

Reports from Bokhara

by
William Moorcroft

Transcriber's Notes: William Moorcroft and his party arrived at the gates of Bokhara Feb. 25, 1825 and remained there and in the surrounding area until July 22 of the same year. While in Bokhara Moorcroft wrote a series of reports describing the people and various aspects of life in that city. These manuscript reports form part of the Moorcroft archive in the British Library where they are listed under the heading MSS.Eur.D. 254 -- Bukhara and Return from Bukhara.

Janet Rizvi and Dan Jantzen have transcribed these handwritten manuscripts from digitized microfilm images, and arranged them in the approximate order in which they were written. The transcripts of the entire Bokhara journal are being broken into three sections for ease of reading, namely:

1. Reports from Bokhara. These contain descriptions of agricultural and other practices which Moorcroft thinks might with advantage be introduced, or at least tried out, in Europe.
2. Journey to Meeankal.
3. Return to Afghanistan.

of which this is the first section. The remaining two sections will be published as they are completed.

These are clearly uncorrected drafts, which Moorcroft never intended to be placed before the public without extensive editing and polishing. The material they contain, however, was entirely omitted from H.H. Wilson's published edition of Moorcroft's *Travels*. The social and political circumstances in which a coherent revised version would have been relevant no longer exist; the transcribers therefore have felt it appropriate to present it more or less as the manuscript indicates, with only minimal editing. Moorcroft covers a wide range of topics, and often has not finished one when he runs on to a second, with two or more essays continuing in parallel on a single page. The transcripts have been lightly edited to place each topic in sequence and to correct obvious writing mistakes. Individual essays are presented in as near their original order as possible. In his haste to note ideas and observations on paper Moorcroft's handwriting sometimes deteriorates to an imperfect scrawl, and some words and phrases have had to be marked illegible.

On page 13 of the manuscript, Moorcroft begins what appears to be a draft letter to the Secretary of Agriculture in London. Following this heading he reports under multiple headings on a variety of practical agricultural observations and makes suggestions seemingly intended for the Secretary. It is unclear which of the subsequent topics were to be included in the letter, and where the letter ended and ordinary journal entries begin. The transcribers have simply included all the topics with their headings, without concern for which were to be included in the letter to the Secretary.

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Moorcroft manuscripts

MSS.Eur.D. 254

BUKHARA and RETURN FROM BUKHARA

ERGINS

Microfilmed

September 1954

(439)

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Contents 20/1

Interalia a letter to Messrs Palmer advising of a Draught for Rs. 15000 and a copy of the letter.

X Meer Kasim KaRee
Lubbs Horze Leouk Kasche Khaja
ZaheerDeen

[This inscription, in Moorcroft's hand, is badly photographed, and practically illegible]

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(6)

NB The private marks ([illeg.]) of our friend at Bokhara consists of the following --
[mark]

Bokhara June first
Return July 1825
Augt.

[Blank page]

(1)

Bokhara
Raisins

There are three varieties without stones or seeds called Kishmish or Bidana viz Syagee, Aftabee and Shibberganee. The two former are the produce of the same vine differing only in the method employed in drying them which gives a difference in color and also in flavor.

Syagee signifies dried in the shade and these raisins are of a greenish or yellowish color. The bunches are hung in windows that are shaded from the sun and that allow at the same time of a free current of air. The ruined buildings of Balkh offered great facilities for this mode of preparation and this raisin cured there is said to be superior to that dried elsewhere, however a stranger will probably not discover any difference between this and that purchased at Bokhara. The Aftabee or Raisin of the Sun acquires a reddish brown color somewhat like that of Chestnut and in fact little differing from that of the sundried Raisin of the Levant and not much in flavor but the Syagee is more delicate than the former or than the Sooltana Raisin and perhaps exceeded not by any in the world. It sells for above [blank]

[2]

The Shibberganee is a black Raisin dried in the Sun of a rich full and sweet flavor which is considered by many as superior even to the Kishmish commonly so called. It takes its name from Shibbergan where it is cultivated largely.

Its price is [blank]

There is another Raisin called Shibberganee larger than the former but which contains seeds and sells [blank]

I have heard that if a vine cutting be deprived of its pith before it is planted the fruit produced by it will be a Kishmish or Grape without seeds. The following is stated to be the process employed for depriving the cutting of its pith. It is slit down the middle from end so as to lay bare the pith tube in two portions from both of which the pith is picked out. When the pith is completely removed the slit pieces are laid together so as to join as accurately as possible and secured by being bound by a string wound spirally from end to end after which the cutting is planted in moist ground and shaded by a mat from the sun for about a week. The ground is kept moist even wet till the cutting has taken root.

Whether this process be really that or not which causes the Grape to be without seed I have no experience and it is not

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easy to ascertain the fact otherwise through experiment by Europeans as no trials of this nature are now made by Gardeners in this country they remaining satisfied with taken cutting from the two varieties mentioned without attempting to produce others.

Yogor Zakarich an Armenian of Georgia known by the name of Georgeen at Bokhara follows the practice of making wine and of distilling Brandy in Bokhara. The Moosulmans although prohibited from the use of wine and Spirits repair to this man's house and drink there in defiance to the precepts of their religion and the apparent severity of the Ulama. But they reject wine and only take Spirits. Georgeen in the course of his experiments upon different kinds of Grapes found the Shebberganee that remains till the weather becomes somewhat cool preferable to any others for wine for his own use and that of his family. But as this Grape yields its principal produce in Summer he found it difficult at this [illeg.] to prevent the Must from running into vinegar in seven or eight days as he had no cellar or other cool place and the crop of Grapes of this kind was nearly over when the weather set in so cool as to admit of the juice lasting in the vinous fermentation and not going further. The wine he sent to me and for which I must observe he would receive no money was as near Port as possible but somewhat

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more rich in flavor whilst its strength induced a suspicion that Brandy had been added which however he assured me was not the case. This Wine appears to me most valuable for the Hills of Garwhal and I shall endeavor to procure it as there exists not the smallest doubt in my mind of it furnishing a Wine resembling and under proper management to the full as good as if not superior to the best Port.

Vines producing Grapes of different size, color and flavor in the same bunch.

This appears to me so very extraordinary that notwithstanding my belief in the veracity of the relater I feel difficulty in committing the process employed for giving this property of the Vine to paper.

When the Sap rises say at the end of March in Toorkistan branches of white of red and of black Grapes of round and of oval and of different forms of large and of small size are cut off and their cut extremities so bent that each bleeds into a suitable vessel placed so as to receive the water as it drops. When a sufficient quantity is obtained the different juices are mixed together and a portion of the mixture is poured into a cuplike cavity made on the top of the recently cut end of the trunk of a thick Vine standing perpendicularly & sawed off horizontally at about 3 feet from the ground.

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ground. The cavity is supposed to have been made sufficiently capacious to hold from half a pint to a pint and when filled a cake of wax is so laid over the whole so that its edges are bent down as to embrace fully the circumference of the stock. A piece of waxcloth still longer is placed over the wax and tied very tight with silk thread or whipcord. Shoots will be thrown out but few will bear the first year but on the second and especially on the third the crop will be considerable and each bunch in different proportions will carry grapes resembling those belonging to the vines from which the juice was respectively taken. This quality is continued from year to year and as far as my informant has had experience does not wear out.

This process is constructed on the principle of inoculation in transfusion and if the result be as stated promises to introduce practices into gardening not only novel but extraordinary and valuable. This is stated to be frequently done at Tiflis the capital of Georgia and always with success.

[6]

Of the saddle of Bokhara principally in regard to the glue employed in its construction.

In another part of my Journal or Memorandums I have given an account of the Lokhaee Saddle made of four pieces of wood. This material forms the basis also of the Saddle of Bokhara but the construction is wholly different. The latter consists of many pieces connected by a particularly strong Glue made with a kind of wool formed of Tendons beaten into an imitation of this substance covered with the bark of the Birch subsequently painted and varnished. Not a single particle of air enters into the construction of this Saddle which with care is said to last for ten to twelve years. The month of April and the first half of May were rainy and Saddles exposed to the weather whilst Horses stand at the Gates of the Fort waiting for their masters in attendance on the King. As far as my experience went they led to a conclusion that though those like all other wooden saddles were liable to be broken they were little subject to be injured by rain unless their surface had been so torn up as to give free access to a large quantity of water. Willow is found to be the best wood for the Saddle through its lightness

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and softness. The saddle is made with celerity with no other tools than an adze of a particular form a saw and a knife. As soon as the Saddler has hewn out two or three pieces of wood he joins them together with glue which soon hardens and he then shapes and saws and cuts them into the shape of parts to which he adjusts other members with much address and within even two to three hours he will have made a saddle tree of which however the different parts are held together merely by glue. The whole of the surface is next covered with a plate of glue on which whilst wet is laid a thin layer of wool or thread fibres extracted by beating with wooden mallets [illeg.] the back tendons of the hind legs of Sheep. This substance is pressed into the glue and when the latter is set another coat is given both of the glue and of the tendon wool. Sometimes even a third coating of these matters is added and the whole substance is called Pae. The object of this addition is to strengthen the joints and the wood generally which it certainly effects in no inconsiderable degree. When the covering is completely dry the edge of the saddle is bound together by slips of the Horns of large deer [illeg.] softened by means of being steeped in hot water and bound by means of brass pins driven through them into the wood. This edging is ordinarily decorated by line work of flowers and other forms of ornament. This general surface with the compaction of the edge

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is coated by means of glue with the inner bark of the Birch brought from Russia[?] and selected for being free from cracks or from holes. This is next painted ordinarily red which is the favorite color of the country on which borders and creative ornaments of flowers are also worked but with a taste very inferior both in design and execution to that of Kashmeer. The surface is then varnished twice and the saddle [is] ready with the exception of holes for the stirrup leathers and crupper. This saddle differs from the Lokhaee Saddle in being hollowed more in the seat and in having a shorter and more perpendicular pommel.

Of the Glue

The material for this is the flexor or back tendons of the hind leg of the Sheep stripped off from above the Hock down to the heel. The tendon when cut off is slit down its middle and hung up to dry. It is sold to Saddlemakers at the rate of thirty for sixpence. About a hundred of the tendons washed clean are put into a pot with a considerable quantity of clean water set on a fire. When the water boils the froth and whatever impurity may rise to the surface are carefully skimmed off and this process is continued until the liquor be wholly freed from

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scum. After having boiled for some time the fire is put out and the liquor suffered to cool in some cases but in others the boiling is continued without intermission till the fluid has acquired a thickish consistence. Where the fire has been checked the boiling is repeated should the cooled fluid be not thick enough to judge of which requires a certain degree of practice. On the fluid being found to have acquired the thickness necessary it is poured by means of a metallic ladle through the interstices of a Spoon of wicker work into a large dish to a depth of about three inches. The fluid is set by for the night and on the following morning is found in the state of a thick jelly which is cut into squares of about 3 inches on a side and a knife being run through each with a sideling motion splits it into cakes or layers about a third of an inch thick which are exposed to the Sun until they become dry. This is used for all the purposes of common glue and has now superseded the strongest Isingglass which formerly was brought in large quantity from Astrakhan. The Pae or compound coating of Glue and of Tendon Thread when dry is about an 8th of an inch in thickness and gives a firmness to the saddle which could scarcely have been anticipated. It is stated that if broken China be cemented by means of this Glue which is called Yelim and exposed for about twenty days to the rays of the Sun

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the joint becomes so strong as to bear the contact of boiling water for a considerable time without being loosened or injured by it. This however is not so extraordinary as that the fillies² of Carts consisting of several pieces jointed by sloping surfaces and not abutted by shoulders are actually joined by this alone without nail or Pin of any kind. I have seen carts thus constructed driven frequently through puddles, muddy roads and streams without being injured by the moisture in which they were

immersed or which necessarily cling to them for some time afterwards. Does the strength of Glue bear a proportion to the density or compactness of the substance from which it is extracted? Or in other words does the compacted tendon owe its solidity of structure to the large quantity of Gluten it contains? It remains only to be stated that the Tendons from which the Glue had been extracted retained their forms and fulness either from the process not being carried far enough or from this substance consisting of fibres. Altogether this Yelim or black glue promises to be a most valuable acquisition to all those arts in which strong glue is required and large quantities of it may be extracted in Europe from the tendons of Horses Cows & Sheep which are now appropriated with less

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advantage to other uses.

If the tendons when dried and subsequently freed from every kind of substance by water be again dried and powdered under a heavy wooden mallet till reduced to a substance like tow or wool and subsequently be reduced by the process just related into Glue this if care be taken not to burn the liquor will form a glue not only perfectly transparent but almost wholly free from color. This is selected for the nicest works of which the joints require great strength with the intervention of little medium. The price of the Tendons slit down the middle but not separated into two distinct portions is thirty for sixpence.

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[The Care and Maintenance of Horses]

If in regard to the treatment of Horses there be much worthy of notice in this country the most prominent feature as valuably available to Britain is the almost complete exclusion of the Poa, Festuca and other natural and soft grasses as articles of cultivation and the substitution of bruised Straw and of Lucerne the latter either in its fresh or dried State, separately or mixed as food for all kinds of Horses. Barley is employed instead of the Oat which I have not yet met with otherwise than as the accidental and spontaneous produce of certain soils and out of India nowhere cultivated.

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In climate not having seen so material a difference as in any considerable degree to account for the much smaller number of constitutional diseases in the Horse in Toorkistan than in Europe. I am inclined to refer the greater exemption to treatment rather than to constitution of Atmosphere. In the hot season the Horses of Oozbukistan kept much in the open air generally near to the house of the owners and well clothed are ordinarily tied to a large wooden pin driven into the ground around which they take a certain degree of exercise. In the winter they are for the

most part placed in stables which relatively to the number of animals are more spacious better aired and sweeter. As in Afghanistan Horses are much more warmly clothed than in Britain and Straw is in the country first mentioned. Straw is never employed as litter. When mentioned as customary in the treatment of Europe it is condemned as wasteful and as militating against the general notions received by Asiatics of the superiority of Europeans in arrangements of every description. In the City of Bokhara a practice is pursued which principally connected with the condition of the Air in Stables, with frugal expenditure as far as that of Straw is concerned, with the health of the horse generally and especially

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in maintaining the feet free from Thrushes and Canker may be worthy of mention. As bearing upon the importance of manure to the lands of Bokhara and of obtaining as large a quantity as possible at as low a rate as may be practicable it is in point to observe that as far as I can judge from various circumstances the site of Bokhara was originally in general little more than a Desert of Sand which through the industry of Man in giving to its surface frequently a dressing of manure that more than compensates for the annual exhaustion of heart from the crop of vegetables raised upon and in lending to it the waters of the River of Sumerkund for the purpose of irrigation has been converted into a greatly extensive tract of somewhat more than moderate productiveness in regard to Bread Corn and of great fecundity in Orchard fruits and especially in Melons. The peculiar management of the Stable largely and as has already been observed frugally contributes to the procurement of the Manure. Sand is brought every day in sacks on the backs of Asses and is laid in heaps between every two horses whether in the yard or in the Stable in the centre of which though there

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there are high Mangers there are no Stalls or partitions. A quantity of this Sand is thrown under the belly of every horse and when this has been wetted with urine it is covered with a layer of fresh sand and so on till night. The Dung is swept away immediately after it has fallen and the stain in the ground concealed by Sand. Every evening the whole of the Sand impregnated with the urine is mixed with the Dung stuffed into Sacks and carried off by asses which leave loads of Sand for the night and the following day one load being appropriated for each Horse during this period. The manure is carried out of the city and deposited in heaps but there is no Dung hill or Dung pit in the City itself and the Streets are diligently in dry weather swept by Scavengers with long brushes made of Sheepskin with the wool and loaded by Slaves on the backs of Asses. The management of the Stable indicates the necessity of constant attendance in the part of the Stable Servants but is probably repaid by the more pure condition

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of the Air of the Stables than if the matters spoken of were removed only three or four times a day. Cows are also in the country constantly kept in yards or under sheds and contribute likewise to the production of their fertilizing means so

essential to a soil naturally sterile and which through the continual loading with animal manure would become an absolute Nitri bed were it not frequently drenched with water which dissolves and carries off much of the Salt. There is another feature of management which is not without its merit. In the middle of every Stable and directly fronting the door is a low room in which are stowed Horse furniture and grain and of which the top reaches not the roof but is shaped into a platform accessible by Steps and covered with thick Felts on which the Stable Servants sleep at night. Through this arrangement notwithstanding the Horses with the exception of Kuzak and Kirghiz Pairs are all kept entire accidents seldom happen. In the country I have not met with a single case of that violent inflammation of the membranes within the globe of the eye which in England especially is so common and so difficult to carry off so completely as not to leave the organ in a state that disposes it

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to relapses of which the frequent recurrence too often terminates in blindness. What share the use of Straw alone or mixed with Lucerne in contributing to the general healthy condition of the Horses in Oozbukistan I shall not venture to pronounce nor in what degree this substance may differ in quality from that produced in Britain although I think myself warranted in observing that the Straw of countries moderately warm and dry is somewhat more nutritious than that of countries under opposite circumstances. But if Lucerne were only equal to the best Modern Hay it possesses the advantage over the latter in being of the same quality throughout the whole crop, under the usual culture, any admixture of herbage of doubtful or deleterious property which although through being in small quantity or from being diffused in a large quantity of innocent plants may fail of

+ The common Yew (*Taxus baccata*) may be given in considerable quantity with impunity to a Horse which has his Stomach newly filled with other food that is innocent whilst an equal quantity administered at another period to the same Horse when his Stomach is empty will almost certainly prove suddenly fatal within from two to four hours without producing any obvious symptom of derangement until a few seconds before the Animal dies.

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of proving poisonous yet at all events may be somewhat more than useless. If the weight of the yield of an acre of Lucerne be only one half as much in Britain as it is in this country its superiority in this respect alone would invite the English Farmer to substitute this plant for the spontaneous produce of the best upland or on water meadow and to prefer it even to the crop of the best artificial selection of the thinner Grasses. But there seems no reason to doubt of the yield of Lucerne being equal to that of this country provided the mode of culture intimated in my letter from Kabool be strictly pursued. In fact the soil of Bokhara is not as well suited to Lucerne as is that of Britain in general. Were it asserted that mixture of bruised Straw and of Lucerne Hay would be found in Britain more healthy and more heartening than Meadow Hay alone it would answer merely to a conjectural speculation the

experiment so far as I know not having been tried. But I may without hazard of being mistaken take upon myself to pronounce that the exertions of our Hunters or of our Post Horses (except at the time of a general election in respect to the latter) are greatly inferior

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inferior to those of the Horses of the Toorkmens and of the Oozbuds when employed in a distant Foraye. The preparation of the Man and of the Horse during the preceding six weeks is suited to the arduous task in which they are about to be engaged. The Rider lightens himself not by sweating under a great weight of clothing but by the most ingenious exercise of his muscular powers under a diet the most spare and coarse that can well be imagined. At a certain distance from the spot at which a number of Horsemen preparing for the Foraye are assembled for the purpose of playing at the game of Booz Kush a Goat alive or dead as may have been previously determined by the party but most frequently a living animal is placed and at a signal the Horsemen gallop forwards to seize it. The Man who first reaches the Goat, stoops lays hold of and having thrown it across his saddle goes at full speed towards a distant goal which having attained he returns at the same rate of exertion to the point from which he started

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and the goat remains as the price of his labors. But the transaction is seldom thus confined to a mere exertion of speed. It more frequently happens that several horsemen seize the animal at the same time and each endeavors to carry it off on his saddle bow. The struggle is maintained with the greatest earnestness and pertinacity it often occurring that many minutes elapse before one man more skilful or more strong than the rest or possessing a more active or a stronger Horse can extricate his prize from the crowd who pursue him at full speed and endeavor to wrest the goat from his gripe. It frequently happens that the animal passes into the hands of ten or twelve different persons before the fortunate victor can reach the Goal with his prize. This Game is pursued not merely with enthusiasm but with a passion that rising into fury and not only is the Goat sometimes killed by the violent pulling but the candidates [appar. sic, sc. contestants?] receive serious injury of which the effects remain for life as the loss of an eye which I have seen.

In the crowd of entire Horses clubbed into the closest contact and pressing upon each other during the struggles of their masters it is most extraordinary that

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there is not any fighting amongst them. Each stands nearly as unmovable and almost as inanimate until his rider urges him on by a kick with his heel when with a few bounds he enters into a full gallop. The sport sometimes continues for two hours although the distance to be run is only a few hundred yards. It is I am told a tolerably correct representation of what actually takes place

+ I have seen this Game practised only amongst the Khuttaghun Oozbuds who are now with the exception of the Orgunjee Toorkmuns the most active in

Forayes. The latter however surpass them in cruelty as when they over power a village or camp if they cannot carry off all their captives they select the women and girls as Slaves, put all the men to death and throwing the infants at the breast into a heap gallop over them till the whole are bruised to death. Or if they have not time for this horrible massacre they stuff the children into a Khugah or lattice tent covered with Felts and setting fire to the wood work the helpless innocents are quickly stifled.

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place amongst the individuals of a foraging party in attempting to carry off children when they attack a village or camp in an enemy country. The method of preparing the Horse has a title which literally signifies "Making cold". The process is begun when the Horse is very fat and through a course of exercise gradually increased he is brought into wind whilst by the abstraction of bulky food, the almost exclusive use of a small quantity of barley and of water only once a day his belly becomes so completely tucked up as scarcely to project below the line of the ribs. When the flesh has become very hard, the animal is found to blow little and not to sweat at all after a smart and hard gallop and that his excrement seldom voided reduced altogether to a very small bulk its distinct particles individually little larger than a Damascene Plum and so hard as not to be broken without much pressure and if when put into a clean dry white cloth and squeezed strongly not to give out so much moisture as to produce a stain upon it the Horse is pronounced fit for a Foraye. In the performance of this work the furthest possible development of the capability of the Horse is acquired for if the Master should be overtaken by the enemy in [illeg.] with his [illeg.]

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either his life is the forfeit of his failure or he himself is carried into slavery. It is not my object to compare the exertions of the English ?Run Horse or Hunter for that of the best Roadster as usually employed is left out of all calculation but generally to shew that Training is pursued systematically and judiciously and that Straw and Lucerne and Barley are preferred for inducing that state of fatness which is considered under the title of "new flesh" indispensable to a preparation for a Foraye to any other kind of food by people who stake their own lives and liberty on the issue of their enterprise[.] Not having time to work out any subject completely I must content myself with presenting leading features of practice possessing somewhat of novelty.

[Cultivation of grain]

In the Oasis of Kinohee [?Kinshee] a district situated between the River Oxus, or Ammoo or Jehoon and Bokhara the soil is light and rich and the Seed is sown broadcast in the ground before it is ploughed. Here ploughing is performed by ?Mares but one man drives a pair whilst another holds the plough

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plough. In the environs of Bokhara the seed is not sown till after the land has been well ploughed and harrowed. The land of Kinohee is light but remarkably rich naturally the quality of that of Bokhara though light is naturally poor as has been already noticed. The only part of the Plough that deserves notice is the share which made of cast Iron weighs about six pounds, costs about a shilling when new and when broken or worn out fetches about half its original value for the purpose of being recast. The form of the Share resembles that of an arrowhead which has a conical hollow in its middle part to receive a wooden shaft of the same shape and which merely slips in without pin wedge or other fastening. There is a fin at each side the whole in one piece the fins working horizontally. After the land has been cross ploughed with this instrument it is traversed by a kind of harrow which consists of two lines of concave short coulter or rather hooks inserted into a broad strong thick and heavy plank their concave edges looking forwards towards the cattle which draw it. This apparatus is yoked by two ropes to a pair of Oxen driven by a man who stands upon the plank keeps himself steady by holding a rope tied to the beam of the yoke and manages the cattle with great address by means of a long willow wand. I have seen him force the animals

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into a brisk trot and the work seemed to proceed with nearly as much regularity as when the cattle work at a slower pace. The coulters or hooks tear up the weeds of which the Quick Grass is the most common and being thrown into lines which after being a little dried by the sun are collected and laid on the headlands till wholly dry when the roots of the Quick grass are beaten to force them from earth, tied in large bundles carried to the city and sold readily as food for asses. The surface of the field is nearly as bare as the turf of a bowling green without any trenches. Wheat and Barley are sown in the Autumn and eaten close in the Spring by sheep or cut and the grass used as [illeg.]. The grain is sown very thick as in Afghanistan but the Straw from the land being less good is shorter however the ear is good and under heavy rain and strong winds in consequence of the shortness and stiffness of the straw and the greater spread of the roots consequent in the check produced by eating or cutting off the first blade little of the ripe corn is laid. The crop is fit for the sickle at the end of June and the grain is of good quality. Water mills of nearly the same simple construction as in the hilly countries of the Punjab

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are employed upon the artificial water courses, but as the River of Sumerkund does not furnish water enough to fill all the Mains constantly these Mills are not continually at work and as the demand for flour is immense in Bokhara Horse Mills of a mechanism somewhat less simple yet less complicated than those of Europe are found in almost every Street as an appendage to a Baker's Shop. The Bran is so completely freed from flour that it will scarcely communicate a white tinge to water but the Millers and Bakers give little other food to their Horses and maintain [them] thereby in good condition a fact which determines the dispute considerably agitated by Economists on the continent as to whether Bran did or did not owe its nutritious quality to the Farina left in it or to the Arilla. It also justifies in a degree some of the

speculations of the Revd. ?Funganau with regard to this substance. Bread is baked in cakes thrown upon the inner face of the sides of upright conical ovens but never on the floor. Salted Tea and bread is the general breakfast of all the inhabitants of Bokhara from the mightiest to the lowest and baking gives occupation to many hundred persons. The regulations in respect to this article are so perfect that hard bread seems scarcely to be known. I have not yet visited any country in which bread is so generally good

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and the saving in time labor and fuel is so great whilst the convenience to the community is so considerable that the plan would be well worth adopting in all the large towns in India for the use of the Moosulman population. Indeed the quality of the bread is so good that I am tempted to seduce a Bokharan to accompany me to Hindoostan for the purpose of setting him up in trade. And I am led to think that in Great Britain this kind of bread would find a great number of admirers not merely from its quality being good but from it being uniformly good and not varying from light to heavy or the contrary as is continually occurring in Europe.

