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J. P. Davis Esq

Boston

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of the Author,

T. S. Mason

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ON SOME

OF THE

VEGETABLE MATERIALS

FROM WHICH

CORDAGE, TWINE AND THREAD,

ARE MADE.

BY JAMES MEASE, M. D.

Member of the American Philosophical Society, &c. &c.

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VEGETABLE MATERIALS FOR CORDAGE, &c.

THE two first vegetables that deserve to be noticed, as being most generally known to the countries in which christianity prevails, are, 1. Hemp, *Cannabis sativa*; 2. Flax, *Linum usitatissimum*. On these no farther remarks are necessary.

In India the fibres of several vegetables, and different vegetable productions, are extensively employed for the same purpose; the principal of which are the following.

1. *Crotalaria juncea*, L.; sana,* or sun-plant. This is extensively cultivated throughout India, and also in the island of Sumatra, according to Marsden, to make small ropes and twine. The Rev. Mr. Carey says there are two varieties of this plant, one of which grows ten or twelve feet high: the seeds of another are sown in October, and rises to the height of four or five feet. The first variety is preferred.† The reason for this preference, according to Milburn, is, 1st, the difference in the size of the two plants; and 2d, the circumstance of the lateral branches which shoot out from the smaller variety, and which render the fibres very difficult to be separated from the woody part. The mode of separating the fibre is extremely simple, as are all the mechanical operations in India. When the seed vessels have nearly attained their full size, the plants are cut, tied in bundles, and steeped in water for two or three days; then taken out, and the stalks broken about a foot from the lower end by a man standing up to his knees in water, who, holding a few of the stalks with the large ends from him, threshes the water with them, till the broken pieces are separated, and fall off. Then turning them, he takes hold of the fibres which have been freed, and beats the small ends in the same manner, until the fibre is entirely separated from the stalks. A few strokes are sufficient. It is then dried and pack-

* Dr. Francis Buchanan gives two Indian names to this plant, viz. *Janupa*, Travels, Vol. i. p. 226, and *Shanapu*, Vol. ii. p. 227. Milburn says that the large variety is called *Ghore sunn*: the fibre is called *Jute*. Oriental Commerce, Vol. ii. p. 210.

† On the Agriculture of Dinajpur. Trans. Asiatic Soc. Vol. x. p. 11.

ed up for market. Dr. Buchanan gives a somewhat different mode of treating the plant to procure the fibre, which it is unnecessary to copy. (Travels, Vol. i. p. 227.) The apparatus commonly used in the United States to break and prepare hemp, would answer much better than any Indian mode. The twine made in India from the sun-plant, has long been an article of regular importation into the United States, and is much used when a strong ligature is not required. It is also extensively employed for fishing seines; for although it is weaker when dry, than the twine from flax, yet is stronger than it, when wet; on this account, and being but half the price of flax twine, it is in great demand by the Delaware fishermen, as one of them recently informed me.* The twine-fibre is also the material from which the well known gunny bags are made, as I have long since stated,† and has been converted into strong demy, crown and cartridge paper: a specimen of the first I received from the late Dr. Lettsom of London, in the year 1803,‡ and still possess it. The value of the sun-plant induced me to recommend the importation of the seeds for sowing in Louisiana, and I repeat the recommendation. The climate of Florida would be equally congenial to it, and from the greater ease with which its filamentous fibre is separated, than hemp, it would doubtless become a favorite with the cultivators. Paper makers will find it profitable to work up the worn gunny bags and old sun cordage, for coarse strong wrapping paper. The specimen I have of the paper is much stronger than that made from straw.§

* Dr. Roxburgh gives the results of several hundred experiments, to show the comparative strength of numerous vegetable fibres used in India for cordage and twine, under the following circumstances. 1. In a fresh state; 2. dry; 3. wet with fresh water; 4. tanned; 5. tarred; 6. after one hundred and sixteen days maceration in fresh water. The result was, that tan in general added strength, while tar, although it preserved cordage, diminished its strength; and in no instance was this more clearly evinced, than in the common hemp, (*Cannabis*) cultivated in Bengal. Wetting cords with fresh water, invariably increased their strength greatly. A dry cord of sun-plant sail twine broke with one hundred and forty eight pounds weight, but required seventy four pounds more, or a weight of two hundred and twenty two pounds to break it when wet with fresh water. Thirty two pounds more were required to break a hempen cord when wet, than to break another cord of the same size when dry.

