DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA.

GOSSYPIUM, *Linn.; Gen. Pl., I., 209.*

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A genus of the Natural Order MALVACEÆ, the species of which are widely distributed on both sides of the Equator, and in both hemispheres. On the North they extend, under cultivation, as far as the shores of Southern Europe, and on the South to the Cape of Good Hope.

The limitation of the forms of these very important cultivated plants, to definite species, varieties, hybrids, and races, has much perplexed writers on the subject. The vast importance of the floss, obtained from the seeds, has induced an extensive cultivation, and that, too, under almost every condition of climate and soil. The ease with which climatic conditions originate local forms, and the rapidity with which hybrids are produced, have *both* combined to bring about a degree of complexity that perhaps exists with no other agricultural crop. The departures from original specific conditions are in fact so great as to render it almost impossible to determine whether the cotton-yielding plants have been derived from three or more species, or are all mere developments from a protean ancestor which possessed indigenous Asiatic, African, and American representatives. This being so, the authors have found it undesirable, at present, to attempt more than a brief review of the botanical literature of the subject. They are conscious that many ambiguities and even errors may be thereby reproduced, but unavoidably so, for, until a thorough and original investigation has been conducted with the living plants, nothing definite can be published regarding the cultivated cottons of India The classification which follows may, however, be accepted as denoting some of the chief forms recognised by us, but the accuracy of the relegation of vernacular names and of the restriction of special properties to definite forms, is open to the gravest doubt. This is due to the authors having been practically limited to a compilation from published works and official correspondence. The primary object of the present effort may in fact be viewed as an attempt to suggest some of the main lines on which a scientific classification of the Indian indigenous and exotic cottons, and of their hybrids, might in the future be conducted, rather than to produce a treatise professing originality. It must, however, be admitted that no real good can be accomplished until an original investigation has been conducted, since everything depends on knowing whether or not a form recommended for experimental cultivation is suited to a particular district.

This knowledge could doubtless be arrived at after the different forms of cotton had been scientifically worked up, and the degree of their hybridisation and the nature of *that* hybridisation clearly established. Indeed, it is at present impossible to write with any degree of confidence regarding this—one of the most important of Indian crops,—since it is often difficult to know what forms are referred to by writers who employ local and vernacular names only, when discussing their properties. Thus, for example, a District Officer writing of *Nurma* cotton may be understood to be speaking of some of the forms of **G. arboreum** or of some hybrid between that species and **G. herbaceum**—*Deshi* cotton with purple instead of yellow flowers. Indeed, it seems highly

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improbable that any form of Indian cotton can be said to belong, strictly speaking, to the Linnean species, **G. herbaceum.** On the other hand, nearly every writer on Indian cotton has denied the existence of **G. arboreum** as a field crop, whereas the chief cotton of Eastern and Northern India seems undoubtedly to be a form of that species. In fact, in this distinction lies the chief difference between the Indian cottons of the Eastern and Western peninsulas, the latter being mainly derived from a form allied to, but quite distinct from, **G. herbaceum.**

Much has been done to discover the soils suited for cotton generally, and under orders of Government, many valuable experiments have been made, with exotic forms. What would appear to be the foremost and most essential enquiry has, apparently, however, been entirely neglected, namely, a scientific and exhaustive investigation into the existing conditions of Indian cotton. Until this has been done experiment can be but blind groping in the dark, which by chance may now and then fall upon facts of importance, but only after needless expenditure of time and money. To effect improvement in the indigenous cottons would of necessity confer a more lasting benefit to the country than even success in acclimatisation of exotic forms. To accomplish this, the endemic cottons must first be worked up. The climatic and other causes which tend to preserve or destroy good or bad properties must be thoroughly established. The influences of hybridisation must be worked out on a scientific basis, by testing the strength of strain, from this species or that, best suited to the environment. The tendency of retrogression from a prized hybrid to either ancestor should not be a matter of periodic deprecation; it should be understood, and, if possible, prevented or the exhausted stock promptly replenished. When experiment and study have furnished the required data on which to act, it will almost for certain be found, that to preserve the cotton of a province or district up to a required standard, specially grown and artificially hybridised stock will be imperatively necessary. Indeed, the establishment of nurseries or seed farms, for this purpose, on a more rational basis than heretofore attempted, would, in all probability, prove the greatest reform possible for the cotton industry of India. When the quality of stock has been improved, attention might then be turned to the modes of cultivation and methods of cleaning the fibre, but these are less defective than the present evil of a degeneration of stock against which the poverty and indebtedness of the cultivator render him helpless. It is significant that in the country that once supplied Europe with its raw cotton and cotton goods, the latter of a quality far superior to the manufactures of the present day, there should exist neglected forms of **Gossypium** which have been lost or allowed to decline and become unknown, in less than a century, while exotic forms and hybrids often, it is feared, of inferior quality, have taken their places.