Of the culture of the Vine at Bokhara

When a piece of land is intended for a Vineyard it is merely well tilled and laid perfectly flat. After the fallow the leaf cuttings of the Vine about a yard in length are planted with both ends in the ground so as to form a bow of which three eyes or buds of the middle or highest portion of the curve are left on the surface of the soil but the wood in contact with it. The cuttings are dispersed in straight lines parallel to each other those in one line being

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being about seven yards apart and the space between two lines being about five yards, the plants exactly opposite to each other. The fields being completely planted which is soon done as the burying of the two ends of each cutting is an easy and expeditious operation all the cuttings are immediately covered with a ridge of earth about a foot in thickness to defend them from the frost. In this condition they remain till the beginning of April or more accurately speaking until in the Spring the buds of fruit bearing trees are observed to have swollen and to be nearly ready to burst into leaf when the earth is carefully taken off the pits so far as to bring into view the three eyes or joints before mentioned of which the central one is sometimes rubbed off especially when it is observed that the side buds are both large. The shoots from the side buds are suffered to run to their full length in a direction exactly opposite to each other in the length of their respective lines and before the winter shall have set in the ends of the new branches are cut off the whole of the upward growth is laid flat on the ground and covered with earth as before mentioned. In the Spring following the plants are disinterred and yield

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a small crop of grapes. In the autumn of the first year they are again pruned as to their ends and covered in the manner before described. The crop of the third year is a good one and the vines under judicious management will have now nearly met but it seems that the pruning is so conducted as to leave generally about a yard clear between the extremities of every two trees. During the second and every succeeding year it is the object of the Gardener to bend the shoots protruding from each side of the aisle or center of the plant into as many lines diverging gently from each other as may be practicable along the face of the land and in contact or nearly in general contact with it. Two human hands of which the wrists are placed in contact with and one above the other, the fingers bending along the forearm extended and widely separate supposing the wrists to be upon the same plane would convey an idea of this method of training or perhaps it may be done less imperfectly by two fans laid in the ground with their handles or joints touching each other and the sticks half expanded still suppressing the wetted ends

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ends to be joined and continued. The following rough sketch may perhaps illustrate the meaning intended to be conveyed a bit better than any description.

[blank area without any sketch]

Care is taken that neither leaders nor spur branches cross each other and every autumn the vines are pruned quite flat horizontally, are buried for five months and expand during the period of seven months in the space of every year. The crop of grapes is generally heavy but if there be much wet weather when the fruit is ripe many of the lower bunches which chance to lie on the ground are spoiled. But if the whole fan of each end be raised by a low Tressel or the main branches be supported by forked branches this inconvenience might be prevented but this practice could not be adopted on a large scale of Bokhara on account of the high cost and scarcity of wood

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wood. The produce of the vine thus trained is said to be considerable but whether more or less than the yield of that raised on Trellis in Espalier or in simple standard as in Kabool I have not sufficient data to determine from my own observation although from a cursory examination of the number of bunches in reference to surface the advantage seems to be with that trained on the ground.

The simplicity of this method of managing a Vine yard is obvious and the expense and trouble attending it are most trifling in comparison with the value of the yield of fruit while the sale of the Cop wood in a large city is by no means an inconsiderable object at the setting in of winter. Much of the ill effects of high winds is diminished by the fruit lying thus low and the heat absorbed by the soil from the rays of the Sun is given out again during the night so that the temperature of the Atmosphere in which the tree is enveloped is likely to be somewhat higher and more steady than when the branches are trained upon Trellis, in Espalier or in

Standard or bush and thus in hot and dry seasons the fruit may ripen sooner than in the usual modes of training †. Perhaps in cold

+ Mons^r Rast of Lyons shewed me Peaches thoroughly ripe on the face of Pisé or earth walls before those on Brick Walls had begun to soften and he stated the difference to be usually about a fortnight a matter of some importance to the Market Gardener.

But the experiments on Pisé walling in England have not been conducted with that considered regard to soil season and expence which might have been expected and the merit of simplicity has been injured if not wholly lost sight of through the adoption of presumed improvements. This mode of building mentioned by Pliny and by other writers de re rustica³ is probably more universal than any other kind of construction but is met with in greatest perfection in the marshes of the Saone between Macon and Lyons where it is conducted on principles as simple as they are ingenious and philosophical. See Cours complet d'Agriculture par M. l'Abbe' Rozier. Ecole niale [techncale?] d'Architecture par M Cointeraun. Mr. ?Gilland

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cold and wet seasons the ripening of the fruit may be retarded under this culture.

The surface of ground generally appropriated for each Tree has been already stated and upon this the produce differs under the influence of difference in the original constitution of the Soil, in the treatment, in the kind of Grape its age and the season. But it may be observed that if the Vine be not judiciously pruned every year and timely buried and disinterred the yield of fruit will in general prove small. At four years old the Taefee or common sweet white Grape which has a skin somewhat thick sometimes gives an immense load of fruit however its averaged produce is in common about two Maunds Kaboole or a hundred and sixty pounds. The Hoosenee yields about one fourth less. The black Shibberganee with seed is on a par with the former but the Vine of this variety called Kishmishee or without a seed produces

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produces only one Maund. Of the Taefee one Maund or eighty pounds sells for a Tunga or sixpence. Shibberganee with seeds for two Tunga. The Hoosenee and Shibberganee Kishmish are three Tunga or eighteen pence.

Horses are said to be sometimes fed upon Grapes in cheap seasons and a material for Wine Brandy and Vinegar could be raised in almost indefinite quantity did not the Laws of Mahomet interdict the use of the fermented liquors prepared from the juice of the Grape to the followers of his precepts. But notwithstanding this prohibition the Jews and Armenians find encouragement for a manufacture both of Wines and of Brandies. The former have made a Wine little inferior to Burgundy but they do not know how to keep it whilst one individual amongst the latter with a more skillful process has produced a Wine which may rate between the best varieties of Port and red Hermitage and if properly kept would probably prove superior to either. But the Grapes in general are rather more fitted to produce

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produce Dessert than Table Wines and Tokay Malaga, Alicant Luebeyana and Pascarete would be more readily made than the drier wines for the preparation of which the rich and sweet quality of the Must would require dilution and probably admixture.

If the low state of Science in Oozbukistan were known to Europeans they would not be led by it to suspect that the Gardeners of this country had invented a process to facilitate the conversion of the Grape into a Raisin on principles truly philosophical and which suddenly destroying the vitality of the fruit tends to hasten the evaporation of its moisture, to prevent its juice running through the usual stages of spontaneous fermentation and to store it with certainty in that of Sugar.

This consists in dipping the fully ripe grapes, bunch by bunch, in a boiling caustic Ley⁴ of saturated brine water and Potash. This partly dissolves the Cuticle causes it to crack increases the consistency of the outer part of the fruit after which the Grapes are freed from the constriction adhered to their surface by immediately immersed in running water in baskets of wicker. They are then hung up to dry and become good Sun Raisins.

Ancient Histories of Britain report that England formerly produced Grapes of good quality and in great abundance in the open air. Whether the constitution of the kind of Grapes then existing

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existing became gradually wore out, whether the plantations were destroyed, whether the climate became less favorable or whether that mode of culture suited to produce fruit of good quality and of due maturity has been lost are questions in which it is not my province to engage. But I have been tempted to submit to you the preceding notice under the hope that in some favorable locality as for instance in the Isle of Wight or in parts of Surrey or Kent or Hants this mode of training may be attempted. It will occur that in a climate so moist generally as that of Britain slopes should be preferred to flat surfaces for this experiment. Should it succeed this agreeable and wholesome fruit may perhaps come within the reach of the middle and lower orders of Society and if the whole crop should not ripen fully in cold and wet Summers it will at least furnish a good and presumably cheap material for a better Vinegar than England possesses at present. An attempt to make wine appears not likely to be steadily successful in England but it seems by no means improbable where the Vines of Kashmeer, of Kabool and of Toorkistan shall have been introduced into and acclimated to the

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the newly acquired Hill territories of British India beyond the range of the violent periodical Rivers if practicable there may be Wines produced in those Districts which in quality and cheapness may compete in the market of England if not loaded with injudicious Duties with the best of Southern Europe. And I hazard this conjecture not merely from analogical reasoning but from experiments ?coarsely made on the produce of an indigenous Grape by the Natives of Buschur.

Of processes in horticulture presumed to be unknown in Europe +

Having heard that in some countries Grapes of several distinct varieties were produced on the same bunch through the means of a process of art I was desirous of learning whether the representation was true or false.

If the fact should have really turned out as stated I saw not any advantage in the thing itself but was influenced by curiosity to enquire on what principle or by what instrumentality a circumstance so much out of the course of Nature as the production of Grapes of different form, size, color and flavor on the same bunch could have been brought about and so completely that each berry should possess the specific qualities of the variety to which it bore the exterior resemblance. If such a state of things did actually exist, if it did not break down the

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the partitions of individual character more completely than had before been effected in organized bodies at least it left far behind in ingenuity the usual means of producing a Hybrid if the product alluded to may be thus called. Such a process involved in my conception at least a field for experiment which might lead to new and important practices in rural economy. At Bokhara I met with a person named Yogor Zakarich or more commonly Goorgeen an Armenian of Georgia who from a state of affluence as a Merchant was reduced to comparative poverty through the loss of his occupation by the fire at Moskow and now followed the profession of a Wine Merchant under the protection of persons in authority. This individual declared that he had frequently eaten Grapes of several varieties from the same bunch at Teflis and had himself made enquiry respecting the method employed by the Gardeners at that City to create so curious a phenomenon. And the following is the account given by them to him. When the Sap has begun to rise branches of white red and of black Grapes of round of oval and of cylindrical forms, of large and of small size are cut off and the cut extremities remaining attached to the Stock and so bent that each end bled into a suitable vessel. When a sufficient quantity is obtained the different juices are blended

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blended and a portion of this mixture is poured into a cuplike cavity just carved on the top of the recently cut end of the stem of a thick Vine standing perpendicularly and sawed off horizontally at about two feet above the ground. This cavity is supposed to have been made sufficiently capacious to contain from half a pint to a pint of fluid and when filled a cake of wax is laid over its mouth so that its edges project beyond the bark and admit of the wax being bent to some distance down and surrounding the Stem. When this cap has been moulded upon the cut end into exact contact with the bark embracing it completely it is itself covered by a piece of wound cloth considerably longer and this is bound to its surface and lashed somewhat strongly to the Stem with whipcord. By this cap the escape of the adventitious flavored juice is prevented as well as evaporation or dilution from rain. Shoots spring from the Stock which in the first year will sometimes carry a few branches, in the second be in tolerable bearing and on the third yield a full crop of

grapes of which the berries of each bunch will exhibit a difference corresponding with the varieties of the different Parent Stock from which the impregnating juices were obtained.

The quality of producing several varieties of Grapes in the same bunch

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bunch is continued from year [to year] and as far as my informant had learned did not wear out. I vouch not for the truth of the report just given the imputed results of which both immediate and remote were against received notions of the physiology of vegetables but the general character and conduct of Yogor Zakarich in the estimation of persons of this country vouch for his veracity nor do I doubt of his having actually eaten Grapes of different kinds from the same bunch although I may entertain doubts if the proofs having been correctly reported to my informant. Nor will I speculate upon the possible consequences of such a mode of inoculating until the fact shall have been refuted or confirmed by actual experiment.

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Of budding

The practice of engrafting by scion or imp is scarcely ever pursued in Toorkistan but budding is performed as follows. The operator brings some cuttings of this spring shoots taken from the tree meant to be propagated to the tree intended to be budded. He then shortens a cutting to the point of thickness he approves making its upper extremity quite flat so that the exposed end of the bark be exactly circular upon one plane at a correct right angle with the stem. He next scores the bark in a circular manner quite as precise about three quarters of an inch lower down the cutting having a leaf and a bud half way or the middle between the cut end and the circular incision.

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incision. The step following consists in reducing the footstalk of the leaf to half an inch in length after which the insulated portion of bark is gently screwed round until it become quite loose and quit the wood of the branch when it is gently and delicately drawn over the upper smaller and cropped end of the cutting without being bruised broken or split. The bud is now prepared and thrown into a basin of cold water to keep it fresh and the buds are taken out of it at the tree to which they are applied.

Previously to having detached the cone of bark the operator had fixed upon a leading or lateral shoot of the tree to be budded and now proceeds to cut off its end at a place which seems a little less than the smallest point of the cone of bark; cutting the upper part of its bark on each side of the stem in straight parallel lines in its length either with a knife or more commonly with the nail of the forefinger and thumb picks off the lateral portions of bark so as to detach them from the wood has still to bind them continuous with the adhering bark. He then slips the cone of bark with the bud in its natural direction over the bared stem in like manner as a ring is

slipped over the finger. If it fit rather tightly when the lower end comes in contact with the bark that remains in its natural position the process is complete but

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if it be at all loose or even slack he detaches more bark and presses the line still lower upon the denuded stem until it will proceed no farther without force taking care that the end look upwards or be on the [illeg.] part of the stalk. It is then customary to spurt a little cold water just before taken into the mouth upon the cone and to refresh this bath once every day for ten days if it chance not to rain once or oftener during this period. The Stump or projecting end of the denuded extremity of the budded shoot and the detached portions of bark remain connected. The delicate part of this process consists in the nice adjustment of the cone to the denuded branch where it should both be in exact contact neither slack nor tight but as nearly as possible imitative of the natural fit between the removed bark and the wood from which it was detached. I have used many words to describe an operation which is extremely simple in itself readily performed after a little practice and which altogether seems to succeed better than the lateral mode of budding as practised in England whether by a simple slit or by a T incision at least more of those performed

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performed by a Native succeeded than those done by me. In the latter case the weather being uniformly warm or even hot and dry the bark of the edges of the incision had a disposition to curl outwards and to leave the inserted slip of bark and bud insulated. I was told that this accident would probably not have happened had I adopted the precaution of having the budded part moistened by having cold water spurted upon its surface once every day for ten days as already stated. Upon this mode of budding I speak with confidence through it having fallen under my own notice[;] of the former process I speak with diffidence and even with distrust through knowing them only from report. Perhaps it might have been more safe for my reputation had I waited for fitting opportunities to report the experiments but such may never arrive as much of difficulty and of danger must be encountered before I can enjoy the leisure available to this object and it seems not highly probably that other Europeans will speedily pursue the path I have thus far trodden in safety but not without peril. X Afterwards write off the Nectarine and Peach of Bokhara. [this sentence sic].

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Of a process said to have been employed for the purpose of producing Grapes and Pomegranates and other fruits without seeds.

In a former paper I took occasion to notice certain seedless varieties of fruit in Asia which ordinarily in Europe are furnished with seeds except indeed that small dried fruit imported by the Levant under the name of the Sooltana Raisin and of

which a more delicate kind is prepared at Balkh in Toorkistan under the name of Kishmish Sareagee or Kishmish dried in the shade

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in contradiction to Aftabee or that dried in the Sun. Some varieties of Pomegranate at Jalalabad near Kabool, several of the Mulberries at Kabool some of the Grapes of Kashmeer Kabool and of Toorkistan as well as in Persia are likewise without seeds and called by the common name of Kishmish

The research I made to discover how these seedless varieties were produced originally wholly failed till I arrived in Toorkistan. I found individuals of these varieties were multiplied by layers, by cuttings or by grafts in buds but the methods by which the fruits respectively had been first deprived of their seeds was unknown and possibly had been lost by the people who still possessed the plants. Persian Gardeners stated that the Pomegranate tree had been reversed and the branches planted in the ground whilst the roots in the air under a particular management unnecessary to be related as the whole account seems erroneous produced fruit without seeds. An Orchardist at Tashkoorghan first mentioned to me a traditional report of the cuttings of the tree intended to produce fruit without seeds being deprived of its pith but he was not certain of the fact and had not made any experiments to determine its authenticity. This practice however is said to be common in Teflis and is pursued in the following manner.

A cutting is split down its middle into two equal and separate portions and the pith is carefully and completely removed from both.

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The split portions are then reapplied together in the most intimate contact possible in imitation of their original position and secured through the means of a thread wound spirally round them from end to end after which a little cold water taken into the mouth is spurted over them generally, the cutting planted in moist ground and shaded from the Sun by a mat for about a week when it is gradually exposed to its rays. It is reported that many more cuttings die in this than in the ordinary mode of planting and in fact that not more than from one third to one half succeed.

I have no personal experience of the preceding practice nor have had an opportunity of trying it. Not a single Oozbuk of the many thousands who possess Vines of this description has any notion of the mode in which they were made seedless. In fact as they have taken this country within the last three centuries and prior to this migration were a people purely pastoral

+ The Oozbuds have in many respects adopted the manners of the Tajiks or Chagatees whose country they overran. At present their Horses are kept entire and an Oozbuk will not ride an Oozbuk or Toorkman Horse that has been castrated, but formerly when a Nation wholly pastoral almost all their Horses were gelt like those of the Kazaks and Kalmuks of this day and whose Stable is still called Akhtu Khaneh or the House of Geldings.

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pastoral it is probable that they found these varieties in the country they now occupy. Whether the invention be due to the Samaneans the Helleno Bactrians or the Moosalmans it is not possible to discover but it may be observed however that the seedless variety of Grape is found in the Levant but whether else where in Europe I cannot presume to determine.

Yogor Zakarich again my informant on this occasion asserts that he has seen this practice pursued with success in Georgia but not elsewhere. If it should be found to be a fact additional light will be thrown upon the economy of vegetables by determining that the pith is essential to the formation of seeds in certain fruit bearing trees.

The absence of the seed however it may have been induced seems to have a wider range of utility than merely that of rendering the Grape itself more agreeable when eaten wither in its fresh or dry state. A specimen of Wine was brought to me at Bokhara made by Zakarich and of what the clearness and mellowness of flavor appeared very extraordinary considering that it was stated to have been made the preceding vintage and was little more than six months old. It was perfectly free from all crude or austere taste and might have been mistaken for a strong Wine mellowed by long keeping. The process adopted in the manufacture presented nothing different from ordinary practice and Zakarich could not account

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account for the circumstance of his own wine being so soon fit for use. The fact seemed of some interest to Wine Countries and to Wine Merchants and I wished to pursue it to some conclusion. Cold is unfavorable to the amelioration of Wine through checking that low degree of fermentation known to conduce to its improvement. In [?Bokhara] Winter sets in rapidly and continues till March so that in the instance in question the mellowing could not in any degree be attributed to a high temperature. I procured some Sun Raisins of the same kind of Grape as that from which the Wine had been manufactured but made out nothing more than that the fruit was ripe and wholly without seeds. This latter fact eventually led to an enquiry into what might be the influence of the presence or the absence of seeds or stones in the juice of the Grape. The quality of the seed of the Grape is not the same in every variety but in all it gives out to the taste a flavor some what austere and in some instances amounting [or] almost amounting to bitter in its ripe and ?recent state. Having enquired for Wines made from Grapes with Stones I found the only specimen I could obtain with a raw crude and somewhat austere flavor resembling to the best of my recollection that

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of acidic and unripe wines in Europe.

May it be presumed that the absence of the stones in one instance and their presence in the other was the cause of the Wine of the seedless Grape soon becoming ripe and that of Europe with seed being slow in obtaining perfection? Do the stones through being bruised and broken in the Press or through being steeped in the Must give out to this liquor the flavor that peculiarly distinguishes them and thus communicate the raw ?mawkish taste to the Wine that cannot be subdued

except by that low degree of fermentation which continued for a long time ultimately brings the liquor to its requisite maturity? Is it improbable that the austere principle in the seed when largely diffused through Wine may perform to it the same office that the aromatic and bitter principle of the Hop does to Beer in regard to preventing the vinous fermentation taking place speedily? It might fairly be inferred from the good quality of the Wine only seven months old manufactured from the seedless Grape that long continued low fermentation is not essential to the production of good ripe Wine. And it seemed equally obvious that keeping was necessary to bring out the good quality of the Wine made from the Grape with seeds. The question is here agitated as connected with the price of Wine and the interest of Wine Merchants. It is

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in both a matter like many others submitted by me wholly extraneous to my professional and official duties and may expose me to the imputation of expending time on researches unconnected with that which perhaps may be considered as the proper and exclusive object of such limited powers as I may possess. In answer it may I trust with propriety be urged that it has fallen to my lot to be one of the first Europeans who has met with Wine made from the seedless Grape or at least who has been struck with the difference between the period of its maturity and that made from the Grape with seed. And the same general apology may be pleaded in extenuation of the intrusion upon this subject that previously introduced in excuse for my trespassing upon others of doubtful value without having personally sounded their foundation. Upon the fact of the Wine from the seedless Grape being free from austere acid and bitter taste and soon becoming fit for use it is suggested whether it might not be worth while of the Vinegrower to attempt to deprive the best variety of Grape of their seed by the process detailed or by some other which ingenuity may suggest and which is certainly

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the nature of art as all fruits bearing seeds abound with them much more in their wild than in their reclaimed state. If this idea were brought under the notice of the French Vendanger he would soon bring the matter to issue at a trifling expence for after our Vine should have been raised of the Bedana or seedless kind this would serve to furnish cuttings for a large Vineyard without the necessity of depriving each of its pith in the manner before detailed. Should experience decide that the process of maturation is retarded by the introduction of the austere or bitter principle into the Wine through the seed, and that the Grape can be deprived of its seed by the operation before mentioned this beverage ought to be sold at such a rate as to bring it genuine and unmixed within the reach of the middle orders of the people in England through releasing and bringing speedily into circulation that capital which now shut up for several years awaiting the full ripening of the wine necessarily enhances its price. It is by no means forgotten that the crude and raw state of new Wine is supposed to be owing to the superabundance of Tataric which is precipitated by age. But it may be asked what becomes of this acid in the Wine

which was fit for drinking in seven months? Will it be said that it was destroyed by the Grape

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the Grape itself through being converted into ?sweet juice through the fruit being thoroughly ripened before it was employed as the material for Wine? This certainly does not afford a complete solution of the problem as the seed bearing Grape when employed for Wine was in a state of maturity equally perfect as that without seed but the former remained crude at the period when the latter was ripe. It would lead too far to follow this question through all the bearings into which it points but it perhaps may be asserted that certain portions of Asia are wholly capable of furnishing a richer material for wine than any of the present wine producing countries of Europe. Perhaps certain portions of British India but if these should stop short of yielding the Grape in suitable perfection through too great a degree of humidity in the Atmosphere in the rainy season there are other portions to which the Indus may afford a ready communication which will bring this Fruit to the highest state of perfection possible for the object and the day when these countries will be compatibly with producers or partners to British Enterprise is perhaps not greatly distant.

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Of the Nectarine and Peach of Bokhara

~~The Mootawallee or hereditary Trustee and Steward of the College of Toksum Jan gave me permission to avail myself freely of his orchard for procuring fruit trees.~~ In my search for varieties of fruit not known in British India I suspected that the term of Shuftalus Loochuk or "naked Peach" might perhaps prove to be the Nectarine as the name of Mooeedar or down bearing was applied to other varieties in contradistinction. The Nectarine had been hitherto not introduced into the Presidency of Bengal, the Peach with a few exceptions mainly referable to the Garden of the late Charles Boddam Esq. at Chuprah who spared no expense in procuring the best kinds were but indifferent compared with those of Europe and the apricot though most inviting through its perfume contained an acid so pungent as to render it unfit to be eaten without cooking with sugar. My arrangements for Peaches and Apricots of the best kind in the countries I had traversed promised to be successful but I had never discovered any traces of the Nectarine. When the Peach had become of the size of a Filberd [hazelnut] I visited some Orchards and found the white and red varieties of Nectarine in pre bearing on small trees and in the proportion of about one to fifty Peach trees. This search brought to light other facts for which the preceding narration is little more than introductory.

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The Peach in this country is never propagated by budding but always raised from the stone sown on drills in Autumn. In the second year the seedlings are transplanted and in third are in full bearing. The trees yield an immense crop in

favorable seasons from the third to the sixth year both inclusive but in the seventh the yield begin to fail and afterwards becomes so uncertain that it is found a better practice to cut down all the trees and to plant a new Orchard than to maintain the old one any longer however good may have been its fruit. It is stated that at this age the stem of the tree is attacked by a Grub which I am led to suspect in its molt change becomes the Caterpillar of the Willow Moth or Sphynx à tête de mort and that Maggots breed in the pulp of the fruit from both which circumstances the Peach is wholly or almost wholly exempt up to this time. If this statement be true a proviso I think it prudent to make when it is impracticable for me to verify or refute any novelty from my own observation it would be gratifying to curiosity to ascertain what change takes place in the constitution of the tree and of the fruit that exacts the

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the attacks of insects. The grub that attacks the stem of fruit trees in India, and to what insect it belongs I am ignorant, may sometimes be dislodged by injecting asafotida diffused in Oil into the upper orifice or vent it makes perhaps to give issue to the dust or chips when it is proceeding downwards but against the mischief produced by the Mosquito depositing its egg in the pulp I know of no sufficient defence. In former communications I have noticed instances of this insect when disturbed by circumstances that have exposed its laying its eggs in due season in the water having had recourse to the expedient of hanging them in the succulent leaves of willow and of the Poplar, of depositing them in grains of Wheat and Barley when in their milky state to the great injury of the crop and also in the pulp of apples as a substitute for its more natural Nidus. In some seasons it is greatly injurious to the Crop of Peaches in India and I have known it spoil that of the large Apricot of Kotoch which has not yet found its way to the plains.

To Orchardists in India it may be interesting to know whether this mischievous insect attack the fruit of young Peach trees in equal degree with that of old ones as involving a point of practice but those of England are only interested in ascertaining whether propagating the individual by bud or graft or

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raising new ones from the Stone is most profitable. Assuredly the crop of Peaches of Bokhara is numerically larger than I have witnessed elsewhere but from the small size of the Stones I have picked up in abundance near the Stems of the trees it is to be suspected that the fruit is small and probably smaller than that of Kabool where budding is practised. It may perhaps turn out that the finest varieties ought to be preserved by budding and these may be suited for the tables of the affluent who can find a compensation for a smaller crop in the superior flavor of that which is raised on the face of walls. And that the plan of raising Peach Orchards from Stones may bring within the power of the lower classes of Society a fruit somewhat inferior in size and flavor to the former but still wholesome and agreeable and with which owing to its high price it now bears few of the latter are much acquainted. This modified distribution it is trusted will not be considered invidious as wealth must always ensure gratifications to its possessor which will be out of the reach of those in opposite circumstances. See page [58].

