flooded parts of the delta and the islands have a dense growth of *Arundo phragmitis* and *Typha;* the Arundo grows to a height of 20 ft. or so, in places.

By the way, I forgot to mention that in the high ground of the delta I found beds of conglomerate, formed of bivalve shells chiefly with sharks' teeth, cemented together in the vein. Thin beds of sandstone also occur in the masses of sedimentary clay of which these hills and the Bish'yabye ridges are formed. At Bish'yabye I found very large ammonites (18″ diam.) and similar univalves, as well as large bivalves. The crests of these hills and ridges are generally crowned with a shallow bed of ferruginous sandstones, the fragments of which strew the flanks and feet of the elevations. Selenite occurs in great quantity and in large pieces, in the clay.

I think I have sent you pretty nearly all of any interest. I have written this letter in a great hurry, as I am just about starting for my trip across the steppe to Peroffsky, along the old course of the Djani Darya.

I look upon the canalisation of the Amú (somewhat in the way before suggested) as capital for the canalisation of Central Asia. It is a scheme which will certainly cost money, but the beneficial results will be so enormous to Russia herself, that I think it is all but certain to be entered on sooner or later. The climate is superb.

* *Elæagnus* is cultivated, and the fruit is probably the *Pontícum* of Herodotus. Yule says Baker mentions incidentally the palm as growing on the banks of the Oxus. I have not Baker to refer to, but it would be interesting to know what word he uses; it is probable that he uses some word equivalent to *date*, and I cannot help thinking he means *Elæagnus*, the fruit of which is like a date. I have some fruit preserved in spirit—for Sir H. Rawlinson if he would like it. Curiously enough, the Russians call *Elæagnus*, *pheneke*, i.e. date, instead of its proper name, *Jidda*.

As to the name of the river Oxus, is it settled what was the meaning of this word? The legend on the map attached to the Grand Charter, compiled 1584–1598 A.D., translated by the Russian historian Karemzin, says: "And 170 versts (old versts of 700 sag.) from Bokhara, from Lake Oguz (which is *ox* in our language), flows a river towards Khoralim (Caspian)." Here Lake Victoria is Lake Oguz—*Lake of the Ox*. Yule, in his Oxus Essay, has a note, p. lxxxvi.: "It is worthy of notice that what has been regarded as a Yak, figured on the obelisk" (I suppose the one in the British Museum—the black obelisk) "of Nimroud is described in the accompanying inscription as Alap-Nahr-Sakiya, the ox of the river Sakiya, a title which may probably characterise the Upper Oxus, rising among the hills of the *Sakiya* or *Sacæ*." Did the name of the river come, then, from the Yak, which may have existed in Pamir, and is a sufficiently interesting animal to give its name to a stream it frequented? *Vide* note on p. lxiv. of Yule's Oxus Essay.

Cimbye, Mikus, and Petro Alexandroskiya are the three Russian posts or camps in the Amú Darya district.

MEMORIAL TO JEREMIAH HORROCKS

IN reply to the petition recently published in NATURE, the Dean and Chapter of Westminster have signified their willingness to permit the erection of a tablet within the Abbey, and in consideration of the very exceptional circumstances of the case, have reduced the fee ordinarily payable to the Chapter to the sum of 25*l.*

A subscription, which it has been thought well to restrict to the sum of one guinea for each subscriber, has been set on foot to defray the expenses incidental to the erection of the tablet and the fee of the Chapter.

Should there be any surplus, it is proposed to invest it in the names of trustees, and to devote the interest to the purchase of books to be deposited in the library of the Royal Astronomical Society, the fund to be called "The Horrocks Library Fund."

Subscriptions have already been received from—

	£	s.	d.
J. Couch Adams, Esq., M.A., F.R.S., Lowndean Prof. of Astronomy in the University of Cambridge, President of the Royal Astronomical Society	1	1	0
Sir George Biddell Airy, K.C.B., V.P.R.S., &c., Astronomer Royal	1	1	0
The Hon. Mrs. Henry Arundell	1	1	0
J. B.	1	1	0
The Rev. A. Brickel, B.A., Rector of Hoole	1	1	0
W. H. M. Christie, Esq., M.A., &c., First Assistant at the Royal Observatory, Greenwich	1	1	0
The Baroness Burdett Coutts	1	1	0
Warren De la Rue, Esq., D.C.L., F.R.S., &c.	1	1	0
The Duke of Devonshire, Chancellor of the University of Cambridge, F.R.S., &c. &c.	1	1	0
Edwin Dunkin, Esq, Secretary of the Royal Astronomical Society	1	1	0
Kenedy Esdaile, Esq., J.P., M.A., F.R.A.S.	1	1	0
Prof. Gladstone, Ph.D., F.R.S., &c.	1	1	0
Robert Grant, Esq., LL.D., F.R.S., Regius Professor of Astronomy in the University of Glasgow, &c.	1	1	0