It will be observed by a comparison with what **Dr. Maxwell T. Masters** has written that, in discussing the forms of **Gossypium,** the authors have on the whole followed botanically (as is customary in this work) the classification of the *Flora of British India.* **Dr. Masters** recognises four species:—**G. Stocksii** (an indigenous plant met with on the limestone rocks of the Coast of Sind); **G. herbaceum** (the chief source of the so-called indigenous or *deshi* cultivated cottons); **G. barbadense** (the American cotton); and **G. arboreum** (the tree cotton, which, according, to **Masters,** is probably a native of Africa). **Dr. Masters,** and following him many other authors, incline to the view that **G. Stocksii** is the wild form, from which the cultivated **G. herbaceum** has been derived. As opposed, however, to this it may be pointed out that, while the description of the leaf of **G. Stocksii** (as given by **Masters**) would in part support that view, its naked seed and laciniated bracteoles point to an affinity to **G. barbadense.** This so-called wild species is only found, however, near the coast, and hence it may prove but an acclimatised form or possibly one of the numerous hybrids that undoubtedly exist in India. **Todaro** seems, however, to have advanced a new theory regarding the Indian cottons. The vast majority of the important growths, he informs us, are hybrids, not true species, hence under altered conditions, as, for example, on being removed from one district to another, they manifest a strong tendency to depart from their recognised and valued properties. He has further described many forms as species between which his hybrids have been produced, *and he practically excludes* **G. herbaceum** *from being an Indian species.* Of his species he urges, for example, that

G. Wightianum has a stronger claim to being recognised as a truly indigenous Indian plant than **G. herbaceum.** A variety of **G. herbaceum,** *vis.*, **microcarpum,** he informs us, is, however, frequently met with, as also a second variety, **G. obtusifolium,** but the typical form of **G. herbaceum,** according to **Todaro,** does not occur in India. His variety, **microcarpum,** he affirms, is the *Dhollera* cotton of merchants, a plant which, like **G. neglectum,** *Tod.* (referred by most botanists to **G. arboreum**), readily hybridises with **G. Wightianum.** These hybrids constitute the better class of Indian cottons, such as the Hingánghat, Oomraoti, &c. **Dr. Masters** follows the usual acceptation of the species **G. herbaceum ;** and, doubtless according to him, **G. Wightianum** would be regarded as a variety or hybrid between that species and one or other of the forms of **G. arboreum.** In *Indian Herbaria* **G. Wightianum,** *Tod.*, is often named **G. herbaceum,** *var.* **hirsutum ;** this is the case, for example, with **Kurz's** specimens from Pegu in the Calcutta Herbarium. The plant is certainly more densely hairy than **G. herbaceum,** and the hairs are stellate, which gives it a velvety and ashy appearance. It seems, in fact, probable that much of the confusion regarding **Todaro's** species is due to its having been spoken of ultimately as **G. hirsutum,** *Linn.*, a plant to which it has little or no affinity. There is probably no doubt that, whether recognised as a hybrid or species, **G. Wightianum** is of the greatest importance to India, even much more so than either **G. herbaceum** or **G. arboreum,** between which in many of its characteristics it is intermediate. **Todaro's** experiments would, however, support the theory of **G. Wightianum** being an independent species. The hybrids produced with it from **G. neglectum** or **G. herbaceum,** *var.* **microcarpum,** were fertile and afforded seed which, in some cases, yielded cotton of a superior quality, but in a year or two these hybrids gradually lost their merit (if not carefully cultivated), and reverted, in the majority of cases, to **G. neglectum,** more rarely to **G. Wightianum.** Experimenting with **G. herbaceum** and **G. Wightianum** by growing them in sterile soils and without irrigation, **Todaro** found the latter species to preserve its characteristics even more persistently than the former. Further, he noted that the good qualities of a hybrid were longer maintained when it was grown at a distance from either of its ancestors.

Todaro has, in a like manner, suggested a line of enquiry with **G. arboreum,** of the greatest practical importance. He isolates a condition which he designates **G. neglectum** from **G. arboreum,** *Linn.* According to **Todaro,** **G. neglectum** has played a far more important part in the Indian cotton question than the true **G. arboreum.** He cites the following synonyms and plates for his new species :—

G. neglectum, *Tod.*, with the synonyms **herbaceum** (*var.* China cotton of Roxburgh and of Royle, non-*Linn.*) ; **G. herbaceum,** *Wight, Ic., t. 11 ;* **G. arboreum,** *Parlatore, in part ;* **Cudapariti,** *Rheede.*

Under his species he also forms a variety with the name **Roxburghianum,** and mentions the following synonyms for that :—**G. herbaceum** (*var.* Dacca Cotton, of Roxburgh) ; and **G. indicum** (*var.* Dacca Cotton, of Royle).