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In respect to Peaches and to Nectarines it may be observed generally that some kinds have more or less of a bitter flavor diffused through the flesh and I have heard it asserted that this derives from the prevalence of the bitter principle in the kernel but with what foundation I know not. It has however been roundly stated that through a knowledge of this fact the fruit of Peaches or of Nectarine trees to be raised from the Stone may be modified by the treatment to which the Stone itself may be subjected. That is that the fruit may be rendered altogether sweet or in other words be wholly deprived of its natural bitter or the latter may be retained at the pleasure of the Orchardist. If for instance it be wished that the fruit should be wholly sweet the Stones to be sown should be steeped in water frequently changed until they split and the sprouts shoot through each about a quarter of an inch in length when they are to be planted. If it be intended that the fruit should be somewhat bitter then stones are to be sown without having been steeped at all. Should the fruit turn out as reported it would appear that the abstraction of bitter from the fruit is effected merely by the

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bitter having been dissolved in the water and washed out of the kernel by frequent change of fresh fluid. I vouch not for the success of the experiment just mentioned any more than for that of the practice before mentioned but may perhaps safely be allowed to say that should there be no falsity in the account detailed those circumstances may lead to other practices in respect to the management of stones which may add a new page to the annals of horticulture.

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Of Orchards

The produce of the orchards in Affghanistan and of Oozbukistan affords an immense resource as a material of food to the Natives of these countries for a considerable portion of the year. And if to this be added the value of the yield of the Melon grounds it becomes a matter of doubt whether the aggregate be not equal to that of the Cereals in a country where every individual eats wheaten bread every day and all horses in work consume Barley or Jouaree

There exists scarcely a Rabat or Country House of the moderately wealthy Citizen or of the Peasant though not exceeding in original outlay the cost of the Stables or Cow house of an English Farm of the rent of Three Hundred Pounds 300 £ which possesses not a walled Orchard or Chahar Bagh larger better stocked with Trees and more productive in Fruit than the Garden, hot water forcing House and Orchard of a Mansion attached to an Estate of Five thousand Pounds a year in England. In Oozbukistan the Orchard constitutes the main feature of the Farm in England with the exception of the Cyder counties it forms an inconsiderable appendage. The fruit raised by the Oozbuk are the Fig, Pomegranate, Grape, Apple, Pear, Quince, Plum,

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Plum, Cherry, Peach, Nectarine, Apricots Mulberry and Sengid or Drupe mentioned in my letter from Tibet. The first is eaten ripe but not dried or at least in quantity insignificant in the latter form, the Pomegranate keeps till Spring, the Grape is eaten ripe most largely, keeps under careful management fresh nearly throughout the winter, gives a sweet Syrup is converted into Raisins but with a most trifling exception in regard to Jews and Armenians in the City of Bokhara is not manufactured into Wine or Brandy. The Apple Pear and Quince are eaten fresh, Plums fresh in general but a few are dried the Cherry Peach and Nectarine wholly fresh, apricots principally fresh sometimes dried in the Sun, and the Mulberry for the most part fresh although some are dried but not extensively as in Kabool. The Sengid is dried. The want of a Sugar of the cane and the neglect of a most extraordinary substitute have not introduced the use of preserving the more tender fruits. Greatly superior as is the Orchard of Oozbukistan to that of England as to weight of produce the garden for producing vegetables ordinarily subjected to cooking is most miserably deficient. Turnips, yellow carrots, red Beet, white and red onions, cabbages, a Lettuce of the Cos kind little removed from the wild state, Fennel, Purslane wild, Chenopodium wild, Spinach cultivated, the triangular Vetch a Gram of India with a variety of Cerf Feuille make up the scanty catalogue

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to which must be added the Solarium Tomato or Love Apple [?in] ?scarcity the Cucumber [illeg.] but the Gourd and Melon especially the two latter in a variety and abundance not known elsewhere. The Vines trained on the surface of the ground have a large portion of land set wholly apart but ordinarily are surrounded by a line of mixed fruit trees near the water trench. Figs and Pomegranates occupy a second department. The Apricot frequently has a square to itself as also the Peach and Nectarine whilst the Cherry Plum Apple Pear and Quince are mixed. The plan of a Garden at Bokhara generally consists of four grand divisions as its name signifies and in one of them is a square Tank into which water is occasionally poured from a Trench communicating with one of the Mains of the River of Sumurkund through a wooden or Stone Trough of which the former is generally covered into what is considered as the resemblance of

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the Nebung or snub nosed Alligator an inhabitant of the Oxus, Ammoo, or Jehoon. This Tank is invariable surrounded by a broad alley of the Goojum a variety of Elm not known in Europe of which the umbrageous top by the profusion of its shoots produces a covering so dense as to be impervious to the rays of the Sun and spreads widely. The more wealthy classes have a few low apartments of clay or sun dried brick walling to which they repair occasionally in the summer and a Haram Saraee with its small garden is generally an appendage. Much fruit is consumed in its unripe state but as every Orchard raises vastly more than suffices for the consumption of the family however large the surplus in the vicinity of Bokhara is sent to the city generally in wicker baskets hung simply and ingeniously on backs of

Asses. Yet considering the low rent of land, and the large produce, fruit bears a higher price with the exception of Grapes and Melons in the market of Bokhara than in any other City of Asia I have visited. In the winter the stalls of the fruiterers exhibit

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exhibit on inclined planes raisins of various kinds separated by the kernels of almonds Apricots blanched stained red green blue in fanciful lines which attract the eye of the passenger. As yet the season for Apples and Pears has not come in sufficiently to enable me to judge of their merit but those I have met with in Kashmeer and Afghanistan are inferior to the best of France and of England, the finest Apricot is inferior to the Abricot-Pêche and Moor Park, the red and white Kandahar Peach are fine and from what I hear of the Yarkund and Balkh it seems probable that it equals that of the Departement de Calvados, the Kok Sooltan Plum of Khoollloom would be an acquisition as that of Sumurkund though bordering on the Cherry might be [illeg.] to an English Orchard but the Fruits which are decidedly superior to the best in Europe are many varieties of Grape and the Pomegranate of Tash Khoorghan (Stone Fortress) and of Shahr Subz or the Green City. It appears to me extremely probable that the latter, one of the best of Fruits

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when in perfection, may be successfully introduced into English Gardens where its bush covered with bright scented flowers will be no inconsiderable ornament and its fruit will last to the following Spring.

But it is not from the Pomegranates of the most favorable parts of Europe or from the produce of India or from that of Jalalabad when it reaches Dehli or Lukknow that an adequate idea can be formed of the perfection this Fruit attains in Toorkistan on a gravelly or rocky soil, deluged as to its roots with cold water under a moderately hot Sun. I shall spare no pains to obtain plants of the best varieties which will be planted in Tub - Panniers to be carried by asses and the arrangement merely wants my return by one line of road but it is possible that I may be compelled to decline it on account of the duplicity of the Ruler of the country. However if foiled now in my attempt I may succeed through another channel. In the mean time an experiment might be made by a few plants from Portugal. In this country of which the cold of winter seems to the full as steadily severe as that of England it is necessary immediately after the fall of the leaf to lay the bush down on its side to cover it with dry Sedges, grass or ashes and to load the whole with a coating of earth a foot deep which should be removed in Spring as soon as the buds of trees begin to swell. This treatment necessitates

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a support being given to the bush tis [?for] the purpose of restoring the perpendicular. In warm sheltered valleys this precaution may perhaps be dispensed with but in exposed situations it is indispensable for this tree as for the Fig.

As I have not affected to preserve regularity in this communication I may be pardoned for again referring to the culture of the Vine trained along the surface of

the ground. On visiting a Vineyard of which part of the produce is annually reserved for the use of the King the central part of the fans of each Vine was observed to be covered by a heap of earth about 18 inches in thickness a practice said to prevent it suffering from the rays of the Sun in very dry weather. And the sides of several fans were raised two feet from the ground by two poles with their ends resting upon two crutches or upright stakes. One end of each horizontal pole began at outermost part of the sides of the fan nearest to the centre and proceeding towards the other nearly joined the other both forming the letter V of which the separated ends embraced the root of the fan. The bunches of grapes hung most closely but the thickest berry was not thicker than the branch of a

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quill and each about half an inch in length whereas this variety called Hoosenee Shootoor Dundun or Camel Tooth Hoosenee when ripe is nearly as thick as a small finger and seldom shorter as it is said than the length between the middle joint of the forefinger to its end. I remarked that the grape in its unripe state was not likely to be injured by being on the face of the ground and that no rain had yet fallen. To this it was observed that if the business of raising were deferred until the Grape should have nearly acquired their full size the branches would be broken through the weight of the fruit. It was stated that there was scarcely any difference observable between the period of ripening, that those which remained near the ground were the sweetest but that those raised kept best. I mentioned the mode adopted in Kashmeer as little expensive the cost consisting of the price of unglazed earthen dishes in one of which the grapes when ripe and gathered dry were placed then covered with another the edges sealed with clay and the whole buried in the ground in which manner they remain fresh and good from five to six months. This plan was condemned as too expensive and as not equally effectual with that of enclosing and covering the fans of every raised Vine with a coarse and cheap mat skewered together and which by its form throws off the rain and

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and through which the Snow cannot penetrate whilst the air has free access to the fruit. When the latter is required a person raises the mat on one side, cuts off as many bunches as he wants and leaves the rest hanging for future occasions. In and through this expedient similar to those employed by our Gardeners for preserving currants on the bush and which applied to cherries is as old as the reign of Queen Elizabeth Grapes are maintained in a state of tolerable freshness though a little shrunk for two months and for four more after having been taken from the tree.

The surface of the country immediately surrounding the City of Bokhara is most thickly studded with walled Orchards and it is said that these are continued almost in contact from Bokhara to Sumurkand seven days journey on a breadth of two days journey. The weight of fruit raised in these Orchards is such as an European can scarcely conceive but with the exception of the Vine the Fig and the Pomagranate there is not any superiority in the other wet kinds of fruit over that of England.

The Chagataees or Tajiks who formerly possessed these countries and of whom the Oozbuds are merely imitators were in the habit of eating bread largely, the latter from the pastoral habits could not thus

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thus indulge in this gratification but now eat more bread probably than any other nation the French not excepted. In no other country is there an equal exhibition of bread. The sellers like Auctioneers in the covered Charsoo or four cross roads mount upon Stalls and Steps and harangue the populace on the merits of their particular bread whilst through witticisms of various kinds they detract from that manufactured by their Neighbors. Yet these very people cultivate fruit to an extent that approaches the value of the crop of bread corn if it does not actually exceed the amount of the latter. Still they employ not the Apples or Pears for Cyder or Perry the apricots or Quinces for preserves or marmalade, the Peaches for Wine or Brandy and the Grapes in a prepared state only for Raisins or Syrup. It cannot fail to appear singular to the European that under these circumstances of misapplication or rather of neglect of applying fruit to every purpose available they should raise such an enormous quantity every year. May not this fact create a suspicion that in England for instance fruit is somewhat undervalued seeing that so small a surface is appropriated to its culture? May it not tend to suggest a doubt whether an increase of Orchards might not be more advantageous to the farmer

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farmer than the appropriation of so large a proportion to other produce? In the Peach Orchards of Toorkistan Lucerne grows fairly though certainly inferior in yield to a crop wholly without shade--but it is not employed under any other kind of tree. The expence of planting an Orchard in the purchase of young trees is very considerable in Oozbukistan this is very trifling. At the village of Yar Jan large tracts of land are sown every autumn with the Stones of the Peach and of the Apricot in drills where the seedlings stand till the Autumn of the second year when they are drawn[,] brought to the Bazars on the backs of Asses and sold at the rate of eighteen pence to about half a crown a hundred. Apples, Pears, Mulberries, sometimes Apricots, and Plums are budded but no one thinks it necessary to apply for the assistance of a professional Gardener in the performance of a process to which every Orchardist thinks himself equal. Such is the facility with which the Ring-bud is employed that half a dozen lateral shoots are budded on the same stock which gives an increase of fruit bearing surface greatly surpassing that produced by the process of budding common in Europe.

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An instance of the parsimony of the Oozbuk has been given in the mode of preserving grapes, the same spirit runs through the whole of their agricultural arrangements and the system of orcharding would rapidly decline were an Oozbuk under the necessity of purchasing plants at double the rate I have mentioned. It is not meant through the preceding observation to deprecate the value of Nursery [illeg.] or to diminish the profits of a class of artists to whom England is indebted for

new varieties of fruits but it is thought that a less delicate and less expensive mode of raising seedlings approaching nearer to that of the field than of the garden might in its larger produce enable them to sell their seedlings at a lower rate and the larger demand might compensate for the diminished price of the individual plant. Perhaps the use of the arrow headed plough and the cutting board Harrow would supersede the slow and expensive spade in producing that fine tilth necessary for their Nursery. But it may here be remembered that the young trees of an Orchard require not the expensive defence of palissades or a binding of thorns or any other guard against cattle every orchard being walled and the Oozbuk never turning his Horses or Cows loose to graze on his cultivated lands but if ever their be any thing left that has escaped the sickle and is not intended

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to yield another crop, the cow is always tethered to a peg and as he chuses his weather for this purpose his land is never poached into holes.

Perhaps the climate of these countries may be somewhat more favorable for producing the Grape and the Pomegranate and the Fig but not for the apple the Pear the Quince the Plum and the Cherry, perhaps not for the Peach Nectarine and Apricot and almost certainly not for the Mulberry which through greater heat lasts not half the time in season as in Kabool.

Altogether the difference may principally consist in a higher temperature and drier constitution of the Atmosphere in the Summer Months. The frost broke up in Bokhara on the 17th of March the rest of the month was windy generally somewhat cold with a few fine days. The twenty first of March is counted as the beginning of Spring. The whole of April was rainy, generally somewhat cold with two or three fine days. About the sixth of May the rain ceased. The Air became warm and afterwards hot. Apricots and Cherries were

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were brought to market about the middle of June and Wheat and Barley were cut about the twentieth of this month.

In point of natural quality of soil that of Britain generally is greatly superior to that of Toorkistan of which country the high plains and slopes would be little better than deserts were it not for the manure and the water supplied to them and in the management of the latter of which the Oozbuk peasant is greatly expert. Against the method of raising a Peach Orchard from Stones it may be objected that many of the new varieties might prove almost worthless or at best bear only the same degree of value of the budded and well selected Peach as the Crab Apple does to the Pearmain the Nonpareil or the Golden ?Runner . Another objection derives out of the greater length of time that elapses between the sowing and the fruiting than between the process of budding and its consequent produce. The first charge must be admitted in part but as an alleviation it may be stated that the best varieties of Peach of Apples &c. are all produced from seed alone.

This fact may induce a doubt whether the prolongation of the life of a favorite individual beyond its natural period through implanting its buds

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buds on young Shoots may not sometimes be carried farther than consists with profit. And whether it would not be more prudent to raise more frequently new varieties from seed to bud from the best of them and thus to renew the general stock. It is unquestionable that the young Peach Orchards of Oozbukistan are by far more productive without any training or pruning than old Peach trees in England under all the advantages of labor and science and expence bestowed upon them. It is probable that Oozbuk peasants would be highly amused at seeing Gardeners in France or in England busily engaged in carefully carving out the rotten wood of a cankered Peach tree two thirds of a century old and afterwards in coaxing and [illeg.] the growth of new bark to cover the ulcer. And they would be surprised to learn that all these pains were given for the purpose of prolonging the life of an old Tree rather than in raising new ones in effecting which there would be less trouble. Engrafted or budded trees live long in England but they are long also before they yield

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yield fruit and exhibit proofs of natural decline by diseased alterations in their structure and by uncertain crops of a somewhat degraded produce. May it not be supposed that the evil originating out of a forced and preternatural extension of the life of an individual may go still farther and impress a particular character on the constitution of the Stone or seed producing that very dilatoriness of bearing fruit that constitutes the second objection to raising Peach Orchards from Stones? Certain circumstances seem almost to warrant this supposition. The tree from the Stone of the ?Wilding or Seedling Peach bears fruit in three years. I cannot make out at what period trees from the Stones of the budded Peach produce fruit as the distinction has not yet in these countries been ?serviceably made but the Seedling Trees from the Stone of the budded Karra Aloo or black Plum of Bokhara and from that of Summerkund usually engrafted yield not fruit in any considerable crop until the sixth year. Other changes in the seed also have a bearing upon ?points of practice in respect to this subject. If the life of a tree which produces seeds and can also be propagated by cuttings be extended through the latter means alone for a long series of years the constitution of the seed is

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affected in a manner that could not have been suspected through the influence of such a ?cause The following fact may serve to illustrate this assertion.

Kashmeer for ages past has been favored for the size, beauty and shady foliage of the Chennar or Plane Trees (*Platanus Orientalis*). It was long ago discovered that by planting a late cutting or pole of this Plane a tree was formed in less time than by raising it from seed and this practice generally adopted cannot now be changed as although the trees are covered annually by a large crop of rough seed cone not more than one in four thousand contains a kernel.

An intelligent cultivator who from curiosity had examined an immense number of the husks was about to give up the search as wholly fruitless when he found a solitary kernel which he supposes might have been capable of vegetating

but what [sc. which] he omitted to put to the test. The mischief produced through perpetuating this tree by cuttings did not stop with the loss of the power of forming seed but extended so far as to cause the timber of the trunk to rot in its center long before the tree has achieved

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its full growth. +

It was long ago found also that the Drupe fruit called Singid in Persian and ?jigda in Toorkee attains the size of trees more quickly from cuttings than from seeds and therefore in Kabool and in Oozbookistan its cuttings are planted along the sides of almost every watercourse or wet ditch. A few of its dates were carried from Yarkund into Ladakh and being sown there were produced from them at Snoorla and other places--a few also reached Kashmeer and at Peshawr also some trees were raised from seeds likewise. In these places the Singid has been but recently introduced. The trees are vigorous, the wood healthy and of regular growth whilst the odor of the flower is delicious and lasts for a considerable time. The fruit in Tibut was of moderate size in respect to the other plums. I had no opportunity of seeing it owing to the trees having been stripped of their flowers.

+ Note: The able and learned Mr. Mursden has given multiplied proof of most extraordinary sagacity in his explanations and illustrations of portions of Marco Polo and his account of the Arbor Secco page 100 serves as an example. There is a place in Khorasan call Sokhte Chinnon or the burnt Chinnon Tree near Sykan in Khorasan and the account I have given of the failure of the seeds may tend to solve the doubts of his friend Mr. Silvestre de Sury.

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At Kabool some trees are raised accidentally from seed, the fragrance of the flower is great and the season lasts long. In the vicinity of Bokhara the tree is raised from cuttings alone its growth is very irregular, its bark throws out much green, its crop of flowers is soon over and its perfume is much slighter than elsewhere. Altogether its condition exhibited the character of decay through prolonged extension from individuals and neglect of raising from seed.

The Oozbuk peasant affects not labor when it can be conveniently avoided. He raises the Peach from Stones, because it cannot be propagated from cuttings and throws not out any suckers. But he avails himself of the facility afforded through the suckers of the apple and the Pear which serve him as ?starts. And the trees of these fruits always budded and abundantly fruitful are smaller and less healthy due reference made to quality of soil than in countries where stocks are raised from pips. In fact they early shew themselves to be somewhat predisposed to a state of degradation which is not the case with the tree of the Apricot and of the Mulberry

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Mulberry raised from the Stone and the Seed.

In most decided opposition to the apple and Pear trees of Oozbukistan raised from suckers are the Crab or Wilding Apple Trees of the Forests in the vallies of Kashmeer as for instance in the District of Lolab.

These trees are most luxuriant in respect to wood extremely healthy but presenting the phenomenon of reversed or pendant branches produced partly by an excess of fruit aided by the mass of Snow which hangs in their thorny and tangled branches for several months. The Mulberry seems to be a tree of vast longevity but its fruit many considered as affording an instance of degeneracy through diminished size long before the timber exhibits any marks of decay. The Mulberry Grove planted by Akbar at Kabool and as tradition reports brought from Lahour yields the white Bidanna little longer than a Horsebean whilst that of the same kind at Bokhara budded on young Shoots is nearly as large as a common brass thimble. It is presumed that the former fruit has dwindled in size Mulberries thus small being considered as not worth gathering. The object of the preceeding remarks is merely to suggest the possibility of the practice of extending the life of an individual variety however valuable itself being carried to an excess.

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Orchard Walls &c.

It has been already remarked that all the Orchards are enclosed by walls from twenty to twenty five feet high made of Earth Pise or cob walling. These are generally furnished with a crenated Curb and solid small bastions the intermediate compartments being decorated with line drawings after various fashion[s] and pattern[s].

In this country these walls are an adequate defence against depredations but the earth of which they [are] constructed is so loose and sandy and abounds so largely with Nitre from the small quantity of animal manure given to the land that large portions fall down after heavy falls of Rain. The mode of construction is extremely cheap and frugality to an extreme as has been already observed runs through every branch of the rural economy of the Oozbuk. The low price of the plough share has been stated. A Cart and Harness for one Horse costs from three to seven pounds sterling and the only iron work in either consists of a small bush of cast iron in the Nave

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Nave of the wheel. It is however little more than a skeleton frame work and the burdens carried with the exception of Stones and Timber are generally shut up in sacks. The wheelbarrow has no feet but its hollow made of wicker work set in a frame of willow has its convex surface resting on the ground whilst the trundle is cut out of a single thick plank. Not a single particle of iron enters into the composition of the instrument of which the cost amounts to about a shilling.

The board Harrow or Dundana on a flat surface is more effectual than any other acting upon the principle of cutting rather than that of turning and when pressed down by the weight of two men riding upon it divides and pulverizes the

clouds raised by the plough in a neat and expeditious manner. I should be guilty of great injustice did I not observe that whatever there may be valuable in Oozbuk agriculture does not originate with these people who were in former times and have been partially reclaimed from the nomadic state since from the Dushte Kipchak they crossed the Sur and invaded the country of the Tajiks. The merit of managing Orchards is wholly due to this

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this people at least in comparison with the Oozbuds but they may have received instructions or practices from the Samanians or Helleno Bactrians. The Oozbuk delights rather in destroying than in improving and he is gradually working his own destruction.

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I have observed that certain fruits which are raised in countries having a dry and warm Atmosphere and in which the plants or trees which bears them are supplied with moisture from irrigation and from dew along or almost wholly during the season of being brought to maturity though sweet and possessing the flavor with the same kind of fruits in other countries are nearly without fragrance. Thus the apricot the Peach the Quince the Apple, the Pear and the Plum of Kabool and of Toorkistan exhale not that perfume which much enhances their value. The Kashmeer Quince sometimes falls during the season of their ripening and then the fruits in question possess some odor.

It would almost seem that the fragrances of fruits is derived from the water of the atmosphere imbibed by the leaves and by the fruits were there not one fact which opposes this conclusion. The Apricot which has been introduced into British India is excessively sour but exhales a most delicious perfume. Further observations are wanting on this point but the general fact may be depended upon as correct.

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Of the Ass of Bokhara

The Ass indigenous to Oozbukistan is of a grey or brown color for the most part but a few are nearly black. His size is diminutive, but his proportions are generally good and though his legs are small the tendons are extremely hard and clean.

His muscles are large in proportion to his size and the activity of this breed forms a striking contrast with the sluggishness of the Ass in Europe. No other fault could be found with the Oozbuk Ass than a want of size which rendered him little fit for heavy work. This was remedied by accident rather than by design through a merchant of Meshed taking to Bokhara a small ass of that country about forty years ago which was purchased by the King Sheek Morad Begh at the price of fifty pieces of Gold. The Meshed Ass did not originally belong to that country but was imported from the Province of Yezd. This breed had

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had the advantage over that of Oozbukistan in being stronger and larger but if I may judge from specimens of the Meshed race it was not equally active as the Ass of the former country. Its color which is of pure white distinguishes it from the Ass of Oozbukistan. The Ass in question served many females of the Oozbuk kind and the produce was ordinarily seen under a coat of grey mixed with brown approximating to a dappled blue or red roan. The females of this cross were again put to the Sire and by thus breeding in and in if this term be allowable in the fourth generation a white breed was raised nearly as large as the Sire and preserving the activity of the Oozbuk Dam. At this moment the lowest estimate of white Asses causes their number to exceed ten thousand whilst another more than doubles this amount. Some individuals of this new breed having been taken to Meshed have brought a higher price than the Asses of that City from their superior activity and I find them greatly preferable to a breed in Persia said to be one of the best in that country and of which some individuals were sent to me at a time when I thought it practicable to raise Mules for the use

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use of the Hon Company's Army from Mares in some respects unfit for breeding Horses of a description suitable for Cavalry purposes. Breeding Mules in Bokhara is forbidden not because the practice has been found to be injurious to the role of Horses but from it being contrary to the laws of Nature proved through the race not being continued, yet through one of those inconsistencies for which Oozbukistan is somewhat remarkable for Mules are desired and held in high estimation by this Sovereign for carrying baggage. Although speaking of Oozbukistan and of Oozbuds it must be understood that the Tajiks are almost exclusively the Owners of the Asses and not the Oozbuds properly so called, these peoples holding the Ass in no respect. There is probably not a single Tajik Peasant in the neighborhood of Bokhara who has fewer than three asses either Oozbuk or of the mixed [breed] and many possess from ten to twenty. The female asses are worked upon Farms at a distance from town and Males alone are employed in the City and in the vicinity. This circumstance of so large

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a number of Asses being kept in a country where a Horse of good size and strength can be obtained at half the price of a large and active Ass seems to evince the superior utility of the latter in the performance of those tasks to which he is especially suited and appropriated. It might be accounted somewhat whimsical were it asserted as a ground of preference that the ass is more intelligent and more docile and more speedy in the performance of his task than the Horse yet assuredly this is the fact. The ass here is one of the most docile and obedient creatures I have seen. At day break great numbers are seen in different places in squads of about a dozen each wedged as close as possible and confined all together by a single rope passed around the neck of each in succession waiting until two men shall have loaded each with manure in sacks and remaining quiet until ordered to go off which

they obey instant and proceed at the rate of from five to six miles an hour one man mounted on one Ass driving five others. A few hours later they are seen standing in like manner ranged side by side but loose with their loads of wild wormwood six feet in diameter two in thickness and three in height remaining almost as motionless as statues until relieved from their burdens when they trot or canter off at the rate of full six miles an hour.