‡ Domestic Encyclopedia, article "Gunny bag," 1803.

† Domestic Encyclopedia, article "Paper," 1803.

§ The foreman of a rope walk, in which the fibre of the sun-plant is largely worked up, informed me, that when hackled "closely," for twine or lines, it would not yield more than one half "tier," that is, long hemp. The rest was tow, and only fit

Milburn says that the island of Salsette produces two sorts of hemp, one resembling the sun-plant, but preferred thereto, when great strength is required; it is the best substitute for hemp yet known. (Vol. 1. p. 283.) The botanical name of the plant yielding it, is not given.

2. *Musa textilis*.—For several years past, a fibrous material under the name Manilla hemp, has been largely imported into the United States, and worked up into glossy white cordage for hawsers and running rigging. Having four years since, accidentally met with a store full of it, I was led to attempt to find out the vegetable that yielded it, but failed to obtain the least information. The mercantile men made no inquiries in the port where they shipped the article, and were satisfied with the good returns derived from bringing it home. I knew it could not be the fibre of the hemp of Europe and North America, having been long familiar with the fact, that neither hemp nor flax are cultivated in any part of India, or the Indian islands, for cordage,* but the particular vegetable yielding the fibre, could not be ascertained. Having however been recently consulted on a question arising at the Philadelphia custom house, respecting the nature of some Indian cordage, and a cordage material from the same quarter, I determined to renew my inquiries, and despairing of acquiring any knowledge from men, I resolved to consult every book on India, within my reach. The second work I examined, was "Crawford's account of the Indian Archipelago," and the first volume of it relieved me from my ignorance. According to this author, the fibre of Manilla hemp is obtained from the *Musa textilis*,† a species of wild banana, growing abundantly in the northern spice islands, and in the Philippines, particularly in Mindanao. The length

for plough lines, halters, bed cords, &c. The "tier" was also full of shaws, and weak. These defects doubtless arise in part from the slovenly preparation of the fibre. The brake and hackle would certainly turn it out in a more perfect state, although they could not alter the strength of the fibre.

* Hemp and flax have been cultivated in India from the earliest times, for the oil produced from the seeds; but the chief object of attention to the first, is owing to the general use made of the leaves for smoking in pipes, either alone or mixed with tobacco; and for making an intoxicating preparation from them called *bang*, which is smoked with tobacco. In Sumatra, according to Marsden, the same practice prevails, and hemp is there extensively cultivated for this purpose.

† Dr. Roxburgh says, that "the species of *Musa*, which we call *Coccinea*, yields what is called Manilla hemp; at least it was sent to me from China as that plant."
—Trans. Soc. Arts, Vol. xxiv, p. 153.

of it when imported into the United States, is from six to eight feet. From many inquiries at the proper sources of information, on the qualities of this cordage, I am authorized to say, that it is stronger, more durable, and more elastic than that made from common hemp.

The elasticity of the Manilla hemp cordage is one of its greatest recommendations, and on this account is highly prized by our seamen. On one occasion a few years since, a New York packet ship in the harbor of Liverpool, during a heavy blow, dragged two anchors, and was driving fast towards a pier against which she would have been dashed with great violence, had not the captain ordered a hawser of Manilla hemp to be carried on shore, and made fast. This being done, the progress of the ship was arrested, but it was not until the hawser had been stretched to one half its original diameter, that she was brought up. The master of a Philadelphia packet, who witnessed the scene with great anxiety, determined immediately on his return home, to order a hawser of the same material.*

3. *Woody fibre inside of the coco-nut husk.*—The short, woody, and apparently intractable, husky fibres, lining the inside of the husk of the coco-nut, constitute the material which Hindoo ingenuity has long since converted into excellent cordage. They are first soaked in water, until they become soft, (and to effect this, Dr. Buchanan says six months are required,) then beaten to separate the woody substance connecting them, which falls away like saw-dust, leaving only the strings. A commercial friend states, that these are spun by hand into yarns of a foot or more in length, and brought in bulk from the Maldivæ, Laccadive, and other islands on the Malabar coast, to Calcutta, and there made up by the native workmen. There are two statements on the subject of the stage of maturity of the coco-nut, proper for the preparation of the coir fibre. Dr. Buchanan says,† that the rope made from the strings of the husk when the nuts are ripe, is very bad, and that the green nuts yield the best material. People, he says, of the low caste of *Williarue*, collect those that have been cut for juice, or thrown down by monkies; but another author asserts, that the fibres “can only be procured from

* He has recently informed me, that had the hawser of the New York packet been made of hemp, it would have parted. The Manilla cordage like that of coir, recovers its elasticity, after being stretched, until considerably worn.