G. neglectum, thus isolated from **G. arboreum,** differs chiefly in being sub-herbaceous, in having broader, less pointed segments to the leaves, and in possessing an acutely pointed ovary. The type form of **G. arboreum,** *Linn.*, is more arborescent, has the segments of the leaves (**Todaro** affirms), bristle-tipped, with the fruit rounded. But in **Parlatore's** picture, cited as in part **G. neglectum,** the flowers are purple, whereas in *Royle's Ill. Him. Bot., table 23, fig. 1* (which is *Wight's Ic., t. 11.*, quoted above), the flowers are shown as yellow with a purple centre. **Todaro** states that while **G. arboreum,** *Linn.*, occurs only near temples and in gardens, **G. neglectum** is extensively cultivated as a field crop, and is in fact the chief source of the so-called Bengal cottons of commerce. It is said to have always yellow flowers with a purple centre, and in this respect resembles **G. Wightianum** and other Indian cottons. Hence it would appear probable that all the purple-flowered field cottons of

India are hybrids with a strong strain of **G. arboreum**, thus preserving the characteristic flowers of that species. Of this nature very probably was **Hove's** red-flowered cotton, which he saw in 1787, extensively cultivated in Bombay. Indeed, similar evidence exists, which goes some way towards proving, that a red-flowered cotton was at one time largely grown before the present greater popularity of yellow-flowered forms.

We have thus briefly indicated some of **Todaro's** discoveries and spoken of a few of his species by name before the reader has been made fully acquainted with these, but we need only add, in this connection, that, while **Todaro** has placed the cotton industries under a heavy obligation for his careful experiments and study, we think he was tempted to form too many species. It seems, in fact, very probable that future research will confirm his opinions alone regarding **G. neglectum** and **G. Wightianum.** But, indeed, while these forms are likely to be regarded as the main types to which all the Indian growths are traceable, it is by no means certain that even these may be retained as species. Be that as it may, in various strains of hybridisation or as seminal sports, *they* have, by selection and cultivation, given origin apparently to the chief Indian races. Of this nature we regard many of the other species described by **Todaro** such as **G. cernum,** *Tod.*; **G. indicum,** *Lamk.*; **G. intermedium,** *Tod.*; **G. nanking,** *Meyer*; and **G. roseum,** *Tod.* Indeed, it would not be difficult to show that all the forms of Indian cotton are very probably but cultivated races and hybrids from two species. If we assume, for this purpose, the existence in India of some form of **G. herbaceum** (or an allied extinct species) the taint of other specific influence in the hybrids would be traceable to **G. arboreum,** *Linn.* The red-flowered field crop (alluded to above) would have been one of the earliest hybrids from these species, which, by selection and possible further crossing, might be assumed to have originated **G. neglectum,** and, by a continuation of the process, to have ultimately yielded **G. Wightianum** and all the other known races. **Todaro** selects certain more prevalent types and raises these to specific value, but pronounces the connecting forms as hybrids. The transition from one extreme to the other is, however, so complete that it seems almost arbitrary to isolate botanically any form. In an agricultural point of view, the isolation is, however, of vital importance, and we are bound to admit that **Todaro's** position is supported by two facts, *viz.*, (1) his own experiments in hybridisation and in testing the stability of character; (2) the fact that the only truly naturalised or, shall we say wild, cotton which we have had the opportunity of examining, possesses all the characters of his **G. Wightianum.** As already remarked, **G. Stocksii** (which by-the-bye, **Todaro** reduces as a synonym of **G. herbaceum,** *Linn.*) would seem from its description (given in the *Flora of British India*) to possess many of the characteristics of the American series of cottons. We have not seen a specimen of that plant, and cannot therefore express a definite opinion regarding it; but the so called wild cotton of Rajputana and of some parts of the Panjáb is almost identically that figured by **Todaro,** as his **G. Wightianum.** Further more, like the wild cotton discovered by **Sir J. Kirk** in Africa, it manifests a tendency to become scandent.

With a panorama before us, of forms no less puzzling than might be prepared from the allied genus **Althæa** (were the triumphs of the gardeners' art in the production of new kinds of holly-hock to receive specific recognition), it need not be wondered at, that we have failed completely to establish the nature of the races of Indian cotton. It must of necessity be difficult, if not impossible, to determine to what species or hybrid, popular writers allude in the works from which the present article has had to be compiled. The authors have been forced, therefore, to accept the simpler nomenclature of referring the Indian cottons to **G. herbaceum, G. arboreum,** and exotic species. Where they have been in a position to say the cotton of a province or district is **G. Wightianum, G. neglectum,** or a hybrid, this has been done, but while, through necessity, compelled to accept the older nomenclature, they feel satisfied that, on the lines established by **Todaro,** though perhaps somewhat simplified, most of the obscure features of Indian cotton are likely to be worked out.