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It is said that with a single word the Driver can cause his [illeg.] to fall into an exact line in succession and the whole are most attentive to his orders. Two persons of my party in different places saw a man who had driven his Asses in front turn up an alley behind them. He went first merely called out to the animals which were in front at the trot and at the sound of his voice they turned round and overtook him at a gallop like so many dogs. I have seen a sign with the hand or with a stick without a blow cause the Ass to go to the right or the left and a whining sound of the voice excite him to quicken his pace or to stop altogether. Although ordinarily one man mounted manages five Asses yet occasionally he has charge of double this manner [?sc. number] and apparently with little increase of difficulty.

People of considerable property ride upon Asses and I have met with a man of consequence coming from his house in the country to the city mounted an Ass whilst his Horse was led in his train. The Ass is frequently mounted by three children or a man or woman and two children or by two men or two women without a bridle and conducted by the voice, signs or the Chain Spur.

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The Ass possesses in a state of nature as much sagacity as any other animal I know and if any Sportsman would wish to present to himself a task by far more difficult than the chase of the Ibex, Argali or other varieties of Mountain Goat or Sheep he may find such by endeavoring single handed either on horseback or on foot in Summer or in Spring to shoot the Wild Ass of Tibet in the valley on the desert or on the mountain where he may see fifty in a day. In the winter when the scanty food of the animal is deeply covered with Snow the pressure of severe hunger overpowers his vigilance and when he has discovered through the acuteness of his sense of smelling a small Furze bush or a tuft of flint-grass and by pawing has freed it from the Snow he sometimes fall[s] under the shot of the Tibetan who for two or three days has patiently been lying in wait for him at a place of favorite visit. In Persia several Horsemen with their steeds in excellent condition and trained to the sport single a Goorkhur or wild Ass from the herd and pursue it unremittingly from morning till night when they desist marking with precision the direction the animal took when they quitted the chase

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chase. Having taken due care of their Horses during the night the Sportsmen at daybreak resume the pursuit of the game which is ordinarily found lying within a few hundred yards of their encampment. Through the cold of the night his muscles benumbed after being greatly weakened by the exertions that during a whole day

had kept his pursuers in the rear and now set apart by that bloody effusion always found in hunted no longer obey his will with their usual promptness and before he can regain his speed he is surrounded and slain for his flesh which is accounted superior in flavor to that of the Deer an opinion in which my limited experience is regard to the Goorkhur permits me not to coincide. The Wild Ass of the hot Desert The Onager of Pliny and that alluded to in Holy Writ is a beautiful animal, in speed for a time exceeding the Horse and almost rivalling the Deer. Its Eye emulates that of the Antelope or Gazelle in prominence and sweetness of expression, its legs are as clean and firm as those of the Deer and its starts and springs evince an irritability like that of the Zebra but without the malignity of temper ordinarily belonging to the latter. The wild Ass of Tartary Equus Hemonius

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Hemonius which out of respect for the Tibetan appellation is here named Equus Kiang but the general fact may be depended upon as correct-- or Horse of the Lar or Mountain Deity is Dihiggetai of Pallus, Genelin

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Genelin, Messerschmidt and other Naturalists deputed by the Empress Catharine the Great to examine the national productions of her distant eastern Provinces. This animal is of a form less elegant than the Wild Ass of the hot Deserts and those of Beekoor and of Kutch and bears some of the exterior

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exterior characters of the Mule approaching to the Horse but the dissection of his organ of voice, his bray[,] the termination of the Duct which delivers the tears into the nose along with other peculiarities of structure appertaining to the Ass move him indubitably

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indubitably to belong to that order of animals. Individuals of these varieties even when taken young are little susceptible of being rendered useful otherwise than for breeding at least the experiments I have witnessed have failed to do more but they have been ill conducted. However the cross with

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with the domestic Ass has produced an animal active intelligent and possessing less of the irritable disposition that distinguishes the Goorkhur of the hot plains with which I am more particularly acquainted having seen that of Tatar only in his native Steppes. The intellect of the domestic Ass of

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of Britain has not merely lowered below that point to which it might have been useful to have had it reduced but absolutely stultified and almost annihilated by a long series of coarse and too frequently brutal treatment which in degrading the physical powers as to activity has subdued his susceptibility to so low a rate as to have rendered the Animal [?insensible] even to blows and almost equally so to an opposite treatment. The education of the Ass in Toorkistan has been conducted on more rational principles inasmuch as without the employment of force or of cruelty it has subdued as much of the natural irritability as was inconvenient for domestic purposes without extinguishing the spirit and activity in general for their suitable performance.

And nothing has more decidedly contributed to produce the docile and orderly conduct of the Ass than the use of an instrument combining the application of a goad and that of a whip. This called Zunjeer Kumchee consists of a short wooden stem that fills the hand and is furnished with a small iron spike or goad about a quarter of an inch long and a few links of a light iron chain attached to the same extremity the whole being fastened

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fastened by a noose of string round the wrist. The rider slightly pricks the Ass on the withers when he wishes to make him quicken his pace direct him to the right or left by placing the unoccupied hand either empty or holding a stick on the side of the Neck near the head opposite to which it is intended that the animal should go and stops him by a call with his voice. The Ass is first broken in by this method without a bridle and after a time he becomes so much afraid of the correction that a mere rattle of the chain of the whip without infliction reminds him of what is required and calls out his exertions just as effectually as the application of the calf of the leg suggests to the [illeg.] of a Horse trained in the Manège the necessity of obeying the intimation if he would avoid a correction more severe.

So perfect is this education that Asses are taught to perform their labors and ridden very fast in the road without a bridle. An Ass only 12 hands and an inch high was ridden for the sake of experiment against a Horse for six Fursukks, or roughly speaking about twenty Miles and the former came out first. This individual is slight in his

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in his limbs which however are well placed. But to a European judging by the rules of proportion belonging to ?Horse and adopted by Europeans in general his back is too long and he is short of carcase which latter circumstance is considered as preferable in the Ass to a full carcase which in respect to this animal is held to be an indication of sluggishness. His Master might have realized a large sum of money by letting [him] serve Mare Asses at a piece of Gold (Tila) of the value of twelve Shillings each had not the Kazee sent him an intimation that he was trespassing against the Shuria or written Law by taking money for such an employment of the Animal. Disgusted at the disappointment of his views and the loss of a practice which he had for some time carried on to great advantage the Ass having the

reputation of being the best in the Kingdom his Owner stated that he would so sell him that he should never again see the Animal which so superior as he was acknowledged to be could not realize to him more money in the employments to which the Ass is commonly available than one

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of qualifications greatly inferior. To avoid the mortification of seeing him in the possession of a Citizen of Bokhara he sold the Ass to me for twenty eight pieces of Gold. Besides the utility of the Ass in the different kinds of business to which the Horse is applicable the former has the advantage on the score of frugality of maintenance and of supporting an equal continuance of proportional exertion with less loss of condition. Mr Bakewell of Disbley used to call the Ass the poor mans friend and not long before his death I witnessed the endeavors of this most able and spirited breeder to procure parent Stock in which he had not been equally successful as in respect to other kinds of Cattle. If the Government shall approve of some suggestions I shall take the liberty of submitting to their notice on the subject of improving the newly acquired Hill Provinces I propose to send some Mare Asses selected from the best in Bokhara to certain Steppes of the Lhassan Province of Chanthan with which I am acquainted to be served by the Wild Asses of those Districts. This experiment will be made not only for the purpose of accommodating the Peasantry of this country

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country who have no other steeds or beasts of burden than the Yak (Bos Grunniens) the Zho or Jubboo a Hybrid non Descript between the former and the Zebu or domestic Cow of India and the Sheep and Goat but with the Hope of being able of introducing the breed of a superior kind of Ass into Great Britain through which the present race may be improved. As connected with this subject it may be not irrelevant to remark wherever the Mule has been largely introduced the raising this Animal has greatly contributed to degrade the breed of Horses a fact I had an opportunity of witnessing in a journey made in early life to examine the Studs of Asses kept in the vicinity of Niort St Maixent and other parts of Cidevant Poictou. See Article L' Âne or Les Animaux. Encyclopédie par order de nature. But for a complete illustration of this occurrence I beg to refer to "Discurso sobre la detîriacion de los Caballos Espanoles par Don Pedro Pablo del Pomar. Mules however it must be admitted are greatly preferable to Horses for certain Kinds of service

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service in certain localities and the best practices in the armies of the Sikhs and of the Afghans consist in the use their people make of Mules as attached to Cavalry.

The want of a sufficient number of strong coarse low priced Mares conjoined with the prejudices of the Indian Peasantry on the plains foiled or rather stunted my attempt to raise Mules for the use of the Commissariat of the British Indian Army. But the few bred were greatly superior to all those I have seen in Asia with the exception of the best raised in the neighborhood of Herat and of Meshed where the

parent stock is much better than any I was then capable of procuring. Of four mules taken by me in the beginning of the present journey two were killed by falling down precipices through the conduct of my Indian Servants who were so much absorbed by fear for their own safety as to forget that the projecting loads of the Mules must strike against the face of the Rock and force the Animals over the cliff. A third was poisoned by eating the leaves of the Yellow Hyoscyamus of Tibut concealed in a bundle of fresh Lucerne. The fourth travelled six hundred miles in the mountains crossed the

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the Himaleh up to the foot of Mooz Tagh, recrossed its ranges by the line of Kashmir followed the mountainous head of the Punjab to the Attock, traversed Afghanistan and the chain of Hindoo Koosh reached Bokhara sound in good condition and was altogether so superior in form and size to the Mules in the Kabool Caravans and so well looking that the Minister of Bokhara intimated that he would prove acceptable to the King a suggestion which was immediately adopted.

When a country is so circumstanced as not to possess sufficient facilities for bringing the breed of Asses to the point of perfection of which in a happier locality it is capable of attaining the substitution of Mules is a ready and safe expedient and preferable to a race of weak Asses. But when the Parent's Stock of the Ass is of great promise and the locality so favorable as to require only the operation of time and the exercise of the judgement of man to develop their capability to high perfection it is presumed that the Ass may with advantage be brought to supersede the infertile animal. But by what has

X Note 3

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has been said it is not meant that the Ass can ever rival the Horse in heavy draught but if the weight to be removed be capable of being divided without entailing inconvenience or risk of injury in the shape of a load on the back it may be found in relation to comparative cost of the animal and apparatus, expense of maintenance and speed to be the preferable means of transport.

He will become an accessory of no inconsiderable merit to the Horse in minor labors and cannot fail to become a most useful appendage to every farm provided his spirit be not broken by coarse and unmanly treatment. I have mentioned before the preference given at Bokhara to the ass for certain functions. At that city a moderately good, young and sound Horse of middle weight may be obtained for eight pieces of gold but a good active ass of four years old will bring twelve pieces and I have heard from

X It is not intended to assert that the Mule is always barren. See Mem, de la Société Royale de Berlin Tome 4ième. De la [illeg.] sur les maladies des animaux de S Dominique. The Roman Proverb " Cum ?Meld peperevit" must be taken with allowance.

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from ten to 12 pieces of Gold for Mares whilst among the Kuttughun Oozbuds the price of the best mare does not exceed thirty Rupees. After I had purchased the Male Ass before spoken of I could not obtain two females in foal to him for a less price than twenty five pieces of gold each, but the value of the produce became enhanced by his leaving the country and would have become particularly [?high] if ?Mares[,] provided the Kazee would have dispensed with the law of the Prophet before mentioned. Many of the enactments of Mohomet propounded in the Sharia or Code of Law do not manifest any considerable degree of that sagacity which pervaded his Institutes as far as Proselytism to religious opinions was in question. It was little to be expected that a Nomadic Arab should have endeavored to promote the interests of an agricultural or fixed mode of life but as a Merchant, as a Soldier and as a breeder of cattle it is extraordinary that he should not have perceived the influence of a valuable Male in improving breeds and that so discerning he should not have been aware

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of the Stimulus to procure the best animal for this purpose through the reward obtainable for his serving Mares. The possession of excellent breeds of Horses circumstanced as the Arabs in his time were must have been an object of great importance and it [is] singular that the efficiency of raceing [sic] in promoting the development of strength and of speed should not have occurred to him or that of having presented itself its value should not have caused him to relax something of that severity against games of hazard which induced him to condemn raceing by way of wager and to restrict it to a prize given by a chief or great man at the celebration of a Marriage feast and which however inefficient as to effect on breeding when analysed fails not to prove exactly the same as to the principle of chance.

It has been seen that the condemnation of taking fees for the use of a Stallion has thrown the best animal of his kind in the country into the hands of a foreigner. This incident however though pro tanto a bar to improvement is trifling in its effects compared to the prejudicial influence of an absurd and unnecessary prohibition law in respect to Horses.

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From various facts which it might here be unnecessary to detail it appears that Seleucus and his Successors of the Helleno Bactrian Dynasty founded a race of Horses round the Metropolis of his Empire probably not the Modern Balkh as has been suspected or related by Geographers and Historians of qualities admirably suited for military purposes. And to this day the best Horses of Toorkistan are met with in this vicinity in the possession of Hordes of Toorkmuns who not many centuries ago migrated from countries in which the breeds alluded to so far from been native were not and are not known at the present time. And it argues much in favor of this race of Horses as well as of the congeniality of the country for raising this animal that under the degrading management of their present Masters their quality should be so good as it actually is.

Now a days a number of Toorkmuns contribute to a Stocks Purse

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Purse for the purchase of a Stallion to serve their own Mares but seldom go to what is considered a high price rather preferring to husband their money and to procure a tolerably well shaped animal with some natural or accidental defect. But had not the breeders been restricted by the law from taking money for the use of Stallions the prospect of such a source of profit would have induced them to retain some of the very best Horses raised amongst them for this special purpose and the lower part of the [illeg.] might at this time have competed advantageously with the best in the world not excepting those of England herself.

In concluding my recommendation of the Ass of this country I may with safety assert that a person cannot go five miles on the road from Bokhara towards Sumurkund without meeting at least one thousand Asses ridden by men women and children or carrying many kinds of commodities to and from market. The only objection I know to the use of the Ass is that his small feet and legs sink in deep mirey roads however there are no

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no roads in Europe half so bad as the lanes and streets of some villages and towns in the Autumn or Winter when the last happens to be mild. The tenacious gluey quality of the mud which reaches nearly to the saddle girths is so great that the Ass is often set fast and in going to pay a visit to the Prince Governor of Kurshee I saw a Camel so embarrassed that his owner thought it preferable to cut its throat than to attempt to extricate the animal whilst my Horse though very active and strong could scarcely make his way through a mud which in its adhesiveness actually bore no very distant resemblance to Bud lime and which when diluted by rain is so very ?arenacious as to become a frequent source of Shibber a variety of Grease not known in Europe and also of ?Farry.

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Bread and Bread Corn

The Bread of Bokhara is so remarkably good in general that I was led to examine into its causes and began my enquiry with examining the wheat. This grain is sown for the most part in the Autumn and reaped at the latter end of June or the beginning of July. The Straw is delicate, the Ear small and short and the grain of the same description but the flour is white well tasted and free from foulness of any kind. The Wheat is left standing till it is most fully ripe in fact I examined the crops frequently when I found them stand so long in the expectation of seeing much grain fall out of the Ear and was surprised to find not a single grain dislodged. I enquired the reason of this phenomenon from farmers some of whom asserted that it was owing to the circumstance of the grain having been sown in the Autumn which gave its whole constitution great and uniform strength. But that Spring Wheat was somewhat apt to shred or let fall its grains from

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the ear in windy weather when fully ripe owing to its system being weak. The experience of these people was confined to the vicinity of Bokhara and they did not all agree as to the facts of the case except in regard to the strength of the constitution imparted to the plant by the cold of the winter. It must be remarked that during the time of the wheat being ripe or nearly ripe no rain falls at Bokhara therefore the dry state of the Ear is never [illeg.] by moisture but contraction in the husk continues to go on whilst the grain losing its moisture shrinks and shrivels though the continued dryness of the Atmosphere. Perhaps the eating down the blade in the Spring or the cutting it off which amounts nearly to the same thing may contribute to strengthen the root and the whole plant as it diminishes the Straw &c. in length and thickness and gives it more stiffness but it is conceived that the principal cause of the grain not falling is the uniform dryness of the Atmosphere and to the [illeg.] maturity of the grains and its exemption from the influence of moisture may be

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may be attributed the excellence of the material. After this the processes of grinding and of baking seem to be as perfect as possible. The flour ground either by water mills or by Horse Mills never stands on hand. The wheat is bought by the Baker who in the City or even in villages if a water [mill] be not near the latter has always a Horse Mill attached to his establishment. The mill is worked by four Horses, the Hopper and stoves drawn by an horizontal log and Spur Wheel is always placed within the Horse walk. The flour is immediately carried to the Bake house which is separated from the Mill merely by a small open Area in which the brush wood for the oven is piled. The Diameter of the walk is 24 feet and the horses are worked without winkers as is the case with all those worked in carts a fact which shews that the practice of working draught cattle with winkers is a bad one through being productive of accidents in Curricles, Buggies &c. Here the Horse is broken in to see what he is to do and the consequence is that he is never frightened when he

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he sees the vehicle in which he is drawing following him. The Bake house is well contrived. One side of it contains a raised shelf of brickwork and an Oven. At the end farthest from the Oven is a broad not very deep jar or pot of earthenware in which is lodged the flour from the Mill. Near to that but nearer to the Oven is a second jar over which hangs a sieve of raw silk. This has a wooden handle. The flour is thrown upon this shaken the fine falls into [the jar] the Bran is put into another jar in front of the two former. Still nearer the Oven is a wooden Tray in which the Dough is put together and worked with water and Leaven. When rising it is weighed out thrown upon another floured table in continuation of the former and whenever [a] layer is completed [sic] a cloth placed over the circular pieces of Dough serves as a floor for a second layer laid in the intervals. The Dough now passes to two other persons on a turn of this Table of whom the first flattens and rounds it then throws it to the second who places it upon a roundish Turband or Pad

of cloth where he extends it still more when it is taken to the Oven a structure which observes [sic; sc. deserves?] a plan and description.

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Of the Guiney Worm or Rishta

The inhabitants of Bokhara and its vicinity from time immemorial have been greatly troubled with the Guiney Worm or as it is here called the Rishta in various parts of their bodies in the Summer season and Strangers who visit this City are frequently also attacked by it.

Except the King, his Minister and some Secretaries no other individual is acquainted with the extent of population of Bokhara of which Slaves make up at least one third part. The Walls of the City are from eight to nine miles in circumference, the houses are generally two stories high and the streets narrow.

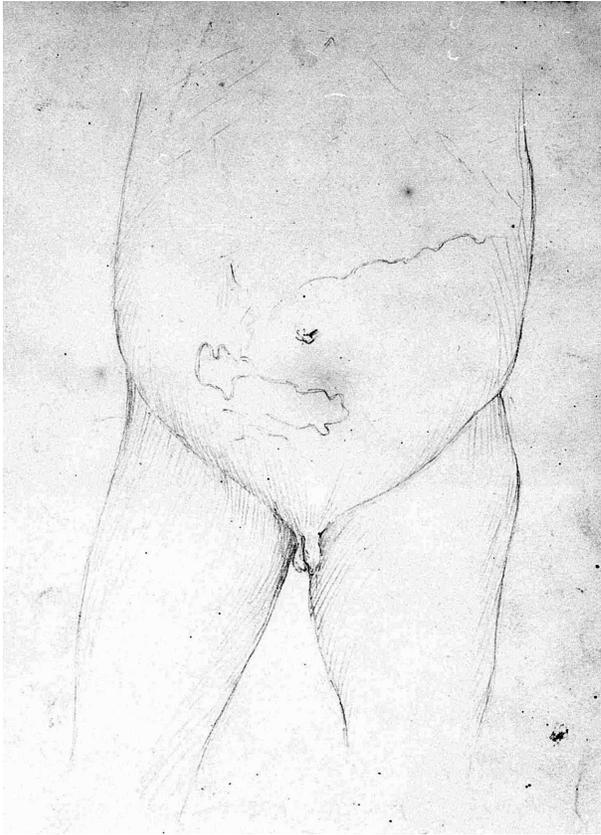
Contrary to the condition of the cities of Asia in general there are no gardens within the walls and scarcely a single empty space of considerable extent with the solitary exception of a piece of low ground occasionally submerged by rain water.

The houses are crowded as closely as possible and the areas or courts belonging to them are no larger than are necessary for the accommodation of a few horses of which almost every family in easy circumstances possesses some. None of the houses are untenanted[. U]ntil the last few years Bokhara

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Bokhara was visited by caravans consisting each of from some hundred to several thousand Camels and Horses from Russia China Persia the Asiatic Turkish Provinces from Afghanistan and from India. This City was in fact the Emporium of Central Asia and its population was and is very numerous--perhaps little short of one *[this number shows signs of being erased and rewritten--ed]* hundred thousand persons. About sixty years ago an ingenious Barber of this city discovered a simple method of extracting the worm when its body was discoverable by the touch under the skin. This individual was very successful in pursuing the practice he himself had invented and instructed several persons in this novel branch of Surgery. His son Meerza Umr surnamed Rishta Kush or Extractor of Rishta is the most expert operator in this line in Bokhara and I have seen him extract twelve Rishta from eight different persons within an hour. One man who was apparently a person of some importance gave him sixpence as a fee the others at the rate of about two or three pence and for the poor the operation was performed gratuitously. He stated that he extracted seldom fewer than fifty worms a day with his own hand and he had two or three assistants. He stated in the hearing of many persons that about one

[Sketch page showing belly of a boy with guiney worm with caption "Sketch of Rishta or Guiney Worm on the belly of an Oozbuk lad named Mookeem at Bokhara, June 1825." This is followed by its verso which is blank.]



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half of the inhabitants are visited annually by this plague every year. His assertion was not contradicted by any of the bystanders and it may not be an extravagance to set down the number of persons afflicted by the Rishta as amounting to one hundred thousand persons in Bokhara provided the population be as numerous as reported. From good authority it is understood that there is not a single family exempted from its presence in the instance of one or more individuals. + Few persons who have one are fortunate enough not to have more and the wife of a [illeg.] Merchant of my acquaintance had sixty extracted from various parts of her body in one year whilst he himself was confined to the home for six months from the fever soreness and weakness which accompanied the presence of several by which he was likewise attacked. Meerza Umr informed me that he knew of ninety worms having been extracted from one person in one season. Neither age nor sex is exempted from the attacks of this troublesome inmate but there are numerous instances of individuals who during a long life have escaped wholly without injury from the influence of these causes which appear to have produced its development and growth in others under a state of exposure exactly similar to that of those who

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who have suffered without the former having adopted any medicinal or other dietary precaution. And the enquiries I have made principally directed to food drink and the state of the digestive organs have thrown no light upon the cause of this desirable exemption. Several persons die every year from the breaking of the worm within the body many individuals are confined to their house from two to six months from suppuration, and sores consequent on the presence of this worm and those who are freed from it are easier are subject to its attacks the year following if they have passed the summer at Bokhara. At this season, the number of persons lame from Rishta in their legs and who are seen sitting in the road side in the suburbs of the city is enormous. Female Rishta kush attend the women of families who are attacked by the worm a practice imposed by the seclusion under which the fair sex suffer especially in this country. Nearly a year elapses before the unfortunate Stranger who has visited Bokhara during the hot season is aware of his having received within his body this insidious intruder which

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in Bokhara gives indications of its presence in the beginning or the middle of May if the weather be warm if not a little later. In some persons a sudden and violent heat is felt throughout the body when the worm has reached the inner surface of the skin. In others the heat is confined to the part in which the worm is about to penetrate the skin. A few instances are known when the patient has been affected with fits. More frequently darting pains have been felt like those which accompany the malignant Ringworm. But most commonly the presence of the worm in a part near the surface is announced by little more than considerable itching in a part of the skin next by slight elevation and redness sometimes a little diffused but more generally limited to a small space in the centre of which is a spot more intensely red circular about a quarter of an inch in diameter pointed in the middle which rises into a small vesicular pimple distended by a small quantity of thin fluid of a light yellow color. When the cuticle be broken of itself from the distension below or behind it a small circular cupped ulcer is discovered of which the sides are perpendicular and the cavity ordinarily about an eighth or a tenth of an inch in depth. Exactly in the middle of the hole stands the extremity of the worm white shining and stiff.

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stiff. The wound looks as if it had been made by a circular punch which had taken out a minute portion of the skin. Things do not however always happen in this course. When the red spot has appeared the worm sometimes withdraws its point raises a second pimple which it quits and finally pierces the skin in a third place where it becomes visible as before mentioned. Of itself it cannot project beyond the skin or at least does not do it more than a third part of an inch and rarely indeed extends its point thus far. In the one and the other instance sometimes a portion of the worm is left like a stiff thick thread in a greater or less extent lying under the skin occasionally traceable in a continued though irregular line for two or more inches but more frequently discoverable only in points or short lengths with spaces

intermediate in which it cannot be felt. Sometime it lies so superficially as to be visible in a ridge and I witnessed a case of a boy in which it was to be seen stretching all the way from the groin across the belly above the navel and terminating just below the last false rib on the opposite side. The movements of the point by which it worked its way felt under the finger like the

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smart strokes of a small artery and the vibratory motions were more especially discoverable at the points in which it had formed angles as if it was endeavoring to straighten itself. A slight sketch was taken of its course but when compared with the part a few days afterwards it was seen that the piercing extremity had receded two inches lower than at first and had taken a different direction. The boy experienced no other inconvenience than a slight sensation of itching at and around the working extremity but this was not attended by any disposition or discoloration in the skin.