† Vol. II, p. 50. London, 1807.

the fruit in its greatest maturity.”* The circumstance of the color of the cordage being precisely that of the inside of the husk of the ripe nut, would seem to sanction this last opinion. It is singular, that the accurate and observant Mr. Marsden should be entirely silent on this point. With respect to the superiority of a coir cable to that of hemp, in salt water, there is but one sentiment among those who have used both. The experienced navigator Forrest says, that the “coir cable gives so much play to a ship riding at anchor, that with a cable of one hundred and twenty fathoms, the ship retires or gives way sometimes half of its length, when opposed to a heavy sea, and instantly shoots ahead again: the coir cable, after being wire-drawn, recovering its size and spring. It is usual for valuable ships leaving the Ganges in August and September, against the south west monsoon, to have a coir cable fresh made, under the eye of the chief officer, for a stand-by. Hempen cables are strong and stubborn, and ships often founder that ride by them, because nothing stretches or gives way; the coir yields and recovers.” He says further, that “it is preferable for small cordage for running rigging, as it passes much freer through the blocks than hempen rope, which if wet, becomes hard and does not run free, owing to the tar casing it, by the heat of the climate, and the rope is stubborn, especially after a rain.”† Other advantages of coir cables, consist in their floating like wood; never rotting in consequence of being soaked in salt water; not exhaling those unpleasant and unwholesome odors which are perceived from hempen cables when wet, and in their being comparatively light and easily managed. But in fresh water, hempen cordage is more durable. Mrs. Graham states, that “the rigging of a country ship of eight hundred tons, in which she made a voyage from India to Ceylon, consisted entirely of coir rope, and that fresh water rots it to such a degree, that the standing rigging was covered with wax cloth and hempen yarn.”‡ A commercial friend confirms the statement of this keen and observant female traveller, and says, that when the operation is neatly performed, the cordage intended for the standing rigging is deprived of its elasticity, (technically, “the stretch taken

* Letters annexed to Heyne’s Tracts on India, p. 15, 4to. London, 1814. The author, whose name is not given, says he resided twenty years in India.

† Voyage from Calcutta to the Mergui Archipelago; introduction, p. vi. London, 1792.

‡ Residence in India, p. 86. Edinburgh, 1812.

out,") then "served," and finally covered with the Indian dubbing called *dammer*. Thus protected, rigging will last for years. European and American ships hire coir cables when in an Indian port, to save their own. The article (coir) constitutes a grand staple of India, the value of which is considerable.

4. *Agave Americana*.—While I was engaged in examining a coil of Manilla rope, in the course of my inquiries about that article, my attention was drawn to another parcel of glossy white cordage, which I was informed by the ship chandler, had been made from *Sisal hemp*, and was much used. Of the vegetable producing it, and the reason of the specific name attached to the raw material, he knew as little, as respecting the Manilla hemp, which he had been working up for several years. But by continued inquiry, I heard of the merchant who first introduced the article into Philadelphia, and from him I learnt, that having been told by a mariner of the rope made from the prepared fibre in Yucatan, he imported a cargo of it in the year 1825, from Sisal, referring me to my old acquaintance Capt. Patrick Hayes, for further information, he having attended to the process of preparing the article for sale in Yucatan, and seen the plants in the open lot before the Pennsylvania hospital! Upon visiting that institution with Capt. H., and entering the green house, he pointed out the plant, which I immediately recognised as the well known *Agave Americana*—that eminently useful plant to the people of the countries in which it is native, and whose distant periods of flowering when removed therefrom, have given rise to a popular error, which will require ages to remove.* According to my informant, the preparation is extremely simple. By means of two sharp corners made by hollowing out the ends of a wooden tool like a flat ruler, the fleshy leaves are slit into two or three longitudinal strips, and the pulpy substance being scraped off, the fibrous material appears, which is then shaken loose, tied in a knot, and when dried in the sun, is put up in bales for ex-

* I allude to the idle story of the plant (the popular name of which is the American aloe) flowering only once in an hundred years.—In Mexico they flower every ten years, according to Bullock, p. 282. In the year 1804, an *Agave* flowered at the Woodlands, the seat of the late Wm. Hamilton, which grew from a sucker of one that flourished thirty six years before, (1778) at Springetsbury, (Bush-Hill) both near Philadelphia.