Before proceeding to discuss the species of **Gossypium** met with in India, the authors take this opportunity of thanking their numerous correspond-

ents who have obligingly allowed them to consult a large series of botanical specimens. Among these may be specially mentioned **Dr. G. King** and **Dr. D. Prain**, for sending a selection of the Calcutta Herbarium sets, accompanied with valuable notes and suggestions; **Mr. J. F. Duthie**, for not only contributing the Saharanpore sets, but for assisting the authors in the determination of the cottons obtained from the Provinces of India; **Mr. Edgar Thurston**, for his kindness in forwarding the collections of the Madras Herbarium. These Madras botanical collections have, in one or two instances, amplified the information derived from the samples received from Madras District Officers. **Mr. Ozanne**, Director of Land Records and Agriculture, Bombay, has also contributed a few specimens, and **Mr. Hare**, Settlement Officer, Berar, furnished interesting notes regarding Hyderabad cottons. From these sources of information, it has been possible to form some idea of the Indian cottons; but unfortunately botanical specimens, being but rarely associated with vernacular or commercial names, much remains still to be done in assigning the specific or hybrid designations for the commercial growths of Indian cotton.

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I. Gossypium arboreum, *Linn.; Fl. Br. Ind., I., 347;* Malvaceæ.

Syn.—This species is frequently, though incorrectly, called, by Indian writers, **G. religiosum**: see *Dalz. & Gibs., Bomb. Fl. Supp., 8; Graham, Cat. Bomb. Pl., 15; also* **G. nigrum**, *Ham.; W. & A. Prod., 55.*

Diagnostic Characters.—*Leaves*, more or less hairy and gland, dotted, ⅔ segmented, or almost cut to the base into 5 or 7 lobes, mostly 5. *Segments*, contracted at the base, narrow, ovate, linear, acuminate, or ovate lanceolate, *not ½ as broad as long, central lobe often having a small, supplementary segment, or tooth, in the deep-rounded, lateral sinus. Bracteoles, ovate, cordate acute, toothed or entire. Flowers*, purple or purple with yellow centre, rarely white. *Seeds*, free from each other, covered with white cotton overlying a dense green or blackish down; *cotton*, not readily separable from the seed.

The supplementary tooth on one or both sides of the middle lobe of the leaf forms a most peculiar character, and in many cases a ready eye-mark in the separation of **G. arboreum** from **G. herbaceum**. It will be found in the remarks under habitat that, according to **Todaro** (the most recent author on the cultivated cottons of the world), three species are included under the above definition, *viz.*, **G. arboreum**, *L.*, **G. neglectum**, *Tod.*, and **G. sanguineum**, *Hasskarl.* It is very doubtful, however, whether these are separable, and the numerous hybrids that undoubtedly exists between **G. arboreum** and the Indian states of **G. herbaceum**, render this subject extremely obscure. **Todaro** affirms that these hybrids are mostly between his **G. neglectum** and the form of **G. herbaceum** which he has isolated under the name **G. Wightianum**. There seems no doubt that many of the cultivated cottons, especially on the higher lands, are either **G. neglectum**, *Tod.*, or hybrids with a strong **G. arboreum** or **G. neglectum** strain. The pure **G. arboreum** exists now, as it did in **Roxburgh's** time, near temples or "in the gardens of the curious over most parts of India, where it is in flower the greater part of the year." **Mr. Duncan**, for example, describes a large, bushy form of cotton (very probably a hybrid) as found in the Benares district, which yields cotton for five or six years and is there known as *Nurma*. This is also reported to be cultivated at Malwa and at Calpee in the gardens belonging to the Rajah of Jalaun. According to most writers, the pugris, worn by certain Hindus, are made from *Nurma* cotton. It was this fact apparently that led **Linnæus** to distinguish a **Gossypium** with the name **religiosum**. It has since transpired, however, that the plant so designated was not the source of the cotton alluded to, but that it was, in fact, derived from **G. arboreum**. The following passage may be given in passing, regarding this supposed sacred character of **G. arboreum**:—

In the Bengal Asiatic Society's Journal (*Vol. XI., 290*), there occurs an article on **G. arboreum** by **Dr. A. Burn**. "The *Nurma* cotton," he there