Note--I know not whether the perfect coagulation of the blood in living arteries and veins affects always the same character in each respectively. But with the obliterated [?obstructed] Jugular Vein of the Horse produced by inflammation sometimes[,] certainly caused by the pin having pierced the vessels and the [illeg.] having been tied up in the ligature I have seen the coagulation which choked the cavity of the [illeg.] disposed in layers perpendicular to the course of the tube whilst in a Horse of Earl Winchelsea affected with fits when put to brisk exercise and of which both the femoral arteries were obstructed by an old coagulum the [illeg.] of the latter were disposed in concentric cylinders. And in a Horse belonging to Col. Palmer from the urinary bladder of which I had removed a Stone and which had symptoms somewhat resembling those of the Horse just mentioned and similar coagula were formed in the long obstructed Femoral arteries and if I mistake not I have witnessed this form of coagulation though in a much less degree in the clots of the portions of carotids of which the [illeg.] had been merely diminished through being included in [illeg.].⁵

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I return to the point of the worm discoverable in the middle of the ulcer which in other cases is seen there alone and cannot be traced by the finger in the surrounding parts. Here it seems not to have wandered superficially but to have proceeded at once with its point directed at a right angle to the skin whilst the rest of its body remains buried in deep seated parts and the difference of condition constitutes a necessity for an essential difference in the method of extracting which shall hereafter be noticed. There are instances and by no means infrequent of the worm reaching the inner surface of the skin and when instead of piercing this substance it discontinues its movements and dies. Its death is generally not marked by any obvious discovered action in the part in which it died. But like a stiff thread it remains quiet and is never absorbed. I have examined many from one year after their death and could discover no difference in their size by the touch. Whilst the

worm is alive it can be extracted through an opening in the skin made by the Surgeon, it can be extracted by the Surgeon or by the Patient himself through the opening the worm has made for itself but when it

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it has died under the skin without producing inflammation some process takes place through which the worm is so completely fixed in the cellular substance that it cannot be drawn out. I heard of this being the fact and then witnessed it. An operator had extracted several from a man whilst I was present and in the neighborhood of a place from which he had drawn out one worm but found another upon which he cut and having laid it bare pushed a probe across and under its body but it would not stir. He then examined the worm upon the probe found it hard, solid, elastic and that the adhesion it had contracted with the parts in which it lay was not to be broken except by actual dissection. In what way this apparently continuous union between a dead body and living parts or at least strict contraction is effected I leave to others to explain.

It is asserted that in some few cases subsequent to the death of the worm after it has reached or rather come in contact with the inner surface [of] the skin that an abscess forms greatly extensive in which the worm is found flaccid empty but not in any degree eroded or broken.

As far as can be ascertained from the reports of great numbers of persons no inconvenience is experienced by them until the worm has actually reached the inner surface of the skin when

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when general or local irritation takes place as before mentioned.

I return to the worm with its head lying within the cupped ulcer. Supposing it was to be seized and pulled out but left to itself the head of the worm dies three or four days after it has pierced the skin the surrounding parts swell & sometimes to such a degree as wholly to conceal the part of the worm which before was visible in which case the inflammation proceeds to form an abscess either from the dead portion producing the noxious stimulus of putrid animal matter or from fluid secreted within the worm and poured into the parts under the skin. X The fore part of the worm may die of itself or it may be killed by mechanical violence whilst the part within will retain its life for some days and excite no material degree of inflammation but if the worm be broken within the body the portion that remains buried soon dies and the inflammation and abscess which follow are severe and serious. It is not meant

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meant to say that the living portion of the worm remaining within the body continuous with the dead portion without the body becomes an independent worm through casting off the dead portion. Nothing of this [sort] takes place but if left alive it can retain its life for nearly two months but no longer for some time it produces no mischief unless it be separated from the dead part through being broken within the body when suppuration invariably ensues but if not extracted

before the period mention[ed] it will certain[ly] cause suppuration. The Surgeons of Europe except those who have visited tropical climates and the Surgeons of large Hospitals have but little opportunity of becoming familiarly acquainted with the Guiney Worm. When their assistance is required it is only after the worm has actually pierced through the skin for the purpose of extracting it or when [an] Abscess has formed through neglect or accident at the last stage of its consequence the ulcer produced by the loss of parts when the matter of the Abscess has been suffered to make its way through the integuments. *[This sentence apparently sic]* The Surgeon or the patient himself at the suggestion of the former ties the loose end of the worm to a bit of quill, [illeg.]in some foreign substance larger than the orifice in the skin made by the worm and winds upon this as much of the body of the worm daily as can be brought out by gentle pulling avoiding most carefully the employment of such a degree of force as to hazard it being broken.

This at least was the practice at the Infirmary of Liverpool in which probably there

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there were more Patients with Guiney Worm than in all the other Hospitals of the British Empire taken collectively. Whether any improvement has since taken place I am ignorant, I confine myself to the practice of Messrs Park, Lyon and Alanson all excellent anatomists and able Operators. Oostad Nuzzeer Barber Surgeon at Bokhara called many times every day to extract the Guiney Worm from out of the hole in the skin it had made for itself was frequently successful in bringing it out entire but occasionally failed through it snapping and became exposed to the charge of unskillfulness through an accident which uniformly brought on swelling and abscess to the part, fever to the system and was sometimes even fatal to the patient.

It occurred to him that when the worm was discoverable in a considerable extent just under the surface of the skin that it might be extracted through an opening made by the knife with more ease than through the opening in which its head was only just seen when the worm was suffered to pierce the skin. Oostad Nuzzeer is dead but his operation is performed with great skill and dexterity by his Son and Successor -- Meerza Umr -- that can scarcely be surpassed.

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The principle of the operation consists in raising the worm out of its bed by means of a sharp pointed probe thrust under across it through a wound in the skin and in bringing it out in the form of a loop or noose. The circumstance favorable to the performance is a superficial [appar. sic] of the worm in a continued line of considerable extent rather than in meanders or crossings with short runs interrupted by spaces in which its direction cannot be felt but this latter condition though involving more of difficulty and of complication than in the former instance amounts not to a prohibition. In Bokhara an individual who experiences an unusual irritation and itching in any part of his body followed by a red spot in any period between the middle of May and that of July immediately suspects the presence of a Rishta and either endeavors to extract it himself, abandons the case to Nature or if he possess a small share of resolution has recourse to the aid of a Rishta Kush who if

the worm be readily discoverable by the touch in the vicinity of the pimple or red spot proceeds to perform the operation in the following manner having in readiness two short thin sharp pointed brass probe like needles but without eyes, a sharp razor, a silk thread and a bit of cotton wool. If the skin covering the worm be hairy he cleans its surface by two or three strokes of

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of the Razor. Having found the most free part of the worm or that which is nearest to surface he pushes the point of the probe superficially and obliquely into the skin immediately over it pulls up the engaged end and with the razor shaves off the small portion of the skin raised by the probe. He proceeds to insert the point of the probe into the cut edge of the skin raises another small portion of the latter shaves it off with the razor and repeats the cuts a third or fourth time until he shall have made a shallow wound sufficient to allow of the doubled body of the worm to come out for which an orifice of about a fifth or sixth part of an inch is found to suffice. If during this proceeding so much blood should escape from the cut vessels as to prevent his having a clear view of the bottom of the wound he wipes it off with a bit of cotton till the bleeding shall have ceased which speedily happens. He dips the point of the probe into the cellular substance of which he raises a portion and shaves it off. This he finds necessary to repeat twice or thrice in general if the worm is somewhat deep and it occasionally occurs that the layer of cellular substance

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substance is so thick and hard as to necessitate the introduction of a second probe between this and the membrane. Having pulled this rather tightly he shaves it off the first probe serving to guard the surface of the worm from being cut a precaution of essential importance. The probe is now inserted still deeper and practice has given to the operator a tact so correct that in bringing the point upwards he exhibits the naked body of the worm lying across the probe. If however there should be any resistance to bringing out the probe indicating the instrument to have passed under some uncut portion of the cellular membrane he cuts this away completely before he raises the worm. Ordinarily however there is no impediment of this nature and within the space of a few seconds of time from the first cut the doubled body of the worm is brought through the wound in a loop of about an inch in length. Passing his fore finger through this he extends the loop to about two inches. He now places the limb or other part of the body in which the worm is situated into the most relaxed position of which its muscles and skin are susceptible and with which he is thoroughly acquainted. With one hand he squeezes pulls up and rubs the muscles and skin of the parts surrounding the wound he has made whilst with the other of

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of which the fore finger is engaged in the loop of the worm he gently draws it towards him then lets it go towards the skin and by an alternate succession of pulls and relaxations engaged with great delicacy he not only disengages a considerable portion of the worm thus doubled but discovers the end [that] furnishes the least resistance and quitting the pull on the loop directs his efforts by drawing and

releasing this till he has succeeded in extracting this end completely. He now pinches the worm close to the orifice between the nails of his forefinger and thumb and draws the fluid it contains towards the end which has been disengaged which is more than usually surcharged whilst there remains a flaccid or nearly emptied portion of the tube intervening between the naked extremity and that still buried under the skin. Whilst pulling and relieving successively the

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the portion of the worm still within the body a part of its fluid contents escapes into the flaccid part in proportion as more and more of the worm comes into the fingers of the operator. In common the time employed between the first incision and the complete extraction of the worm does not exceed two minutes and seems to be attended with little more pain than that necessarily produced by the cuts in the skin. The operator having examined both ends of the worm shews them to the patient that assured of their being entire he may [be] freed from all apprehension of the swelling abscess and general irritation of the system consequent on the breaking of the worm so that part remains within the body. The object of the moulding of the muscles and of the skin is to loosen as much as may be practicable the worm from its intimate contact with the parts in which it is engaged and to take its body from the stretch in which it is thought to be and the alternative tightening and relaxing the worm by the operator is supposed and not without reason to facilitate the extraction

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extraction much more than a dead and continual pull. The drawing the fluid of the worm from the part still entangled in the body to the loose extremity is by affording an empty space in the part of the tube nearest to the former to receive a portion of its contents and thus to diminish the mischiefs which follow the snapping of the worm to which a large portion of the fluid in question is supposed mainly to contribute. This is the ordinary course of the operation and these the motives of the manual practised.

But things do not always happen thus the worm being sometimes though not often found to have taken a direction directly opposite to that in which it first proceeded and by this return to have formed an entanglement in the cellular membranes almost resembling a kink or twist which opposes difficulty to the extraction. When from the stiffness of the resistance opposed by the worm to his pulls the operator

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operator suspects that he shall not succeed in extracting the worm at one sitting by one round he endeavors to ascertain at what point the entanglement is situated and if he find it to make a second wound upon that part, or if he cannot satisfy himself in this respect he proceeds to cut open such other portion as he finds to be superficial and liable to give way to a pull from the first wound. Having brought up a second loop he pulls gently to discover which side of it communicates with the loose end brought out of the first wound and whether the knot or impediment is

included in the portion of worm between the wounds or lies on the other side. If he finds that in pulling the worm from the new cut it brings toward him the portion that still hangs out of the first wound he strips the fluid from the part of the worm nearest to the orifice into its loose extremity ties the flaccid portion with a thread of silk breaks off the loose end which has been surcharged with fluid and withdraws the part intermediate between the wounds along with the Silk through the second wound. If on the contrary the worm draws more readily

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readily from the first wound he extricates the other end of the worm through the new wound ?stuffs into its extremity as much of the fluid as he can from the middle portion ties the latter with a silken thread breaks off the worm and pulls out the remaining part and the silk through the first wound. Sometimes though very rarely it happens that one end is so firmly engaged as not to be extricable without risk of being broken in the body. In this case the operator places a bit of greased ?rag upon the wound the worm having its broken end tied with a thread of silk hanging out of the orifice and if it be the leg, thigh or arm wraps it around rather tightly with a bandage directs the patient to take exercise until he shall have perspired fully not difficult matter in the season of the Guiney Worm and to return to him in two hours. At this time the Operator generally finds the worm may be drawn out and scarcely ever fails to extract it with facility. In fact the Operator seldom if ever fails to extract the worm completely either in its entire state or in two portions at one sitting when the

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operation is performed before the part in which it is situated has begun to swell. When the Operator is called upon to extract a worm of which the head lies within the wound or ulcer formed by its presence through the [?] he seizes its point in hand in a bit of cotton placed between his forefinger and thumb and having drawn out an inch or two relaxes the u7muscles and the skin by position as before mentioned and squeezing and rubbing the parts surrounding the orifice proceeds to extract the worm by an alternate succession of gentle pulls and relaxations as already noticed. If the worm shall have been dead for three or four days its fore part will be empty greatly diminished in diameter will have lost its worm color and have acquired that belonging to a thick thread of wet white silk. But as it is drawn out it is found to have retained its vitality and natural thickness and color. Should he find the worm to stick firmly, after a certain portion has been drawn out he strips out whatever fluid may have been in it and leaving this emptied part lying in the skin, guards the surrounding parts, ties them until they admit of their being drawn and after the lapse of two hours employed in brisk exercise repeats his labor which generally proves

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proves successful though in some rare instances the operator prefers to defer his attempt to the following day. But if much swelling has not [illeg.] it seldom indeed occurs that the complete extraction is delayed longer than the second day of the

attempt. When through considerable swelling of the integuments and subjacent parts the head of the worm has become concealed or buried in the wound or as it were become retracted though this last condition in fact does not happen or that the head is so tightly girded by the thickened state of the skin and cellular membrane as to convey the idea of the worm being firmly fixed in the parts below the operator has not yet attempted to dilate the orifice with the view of discovering whether the enlargement of the opening in the skin would not enable him to extract the worm but waits until an Abscess shall have formed and pointed when he divides the skin at the most elevated part. *[This convoluted sentence apparently sic]* The Operator is greatly apprehensive of proceeding to extract the worm when he finds it not readily to yield to its efforts under the case of swelling and always refers the difficulty

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difficulty to the worm being fixed in suppurated parts rather than to the diminished calibre of the orifice from the degree of deposition that has taken place in the skin. At this point the practice of the Bokharans is apparently defective. The centre of the wound always offers the facility of a guide either in the orifice not wholly closed or in the worm itself which a slight cut made with precision would almost certainly bring into view. As far as I can judge the dilation of the stricture would enable an operator with a good hand to seize the head of the worm and from the examination of many cases I am led to think that for several days subsequent to the swelling in the skin the effusion in the parts underneath remains fluid so that the enlargement of the ulcer would bring to view the head of the worm [and] enable the operator to lay hold of it and thus to save his Patient the very formidable consequences of the formation of matter sometimes to a great depth with a formidable destruction of parts terminating occasionally in an ill conditioned ulcer and as has been noticed not very infrequently leading to Death itself. I observed that the extraction of the worm by means of the probe when there was no inflammation was

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was effected with much less force than when its extremity by its own [illeg.] had pierced through the skin and an attempt was made to extract it by this opening it had formed. I recollect likewise that the degree of force I have employed in drawing out only a few inches daily from the bodies of Sailors who had come from the Coast of Africa to the Liverpool Infirmary exceeded that exerted by the Rishta Kush of Bokhara in bringing out an entire worm of twice the thickness of the former and of three feet in length in the course of a few seconds. Had I not gained experience as to the change which takes place in the worm after it has died I should certainly have considered the Rishta of the Gold Coast and that of Africa as different varieties of the same species. Through my unskilfulness and anxiety to extract the worm speedily I broke the first two I attempted to extract but the serious consequences of this accident rendered me more cautious and more successful on subsequent attempts.

It was asserted by sailors that the part which was broken within the body remained alive and

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and presented itself in another place but observations made at Bokhara have convinced me of this being a mistake and that the worms which afterwards pierced the skin were different individuals. An instance of the Guiney Worm having been brought under the notice of an European Surgeon before it had actually pierced the skin is it is presumed not upon record as Europeans are so seldom attacked by the Rishta as not to be aware of the nature of the pustule by which they are troubled until the worm has actually pierced the skin so that they have had little or no opportunity of devising any other method of freeing the patient from this troublesome visitor save by that usually practised. The mischiefs which result from the breaking of the worm of Bokhara are not less formidable than those witnessed at Liverpool and these appear greatly disproportioned in magnitude to their cause. A person who has nourished many Rishta within his body for several months is wholly unconscious of their presence until they shall have made their way to the skin. In this place I shall beg to assume that the egg of the Rishta is taken into the stomach is

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is there hatched subsequently traverses the exits of that organ or some other part of the alimentary canal and by a path more or less tortuous pierces through the parts which intervene between that canal and the skin. This at present may appear in the light of a mere supposition and thus it may be expected to stand until the facts upon [which] this conclusion is founded shall have been exhibited. The absence of all feeling like irritation until the worm shall have attained the situation just adverted to may tend to shew that it is not the mere presence of the worm as a foreign body which produces the inflammation and abscess.

Until the worm shall have raised a red Spot upon the skin or a deposition more or less diffused in the cellular membrane which raises the form as sometimes happens it rarely happens that there exists any symptom of local inflammation. Nor does the collapse of the sides of the tube which the worm had formed apparently excite the smallest alarm or reaction in the greatest number of cases along the tract in which the Worm may provided it be carefully extracted before

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before it shall have made an open break in the skin. I prevailed upon the boy who had the Rishta lying across the front of his belly to have it extracted in my room and another person accompanied [him] to have two removed. On the following and other days I examined the lines in which the worms had come but could not by the eye or the touch discover the least difference between the state of the skin there and in the neighboring parts. Thus whilst alive the Rishta causes not in general any perceptible irritation until its head begins to penetrate the skin when inflammation takes place generally for a day or two confined to a spot before the head of the worm has raised the cuticle into a small vesicle but which becomes diffused not only over a larger surface of the skin and is attended with great effusion in the cellular membrane & with other inflammatory actions ending in suppuration and destruction of deep seated parts as well as of the skin itself if the abscess be not

timely opened. This condition attends or closely follows the death of the head of the worm I mention pointedly the head of the Rishta because it seems that the whole of the body of the animal does not die at the same time that the head dies but that the destruction of its vitality goes on slowly and successively proceeding from before and going backwards. It is not quite clear whether the death of the rest of the body is a necessary

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necessary consequence of the death of the head and if the latter part were drawn out until the living part of the body were in the mouth of the orifice and this process were to be carefully performed once in twenty four hours so that the dead part should never be for a longer period within the skin it seems possible that even the vitality might last up to the last inch. But it appears also that the worm can not live either partially engaged within the skin or situated wholly below it longer than a period of two or at most three months after its presence shall have been recognised. The season for the Bokhara Rishta making its appearance in the body extends from the middle of May until the middle of July after which last date it either dies or remains quiet as in the cases where it has not pierced the skin or produces [sc. produced] suppuration where it has penetrated to the surface. The condition of being situated in a certain degree of fluid seems indispensable to the continuance of its life. It is in fact a water worm and cannot live in the air. But neither can it live surrounded in the body fluids of another animal longer than a certain period which is that of its natural life. It has accidentally quitted its natural nidus, has been hatched and nourished in one that it is not natural to it has

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accommodated itself perhaps with gratification to the advantages of its artificial site until the full development of its strength has developed also the instinctive impulse to search out its mate for the purpose of continuing its species. Perhaps the life of this animal in its natural locality little needs the period of twelve months when having furnished a new offspring it has completed one object of its existence. It has been shewn that the head of the worm cannot bear the contact of the air without dying and that it may be drawn out gradually in the manner commonly employed in Europe--till the whole be extracted without much mischief to the skin or to the tract in which it has lain. But if the dead part be buried below or within the mouth of the ulcer and not be drawn out as before stated or if it be mechanically broken off in its living parts within the body inflammation and suppuration are the inevitable consequences. Does the dead worm poison the parts in which it may lie by the mere stimulus of putrid animal matter or is there some poison of a particular specific nature poured into the parts from the mouth or the intestines of the worm? or fluid secreted perhaps to poison or stupefy its prey in its natural situation and which

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which attaining perfection when it has reached the skin is there opportunely thrown out [of] the vesicle? The latter supposition may appear gratuitous as there exists not a single circumstance to countenance the idea of any other instrumentality

being necessary to the progress of the worm than that which is merely mechanical. What then can have originated a speculation apparently so strangely remote from probability?

Meerza Umr pulled a Rishta with too much force; its body snapped in two a drop of fluid from one of the portions spurted into his eye and produced immediate pain with a great flow of tears. He washed and wiped his eye as soon as possible but the vessels of the membranes filled largely and the lids were swollen and nearly closed the day following. The Rishta in its [illeg.] state is to be found in two conditions as to its intestines. When extracted early in the season and I attended at the Shop of Meerza Umr as soon as apprised that a Patient had presented for operation I remarked that a brown line like a minute thread ran nearly through its whole length generally continuous but in points interrupted though the interruptions were not permanent. The brown line was the intestine in its collapsed or empty state; the interruptions

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indicated the presence of Chyle the whiteness of which distending and thinning the contents rendered their vascular structure no longer visible. The diameter of the worm at that time was less than that of the worm in June. The circumstance reminded me of the brown line perceptible in the bodies of the Ascaris which settled in the wind pipes of the Ram Lambs of the Merino flock of his late Majesty when feeding on rank ?aftermath in a wet autumn. The worm was seen plump and uniformly white whilst the lambs were on green food and shrunk and shewed the brown line when the Ascaris was thrown out of condition by the Lambs being confined to dry food in the Conservatory of Buckingham House. As the weather became warmer I observed that Rishta became thicker and fuller its intestines were so distended with Chyle as to be wholly white without the smallest vestige of brown line.

From the cylindrical or slightly concave extremity which is the head the color is an opaque white till within about an inch of the hook or tail which latter part is filled with

Note: It may be remarked as not unimportant to agriculture that under a strengthening course of medicine suggested by Mr. Fulk[?] along with dry food all the Lambs thus treated recovered.

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with a fluid colorless and thin. If the Rishta be broken a white fluid like cream may be stripped from its intestines and the general tube will appear like a semitransparent membrane resembling a strip of Peritoneum of the Horse deprived of its elastic ligament. I passed a Rishta through the Muscles of the heart of a fowl in its whole length like a ?Seton with the ends hanging out then a second in another fowl but broke it half way in its course through the Muscles in imitation of the rupture of a worm in the human body and a few threads of raw silk of the same size were run through the heart of a third fowl. No difference was observed in the result. Into the muscles of the heart of a fourth fowl I injected the contents of [illeg.]

Syringe of water and into that of a fifth the same quantity of the ?stuffings of Rishta diluted with water so as to allow of its passing through the tube. There was no difference in this result. Perhaps I had a bad subject for the experiment. The domestic Fowl is not attacked by Rishta its powerful stomach perhaps crushing the Eggs when taken in but the domesticated Sparrows and Lark

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with less powerful Stomachs are attacked by Rishta which affect the inside of the Thigh as their point of exit and the bird ?does well. It has been remarked at Bokhara that the Rishta which excites the formation of abscess whether from its gradual death from exposure to air or from its sudden death from breaking when discharged along with the content of the Abscess is found always empty and reduced to its outer skin which retains its toughness. The question of there being any other poison save that of dried animal matter remains undecided but the facts collected warrant the following conclusions in relation to practice Viz

1st. That when the head of the Rishta is discovered by the red spot before the Vesicle is formed, in nineteen cases out of twenty as much of its body may also be perceived by the sights [sic] or the touch or by both as may enable the Surgeon to lay it bare by an artificial opening and to extract it at one sitting with perfect safety to the Patient if

X Sparrows are domesticated in Bokhara for the purpose of amusing persons who teach them to fly from the finger to a certain height in the air when they remain stationary & fluttering for a time and return to the finger. The ?Khuttaghars educate the Goldfinch for the same purpose.

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if the practice detailed be strictly followed.

2d. That when the head of the Rishta is discovered in the ulcer and can be seized between the thumb and the finger by the intervention of a little cotton wool it may in general be extracted in one sitting or in one day or at most in two days by adopting the method before described as applicable to this condition.

3d That when the head of the Rishta cannot be drawn out any further than the dead portion extend, instead of pursuing the ancient practice of waiting day after day for the death of the exposed part of the worm for three weeks or a month with the risk of breaking it by pulling it daily to a considerable strain it is preferable to cut up the orifice made by it on each side and to proceed to extract it at once by the mode pointed out. For according to the observations I have made the resistance of the worm arises partly from deposition in the skin consequent on ?local ?circulation by the worm having ?reduced the hole formed by the worm to a diameter too small

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small to admit of the passage of the living portion and which even pinches the dead portion reduced to a mere thread of skin and partly to the hold the animal exerts in its exertion to withstand the unusual sensation of pull exerted upon it. The

dilatation of the hole will be sufficient to answer the purpose of removing its strictured condition[,] and the hold established by the worm through its stiffening its body, through its convolutions in the cellular membrane and through its having fixed the ?hook of its head or extremity or ?tail in some part may be overcome by relaxing the skin and muscles and by gently pounding squeezing and rubbing the substance in which it is buried so as to bring it into a loose and relaxed condition.

4th. That when the head of the Rishta has not been broken off but has been ?crushed or buried through the swelling in the skin it is practicable to dilate the wound and to extract the head which deprived of life must remain in the part where its first extremity, say two inches, first died. It is stated positively must remain because progressive movement of the worm is

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affected by its anterior extremity alone as I have seen by watching its mark under the skin and when placed in hot water. The head can certainly retrograde to a certain point but it is presumed that its power in this respect is limited it being apparently necessary that it should seek the surface. In fact it is not to be made out that a Rishta which has once reached the inner surface of the skin although it may leave one point and go to another has ever replunged and been lost in the body. Both in the natural situation of the Rishta as will be shown and in its parasite condition the tail seems to have little other function to perform than that of hooking itself upon some substance. It cannot of itself retrograde or proceed and thus when the very active parts of the anterior extremity which from observation I calculate at two or at most at three inches dies the posterior portion must remain in situ until the structure of the parts in which it lies shall have been broken up

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up by the process of suppuration. Of the truth of the preceding statement I entertain not the slightest doubt so that the Surgeon who is perfectly well acquainted with natural and diseased structure cutting into the recent and contracted ulcer made by the worm will certainly find its head and as certainly draw it out. The operation requires nothing more than the employment of the most ordinary requisites of a Surgeon. The practice of Meerza Umr is perfect in respect to extracting the worm by an artificial opening and equally so when the worm hole has not been too much strictured by deposition to admit of its passage but when this has happened and when the head of the worm has been wholly ?buried by swelling in the pierced point it is timid and defective. I have furnished [him with] a minute [illeg.] & other instruments explained my views which he has fully adopted with the most sanguine expectations of success from their application to practice. I would not rob him of the merit of perfecting the treatment of Rishtas but if he prove apprehensive shall be compelled for the sake of humanity to operate myself upon two or three cases to remove his fears.