portation.* Great quantities are sent to Cuba to make coffee-bags, and since the year 1825, numerous cargoes have been imported into the United States, and worked up into hawsers, running rigging, and small ropes. Much of the late importation I am informed, has been of a quality far inferior to the early stock. In Yucatan, about Merida, the most beautiful sewing thread is made of the fibre, some of which Capt. Hayes brought home, and used in his family. The coarsely prepared fibre for ropes and hawsers, resembles the Manilla hemp, but is harsher to the touch: this may be owing to the great size of the leaves, and to a careless preparation of them, for the fibre from Hayti is much finer than that from Sisal, and the small ropes made from it are beautiful and glossy.

The plant has a very extensive range in Asia, South America, Mexico, and the West Indies, and wherever found, is applied more or less to the same purposes as hemp or flax. In Yucatan the fibre is called "hemequin:" in other places "pita,"† the name by which the thread and twine made of it are also known. In Colombia the prepared fibre is called "coquise," and the name *pita*, given to that of a tree, called *marichi*.‡ The cordage from the *Agave* plant is said to be liable to mildew, and to lose its pliability after being wet, faults that do not attach to the Manilla rope. It is also thought to be inferior in strength to this last. Hawsers made of it are much less durable than those composed of Manilla hemp.

I was led to the preceding investigations by the following occurrence, to which I have already alluded.

In the autumn of 1829, Mr. F., a merchant of Philadelphia, imported a quantity of "coir cordage," and also a large parcel of the

* "The leaves vary from five to eight feet in length, but some considerably exceed these dimensions."—Ward's Mexico, Vol. I. p. 55.—Mr. Bullock measured some ten feet long, fifteen inches wide, and eight inches thick.—Residence in Mexico, p. 71.—In Hayti they seldom exceed five feet in length. Humboldt has given a very interesting account of the various uses to which the plant is applied, in his *Political Essay on the Kingdom of New Spain*. Mr. Ward, in the account of his mission to Mexico, has also stated some of them, and given a fine plate of the plant.

† This is its name in Guatimala, according to Dunn, p. 241.

‡ The fibre of this tree is said to be ten or twelve feet long, and finer and more silky than that of the *Agave*. It is used for sewing half boots and shoes.—Notes on Colombia, by Lieut. Bache, U. S. Army, p. 89, 1827.—It is to be regretted that no further account is given of so valuable a tree or its produce, and that no specimen of the fibre has been brought home.

fibre of the "sun-plant" for rope makers; and a question arose on the duties to be charged on each. Mr. F. said that in importing them, he had been influenced by the edition of the tariff law of 1828, republished in that year by two clerks of the custom house, and revised by the late collector, in which the duty on coir rope, is charged at 15 per cent. ad valorem; and the "sun-plant" not being mentioned at all, he concluded that the duty would be the same as on the other "non-enumerated articles," viz. 15 per cent. It was however determined to charge the coir at the same rate as that paid by imported hempen cordage, viz. five cents per pound, and Mr. F. accordingly paid that duty. Sometime after, another parcel of coir rope was imported into Boston, and the owners resisting the attempt to class it with foreign hempen cordage, the collector finally assented to their construction of the tariff law. The extra duty, therefore, which had been paid by Mr. F., amounting to seven hundred and seventy five dollars, was refunded to him. With respect to the sun-plant fibre, the question was, whether it should be charged with the duty of imported hemp, which was fifty dollars per ton, or be classed with the non-enumerated articles, paying an ad valorem duty of 15 per cent. and which, in the case of the sun-plant fibre, would lower the duty to nine dollars and ninety cents per ton. This last sum was finally fixed on. The decision of the Boston collector as to the coir, and that of the Philadelphia collector on the sun fibre, were in strict accordance with justice, propriety and reason; for the framers of the tariff law of 1828, when fixing the high rates on imported cordage and hemp, had alone in view, the hemp of Europe, (*Cannabis sativa*), and cordage made from it, never dreaming of any other material for cordage than that yielded by this vegetable. The officers of the customs, therefore, might with as much propriety have classed a cargo of Paraguay tea (maté) with some of the varieties of green or black tea of China, and charged the duty accordingly, merely because the daily beverage is prepared for millions of people in South America, from one of these vegetables, and from the others in China, Europe and North America, as to equalize the duties on two articles made from substances so opposite in their natures, as the coco-nut husk strings and the hemp fibre. The same remark is applicable to the hemp and sun-plant. It would have been quite as unreasonable to charge at the same rate, two raw materials, such as hemp and the fibres of the sun-plant, which are the produce of