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wrote, "is a perennial plant, lasting for four or five years or more. It grows in every kind of soil; but attains perfection only in the light, sandy, *gorát* lands. The wool is fine, silky, of considerable strength, and fully an inch long. Hedgerows, gardens, and groves of trees about the abodes of devotees and temples, are the places where the plant is found. Muslins and turbans are made from it. Since the introduction of European cloth, the culture of this cotton has almost entirely ceased. Its yield per acre is estimated at one hundred pounds of clean cotton in the first year, and in the second at from three to four hundred pounds. The great hindrance to its cultivation is the fact that it requires protection throughout the year. The price of this cotton in the market at Broach is always double that of the common country article. But there are never more than a few pounds procurable." In the *Broach Gazetteer* it is added to the above that "*Nurma* or *deva kapas* **(Gossypium religiosum)**, would seem to be grown only to a small extent, chiefly near temples and the dwellings of ascetics. It is used in making the caste thread (*Jandi*)." Before passing from this subject it may be pointed out that the above opinion as to the value of *Nurma* cotton, is most probably greatly over-estimated.

A far more serious error has, however, been made in regarding one of the conditions of this species as a form of **G. herbaceum.** This has been cleared up by **Todaro**, who has isolated as species many forms hitherto viewed as but cultivated races. Some of these he has associated with **G. arboreum**, others with **G. herbaceum.** While viewing **Todaro** as having materially advanced the study of the species of **Gossypium**, we are not prepared to agree entirely with him that **G. Wightianum** and **G. neglectum** are good species. They are perhaps at most varietios, if, indeed, they are anything more than hybrids, derived from the two originally Asiatic (or Old World) species, represented by **G. arboreum** and **G. herbaceum.** But, whether species, varieties, or hybrids they are, however, of such importance as to necessitate separate recognition, and the following passages, compiled from all available sources, are intended to allow the reader to form his own opinion as to the desirability of their retention or separation from the Linnean types.

Todaro's separation of **G. arboreum,** *L.*, into two forms may be exhibited as follows:—

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Conf. with pp. 8-14; 63; 102; 103; 119; 134; 142.

α **G. arboreum,** *proper.*

DIAGNOSTIC CHARACTERS.—Arborescent, cultivated in gardens only or near temples; not a regular field crop. *Leaves*, 5-7 lobed with an extra tooth in the left side sinus (or both sides) of the central lobe; thick, leathery, sub-glabrous or with short, abortively stellate hairs on the leaves and longer hairs on the petioles and young stems: lobes bristle-tipped: petiole long, rigid: *stipules* falcate. *Inflorescence* axillary, generally one-flowered; peduncle about ¾ the length of the petiole, but jointed above the middle, bearing a small leaf and two stipules at the joint. *Flowers* small, purple, a little less than twice the length of the bracteoles; *bracteoles* medium-sized, base with round ears, apex ovate, acute toothed or sub-entire. Ovary rounded; seeds with greyish black velvet underneath the floss.

Todaro figures this plant, as well as **G. sanguineum,** *Hasskarl*, on Table I.: we regard both these as representing the Linnean plant. The differences in **sanguineum** are very slight:—purplish stems, petioles, and bracteoles; lobes of the leaves scarcely constricted at the base, and lower pair much smaller than the others; bracteoles, as a rule, more deeply toothed. **Wight's** *Ic., t. 10* (taken from *Royle, Ill. Him. Bot., t. 23, f. 2*), is a very indifferent representation of **G. arboreum**; in fact in hairiness and shape of bracteoles it more nearly resembles the form indicated above as **G. sanguineum,** *Hasskarl*. **G. arboreum** is the *Nurma* or *Deo* cotton of most writers.

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§ **G. neglectum**, *Tod.*

DIAGNOSTIC CHARACTERS.—A large bush, chiefly grown as a field crop, and sometimes seen not more than 18 inches high. *Leaves*, 3, 5, 7-lobed, but extra tooth in sinus less distinct and lobes more linear and simply acute, rarely bristle-tipped: densely coated with long spreading hairs, and, if hybridised with **G. Wightianum**, having stellate hairs as well: *stipules* broad, linear. *Inflorescence* on short lateral branches, 2-4-flowered. *Flowers* yellow with purple centre or yellow with purple tinge (**Todaro** doubts the flowers being ever pure purple, as in **G. arboreum**, so that the so-called purple-flowered field crops, of indigenous plants, are either **G. arboreum** or hybrids of that species): *bracteoles* very large with greatly elongate lateral ears but in shape above ovate acute, toothed. *Ovary* pointed, boll of cotton sometimes elongating from the capsule so as to resemble a kidney-cotton: seed with green velvet below the floss.

Conf. with pp. 8-14; 98; 102; 111; 118; 129; 134; 142; 147.