I shall also inculcate the propriety of making an opening into neglected cases of Rishta as soon as penetration can be discovered as the

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the Rishta must of necessity be there as its obstruction must diminish the mischief and save some of the parts which must be destroyed by deferring the opening until the matter softens. Having stated that the diameter of the hole formed by the worm end in the skin contracts from deposition taking place in the skin in consequence of the injury done to it by the Rishta it may be suspected that the worm itself might have been strangled by this constriction rather than by the worm being found in a new element. It is to be observed that when the hole is first seen with the worm lying in it the former appears too large for the latter which seems as it were loose. And when this worm has been extracted it scarcely gives any signs of life and speedily and quietly dies. But if when apparently lifeless it be placed in hot water (96 ° Fah:) it soon shews signs of returning life and ultimately works from two to three inches of its anterior extremity with some activity carrying the point of it to the

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the surface of the water if this be not above two inches deep above its head sometimes to about an inch but always withdraws it rapidly as if from some disagreeable impression. At the risk of being considered desultory in reasoning if not inconsistent in regard to opinions already advanced I shall venture to mention an instance that seems to support the supposition of the possibility of the constriction of the worm-hole squeezing the worm to death. Sir Thomas McMahon in Calcutta consulted me respecting a valuable Horse which had a worm in the inside of the Globe of one eye a circumstance by no means uncommon in the hot season in India and respecting which also if I mistake not a paper has been published as (Philosophical Transactions?) affecting Horses also in South Carolina. Mr. Surgeon Gibb First Assistant to the Honorable Company's Stud had frequently and successfully performed the operation of piercing the cornea with a Lancet through the wound of which the worm was forced along with the aqueous humor through the Globe being suddenly and violently pulled down into the orbit by the retraction muscle as soon as the cornea has been struck. X

X The application of the Extract of the Datura whether purple or white by dilating the Pupil renders the operation more safe and a smart puncture is more effectual than a slow incision

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This case was however so circumstanced as to interdict the operation just mentioned in consequence of the worm having pierced the Iris and one portion being in the anterior chamber of the Eye and moving as to its loose extremity with vivacity in the aqueous humor as if struggling to extricate its whole body whilst the other part remained behind this membrane. A fact or two had occurred which suggested a suspicion that the mischief done to the organ by the pressure of the worm was not effected so much by mechanical violence as by the action of the Horse itself which annoyed by this extraordinary disturbance in its sight accompanied doubtless by somewhat of irritation endeavored to relieve itself by rubbing its head against the head stall the wall or any hard substance near it. When the worm had

been discovered before the horse had thus rubbed its head and eye I had witnessed neither deposition within the aqueous humor nor opacity in the cornea but both were quickly produced by the violence with which the horse rubbed his head to get quit of the intruder.

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A worm had been seen in the eye of a Horse for a short time and had suddenly disappeared. From several observations I had reason for considering this worm (Trichuris?) to be a migratory animal and contended that it was better to wait and act according as a change of circumstance might indicate rather than to interfere with a worm thus delicately situated. Accordingly it was determined that the Horse should have his head covered as to prevent his being annoyed by seeing the worm of which the loose end extended as far as the middle of the Pupil and so secured as to prevent his rubbing the eye should there be an irritation produced by the movements of the worm. The directions given were most accurately followed. On the day following the movements of the worm seemed somewhat less lively and it appeared to have made little if any progress forward from which the possibility of its dying without effecting its extrication was anticipated and mentioned to Sir Thomas McMahan.

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Within the course of a week the anterior portion of the worm hung motionless perpendicularly from the hole it had made in the Iris and in contact with that membrane. I examined the surface of the iris immediately surrounding the point from which the worm was suspended, compared the size of the Pupil and the working of the membrane with the other eye but could discover no difference. Finally and within no long period the worm wasted was dissolved absorbed or in other words so disposed as not to be in slightest degree perceptible.

This case presents the curious fact of probably the most sensible and most irritable muscular structure in the whole frame apparently suffering no inconvenience from being punctured and forcibly pulled through the continued violent wiggling of an animal which during several days was engaged in its substance. And yet this membrane runs into inflammatory action most rapidly through a substance which naturally situated behind it was artificially placed before it.

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I lately performed the operation for the cataract through the cornea for a poor Hindoo at Bokhara. In one eye the lens was hard. In the other the cataract proved soft and the cream like fluid issued freely through the torn capsule into the aqueous humor.

Violent pain in both the eye and the head occurred within a few hours with swelling of the upper eyelid and vomiting before I was informed and had I not cut open the cornea to let out the fluid and to relieve the Iris from the pressure in its fore parts which putting it on the stretch forced it backwards on the almost empty capsule the eye would have been lost. And its subsequent dissolution however

effected as far as observation could be made caused not the slightest injury to the structure and functions of one of the most delicate organs in the body. It may perhaps be concluded that the worm in the eye was actually strangled by the muscular pressure of the Iris in its attempt to work its way through the membrane or by some deposition within its substance which was not obvious to me and this conclusion may as before noticed come in aid of the idea that the contraction of the orifice in the skin may destroy the life of the Rishta rather than its contact with a new element.

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But it must be recollected that the worm in the eye was actually migrating and had actually reached the goal of its exertion the surface of the body and that the delay it there experienced might have exceeded the natural period of its existence. Or it might have died for want of that food it had food it had [sic] found in its way from the Stomach of the Horse to the surface of the body. I speak here with some responsibility as to the power of making good the assertion but if the worm in the eye be compared with that which nestles in circular cells in the Stomach it will be found to be of the same family and little differing from that which is found in the coagulum which sometimes lines the anterior mesenteric artery of poor weakly colts and

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and often enough in Horses that were not previously to their death suspected to have labored under any malady. The latter worm is seen frequently with one portion of its body entangled in a coagulum greatly more firm than the structure of the Iris and the other projecting so as to influence the work of the torrent of the blood and yet is not strangled or killed by the toughness of the former or the flow of the latter. A Horse which died under an attack on the intestines in some respects resembling violent colic on dissection was discovered to have been killed by effusion of blood between the plates of the Mesentery being largely diffused over the intestines without any having escaped into the general cavity of the belly or into the intestinal tube.

The bleeding was traced to a small hole in the portion of the anterior Mesenteric artery before mentioned called by French Hipptomists l'Aneurisme de l'Arterie Mesenterique antérieure and it was suspected that the blood had been injected through that opening after its side had been traversed by a worm. Of the latter circumstance there was no direct proof but no cause more

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more probable could be assigned for the breach. I have found the *Ascaris Crinensis* (Crinon) with half of its body lying on the peritoneal surface of the intestine loop and the other half engaged in the muscular coat. This situation exposed the animal to pinches greatly more severe than the worm in the eye could possibly have experienced in the Iris. Another variety of *Ascaris* is often met with on the outer surface of the yellow elastic Ligament that is accessory to the Peritoneum in recovering its lesser dimensions after it has been greatly distended and this is seen

also on the outside of the elastic Ligament which is also accessory to the abdominal muscles. These worms must have passed an ordeal greatly more perilous than the mere traverse of the Iris by an individual of the same family. The fragments of the worm in the eye having been arrested by a membrane so weak as the Iris may almost lead to a belief that the Rishta somewhat ?mooted tendons and tendinous membranes and wound a tortuous course through the interstices of muscular fibres and through the cellular

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cellular membrane. Dissection of the human body being not allowed at Bokhara this road to truth is impracticable. A foundation for deduction may be deemed from analogy. At Lyons whilst examining the nature of that diseased alteration in the structure of Tendons that takes place by interstitial deposition subsequently to sprains I divided crosswise the Suspensory Ligament of the fore leg of a Mule which had been greatly thickened and perceived a white thread like substance project from one of the cut ends and move from side to side. On laying hold of it several [illeg.] were drawn out and on quitting it the thread retracted and formed a convolution upon itself. It was traced and found to be the Gordius, Dracunculus, Vena Medinensis or Gunay Worm as it has been variously called lying in a zigzag line in one of the vascular interstices of this ligament.

M. Hénon the Professor of Comparative Anatomy who had made deep researches into the History of Parasite Worms was asked if he had ever met with such an occurrence answered in the negative and for a considerable time doubted of the substance exhibited

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exhibited being a worm but at length became convinced of its independent vitality. More than enough has probably been advanced to shew the possibility of the Rishta having the force to penetrate parts of considerable density of structure but how it comes to pass that in its march it should not produce disorder in the living and sensible substances through which it passes appears to me not readily explicable. Could the Iris be pierced through the Cornea with an instrument as fine as the head of the worm of the Eye without producing effusion of blood and pain in a membrane so highly vascular and endued with such exquisite sensibility? Has the Rishta any means of facilitating his progress besides those merely mechanical? If a wound were made in the skin and a thread introduced through it into the parts underneath of the thickness of the Rishta by any contrivance Surgery could devise would not inflammation along its course be the consequence? How does it happen that inflammation does not take place when the Rishta pierces the body in the opposite direction? The Rishta

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the Rishta may be suspected of not creating any more irritation in the parts through which it silently though not very slowly wends its way to the inner surface of the skin than the bundles of muscular fibres moving amongst themselves or the pulsation of an artery in its bed or neighboring nerve. Does it enjoy this privilege

through being a living animal substance of similar temperature notwithstanding it separates and bores through structure possessing sensibility? Has there not been a preparation made against this insidious intruder that come from within? The Rishta gives not alarm apparently either generally or locally until it has reached the skin in piercing which it excites no other sensation than that of itching sometimes with more often without a feverish feel. Then and not till [then] the skin becomes inflamed and reaction takes place but not if the hole be fully blocked by the body of the worm and the [illeg.] part be carefully extracted in proportion as it loses its vitality. Do not the facts stated tend to favor the somewhat exploded opinion of ?mischievousness being exerted on a wounded surface by the admission of air? The hollow left by the worm when extracted from an artificial opening collapses and unites apparently without increased activity of [the] vessel.

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Why should itching be produced on the inner surface of the skin and not actual pain when the worm begins to pierce it? When the Rishta is extracted by an artificial opening before the skin is perforated but where the red spot with or without a vesicle points out that its head is there and the whole body is full of fluid. But when the perforation is completed and the head dies this part is found empty. Whether the fluid was discharged before death of the head or happened as a necessary consequence of that relaxation of Sphincters which accompanies the departure of life is not known. I placed three Rishta which had been extracted by artificial openings in cold water. They moved a little but after a short time the head of two seemed to burst with a spasmodic motion or jerk and a considerable quantity of milky fluid was discharged from it which diffused a cloud through the water. A second trial of this was repeated with water of blood heat and one of the three burst in the same manner and it appeared that the head had externally been split and a considerable length of intestine extruded. All these three were the longest of the whole. Whether the worms drank so largely of

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of the water as to burst from this cause or whether this explosion takes place when the worm has pierced the skin I have not facts to determine. But I know that always entire when extracted by an artificial opening it does not always explode when placed in water and never when it remains in the air. The much greater rigidity of the bodies of those worms immersed in the water than they possessed before augurs in favor of their having acquired it by imbibing fluid. The burst part was always in one spot its content seemed similar in all and the fluidity of the emptied tube was so nearly equal that if the intestine had not protruded I should have been led to suspect that the process was natural and that the discharge of the fluid was a means employed as an accessory to the mechanical power of the head and perhaps produced the itching and the blister. The speculation might have been carried so far as to suppose that in common a quantity of fluid proportioned to the ?work to be effected was discharged but then from the eagerness to drink that element which will be shewn to be natural to the worm deranged the process. *[6½ lines crossed out here, as follows]* ~~It has been stated that an acid quality belongs to the fluid of the~~

worm as proved by the accidental extrusion of a small quantity into the eye of Meerza Umr which bore out by the effects of its introduction into the body

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body of a fowl. The Rishta Kush of Bokhara believe most strongly that the fluid of the worm is highly poisonous but have no other proof than the mischief done to the parts in which a worm has been broken and the solitary instance of its really possessing acrimony by the pain and inflammation produced through the accidental introduction of a drop or two into the eye of Meerza Umr with which probably only one or two individuals are acquainted. But with this they are disposed to mix up the action of dead animal matter. On this latter point there are innumerable instances of proof that dead animal matter in other words dead Rishta will lie for many years in the body without raising the slightest disturbance in the part. And one worm has been seen to have died and been dissolved in the eye without creating any obvious mischief in that organ. Neither of these conditions of the loss of life superadded the process of putrefaction. Putrid animal matter introduced into the blood produce great mischief both in the part and in the constitution but not uniformly and constantly whereas the effects of the broken Rishta are uniform and constant

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a fact which almost countenances the idea of there being something of a specific nature in the fluid of the Rishta. However experiments are wanting to decide this point and the position in which I stand in this country forbids me to prosecute far a matter which more curious the important may perhaps have already been carried further than is useful in regard to practice.

I may add to the perhaps useless prolixity of which I have been guilty through observing that in the body of man and of other animals the Rishta is apparently naked and defenceless. Perhaps the acrid character of its fluid contents, if not gratuitously assigned may serve it as an occasional safeguard. Nature seems to have taken especial care of the safety of some of those Animals which make use of the bodies of other animals as a home for a certain stage of their existence in one form in their progress to another stage in a different form. But this care seems to be conferred to those classes which of necessity must be Parasites in undergoing their changes from one state of existence to another and not to those which by accident having in one condition entered an animal body accommodate themselves so far to their new situation as to undergo a second change and attempt to migrate but are incapable of preserving their vital principle so

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so far as to gain situations in which they could have an opportunity of continuing their species. The History of some of these animals has been well made out but that of others remains still involved in the deepest obscurity. Amongst the former the circle of the existence of those variety of *Cæstrus* erroneously called *Haemorrhoidalis* or commonly *Bott-worm* has been completely ascertained. MM Vallismere and Reaumur as commonly known first called the attention of Naturalists to this subject but adopted an erroneous opinion as to the mode by

which its eggs were introduced into the body of the Horse. M. D'Alambert in conjunction with M de Buffon made farther researches and as bearing upon the history of this [illeg.] in connection with that of the Horse the Ass the Cow and the Sheep. X & Mr. Chuberat Director of the Veterinary School of Charenton with the aid of M. Guinst proceeded still further . M. Bredin

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Director of the Veterinary School of Lyons confined his observations upon this matter to a MSS to which his Pupils had access. *[12 lines crossed out]*
And if I mistake not Mr. Heressant somewhat enlarged the field of action of the Œstrus by adding to the Horse Cow, Sheep and Deer the ?faeces of the Fox. Great progress however had not been made in the natural history, structure, and physiology of this insect until Mr. Hénon the able Anatomist already mentioned devoted considerable time to these points. The result of his researches were communicated by that individual, one of the best Entomologists of the age, to his Pupil Mr ?Eric Weborg late Director of the Veterinary School of Copenhagen and by him related to me. In that year 1791 I had the pleasure to hear Mr. Hénon deliver a lecture upon this subject which fully established his

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his claim to having detected the Fly in the act of depositing its eggs upon the Coat of the Horse and ascertained that the Mucilage by which they are smeared during their course down the Oviduct and by which they adhere to the ?penis was insoluble or nearly insoluble in cold water and also that they were placed always in situations which the Horse could reach with his teeth and never on surfaces differently circumstanced. He had examined the structure of the Pupa with the most rigorous attention and after demonstrating the mechanism and nature of the extraordinary defences given to the insect in this state pronounced as far as his experiments had gone the impractiability of destroying it in the Stomach without killing the Horse in opposition to the assertions of his former Colleague Mr. Chabert. Mr. Field gave a ball containing the Eggs of the Œstrus to a Horse which had been so kept as to have been at least for the preceding year accessible to that insect and discovered by examining his Stomach eight days afterwards that the Eggs had hatched and that the number of the Pupae or Maggots at anchor on the surface of the Stomach were only one or two less

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less than the number of eggs given. This ?first before vomiting was ?twice supplied. And Mr. Bracy Clark has the merit of having given a circumstantial and luminous account of this insect in the Transactions of the Linnaean Society. The history of no other parasite animal has been so complete as that which Mr. Clark has furnished

but these facts which I may have collected or may have it in my power to collect will be too few and too insulated to have any pretension to more than an approximation. But before I wholly quit the Rishta as connected with its progress to the Skin it is fitting to remark that when extracted by an artificial opening its anterior point or head although a little conical, when examined in the hand or on the ground or even under the application of pressure seems to have little claim to be called a point. But when the worm just after having been extracted by an artificial opening is placed in warm water and especially when rather short and thin than long and thick extends its head really into a point. One that had been thus circumstanced passed its head along the inside of a brass vessel filled with warm water and having followed its direction for a considerable distance placed the point of its head nearly at a right angle with the rest of its body and appeared to push with such force as to such force as to [sic] displace

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displace the rest of the body though a yard in length extended and to cause it to roll in twists upon itself. From the exertion it then made I should be disposed to think that the head possessed sufficient muscular power to make its way through soft parts without the aid of any other means. Its mode of piercing must however have something peculiar in it and much differing from that of a sharp pointed instrument of metal of the same size. A Needle for instance if pushed through the skin from without as is well known produces a sensation of pain and not one of itching and a needle long buried in a persons thumb when pressed upon always gives the sensation of severe pricking.

Of eight Rishta taken indiscriminately from a large heap in the shelf of a Rishta kush the shortest was two feet ten inches and a half and the longest three feet five inches. There are however some larger and some not more than eighteen inches in

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in length. The greatest thickness is about that of a middle size knitting needle and that of shorter worms is proportionally less. The general form is cylindrical or more strictly speaking conical but this so little as scarcely to be perceptible. The straight end is the head the opposite a little larger and furnished with a small sharp hook the tail. The general color of the body of a cream white. As I forward specimens farther description seems to be unnecessary. Altogether the Rishta is a little larger than that brought from the Gold Coast of Africa but as far I can charge my memory in other particulars there is much resemblance.

The water of Bokhara has long been accused of giving rise to the worm in the bodies of its citizens but no other evidence has been adduced in support of the accusation than popular assertion founded upon the difference between the ordinary condition of the water of this City and that of other places. Through reasons not now to be detected the present City of Bokhara has been built on a soil originally consisting of little more than sand and at a considerable and most inconvenient distance from a River.

This sand was a bad material ill-suited for wells and accordingly for this reason and from the water in

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in general being of a quality rather indifferent than good few have been sunk. The traditions faintly current respecting the means by which the River of Sumurkund was artificially brought within a few miles of the City however honorable to the imputed deviser of the plan seems more of romance than of probability the Historians of Alexander having been wholly silent upon a subject which they would scarcely have failed to render with justice available to his sagacity. Without endeavoring to enquire whether this was the work of Seleucus or of some of his successors in the Helleno-Bactrian Dynasty it is sufficient to observe that waters were brought by Mains from the River of Sumurkund for the purpose of irrigating land and of supplying the City with what is required for domestic use.

These Mains branch into canals which running through the streets discharge their contents into open Tanks or Reservoirs to which every one has access. The Mains are cut through sand more or less mixed with earth. The canals are open broad ditches with sloping sides and of sand and mud and some of the Tanks are lined

Two Rivers unite in the Mountains to the North of Sumurkund and running through the plain of Sumurkund under the name of Ak Daria and Kurra Daria are appropriated to the purpose of irrigation. Their trunk much lessened falls into a Lake two days journey to [several words illeg.] and about 20 miles in circumference.

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lined with stone whilst others are ponds or merely deep excavations in the ground. The Mains sometimes contain water but more frequently [are] empty; the canals might be mistaken for the Sewers or Receptacles for the filth of a large city were it not observed that dead Dogs or Cats are removed from their banks that the refuse stuff from Dyers Vats seemed more from accident than design occasionally to find its way into them. But an European who should observe their green yellow or black contents in which putrid gas is seen rising plentifully in a rapid succession of large bubbles occasionally displaced by a bountiful torrent of clay colored water and sand would as readily conceive that [the] First Ditch were its surface exposed was intended for the domestic uses of the Citizens of London as that such a horribly disgusting mixture was purposely meant to be the beverage of a people whose laws restrict them from the use of fermented liquors. Yet this is the present arrangement and has been that of many ages past. In the Summer season however the water in the Reservoirs is not allowed to stagnate as boys almost continually bathing in it keep the green or yellow fluid in a state of constant agitation. Were the Moosulmans allowed to make use of the rich juices which are so amply presented by the Vine, the apple the Pear and

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other Orchard Fruits in this country some thing might be pleaded in extenuation of this most extraordinary degradation of an article absolutely necessary to the life of Moosalmans. Is it a matter of wonder to any reasonable person that Citizens to ?shun such an odious draught as presented should be tempted to transgress the ordinances which in limiting Moosulmans to water or watery Sherbets should neglect to insist on the Rules providing for their subjects the element at least in a pure and wholesome state? But most of the other arrangements adopted for regulating the conduct of Moosulmans are equally imperfect with that respecting the use of fermented liquors and in their very principle invite to the commission of those criminalities they were intended to repress. It is to be regretted that now individuals who quarrel with the administration of Justice in British India should not enjoy an opportunity of witnessing juridical practice in those Asiatic Countries in which it is stated to be most pure. I mean not to be severe and I ought to be grateful for I have received benefits from the Minister of [illeg,]

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The Head of the religion, with the Mooftie and Kazeer of Kubool on hearing of my life, being endangered by the designs of a Native Chief into whose hands I had fallen voluntarily and unsolicited by me transmitted a Testimonial in my favor. A Sum of money was due to me from the Estate of a person who died suddenly and the Creditors were summoned before the Kazeer of Bokhara to prove their debts. A Moosulman Servant attended in my behalf and when about to swear on the Koran as to the amount of the sum and circumstances the Head Kazeer said that an Oath on his part was unnecessary the character of the Europeans belonging to Hindoostan being so completely established for justice and truth by the unanimous reports of persons who had visited their country than he considered the verbal averment of the facts even by one of their Servants as proof sufficient of the debt. And the money was accordingly paid. But Moosulmans were obliged to take Oaths and to advance other proofs. I was wholly unacquainted with the individuals just mentioned and the impression made is wholly due to the mode in which the Company's Government is administered. I could multiply instances but perhaps these are sufficient as it proves the fact that the word of an European through his Servant was held to be more binding than the Oaths of Moosulmans in a Moosulman court of Justice.

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Happy would it be for the Citizens of Bokhara were the qualities of the water in the Tanks only disgusting but unfortunately they are more directly mischievous.

The edges and bottoms of the canals where partially dry are studded with casts and pierced with holes by myriads of waterworms which sink lower and lower as the water dries up until the occasional torrent bring them up from their beds and rolls them impetuously into the Tanks.

Had I attempted to examine the sides and bottom of the Tanks in the City or even to look curiously and steadily into the water I should have exposed myself to some of those suspicions which superstition generates in the mind of its votaries and so numerous and so strangely inconsistent is the greater part of them with Truth or probability that I thought it prudent to avoid their possible influence by

commencing my search into the condition of Tanks in the Gardens of Individuals who live out of the City. In the first day on which I seated my self on the bank of a Pond or Reservoir not lined with walling the water seemed to be almost alive so vast was the assemblage of

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aquatic insects with many of which I was acquainted but had never before witnessed such an accumulation. I could not however obtain a sight of any to which the origin of the Rishta might reasonably be ascribed. In the second visit I was informed by Mr Guthrie, the apothecary who accompanied my party, that he had discovered several long cylindrical worms just within the waters edge but had failed in his endeavors to catch them. Great numbers of somewhat long, brownish worms in shoals as closely compacted as the fry of Eels along the banks of some Rivers in Europe were seen within the waters edge near the bottom in some places like clouds, in others more resembling ropes moving amongst themselves with such vivacity as completely to baffle the spectator in an attempt to trace the course or movement of any individual in the shoal. A hand dipped suddenly down into the mass and rapidly closed brought not up a single worm and a hand kerchief stretched on sticks and slid horizontally near the bottom had not better success. The worms disappeared instantaneously and all together not one coming on the upper surface of the cloth. However after the water had become tranquil a few worms were again seen on the place where many had been before observed. Within a short time the

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the number considerably increased and at length equalled the first assemblages.

It was remarked that notwithstanding the intense vivacity of motion kept up in the cloud and rope like shoals their outline did not vary that they remained compact and that the masses were not in the least degree progressive.

As soon as the hand was introduced into the water however slowly it was moved towards the worms they seemed sensible of the approach of an enemy disappeared and were not perceptible as long as the hand was kept in the water near them although perfectly quiet and motionless but on its being withdrawn again appeared in their usual numbers and activity. They possessed sight or some other sense which compensated for the absence of the organ of vision.

Their disappearance without dispersing along with the other phenomena just mentioned led me to suspect that the worms had withdrawn into the mud although it was difficult to comprehend how such a multitude could so rapidly sink into and emerge from this substance without raising a cloud of it or at least so much as to render the water turbid. When they next appeared the hand

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hand was plunged perpendicularly down into the mud and closed after a quantity was included in its grasp. It brought up along with soft mud a vast number of long thin worms interwoven and twisted into a mass solid heavy and covered with their own slime and with mud. The mass was placed in a basin and water poured upon it till it was freed from the mucus and mud in which it had been enveloped. After the

basin had been filled with water and this had become quiet great numbers of worms were seen springing upwards from the mass and having reached the height of about two inches they brandished the upper extremities of their bodies with great quickness laterally backwards and forwards and circularly whilst their lower extremities remained fixed in the mass.