vegetables so different, and from opposite quarters of the globe, for no reason, except that they can be worked up into the same articles, and applied to the same mechanical purposes. In the case of the coir and hemp, however, this equalization subsequently took place; for upon refunding the amount of extra duty paid by Mr. F., an order was issued by the treasury department, to charge in future, the same duties on hemp and coir cordage, viz. five cents per pound, and this duty was actually paid on a quantity a few weeks after. This order cannot be justified by the terms of the tariff law, and must be considered as the result of a forced construction of it, for the reasons just given. Coir cordage, and that from other Indian vegetables, ought to be classed with the sun-plant twine, and with the fibres of the Agave, (Sisal hemp,) until an express law on the subject be passed, to fix their rates of duty.

A discussion on the subject of the twine made from the sun-plant, had taken place at the custom house of Philadelphia, in the year 1808, in consequence of the arrival of a ship from Calcutta, with a quantity of that article on board. By a law then recently passed, hempen cordage was prohibited, and the surveyor of the port being informed of the twine on board of the ship, showed samples of it to several persons all of whom pronounced it to be made of hemp. He therefore gave his opinion that the law had been contravened, and that the ship had incurred the penalty expressed in it. But on a reference to the collector of the port, he was overruled, for one of the supercargoes, had the foresight to obtain letters from Mr. Wm. Roxburgh, jr. the superintendent of the botanic garden near Calcutta, and from the Rev. Mr. Carey, to show the nature of the plant from which the twine had been made, and that neither hemp nor flax were ever used in India, as materials for cordage or twine, a fact since frequently confirmed. Although such authorities required no support, yet the supercargo to increase the chance of a favorable decision on the question, thought proper to consult me, and I referred him for a confirmation of their statements to the articles I had published five years before, (1803,) in the work already mentioned. A gentleman who had resided for ten years in Calcutta, added the weight of his testimony to the same points, and the ship was released from the custom house seals. I annex the letters of Mr. Carey, and Mr. Roxburgh, which the supercargo put into my hands at the time.

5. The most singular vegetable fibre convertible into cordage, is the production of a Sago Palm, first named *Saguerus* by Rumphius,* who gives a long and interesting account of it, and an excellent plate of the tree, showing the mode of growth of the fibre. The common name of the fibre in India is Ejoo. In the Island of Sumatra, according to Marsden,† it is called *Anou*. It resembles black horse-hair. "Each tree produces six leaves in the year, and each leaf yields ten and a half ounces of the fibre, which makes the annual produce of each tree nearly four pounds. Some of the best trees produce full one pound of the fibres in each leaf. They grow from the base of the footstalks of the leaves, and embrace completely the trunk of the tree. The fibres and leaves are easily removed without injuring the tree."‡ Crawford says "It is used for every purpose of cordage in India, domestic and naval, and is superior in quality, cheapness and durability, to the cordage manufactured from the fibrous husk of the coco-nut." Cables made of this unique production, are occasionally brought from India, but not as an article of commerce, into the U. States. It is presumed that this was the cordage brought by the ship *Ajax* a few years since into New York, and called "Palm tree cordage."

6. In Italy, the *Hibiscus roseus*, *Thore*, has been within a few years employed for small cordage, by Signor Barbieri, curator of the botanic garden at Milan, who two years since sent a specimen of a cord made of it, with some of the seeds of the plant, to "the Philadelphia Society for promoting agriculture," which were distributed. The plant abounds in the marshes of Italy, and grows twelve feet high. It is a perennial, and as it is therefore not liable to the same expense and attention required by common hemp or flax, it may lay claim to some exclusive advantages over these plants. S. Barbieri did not state the comparative advantages of flax and the *Hibiscus roseus*, as to the separation of the fibre, a point by the way, of great consequence. The people of Cumberland Co. New Jersey, have long

* Herbarium Amboynense, Vol. 1. p. 57, plate 13. It is the *Borassus gomutus* of Loureiro, Flora Cochinchinensis, p. 618; and *Arenga saccharifera* of Labillardiere, according to Dr. Roxburgh. This last work, I have not seen. Rumphius says it is found on the coast of Java, about Grissek and Samarang, and in the islands of the Molucca Archipelago. It abounds in Amboyna, p. 59.