An excellent plate of this plant will be found in "The Field and Garden Crops" under the name of **G. herbaceum**. Parlatore's plate of **G. arboreum** represents, on the whole, the Garo long-bolled condition of **G. neglectum** except in the colour of the flowers, and **Wight's** *Ic., t. 11* (taken from *Royle, l.c. t. 23, f. 1*), is a good illustration, except in the fact of the inflorescence being shown solitary flowered, which it rarely is in typical conditions of this species—the *radhia* and *manúa* cotton of Upper India. **Todaro** says that, having cultivated this plant for fifteen years, he never saw it with red flowers but always yellow and of a brighter tint than in **G. herbaceum** or **G. maritimum**—more resembling in fact the flowers of **G. Wightianum**. But **Roxburgh's** Dacca cotton, which **Todaro** refers to this species, has the petals tinged with red. **G. neglectum** is extensively cultivated in Bengal, the North-West Provinces, and the Panjáb, constituting to a large extent the so-called "Bengals" of commerce.

Conf. with p. 60.

For probable hybrids of this species, *see* the remarks under **G. herbaceum**.

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(*For II. see p. 16.*)

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Vern.—*Nurma, deo kapas,* HIND., (*Borailli, tangori?* DACCA) BENG.; *Budi kaskom, bhoga kuskom,* SANTAL; *Bogali, nurma,* BUNDEL.; *Manua, radhia, nurma,* N.-W. P.; *Kapas,* PB.; *Mannua, deo,* C. P.; *Deo kapas,* BOMB.; *Deva kápása* (according to **Sakharam Arjun**), MAR.; *Deo kurpas* (God's cotton), MYSORE; *Shem paratie* (according to **Ainslie**), *semparuthi,* TAM.; *Patti,* TEL.; *Nu-wa* (according to **Mason**), BURM.; *Kárpásamu* (according to **Elliot**), SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 519; Dalz. & Gibs., Bomb. Fl. Supp., 8; DC. Origin Cult. Pl., 405; Graham, Cat. Bomb. Pl., 15; Sir W. Elliot, Fl. Andh., 84, 146; Rheede, Hort. Mal.; Rumph. Amb.; Burm. Fl. Ind.; Mason, Burma & Its People, 518, 756; Hove, Journal of Tour in Bombay made in 1787; Ainslie, Mat. Ind., II., 284; Dymock, Mat. Med. W. Ind., 2nd Ed., 110; Pharmacog. Ind., 225; Bent. & Trim., Med. Pl., 37; S. Arjun, Bomb. Drugs, 17; Lisboa, U. Pl. Bomb., 228; Royle, Cult. & Com. of Cotton in India, 144-145; Prod. Res., 221. In the Jours. & Trans. of the Agri-Hort. Soc. of India, frequent mention is made of Nurma cotton: of these the following may be specially cited:—Trans. V. (Proc.), 65; VII. (Proc.), 17; Jour. (Old Series), I., 278; II., 437; IV., 106, 108; XI., 295, et seq.; (New Series) II. (Proc. 1870), XLVI.*

Habitat.—The typical condition of this species is a low tree or shrub, met with in garden cultivation throughout India. Except, perhaps, in a state of hybridisation it rarely occurs as a field crop, but, as explained above, it seems probable the purple-flowered indigenous cotton crop, mentioned by many writers, is of this nature. The chief commercial form of this species is, however, the plant isolated by **Todaro** under the name of **G. neglectum**.

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G. neglectum is extensively cultivated as a field crop. It has bright yellow flowers, and deeply palmately segmented leaves, which in shape are scarcely distinguishable from **G. arboreum** proper, except in that they are more herbaceous and very much more hairy. How far **G. neglectum**, *Tod.*, may, by future observers, be confirmed as of specific value, we are not at present prepared to affirm. It seems, indeed, quite likely that it may prove but a hybrid between **G. arboreum** and one of the plants belonging to the series which we prefer to continue designating **G. herbaceum**. But whether species or hybrid, there is nothing gained, but, on the contrary, everything lost, by swamping so important a crop—the Bengals of Commerce—with either **G. arboreum** or **G. herbaceum**. To this species **Todaro** refers all the China and Dacca cottons described by **Roxburgh** as forms of **G. herbaceum**, but while some of the Dacca cottons seem to be of this nature, others most certainly are not. There is, however, a much stronger taint of **G. neglectum** in the cottons of Eastern and Northern than in Western India, where **G. Wightianum** becomes the prevailing form. The long-bolled Garo hill cotton agrees admirably with Todaro's description of **G. neglectum**, and the cottons of the Santal country are very similar, though they differ, not only from the Garo cottons but from each other. The **Rev. A. Campbell**, of the Santal Mission, who has kindly furnished admirable botanical specimens of the two cotton crops of Manbhum, informs us that they are grown at different seasons, and are quite distinct, being known as *Bhoga-kaskom* and *Budhi-kaskom* respectively. The latter (*Budhi*), he says, is generally grown in gardens or on the homestead lands. It flowers in November and yields a larger crop than the former (*Bhoga*), but, as it requires a richer soil, is much less cultivated. The *Bhoga* is the staple crop of Manbhum. It is sown in June-July and flowers in October; in rich soils it attains a height of 4 feet but is more frequently met with from 2 to 3 feet in height. **Mr. Campbell** also alludes to a third form of cotton known as *Jurgundi*. As he has not furnished a sample of this we are unable to say what it may be: it is, however, sown on high lands in June-July and flowers after the rains. The floss is slightly red coloured but of good quality and well thought of for making cloth. It has a stronger fibre than *Bhoga*, but the yield is considerably less, so that it is by no means so popular. The difference between *Bhoga* and *Budhi* as seen in the herbarium is, however, so slight that it is impossible to give a description that would isolate the one from the other. They are both forms of, or at least are allied to, **G. neglectum**, *Tod.*, and it would thus appear that that species has been sufficiently cultivated to give origin to races that are grown at different seasons of the year. If after all we accept **G. neglectum** as but a hybrid, some of its forms approach **G. arboreum**, while others have a stronger strain of **G. herbaceum**.