A finger however quietly introduced into the water caused the worms to sink upon the mass and a stick slidden into the basin in the same manner with the finger produced the same effect. Some individuals separated from the mass not without difficulty were compared with the Rishta which had been recently extracted from the bodies of men by artificial openings. There was a general resemblance in form and character with a difference in size and color. The Gordius was

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on [?sc. of] a length of from three to four inches or somewhat more while the Rishta was in an extent of from eighteen inches to three feet and a half. The Gordius was of the thickness of a sewing needle carrying coarse thread, the Rishta of that from a fine to a middle size knitting needle. The Gordius was brownish the Rishta white or rather of the color of cream. The Gordius had a brown colored substance perhaps intestine running from near the small end to near the large end. In the beginning of the season when the Rishta made its appearance the brown line was more distinctly perceptible than when it was farther advanced. This difference might perhaps be owing to the worm having attained a more complete growth and to its being more distended with chyle and this seemed probable from the tube having a darker color when stripped of its contents through drawing it between the nails of the finger and thumb. The Gordius when first taken out of the mud and washed was fuller and of a less dark color than after it had been kept ten days in well water which did not contain any animalculus at least not any could be discovered by the

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naked eye. In the Gordius the brown line was broken into many short points separated by transparent spaces more resembling the links of a chain placed at short intervals whereas in the Rishta the line when first seen was continuous. The body of the Gordius was marked with slight circular depressions opposite to the dark places and it was thought that a peristaltic or progressive movement was observed. The Rishta was not marked with [illeg.] depressions but nearly cylindrical or very slightly conical in its whole course from the thicker to the smaller end. Generally it might be said that there was in a reversed order as much difference between the condition of the Rishta in the beginning and advanced state of the season of its migration as in that of the Gordius when first removed from the water and ten days afterwards. The anterior extremity of the Gordius and the Rishta strongly resembled each other and the hook and transparent portion at the posterior extremity was exactly similar. From the practice of brandishing the head so rapidly and so unremittingly it may be inferred that this action is employed in seeking and seizing its prey probably [2 words illeg.] for the first object of which it seems endued with extraordinary

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extraordinary sensibility. The Rishta immersed continually in fluid food [is] not necessitated to make any considerable exertion with its head but one that had been extracted with little force when placed in warm water raised its head and darted it about in exact correspondence with the movements of the head of the Gordius although it might have been supposed that the instinctive impulse to this kind of exertion might have been extinguished through the absence of all necessity for making it. The hook of the Gordius seems to be an instrument intended to render the separation of individuals more difficult. The Gordius is more decidedly gregarious than perhaps any other animal known. Why it should be thus in relation to procuring its food cannot perhaps be discovered but the interlacement is obviously useful for maintaining its position.

Previous to this time I had not met with the Gordius in its natural locality and condition but feel not hesitation in asserting my complete conviction of this worm being the Parent of the Rishta. It will scarcely be expected that circumstanced as I was I could detect the Gordius in the act of ejecting its eggs or bringing forth its young

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young for I cannot determine whether it does one or the other but from analogy taken from other worms that are aquatic or nearly so induced to favor the first supposition. It is presumed that the eggs of the Gordius are diffused through the water of the Tanks along with millions of other insects are swallowed hatched in the stomach from which impelled by instinct on the completion of their growth to make their way to the surface in search of an opportunity to continue their species. It seems not difficult to explain the shades of difference between the Gordius and the Rishta by referring to the difference ?belonging to their natural and artificial habitation. The size may be accounted for by the difference in the quantity of the nourishment in the respective localities. There was no vegetable substance growing in the pond nor is there any vegetable in the sandy mains which convey the water to it from the River of Sumurkund. It follows therefore that the Gordius must live on animalcules with which the water swarms. The transition

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transition from one kind of animal food to another cannot be very violent but the Gordius must occasionally fast through a scarcity of prey whereas the Rishta is always immersed in food of very superior quality. The Gordius must experience the alternations of distension and collapse the Rishta that of distension alone as far as abundance of food is the cause of this condition. X—The food of the Gordius is probably colored as the Scolopendra aquaticus and other insects observed in the neighbourhood of the shoals have reddish or brown horny coverings of which the exuvial and indigestible parts may be seen through the semitransparent skin and intestinal tube. The Rishta finds a colorless fluid in the achiton membrane perhaps analogous in nature to chyle of the finest kind and which perhaps may be wholly assimilated as the portion of the body next to the hook is always transparent and void of color. Thus the intestine of the Rishta when fully distended with white chyle

as at the latter period of its growth looks wholly without color. And before it is stretched up to its full growth is only brown in a very faint degree.

It must be observed in reference to the white color of the Rishta that constantly kept in a state of darkness the want of the influence of light may contribute to blanch its body.

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It has been observed that the Gordius differs in its natural condition through causes not fully known and respecting which it is useless to speculate. The like discrepancy is to be found in the Rishta. In the Sparrow and Lark the Rishta is thin and scarcely a span in length, that of the Dog is a little longer, and that of the Horse about two spans whilst the Rishta of Man varies as has been before stated was from one foot or eighteen inches to three feet and a half whilst alive but when dead and drawn out like a wire through its [illeg.] out of an orifice which contracts in diameter as the resistance to the growth of the surrounding granulations lessens the Rishta little thicker than common sewing thread greatly exceeds the length it possessed when alive.

Note: I have not seen the Rishta of all these animals but have been informed of their existence by too many individuals unconnected with each other to have any doubt of the fact. I was referred to the Police Office for a view of a Dog with a Rishta in its leg but the Marshall or Head constable of that night told me that the Dog had extracted the worm by licking the sore which bore the character of an ulcer from Rishta.

It may be doubted whether the Gordius

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Gordius which naturally lives in a temperature seldom higher than 60° Faht and probably torpid in the rigor of winter could produce an offspring that could accomodate itself to a temperature of 96°. But this is not so extraordinary as it may at first seem seeing that the individual Leech which has experienced the coolness of the nights during the rainy season in the lower ranges of the Indo-Tartaree range of Mountains insinuates itself into the nose of goats and Dogs as I have witnessed and through acquiring a size vastly exceeding its ordinary dimensions in the natural locality proves its power of accommodation to heat and the influence of plentiful nourishment. From the facility with which the Gordius entrenches itself in the earth and emerges from it the worm experiences probably but little difficult in making its way through the cellular membrane. In the case of the boy Moqeem of which the Rishta was perceptible just under the skin I observed that in four days its tail travelled five inches in a straight line but its head must have travelled

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travelled at least twice as far in the convolutions it had described. The sharpness and stiffness with which the Rishta can give to its head have already been mentioned and three Rishta in warm water united their respective bodies in convolutions which had they been closer or perhaps had the animals not been distressed by being pulled out of their beds and placed in an element which though natural was now quite new to them their folds and twists would have resembled those of the Gordius. As it was the approach was sufficiently striking to add another feature of similarity.

The Rishta in its progress to the skin affects not any particular course but on the contrary wanders largely. It has been known to come out as high up the body as the fauces and palate and emerges from every other part intermediate to the foot. However it is more particularly disposed to penetrate the skin near the knee and especially below the back part of the bend of the knee upon the head of the muscles of the calf of the leg. In the Horse it has been said to have emerged below the knee and I have met with enlargements in the leg just

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just where a plexus of vessels crosses over the back part of the flexor Tendons of the foot of a nature that had never previously come under my notice and which from the circumstances attending its rise increase and decrease I am inclined to attribute to Rishta which had stopped there and not having been able to penetrate the skin had then died.

I found the Hindoos and Hebrews less affected with the Rishta than the Moosulman population a difference which at first view might at first view be suspected to derive from the two former classes indulging freely in spiritious liquors were it not known that of the Moosulmans although forbidden the use of inebriating fluids many observe this ordinance only in public. One Moosulman family which in former years were much affected with Rishta have been latterly been almost wholly free from it and know of no other cause to which they can attribute the exemption than that of having taken a few Pills of assafotida

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which Drug the Hindoos also employ occasionally in their processes of cooking.

It has been asserted that much of the Assafotida raised in Khorasan is imported to Rice growing countries in low latitudes in the East and employed there as a steep for seed grain or is thrown into the water in which the seed is sown to prevent it being eaten by insects but I have no strong evidence of the truth of this position. I do however know that at Sykan in Khorasan near the place alluded to by Marco Polo or his learned Editor under the name of Arbor Sicco and now known by the appellation of "Sokhté Chinnar" or "the dry or burnt Plane tree" a stage in the journey of my party, Assafotida is employed to impregnate the water used for irrigating Melon Grounds without which precaution it is said the young plants would be destroyed by insects. And in Kashmeer I have seen the strong rank smelling leaves of an umbelliferous plant Prangos there called Krangos and of which much has been said in another paper thrown upon the lands just sown and flooded for the purpose through the taste or smell communicated

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communicated to the water of driving into the earth a small Slug which until the water was thus impregnated ate off a large proportion of the young shoots. Whether the exhibition of any substance as a medicine will tend to prevent the developement [sic] of a worm which at one period of its existence withdraws itself from the direct contact of medicaments is not known but the facts collected have added the Gordius to the list of Parasite animals which cannot live in their unnatural home for a longer period than twelve months.

A close view of the vast accumulation of human suffering created by the Rishta induced me to consider of the possibility if not of preventing its occurrence altogether at least of diminishing its amount by some cheap and easy expedient as a plan of which the execution would entail any considerable expenditure would assuredly be neglected.

The Minister, Wazeer or

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as he is called Hakeem Be or Kosh Beghee or Lord of the Household had been pleased to admit me to visit and converse with him on the footing of friendly intimacy and I availed myself of a favorable opportunity to introduce the subject by shewing the resemblance between the Gordius called in Toorkee Khejee and the Rishta giving my opinion as to the method in which it obtained admission into the body and when his curiosity was excited suggested how much it might tend to add to the reputation he already possessed were he to confer on the Citizens of Bokhara the obligation of relieving them from the presence of the Rishta. Finding him influenced by some of the considerations it was stated that water worms were the natural food of fish the former abounded in a prodigious degree in all the Tanks as he well knew, that there were no fish in these Reservoirs but that if a large number of fish were turned into them they would speedily demolish the plague with which the people of Bokhara were annually visited by eating the Khejee.

The operation it was asserted was easy as persons now caught

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Fish in the River of Sumurkund that they might brought in the ?Khogeena or wooden Pannier now employed for carrying bread on the backs of asses and that nothing more was necessary than to fill these with water and fresh Grass through which means the Fish might be transported a journey of four or five hours with safety. It was further stated that as the Fish could not speedily destroy such myriads of the Gordius as were seen to exist in the Canals and Tanks it might be well publicly to recommend to the people to adopt the precaution of filtering the water of the Tanks through a fine cloth covered with clean sand [which] might be changed every five or ten days. The Minister approved of the suggestions and enquired as to the number of Fish that might be wanted for stocking the Reservoirs but here the matter ended. The novelty of the proposition required that it should be laid before the King who was absent

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absent on a campaign against the Kathaee Kipchak who had rebelled for several years and had set up the standard of independence. But from what I have seen of this country it is reasonably to be expected that the measure will be approved but never be acted upon. Were the country in the hands of its former inhabitants the Tajiks who times long past have lived in cities and appear formerly to have made considerable progress in the arts of Peace the proposition might have experienced a different fate but civilization and its arrangements sit awkwardly on the Oozbuk whom three centuries spent in the habitations of the Tajiks have not weaned from a predilection for forays and nomadic habits.

At an expense of less than twenty Pounds Sterling all the tanks of Bokhara could be sufficiently stocked and this trifling outlay might save to the State the loss of the labor for from one to two months at an average of at least ten thousand individuals but in Oozbukistan nothing is done on the principle of public Spirit. every movement originates from and is centered in Self.

Note: About night a boy who had a Rishta in the arm just about to come

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come through the skin of the arm went to bathe but as soon as he was in the water was alarmed by the movement of the worm. He scratched off the blister the Rishta thrust out its head which was gently seized by the boy withdrew the whole worm from its bed with a facility that surprized those who witnessed the fact. This furnishes a suggestion as to the propriety of the Patient going into a bath when the Rishta is preparing to perforate the skin and then to attempt effecting its extraction.

NB: After the above was written I was called by the King to take leave of him at the siege of Yungee Kurghan or the new Fort belonging to the Kathaee Kipchaks of Merakale which he was endeavoring to take by blockade more than by operations actively military The number of Bokharans lamed in his army from the Rishta had induced him to send for a Rishta Kush from Bokhara and Meerza Umr the person deputed had made trial in a few instances of the practice I had suggested of cutting open the mouth of the wound. He had been uniformly successful in extracting the worm through the enlarged opening but feared to cut down freely along the Lines when the head of the worm had been broken off.

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The Rishta having naturally its habitation in a locality where there is little air and in its parasite condition being probably supplied with even a still smaller proportion seems incapable of bearing the contact of any air in large quantity and dies within a few hours or indeed it would appear that this period may be confined rather to minutes if conclusions were made from the short space of time the Rishta shews signs of life after having been extracted by an artificial opening and exposed freely to dry air. But in the latter instance it will be recollected that some force is employed upon the body of the worm and when apparently dead it sometimes

revives on being thrown into water. It has been previously stated that it is only that portion of the worm that dies which is in or just within the mouth of the wound and that the part out of the reach of the air remains long alive or dies only as it come gradually into its immediate vicinity or when the stimulus of its presence in some manner induces deposition of fluid and subsequent suppuration. When however the part engaged in the wound loses its vitality the sphincter of its mouth being relaxed the fluid contents of the part are discharged and the sides of the worm collapsing and shrinking present no material obstacle to the contraction of the wound which speedily takes place by deposition and granulation. This contraction is indeed so rapid and exercises such a degree of squeeze upon the body of the worm that all farther discharge of fluid save from the

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the part immediately engaged in the wound is prevented and in proportion as the worm is drawn out the fluid is accumulated in smaller compass and the difficulty of extracting the body is increased. There is no reason to suspect that the enlargement of the opening can fail in every case where it is resorted to sufficiently early to afford facility for the extraction of the worm.

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Chuck Gundum Koble Thrashing Machine

Material wood without a single particle of Iron. Frame of Mulberry or other heavy wood. Stampers of the same. Seat and bars of willow or Poplar.
See Model made roughly

	Feet	Inches
Length of Side Beam	6	
Breadth		9
Thickness		4 1/2
Length of Roller	3	
Diameter		9
Length of Axis		7
Diameter		4
Stampers five in one row five in another		
Number of Rows from 5 to 7 according to ?Diam of Roller		
Length of each Stamper out of Roller		7
Thickness		2
Distance of each Roller from end of Beam	2	9
Di. from each other--counting from		

center of Axis holes	2	9
Height of Seat from top of beam	1	3

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Thrashing Machine

Breadth of Seat	1	3
Cost in Bokhara where wood is cheap	One Tila or six Rupees	

With two Bullocks can thrash 9 Maunds of Wheat and reduce the Straw into Chaff in half a day. But it must be remarked that the Straw is so dry as to become absolutely brittle from this cause and from intense ripeness. The Machine it is said can reduce the Chaff almost to the fineness of Bran but this is not to be expected in Britain when from opposite circumstances the Straw retains much toughness and elasticity. In Hindoostan this Machine may prove as useful as a peasant who has only one pair of oxen can employ these without waiting for those of his neighbor to form a team. The principle of improvement on the common model of treading out is that every Stamper is equivalent in effect to the foot of a Bullock.

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Economical method of keeping Sheep

Almost every peasant in Toorkistan besides the flock of Sheep he may possess at pasture upon the plains or mountains has two or four Sheep tied up for the purpose of fattening them for the winter. These animals are found to fatten better in pairs than single and Wethers are taken in preference to Rams or to Ewes. They are generally tied to a log either in the garden or near the Stable and then fed with the refuse of the former or from leavings of the horses or scraps from the house and are rendered heavily fat in the course of six months. Ordinarily their food costs little more than the trouble of collecting it but there are some people especially those who live in Cities who are obliged to purchase almost the whole of the food of the Sheep. Those which are most preferred are Wethers of the Kusak breed--of 3 or 4 years old.

Cost -----24 Tungan or 6/-8

Keep for six months upon Straw and Bran moistened or at night a double handful of Barley or Meal of Oilcake. Expense calculated at the highest price one Muree a day or four days one Tunga or ten days a Rupee or three Rupees a month or eighteen Rupees for six months.

Recapitulation

		Tunga		Rupees
Price		24)		
Keep		72)	=	24
	Yield			

Tail Fat -- Half a Maund Bokhara or 1 1/2 M ?Khumb- -- sold for 4 Tilas or 3 Tilas per Md.

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		Recap	
		Tila	Rs
Tail fat		4	or 24
Flesh and fat 2 Mds Kabool		1 1/2 =	9
Kabool			
Pelt and fleece			0.1
Head and inwards			0.1
			<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
			33.2
		<u>Cost</u>	<u>24-</u>
		Profit	9.2

The Sheep are watered once a day in cold and twice in hot weather. They are [illeg.] in [illeg.] fed by Children and I have never seen one neglected or in bad condition.

The ?Collar employed for fastening them to a Stake is partly of wood and partly of iron the latter on the principle of a Swivel which answers completely. Its price is about two ?pence. At almost every cottage two Sheep might be kept with profit these animals having to eat such substances in their confined state as they would certainly refuse in their natural condition and turning to profit though on a small scale those articles which without them would be thrown on the Dung pile. I have procured a pattern of the Swivel collar which is a simple neat and clever contrivance.

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Vinegar made from whey

With some exceptions the Province of Dogpustan produces few Grapes and the Farmers use the whey obtained in making cheese from Ewe Milk after it has been kept till thoroughly sour as a substitute for Vinegar.

This sourness is seldom acquired until the period of twelve months has elapsed when it is found to be pure and without any taint of putridity. Whether it would be worth while to apply this fluid on a large scale to the manufacture of Vinegar instead of appropriating it exclusively to the feeding of Pigs as at present cannot be determined except by a trial experiment but it seems not improbable that by mixing whey with Sugar a sourer Vinegar might be obtained than by employing water as a solvent for saccharine Matter. And it appears likely that an excellent acetous acid might be procured by distilling the crude Vinegar thus treated.

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Silk

About two thousand Pound of Silk are annually raised in Bokhara and its vicinity as Ebigdeevan and Subee Ab. Its price when reeled on an average of quality amounts to about 48 Tilas per pound making the sum of ~~96000~~ Tila or 000 . Its principal consumpt is in Bokhara where it is worked up especially into a kind of silk Stuff called ?Udrees but it is exported to Oorgunj and the Silk of Subee Ab is especially taken to Kabool. The tax upon the gross produce is one in forty or 2½ per cent. Much Silk is imported from Rusht by the road of Meshed. The ?home harvest depending solely upon the produce of young leaves takes place only once a year and as yet no attempt has been made to raise a second or third crop of new leaves in the same season. The Mulberry best suited to the worm is that variety which produces a small berry with seed of which the pulp is so scanty that it is called Nur Toot or ?Mule Mulberry of which I have obtained the seed. The worms produce cocoons of three colors viz Nabob or yellow, white and Zungaree or light green. The cocoon is somewhat of a large size and the fibre is rather coarse and strong a quality preferred for the fabrics of Bokhara. Raw reeled Silk of good quality is worth about seven Tilas a ?Chanak or a Ser and a quarter of Peshawur. The consumpt of Silk in the fabrics of Bokhara is supposed to employ about four thousand shops ?only or ten thousand persons. Price of Cocoon [illeg.] ½ 2½ Chanaks for a Tila.

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Bhung Churrus or Gum of Hemp

About 150 Maunds of this Gum are annually imported into Bokhara from Sumurkund, Marghestan, Kokun and especially from Oca Tippeh and it is raised in no small quantity in the immediate vicinity of Bokhara. The Harvest takes place in Autumn in the following manner. The Crop of plants is cut when the seeds are fully ripe and the plants are set upright or nearly so that their head, uniting may form a sheaf which is intended to retain its erect position until the leaves and seeds shall have become completely dry. This generally does not take place until the nights have become considerably cold. When the foliage &c. are dry the plants are slightly beaten upon a carpet and the seeds and leaves form a mass. This is sifted through a fine silk Gauze and the fine dust falling through the Sieve is caught by the carpet the coarse leaves and the Seed remaining within the instrument. The dust is put into a caldron over the fire which is very low and when the former has slightly heated it is squeezed together into a Mass called Churus. This is sold wholesale at the rate of five Tilas 7½ Tunga = Much of this Gum is consumed in Bokhara itself but considerable quantities are exported to Kabool and to Hindoostan. The mode of using it is as follows.

A small quantity is held near a fire till it become warm when it is divided into small portions which are mixed with Tobacco in powder

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and formed into a ball which is placed upon the heated charcoal of a [illeg.]. The smoker pulls from one to ten draughts of the smoke according to the habit he may have acquired. A person unacquainted with the Drug is often intoxicated with a single draught. Its effects are so sudden as to be almost immediate. Indeed it has been reported that Shah Juhan inquired of his Physicians if it was true that there existed a Drug of which the inebriating power was so great that if a person with one foot in the Stirrup took a quantity of it he would be intoxicated before the other foot could reach the other Stirrup and was answered in the affirmative and then the Drug was Churs. The first effect seems to be on the ear which cannot distinguish sounds with precision or mistakes the meaning of conversation. The next in order appears to be a difficulty to keep the eyes wide open the upper eyelid falling so obviously as to give the idea of the eye being smaller than usual, the white of the eye becomes red, vision is impaired, objects become small confused and in irregular motion. Almost immediately after this the smoker thinks that all the persons who surround him are in a state of intoxication but shortly feels that he himself is in this condition. His first impression is that of intoxication which remains for a considerable time and is succeeded by a sleep in about an hour. The muscles of the legs become partially disobedient and if the quantity inhaled be considerable the inebriate falls down as under the inebriating influence of fermented liquors. If the smoker fall asleep

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the sleep lasts seldom longer than from one to two hours and on awaking he finds his head somewhat heavy but this is speedily shaken off and he becomes as lively as if he had not been under the influence of debasement. A person may be thrice intoxicated and thrice sober in the course of twelve hours. But this account is true only in respect to those persons who smoke lightly for an individual who indulges deeply may remain intoxicated for a night and a day in heavy sleep but for the most part without snoring. In the latter instance he awakes with headach but if he drink an acid as Buttermilk, Lemonade Tamarind infusion, Vinegar and water the headach quickly goes off and the inebriate finds himself well with some degree of general weakness--but is not affected with that derangement of Stomach which is the usual result of intoxicating liquors when into that organ nor with costiveness [constipation.—Ed.] or other mark of derangement in the alimentary canal consequent on this abuse. The person who indulges in the use of Churs becomes particularly fond of Sweet meats and of rich food but dislikes acid. His powers of digestion seem not to be injured by the use of this Drug. It is stated that if a Bhungee live well upon rich and greasy food that he is not greatly if at all injured by indulging in the use of this Drug but that if his food be of a poor and weak quality as grain and pulse &c. without flesh he will speedily have his mental powers considerably deteriorated and gradually losing

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losing his power of recollection degenerate into a drivelling idiot. Excessive indulgence also of this Drug produces effects similar but at a later period on persons who live on food of a less meagre quality. It must be remarked that on some

persons the stimulating impulse on the Brain is so confused that they seem all at once to lose their senses. At Punshunbe in Meeankal I saw about twenty persons at the Shrine of a Saint engaged in smoking Bhung. One person who was a Dervish or Faqueer here called Dervanaa ?head after having taken two or three pulls from a Bhung [illeg.] suddenly sprung up held his head between his hands roared out as if under the influence of intense pain, then cried, afterwards laughed, jumped as if in an extasy of gladness, danced, grasped trees in his arms, threw himself into some water and appeared as if wholly mad whilst his companions appeared to be enjoying some pleasing reverie.

Instances of this temporary mania are stated to be somewhat infrequent and bear a proportion of one to a hundred. Its effects gradually subside of themselves but may be checked by the exhibition of a Dose of Acid Drink. From what I have been able to collect it seems probable that the use of Churus becomes a most dangerous and inveterate habit replete with greater peril to the health and

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and worldly condition of the smoker than even the addiction to spiritous liquors, Tobacco, or Opium in its varied forms. Several cases were adduced by my informants of persons who indulged immoderately in its use having completely neglected their temporal affairs given up their wives and families lost their fortunes and ultimately having stripped themselves of their last clothing to purchase the Drug have been reduced to a state of absolute idiotism and nudity the sense of shame having been gradually extinguished. Names were adduced of Kaboolees who had thus sacrificed their health and comforts to this gratification and I have witnessed cases of deprivation of understanding both temporary and permanent arising from this cause. This want of the condition produced by Bhung appears to be more terribly imperious than that of fermented liquors or of other inebriating substances. A case being instanced of a Mule Driver or Kafila Bashee who on a journey having exhausted his stock of the Drug could not procure a supply even at the price of two Ushrufees or Gold Mohurs for a very small quantity possessed by an Afghan who was well aware of the value of the necessity and with-held the Article until the infatuated Muleteer actually paid this crafty and avaricious countryman four Ushrufees for a single Dose or Chillum without which the smoker thought he should have died. This habit however inveterate may gradually and safely be quitted by men of resolution and I saw an Oorgunjee, Dulla Bae, the Keeper of the Seraee in which I lodged who

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who had abandoned it after many years use. I noticed in several Churs Smokers a difference in the direction of the eyes sometimes lasting only whilst the influence of the Drug produced inebriation but at others permanent and inducing obliquity of vision. On considering the extraordinary and sudden power this Drug is capable of exercising upon the Brain it has occurred to me that it may be employed with advantage in able hands in the treatment of some affections of the Organ as in Locked Jaw and in Mania. Perhaps even in Inflammation of that Organ after due examination and it may be useful and it may be used on the principle of substitution.

I have procured a considerable quantity of the best kind obtainable in Bokhara for the Hospitals in Calcutta and for transmission to Sir [illeg.] Horne in England. What would be its effects in Snake Poison? Would it not hasten the activation of the Nervous Energy?

I know nothing yet of its influence on the action of the Heart but will follow up my observations. In Cholera Morbus ? In the cold fit of Intermittent Fever? In Hydrophobia?