† History of Sumatra, p. 77.

‡ Roxburgh, Trans. Soc. Arts. Lond. Vol. 24, p. 152.

been in the practice of making ropes and plough lines of the *H. palustris*, the growth of their marshy districts.

7. The *Sida abutilon*, treated as hemp, yields a fibre, from which very excellent ropes are made. It abounds in the United States, particularly in Pennsylvania and Virginia.

8. *Phormium tenax*; New Zealand Flax. We owe the knowledge of this valuable plant to the first voyage of Capt. Cook. All the attempts to cultivate it in Europe and the U. States, in the open air, have failed. Cables and ropes formed of it, are said to be not only much lighter, but far stronger than those made from hemp, (*Cannabis*), viz. in the proportions of $23\frac{5}{11}$ to $16\frac{1}{3}$. The missionaries might render an essential service to the objects of their spiritual care in the New Zealand group of islands, by urging them to cultivate extensively this valuable production of their soil. The growth, preparation of the raw material, and its exportation might be made greatly auxiliary to their civilization, by inducing habits of regular industry, and by furnishing them with the means of procuring every article of clothing, and for domestic use, books, and the various things connected with the arts of civil life, all of which moreover, have hitherto been supplied at the expense of the friends to missions in Europe, and the United States.

Philadelphia, December, 1829.

P. S. I send herewith specimens of the fibres of

1. *Crotolaria juncea*, sun-plant of India, the material of Calcutta twine.
2. *Musa textilis*, Manilla hemp.
3. Coir fibre, from the inside of the coco-nut husk.
4. *Agave Americana*, from Tampico and Hayti. Sisal hemp.

Letters on the Sun-Plant of India, referred to in page 35.

Dear Sir—In reply to your inquiries, concerning the material of which gunnies, twine, &c. are manufactured, and which you say are thought in America, to be manufactured from hemp, I observe that hemp, (*Cannabis*), is no part of the material used in those goods.

I have written a paper on the state of agriculture in the district of Dinajpur, which is printed in the volume of the Asiatic Society, now in the press, and in it, I have taken some notice of the cultivation of the plants used in the manufacture of gunnies, &c.; but as that volume will not perhaps be published in less than another year, I can-

not refer you to it. I therefore observe, that there are several plants indigenous to India, the fibres of which are used for the manufacture of cordage, twine and gunnies, the principal of which are the *Crotalaria juncea*, (called sun by the Hindoos) and two species of *Corchorus*, (Paat or Kosta of the Hindoos.) Several species of the *Hibiscus*, furnish a durable fibre, but are cultivated in too small quantities to be brought to market. *Robinia* or *Millingtonia cannabina*, is used by the natives to make ropes, but is seldom brought to market.

Hemp (*Cannabis*) grows in most places throughout Hindostan; but the Hindoos are ignorant of its uses for cordage, cloth, &c., and only cultivate it in very small quantities, on account of its narcotic qualities. Flax is also cultivated in large quantities for its seed, but the natives know nothing of its use in the manufacture of linen cloth, &c.

The East India Company, have tried to extend the cultivation of hemp (*Cannabis*), and flax (*Linum*), but the attempt has not been attended with the desired success. The natives are loth to venture upon the cultivation of a plant (hemp) which has never been tried by them as a crop, or to strip the bark from the feeble stalks of the flax, while they find the cultivation of *Crotalaria* and *Corchorus*, so easy and effectual for cordage, sail cloth, &c., and that of Cotton so proper for cloth.

You may therefore assure yourself, that neither gunnies, twine, rope, nor any other article of Indian manufacture, which is brought to market, is made of hemp (*Cannabis*), or of flax (*Linum*.)

I am, dear Sir, yours very truly,

WM. CAREY.

To Mr. Henry Drinker.
Calcutta, July 22, 1807.

Botanic Garden, near Calcutta, July 22, 1807.

Dear Sir—The principal material of which twine and other sorts of cordage are made in India, besides the coarse bags and canvas, is sun (the fibres of *Crotalaria juncea*;) also Paat is used (the fibres of *Corchorus capsularis*), and several other substances, all of which are different from hemp, (*Cannabis sativa*), and flax, (*Linum usitatissimum*).

WM. ROXBURGH, Jr.

In charge of the Botanic Garden.

To Mr. Drinker.



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