On many parts of the Himálaya cotton cultivation is prosecuted to a limited extent, ascending in Kumaon, Garwahl, and Murree, to altitudes close on 5,000 feet above the sea. The plant grown in the Simla district is apparently a hybrid stock, having a strong taint of **G. arboreum**, and much resembles the *Semparuthi* cotton of South India. **Mr. Vaupell** mentions a shrub met with in the neighbourhood of large towns in the Eastern districts of Gujarat, in spots most favourable for irrigation. Its wool, he states, is the finest of any, of a beautiful silky staple, upwards of an inch in length, and only used in the manufacture of the finest muslins. It is, he adds, but sparingly cultivated. *Nurma* cotton is also specially mentioned as a very fine cotton sent from Khorassan, and, according to several writers, is well known in Malwa. **Dalzell** and **Gibson** fell into the error,

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frequently made some twenty or thirty years ago, of assigning to this species the name **G. religiosum**, *Roxb.*, but they call it by its most general vernacular name *Nurma* and speak of it as "arboreous, slender, hardy, having the habit of a tree; cultivated rather extensively in the North-West Gujarat as a triennial (?), also in Sind. It derives its name '*Deo kupas*' from being most extensively used for the sacred thread of the Banians, *Moonj*." There would appear to be little doubt that the plant referred to above was a form of **G. arboreum**. With reference to the remarks below, on **Hove's** red-flowered cotton of **Bombay**, it is interesting to notice that **Dalzell** and **Gibson's** Gujarat field crop of **G. arboreum** is very probably one and the same as that described by **Hove** in 1787.

The Transactions and Journals of the Agri-Horticultural Society of India teem with papers and reports on cotton, but only from about the year 1850 do these deal at any length with the indigenous growths. The following passages may, however, be given in this place as presumably alluding to **G. arboreum**. So long ago as 1837 a **Mr. D. F. McLeod** of Seoní (Central Provinces) furnished the Agri-Horticultural Society with two samples of tree-cotton, both of which appear to have been **G. arboreum**, *L.*, as defined in the *Flora of British India*. These were then known as *Munnooa* and *Deo*. The former was a green and the latter a black seeded condition. They were perennials and "yielded their cotton in the hot weather, and not as the common country annuals, at the close of the rains." "These varieties are planted," says **Mr. McLeod**, "by the natives near their dwellings, with a view to shelter, and the produce is chiefly used for making Brahminical threads. The *Munnooa* is also cultivated extensively in fields on the ranges east of Mirzapore." It may be surmised that the *Munnooa* cotton of the above passage was **G. neglectum**, *Tod.*, and the *Deo*, **G. arboreum**, *L.*