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Of Ice and Ice houses

The Summer of Bokhara is hot and dry. The water collected in the Tanks of the City for the most part exposed to the rays of the sun becomes heated and mawkish whilst as is common in a hot climate or season the demand of this fluid to allay thirst felt by all classes of society is especially experienced by those who labor in the open air. Ice or water cooled by ice being generally or partially dissolved forms the means by which the poor as well as the rich combat one of the most distressing sensations short of actual pain to which the human frame is exposed and which carried to an extreme is more afflicting than actual pain itself. Ice in some countries of Europe for example in England constitutes a luxury in Summer almost exclusively reserved for the use of the opulent on account of its high price in cities and large towns. This price obviously arises not out of the first cost of the article itself which is really nothing more than the value of the labor employed in collecting it but in the expense of the apparatus considered necessary for preserving it from winter to the period in which its employment is desirable and in the waste that takes place before it is brought to market. In that country where the arts of Peace have been carried to a high degree of perfection it is somewhat singular that the use of Ice should not have been more general in those Summers in which the

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want of a agent to cool liquids used as drink is considerably felt by the poor as well as by the rich. It may be said that the hot season is in general short and in some summers there is scarcely any occasion for a cooling medium so that the demand for Ice being uncertain the person who might speculate on laying in a stock for the use of the Public might risk money on a concern which might not remunerate his outlay and labor. In fact however there is seldom a summer so cold but that it has a few hot days in which Ice would prove agreeable could it be afforded at a rate that would at once bring it within the reach of every class of the public and recompense sufficiently the Ice collector. Individuals of large fortune in this country and confectioners and Fishmongers in cities and towns are at present almost the only persons who make a point of collecting Ice for consumpt[ion] in the summer in England, the former in buildings made expressly for the purpose the latter in cellars modified to this application. Were a gentleman of small fortune or more especially a Farmer to indicate an intention of making a collection of ice for the Summer it would expose him to the imputation of extravagance. Yet if the art of the latter were fully

and accurately examined there would be found in it more of prudence of cunning and of benevolence than of the quality to which at first view it might be exposed. Suppose the farmer to be obliged to hire laborers for the speedy performance of his Hay & of his corn Harvest

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and to provide for them a given quantity of Beer, of Cyder, or Butter milk or Whey or other fluid. No one can doubt but that Ice diffused through the beverage would render it more palatable to the drinker and it may with truth be asserted that a much smaller quantity of the cooled liquid will assuage thirst than of that which has acquired the heat of the atmosphere. Whether the saving of the difference in quantity will make up the cost of the ice becomes the only point in question for the laborer cannot but be abundantly sensible of the difference in quality and be grateful for an attention somewhat novel and which may even appear as Quixotical in the annals of agriculture. Coal heavers and other laboring classes would not less relish their Porter for its being cool provided they paid not or only in a reasonable degree for the process. It will surely not be contended that the use of cooled liquors in hot weather has a tendency to produce effeminacy or fastidiousness in laboring people, nor to induce disease or a tendency to maladies of any description.

Apprehension upon this subject is wholly unfounded in respect to persons the heated state of whose bodies is brought on by bodily exertion in a hot season. If the gratification in question can be afforded at a very light expense it is presumed that the possibility of effecting it would rather be

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recommended than scouted on account of the novelty of the position. Ice was seen brought into Bokhara in the Summer of 1825 in wooden crates on the backs of Camels Horses and Asses and retailed by the sellers of Fruits and of Vegetables on Stalls whilst persons were employed in offering bowls of water with lumps of ice swimming in it to the frequenters of the Bazars at a very low rate people called at the Shops of Milk and Cream sellers to drink Buttermilk cooled by the same Agent. Great numbers of people were seen going to their houses with lumps of ice in their hands for the use of their families and the peasant who had sold his remaining charge of fruit was seen returning to his home with a large block of ice in one of his panniers. It was found that a man could procure as much ice as would sufficiently cool as much fluid as would last him half a day for a price of brass coin of the value of 180th part of a Rupee or coarsely speaking half a farthing. The cheapness of this article by retail much greater than that of Kabool of which the Ice pits had been examined led the writer to enquire into the causes which enabled the Bokharans to under sell the inhabitants of the former city and the following facts were observed.

The Ice was procured from ?flashes or shallow lakes of water just without the walls of the city

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and afterwards piled for keeping. The ice employed is always that of a considerable thickness hardened by long frost. It is drawn in as large lumps or sheets as possible

and close to the edge of the water an eminence is chosen of such a height as is never likely to be covered by any possible increase of the water and of a surface affording a basis sufficient for the pile to be raised upon it. When levelled on its summit about ten yards in diameter the surface is covered with a coating of flags or the dry and withered leaves of sedge about a yard thick and upon this is laid as closely and completely as possible a bed of ice. On this a second layer is filled with as little interval as practicable between the layers and so in succession every fresh layer being somewhat smaller than that below it so that the pile assumes the appearance of a cone of which the height about equals the diameter of its base. The pile is surrounded by a body of flags of about a yard in thickness and then covered with a coating of earth well compacted by heating. The foot of the pile is so managed by sloping off its edges that no water can lodge upon it and in this State the Ice hill remains till Summer has set in when it is opened on one side of the base. Ice is sold at the Hill at the rate of fourteen Ass loads or 12 Horse load for a piece of gold say thirteen shillings value. The opening is closed by Masts by [illeg.] and by blankets

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On this little expensive plan the Ice Hills of Bokhara are constructed. Rain fell almost every day in March and April but from the conical form of the Hills the water shed off without penetrating deeply into the coating and employment was given daily to many thousand people for the space of three months.

How small must have been the expence of cutting and of piling the Ice may be collected from the low price paid for it by retail in a large city of which all the inhabitants save infants and persons laboring under some disease partook more or less of every day for nearly three months. The crates or panniers in which the Ice is brought to market are covered with a piece of thick Felt which shields it abundantly both against the rays of the sun and against the rain. It may be perhaps be objected against the introduction of Ice amongst the lower classes that it make a new want not heretofore particularly acknowledged but in answer it may be observed that if its use be found generally agreeable it will come into demand[,] if otherwise its consumpt[ion] will be partial and therefore fail to produce the effect anticipated. If it should become general for two months in London its collection and sale will give employment to many persons of the lower orders as a better plan cannot perhaps be devised than that of bringing it into the city

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City upon Asses. A new channel will be given for the circulation of money especially amongst those classes who most stand in need of such an aid. This may at first be small but pro tanto it will be beneficial.

Perhaps every Porter House of large draught may find it to their interest as far as the gratification of their customers is concerned to have a supply of ice and under the view given there seems no reason why every gentleman residing in the country and every large farmer should not have an Ice Hill which need not be in a shaded place but merely on an eminence natural or artificial on the edge of the pond or lake from which the ice may have been extracted. But it must be observed that the thin ice drawn from the surface of ponds slightly frozen will not stand under the

process recommended. The Ice proper for keeping should be four inches thick and upwards and if it could be dried by exposure during a night of frost before it is filled the better it will be suited for the Store. For ice pails for liquors and for freezing cream and juice of fruits ice in England is generally coarsely pounded or broken. In Bokhara ice is reduced to a coarse kind of snow by heavy iron knife the edge

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edge of which reduced to about a tenth of an inch is cut with shallow indentations and teeth like that of a saw. The blade horizontal is furnished with two upright handles of wood resembling those of a spoke shave. The person who uses this instrument has a block of ice placed before him upon the edge of a low table to the lip of which the lower border of a short apron is attached by two loops to two pins about half a yard apart whilst the upper edge is fastened round his waist in the usual manner. The Workman strikes the knife against the block at its upper front raking it downwards and every stroke brings with it filings or dust of ice like snow.

This department belongs to a Confectioner who mixes with the ice a vegetable Syrup of the consistence of honey not yet known in Europe but serving as a good substitute for the Sugar of the Cane. This sweet Ice is sold at a very low rate or about two ounces for half a farthing and the ice thus made somewhat resembles the compound which would result from a mixture of good brown Sugar with finely pounded ice. It may seem to be a Sweetmeat only fit for children but Raceter Jan or Heartsease is in high estimation amongst Oozbuds of all classes and the reduction of ice into the state of powder trebles its value by the use of labor alone. The writer of this found that spoonful or two of this ice dust stirred into

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into the liquids he drank saved the trouble of any other process and had the advantage over the ordinary forms by lowering the temperature of the beverage almost instantaneously. The writer of this may have attached more value to the use of Ice than may strictly belong to it and an apology for this may be found in a long residence in hot climates and to the frequent influence of Thirst in countries where the water of indifferent quality had acquired a heat which would have caused it to be rejected by almost any persons however thirsty in the happier climate of Europe. Aware of the effect of this condition upon his own mind which may have led him into error he prefers to be considered as an Enthusiast rather than to remain silent upon a subject which possibly may afford an additional gratification to the middle and lower orders of his countrymen.

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Kummuree and Bursatee

Kummuree The disease in India & Turkistan thus named or weakness in the loins in Horses is called Badi Sug or the disease of the Dog in Afghanistan. It would seem to have been common in the time of Mahomet as he has placed it as a case [for] annulling bargain of

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?sale and authorising return of the Horse purchased with such an affliction along with Farcy, lameness of long standing, bad feeder &c. in the Sharia or written law. I had heard that it was somewhat common in Toorkistan and in truth was willing to hope that I might there collect facts and observations which might throw more light upon a subject on which the ?dissertations of Kummuree Horses I had made furnished a few hints as to the nature of the alteration in the structure of the Nerves affected in this complaint but had little if at all tended either to develop its cause or to lead to its cure. A few cases only had got well under my management. These few were of recent occurrence and the treatment was commenced as soon as practical after the disease was perceived. But as far I can charge my memory never did a single case of long standing perfectly recover or appear to be materially benefited by any of the various modes of treatment I had adopted. And the proportion of these instances which did completely recover was so small to that of those which either did not recover at all or only in an imperfect manner as to induce no reliance upon those modes of management which appeared to have been successful or more correctly speaking under the prosecution of which the Animals had got well.

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I had practised almost whatever had been recommended by natives as having been found useful, I had prosecuted ideas thrown out by English gentlemen whose opportunities of observing the complaint had been not few and I had followed the suggestions of my own mind to an extent and in a variety of form not inconsiderable. Experiments based on reasoning and others of features somewhat empirical ended equally in disappointment. As far as my enquiries could reach this disease in its consequences had been a reproach to such ingenuity and science as had been employed upon it in ages past and the prospect of success seemed little more flattering to those who were disposed under circumstances apparently somewhat more advantageous to continue the research. The disease entailed upon the Hon E.. Company a large loss annually in the various departments in which Horses are employed and perhaps especially in that of the Stud in Stallions in Mares and in young Stock. The public also suffer considerably from the same cause but the loss being divided amongst many is less noticed and less dwelt upon. My predecessor in office considered the case as wholly desperate and irremediable. "If" said he "a cure could be discovered for the Kummuree and the Bursatee the Govt would pay for it cheaply by granting a pension to the Inventor of a Lakh of Rupees a year." Without insisting upon the accuracy of the premises the sentiment as coming from a person who had

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long possessed opportunities of witnessing its effects conveys an impression of both diseases being most formidable and disastrous. In fact this Officer considered the losses produced by these maladies as the only serious obstacles to the introduction of a system which would provide to the Government an internal supply of Horses for the Cavalry adequate to the demand and superior to those procurable from any

other countries available to this object. Some intelligent individuals had imputed blame to the localities on which the Stud experiments had been instituted and carried on. These places according to them through their climate and ?productions as to food contained causes which at least or also predisposed to if they did not actually produce the disorders in question. Without meaning to deny the differing influence of different localities I may justly accuse myself of having given too much weight to natural difference in situations not indeed without some research and evidence, but a more extended examination taken from premises vastly more large shewed that the conclusions were of a nature more general and more ?compelling than the case would fairly bear out. The diseases were found to exist within the whole field of enquiry in a greater or less degree and there was so much difference in the results of different years as to

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involve the whole Kummuree subject in considerable doubt and obscurity. Allowing an influence to locality as far as temperature in degree in steadiness or variableness, in slow or in sudden transition, in dryness or humidity of atmosphere and of Soil there were other circumstances independent of a general and careful management which had all been so accurately examined in their bearing upon one or both diseases as the field for investigation they presented fairly required. Passing over a comparison between the upper lower and middle provinces of British India in regard to the production of the diseases in question from a presumption that others have had greater opportunities of making it than I have I may with less doubt of my facilities upon this point take upon myself to say that of Bursatee there is less in the Punjab than in British India less in Afghanistan than in the Soobah of Lokam and scarcely any in Oozbukistan. The Kummuree is less frequent in the Punjab than in British India, not very infrequent in Afghanistan and common in Toorkistan from the Hindoo Koosh to within a days journey of Sumurkund my personal enquiries having proceeded thus far. In this paper I confine myself almost wholly to Kummuree or a greater or lesser degree of palsy in one or both of the hind legs or extending

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to other parts of the body mentioning the Bursatee or hot weather sore incidentally and only in relation to its comparative prevalence or infrequency in the countries just mentioned. In this point of view the account of the Bursatee stands as follows -- It is much less common in the Punjab than in British India very seldom seen in Afghanistan but known in Oozbukistan under the name of [blank] infrequent and never extensive or formidable.

When it does exist it is found more especially in the angle of the lips forming upon a destruction of the skin from bruise or tearing up of its surface by the bridle. The constitution of the [illeg.] in the Punjab differs little from that of the upper Provinces of British India as I have had an opportunity of seeing the same season in both. Straw is more largely employed as fodder. Barley [blank] Doob Grass is so plentiful as to be cut with the sickle for the use of Horses in towns. Channa or Grain is [blank]

The quantity of surface Doob grass is larger than in Hindoostan from the cultivated surface of the soil in the latter being vastly greater. The water on the whole is as good if not better that is in respect to impregnation with Salts in the plains than that of British India and where it does exist it consists more frequently of common Salt than of Soda or Nitre.

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The climate of Afghanistan at least of its lower part near Peshowr has been given by the Hon. Mr. Mst. Elphinstone. In the hot season the days are very hot but the nights cooler than in British India. There is no regular rainy season at least in the summer so that moisture of the Atmosphere is not enjoined with heat. The water of Peshowr is probably more pure than that of the Punjab generally and that of the vicinity of Kabool extracted by Karez or underground tunnels which serve as artificial taps or vents for Springs or sheets of water shut up between strata of material but permeable is excellent. At Peshowr the use of Barley is general instead of other grain or pulse with the exception of the Indian Corn (*Zea Majis*) in its milling state in the Autumn, and along with Barley and Wheat Straw, [illeg.] recent or dry (*Trifoleum*) [illeg.] Lucerne fresh or dry a small quantity of Kobbul Feirin or Doob grass cut with the Sickle or eaten on the Chummun or Plain from the Puhit Peg.⁶ The practice differs little in Kabool. In Oozbukistan with the exception of the countries bordering the Hills as Budukshan & its former dependencies when it is good the water is loaded with Sand and when it has reached the plains and having come from the Mountains of Sumurkund and carried along the valley of Meeankal it becomes more or less charged with saline matter and especially with Nitre or being mixed with the surplus water of

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the fields richly manured and inundated each with the coating of saline earth which lines the Mains and lesser watercourses. The days of the Summer of Oozbukistan are hot the nights cool sometimes cold. The food is wheat and Barley Straw, Lucerne fresh or in Hay and the Toorkmens give the Juwar or Jawera to their Horses.

In British India Horses are scarce; in the Punjab less so; in Afghanistan Horses are bred, bought from other countries as Colts and reared, imported from Balochistan, Herat Meshed and Oozbukistan but I am unable to say in relation to populousness and to surface whether they are more or less numerous than in the Punjab although I think that good Horses are more common and considerable numbers are annually taken from the north eastern part of Khorasan and from Bokhara to the market of Kubool. But unquestionably Oozbukistan is the great mine of Horses and due care employed in the selection of Stallions and in the appropriation of Mares on the banks of the Oxus and of the Marghab of which the waters are excellent & material and artificial facilities being good breeds might be reared and preserved which would rival if not excel the very best now known. The large unoccupied space of the country is one facility, the good quality of the waters of the rivers just mentioned another, the dryness of the climate in some respects

favorable to this object is a third but the great advantage is that which derives from the power of producing healthy food in sufficient

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sufficient quantity at a very low rate. This, I consider as one of the main features in which Oozbukistan possesses advantages over most of the other countries in Asia, I have seen advantages almost wholly artificial and deriving from bringing the waters of rivers to irrigate lands which without them would yield scarcely any thing save alkalescent and bitter vegetables, Lucerne forms the basis of the food of Horses in Oozbukistan and managed with prudence is capable of doing all that is desirable in this respect alternated with [word missing] alone or mixed with burned Straw of Barley and of Wheat with the grain of the former; Barley Straw being given in Summer and that of Wheat in the winter a practice founded upon effects through which observation has assessed the quality of cooling to the former and of heating to the latter. But it has been reported that the disease of Kummuree is common which if true indicates some condition of things adverse to the health of the Horse and which in a degree counterbalances some of the advantages previously set forth in favor of Oozbukistan as a horse breeding country. It becomes on this point necessary to advert [to] circumstances long past as to two journies undertaken for the purpose of appreciating the resources of the middle and upper provinces as to parent stock, food and the prevalence absence or infrequency of the disease just mentioned.

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It was decidedly ascertained that the reports of very intelligent persons much at variance upon the healthiness or insalubrity of certain localities could be reconciled by recurring to the differences of events of different epochs. It had been stated as the result of long experience by an individual whose veracity could not be doubted that during a period of fifteen years nothing like an epidemic disease had been observed amongst horses in T Tibet nor had the oldest Natives of that country ever witnessed this calamity. But in the year [blank] this actually did take place. The early part of this year was hot particularly in March when one day a thunderstorm suddenly took place accompanied with a singularly cold wind and an immense fall of hailstones of extraordinary size by which some cattle were said to have been killed and many were really wounded to which I was witness. The transition from a high to a very low temperature was very sudden and the latter condition remained for several hours and many persons were affected with violent colds and fever.

Several Horses were seized with inflammation of the lungs and many more had depositions of fluid thrown out of the vessels in various parts of the system causing great swelling especially in the head and in the limbs. A considerable number of Horses died several were left with Kummuree or a greater or less degree of paralytic affliction of the hind legs and few escaped without an effusion of fluid in the lower part of the legs which gradually was absorbed and disappeared.

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Large incisions were made in various parts of the body and had not a hole been cut in the front of the windpipe through which the animal breathed when the operations of the nostrils were so nearly closed by blood effused from the vessels bringing their sides into contact so closely as to leave only the appearance of lines indicating merely the situation of the natural openings a very valuable Stallion would have been lost. It is not meant here to enter into a minutely detailed account of the symptoms or of the appearances of bodies dissected farther than to observe[,] as connected with an explanation hereafter to be attempted[,] at this stage of the history to observe that the fluid thrown out was not probably the effect of palsy of the extreme vessels but more likely the result of that increased activity from ?colored blood being found to fill the ordinarily empty spaces of the cellular membrane. But it is not irrelevant to notice that upon the success of these large incisions soon letting out the extravasated blood and letting off that pressure and disturbance of parts which would speedily have ended in the destruction of their vital principle has led to a similar practice in great depositions in the head in Erysipelas or St. Anthony's fire which had brought all the features of the face almost into an equally swollen

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surface though the ?identity of the [illeg.] could not be recognised. This along with steaming the head with vapor arising from water dashed upon heated stones and strong purgatives has been quickly successful in cases which under a less energetic practice would in all probability have ended fatally.

Save the existence of this sudden deposition little was made out by dissections which could not be prosecuted with great ?nicety on account of the demand for my labors to succour the numerous animals which stood in need of relief. The weather after this fluctuated frequently between great heat and considerable coldness of the atmosphere and during this period which lasted nearly a month several Horses were struck suddenly with Kummuree. Amongst others one Mare of three years old of great promise perhaps the most perfect in form and action that had been bred at the Stud and which had been in high health the preceeding evening was found early in the morning affected with Kummuree to such a degree as to have wholly lost the use of her hind legs at least so far as to be unable to get up from her own exertions or to support herself when raised. She was bled largely had a purgative given but became exhausted in from two to three days through her almost incessant efforts with her fore legs to rise and when raised to fall forwards. As this was one of the first cases of Kummuree that I had seen in the first attack so suddenly to have proved

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proved fatal I was particularly anxious to discover what had happened to the nervous System and found not only a much larger quantity of watery fluid than is common in the membrane lining the canal in the bones of the back and blood thrown out upon the surface of the nerves of the loins as they pass through the holes in the bones just mentioned but diffused through the substance of the Nerves

themselves whilst the bones were bathed with a bloody effusion which entered into the muscles above and below them.

It became a question whether the excess of water in the sheath of the Spinal ?chain or the blood and bloody effusion were ?urgently cause of the palsy of the hind legs or were themselves the effect of the often repeated and violent exertions the animal had made to rise and when raised to support herself and to go on. Within a very short period another Colt or Filly, (I speak with uncertainty on a point not material as the sex affects not the object and I have not my notes at hand) was affected in a manner nearly similar but less violent and which was put to death on the second or third day under a persuasion that the perfect recovery of the animal was not to be expected and under a hope that dissection of this case and comparison of the appearances with those of that just mentioned might clear up the doubt as to the connection of the effusion with the paralytic affection. A deposition was seen in the same situation but less considerable in extent. These cases were both recent. It remained to be seen whether in

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Kummuree of old standing there were any appearances indicative of similar deposition in and on the nerves of the back. Unhappily the Stud furnished too frequent examples of this disease ever to be without some cases of the description and in fact my attention was too decidedly fixed upon the importance of the disease not to have a few instances constantly under my observation. It was found that Stallions and Mares laboring under this complaint yielded Stock frequently and apparently without more proclivity to this malady than others sprung from Parents unsuspected of being thus injured. It is not however meant to say that the practice of breeding from Stock similarly affected is highly prudent, perhaps more with truth may be conceded and it may be advanced that a risk is incurred ?thusly of forming a constitution with an hereditary aptitude to the complaint greater than might exist in progeny springing from a Sire and Dam wholly free from suspicion of conveying susceptibility of this nature, in plainer language, wholly sound. But to my eye whether correctly viewing or not is a question on which others are left to decide there seemed in almost all the Horses I had seen in Asia an absence of that vigor of action I had witnessed generally in Horses in Europe and in my judgment bordering on debility and touching almost upon disease.

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It was exceedingly difficult to strike the line between that condition which appeared to be the ?creature of climate and under which Horses performed the services exacted from them as it would seem effectively and whenever called upon and that state which might be held as the commencing or even advanced condition of disease. In the merely suspect or commencing condition it obviously would have been considered highly reprehensible to have wasted property of great cost and of difficult acquisition because it seemed not absolutely perfect. And I felt[,] whether others will join this sentiment may be doubted[,] that I could not conscientiously condemn and discard in the circumstances under which the Stud was then placed animals which in relation to their breed, their age, their obvious qualities abstracted

from this complaint and from the throwing progeny more frequently free from the disease than the contrary[,] left the question of hereditary predisposition undecided without incurring a moral responsibility in devolving the property of others consigned to me to a destruction which had it been my own I should have paused and committed to farther time. The subject was new, was difficult and was dark. From every point in which it met my judgment its features

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seemed importantly to demand and especially from me a rigid and continued enquiry It was not a mere matter of profit and loss in which the interests of a single individual were involved. It had a higher and more extensive range of bearing[,] it related to a cause which affected most seriously the practicability of raising with advantage an accessory to that branch of military service of which the scantiness long felt and generally acknowledged had elicited a system of interior supply founded upon the soundest principles of policy provided it could be pursued with a success corresponding to that derived from the employment of equal capital & other means in other countries. I employed the best judgment I could bring to this point whether its decisions were false or sound it is not for me to determine.

Note

The question has yet touched upon Parent Stock and progeny. It branches out still further. I have been accused in retaining upon the Establishment[,] and as the accusation implied I think I may say here without a definition of term[s][,] of [illeg.] animals which experience had proven to be only a burden. That condemnation should follow such a charge wholly unanswered[,] and under circumstances [that] could not then have been by any possibility have been replied to and of which I was wholly ignorant cannot [?but] excite surprise.

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I mention it now pointedly First Because I have been publicly taken to task by the individual whom it concerns for not having given to the Public my sentiments upon the nature of the disease under which the animals in question then labored. Secondly Because it affords an opportunity for placing that transaction in a clear light as far as that individual and myself are concerned and Thirdly Because it furnishes data upon which those Authorities now in England as private individuals can alone estimate whether under the circumstances I was guilty of the impropriety in question or otherwise. But some apology is due from me. It is an indication of a bad mind to store up injuries real or fancied for several years and then to revive them for the sake of engaging in controversy which for a benefit perhaps ?ideal must produce consequences that cannot fail to prove afflicting to the persons engaged in the controversy and through them to their friends. Why have I placed myself in the predicament of having the qualities of my mind brought to trial before the Public in a light so [illeg.]? I reply because the provocations have been so great so repeated and so uncalled for that I must either sink in my own estimation or place the subject before the Public. Yet there remains another alternative. If the individual in question feel that all has not been right in respect to [illeg.] of conduct he will be silent and the Public without any

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knowledge of names will be no farther interested. If he adopt a contrary course of conduct whatever be the result he will ?recollect that I have acquitted myself of that pledge wrung from me by himself through the insulting letter sent to me at the moment when I could merely state that I could refute his position though [illeg.] by him. The Govt & the Public will judge between us. I had buried the former transaction in the most complete silence and bore without complaint or even [illeg.] an obloquy in the justice of which a correct opinion will hereafter be formed. I am not a Volunteer in the matter but am literally forced to a measure I deeply regret circumstances should have rendered necessary.

The preceding digression amongst other features will convey an idea that in the Establishment was at least one animal which without the former sustaining much injury by its loss might be sacrificed to dissection. In fact a Horse which had been long considerably affected with Kummuree and latterly to have become unable to perform work at the Mill for bruising Grain was killed for the purpose of being dissected. The substance of the Nerves of the loins in passing through the holes of the back bone appeared to be more compact than is natural in a healthy condition and covered by a yellow deposit which seemed to be coagulable Lymph. This appearance was continued to the [illeg.] Sciatic Nerves when spread over the Ligament of that name and the same or nearly the same condition was seen in various other instances of Kummuree Horses of ancient date but blood with bloody effusion were seen in the Nerves of the loin in most cases.

¹ On this and a few later pages, the binding obscures a couple of letters at the start of each line of this page, rendering some words not only illegible but unguessable.

² Fill is an archaic word for shaft.

³ De re rustica: on country matters.

⁴ Ley, an archaic spelling of lye, a chemical term.

⁵ The subject matter of this note is off at a tangent to the main thrust of the text. It is moreover (apparently) written in haste and the writing more difficult than usual to decipher. It is also replete with technical vocabulary, some of it unfamiliar to both the editors. We have done our best to make some sense of it, but a complete and accurate transcription may have to await an editor as familiar with anatomical terms, particularly those applicable to the horse, as with the peculiarities of Moorcroft's hand.

⁶ This sentence is barely legible, and its meaning obscure.