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In 1842, an interesting enquiry was instituted into the subject of the Chanderí (Gwalior) cotton, from which the once famous muslins were made. This was at first attributed to **G. arboreum**, but **Mr. C. Fraser** and other writers assigned it to a peculiar form (*Barariа*), a Berar cotton, grown on a limited number of fields around two villages, or simply to imported Berar cotton. Incidentally, however, **Mr. Fraser** also deals with the subject of *Nurma* cotton, remarking that it was found all over Hindustán, but in Chanderí was "never employed, nor grown in large quantities. The plant stands about seven feet high and is bushy; solitary plants are met with occasionally in private gardens, and the produce is worked up into Brahminical threads for the higher classes of society." (*Jour. Agri-Hort. Soc., Old Series, Vol. I., 278.*) The Chamber of Commerce, Bombay, in their Annual Report for 1842-43 refers to the two forms of *Nurma* cotton, grown in Broach, by **Dr. Burn**. One of these, **Dr. Burn** wrote, was "a very fine, soft, strong, long, and clear-coloured staple, superior to the best Broach, and which would compete with the very best American short-staple cottons, could it be produced in sufficient quantity." The Committee in their report on the samples supported this opinion, adding that, "it was extremely advisable that steps should be taken to extend the cultivation of so choice an article of Indian produce." Nothing was, however, apparently done in this direction, and the cotton referred to is now probably completely lost. But it would, perhaps, be unsafe to assign, to any known form of **G. arboreum**, so flattering an opinion, the more so when the identification of the plant referred to is dependent on the mere assertion that it was a form of *Nurma*. Long before the date of the above report, numerous experiments had been made in acclimatising most of the American cottons, and it is, therefore, possible that the fibre may have been got from one of the larger growths of American which often assume the size of the

GOSSYPIUM arboreum. — **The Indian Arboreous Cottons.**

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Indian tree cotton. Peruvian cotton, for example, is, like **G. arboreum,** frequently met with near temples and grows into a large bush or tree. **Mr. Blount,** Government Cotton Planter, in a report (1845) on the cottons which he found the natives cultivating in Goruckpore near Benares, mentioned, however, what appears to have been the same two forms of **G. arboreum.** These were known as *Bogalí* and *Nurma.* The former, he wrote, was grown as a field crop, being sown at the commencement of the rains, and the latter raised near huts only. Both these plants produced their fibre in February and March. The ordinary cotton of the district—that most extensively cultivated—he contrasted with these, stating that it was known as *Kuklí.* It was planted in February and gathered in June and July. There would seem little doubt but that, like the *Munnaoa* cotton of the Central Provinces, the *Bogalí* must have been a field crop which nearly, if not absolutely, answers to **Todaro's G. neglectum.** Many subsequent writers dwell on 'the tree cotton,' 'the red-flowered cotton,' 'the *Nurma* cotton' of the Benares Division of the North-West Provinces—a peculiar and perfectly distinct crop from the ordinary cotton of these provinces.

Conf. with p. 11.

Turning now to Bengal: in a long and most instructive report on the indigenous cottons of Eastern Bengal, written by **Mr. T. Allan Wise** in June 1860, much light may be assumed to be thrown on the subject of **Todaro's G. neglectum.** From that paper, there would appear to be considerable likelihood that two or three of the Dacca cottons are forms of **G. arboreum,** one most probably **G. neglectum,** *Tod.* Whether that form was actually (as **Todaro** asserts) the reddish-tinged plant, with pointed leaves (described by **Roxburgh** as a variety of **G. herbaceum**), may be open to doubt. **Mr. Wise** specialises eight forms of cotton as found in Eastern Bengal, *viz.*, (1) Tipperah Hills cotton: (2) *Sheraj* cotton: (3) *Bogga* cotton: (4) *Borailli* cotton: (5) Dacca cotton: (6) Dacca *Tangari* cotton: (7) Common Bengal cotton: and (8) Foreign cottons lately introduced. We shall revert to the subject of most of these cottons under **G. herbaceum**; but it is desirable to deal here with those that appear to belong to the **G. arboreum** series. The *Sheraj* cotton, **Mr. Wise** states, "very probably comes from the Garo hills. It is considered, after *Borailli,* the second best cotton found in the bazárs of Mymensing, and from it the cloth worn by the better class of natives is made. It is bought by the ryots in the bazárs for their wives and daughters to spin into thread, which they sell to the professional weavers to make into cloth for the markets." The *Bogga* was a very inferior sort of cotton, used in making the *do-sutti* or "two-thread" cloth employed for sails. It was said to come from the mountains of Assam. The *Borailli* "is the finest kind of cotton procurable in these marts, and from it is made the very fine thin cloths which the landed proprietors and wealthy natives are fond of wearing. It is the largest cotton plant I know, reaching the height of some eight or nine feet, with beautiful drooping branches, which, if erect, would measure more, and, as it is a perennial, must be very profitable; but it only grows in high village lands quite clear of inundation. It bears pods every month in the year for three or four years in succession, and being in every way such a different plant from any of the Dacca kinds, I am inclined to think it is peculiar to Mymensing district, or, more probably, is a foreign kind imported here by some of the early Portuguese settlers who had large villages in the district." The cotton plant of Dacca, from which the famous muslins were made, was, **Mr. Wise** informs us, in his time, an annual crop, found on the low-lying, rich, alluvial lands, which were periodically inundated. It was sown in September or October, in lines, between which chillies were grown. In connection with the account given above of Santal cottons, it has been stated that, although the two crops there grown differ materially from an agricultural point

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