

ON
CANNABIS INDICA.

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The present essay is submitted to the Medical Faculty principally with the view of detailing some observations on the Botanical History and Therapeutic Uses of Indian Hemp.

In the Spring of 1849 I undertook some experiments, with reference to the Botanical Characters of the plant, in the Edinburgh Botanic Garden. More particularly it was desirable to ascertain the identity or non-identity of the Indian and European species of Hemp; and the effects of different modes of cultivation.

I am compelled to bring forward these observations in a necessarily imperfect form: as from the nature of the inquiry, it cannot be made complete in the short time to which I have found myself restricted. To make the inquiry perfect I propose to continue these

observations in the course of the ensuing summer.

From the results obtained, besides the general interest attached to this remarkable drey, I have been induced to select this subject for my Inaugural Dissertation.

The subject will be considered as follows

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General History

Indian Hemp has been long known in the Indian and Persian Empires, and various other countries, as a medicinal and intoxicating agent, but was almost entirely unknown to Europeans, except through the accounts of travellers, until of late years.

It was first brought into prominent notice by Dr O'Shaughnessy of Calcutta in the year 1839.

In the account of the plant by the above author a very elaborate and minute detail of the early history of the drug is entered into; but as these matters may be said to be of minor importance, and more curious than actually useful, it seems sufficient on this subject to make a very few general remarks.

While the Greek Physicians as we are told by Dioscorides were acquainted with the emollient

properties of the seeds of hemp, they seem to have been wholly unaware of the narcotic virtue of the plant.

In the year 600 the Hindoos were in the habit of employing it, since which time Hemp has been in constant use as a means of allaying pain, and more particularly as an intoxicating agent among the inhabitants of the East.

Hemp would seem to have been known at a still earlier period to the Chinese — In a communication to the Academie des Sciences in the early part of 1849 by M. Stanislas Julien extracts are produced from a Chinese work showing that so far back as A. D. 220 a Chinese physician named Hoa-Thoa produced insensibility in his patients by means of a preparation of Hemp, and that operations were then performed without pain to the patients. This statement would however require further confirmation.

Among the more modern authorities mentioned by Dr O'Shaughnessy, a description of Hemp with plates is given in Rumphius Herbarium Amboinense, published in 1695 —

Rumphius assigns the upper provinces of India as its habitat, and states it to be cultivated in Java and Amboyna.

He quotes from Galen that it was customary in his time to give hemp to the guests at banquets to promote hilarity and enjoyment.

Some allusion to the plant is also made in the work of Nees von Esenbeck, in Ainslie's *Materia Medica*, and also in the *Bulletin de Pharmacie* for 1810 by M. Rouyer, apothecary to Napoleon in Egypt.

But the merit of more particularly bringing the plant into notice is due to Dr O'Shaughnessy of Calcutta.

His essay attracted attention to the subject and many experiments with the drug have now been made.

The expectations held out by him have not been so fully realized, as one would be led to anticipate. This can however be so far explained by a want of confidence or neglect on the part of many, and the use of spurious or ill-prepared substances on the part of others.

Its advantages in medicine will be pointed out in a future part of this essay.

Botanical History

From the observations of Dr. Royle, *Cannabis* appears to be a plant of the Persian region, where it is subjected to great cold, in winter, and to considerable heat in summer, and that it has thus been able to travel on the one hand into Europe and on the other into India.

In the *Flora Medica* of Dr. Lindley *Cannabis sativa* is placed in the natural order *Urticaceae*, no allusion being made to the *Cannabis Indica*, as he obviously considers the two to be identical.

The plant is thus described, - Flowers dioecious; male flowers racemose; calyx 5-parted, imbricated; stamens 5, anthers large and pendulous; female flowers in spikes. Bract acuminate, rolled round the

ovary in room of a calyx. - Ovary roundish, with one pendulous ovule, and two long filiform glandular stigmata. - Acheneum ovate, one-seeded, embryos doubled up, with the radicle parallel with the plano-convex cotyledons, and separated from them by a small quantity of albumen.

He also states that it is an annual, three feet high, covered all over with an extremely fine rough pubescence, hardly visible to the naked eye. - The stem erect, branched, bright green, angular. The leaves alternate or opposite, on long weak petioles, digitate, scabrous, with linear-lanceolate sharply serrated leaves, tapering into a long smooth entire point. stipules subulate. Clusters of flowers axillary, with subulate bracts; the males lax and drooping, branched, and leafless at the base; the females erect, simple, and leafy at the base. - Male calyx downy; female calyx covered with short brownish glands. [see Plate II]

Dr Lindley now places this plant in the Natural Order Cannabinaceae, separating

it from the Urticaceae, - the latter having small flat stipules, limpid juice, a solid erect ovule, and a straight albuminous embryo; - the former, having a solitary suspended ovule, and a hooked exalbuminous embryo.

Two species of *Cannabis* have been described by many Botanists - viz - *Cannabis sativa* and *Cannabis Indica*, but repeated careful comparisons have failed to discover any material difference between them; the generally received opinion now being, that the same plant under the modifying influence of climate and cultivation puts on a variety of characters.

Dr Boyle remarks - "that like Dr Roxburgh and others he was unable when in India to observe any difference between the plant of the plain and that of the hills of India, nor between these and the European plant. The Indian secretes a much larger proportion of resin than is observable in the European plant, but a difference is observed in this point in India between plants grown

in the plains and those of the mountains, and also when grown thickly together. - The natives plant them wide apart, to enable them to secrete their full powers - In Europe the thick sowing, and moister, often dull climate will prevent the due secretion of the peculiar principles of a plant of the Persian regions."

The following experiment made in the Edinburgh Botanic Garden would lead to similar conclusions with regard to the identity of the Indian and European plants.

A few seeds picked from fresh Gungah were sown on the 17th March 1849, as well as some seeds from decayed Gungah: the latter never germinated, but the others appeared above ground in a few days - In the course of a week they attained a height of three inches under glass - Three shoots were planted in the open air, while the remainder was kept in the hothouse.

On August 1st those without had attained a height of $4\frac{1}{2}$ feet, and it was remarked that they had a peculiar strong minty

odour. On the 1st October one of these was 9½ feet high with several strong woody stems, and abundant foliage; flowering seemed to be commencing, but the advance of the season with accompanying cold weather arrested any farther development.

The plants in the Hot-house at the same time were 4 feet high, slender, with few leaves, but in full flower. Plants of the common hemp growing in the Garden had a very similar aspect; being however in full fruit. The progress of these plants was carefully observed by Dr Balfour, Dr Christow, and myself; and to the kindness of Professor Balfour I am indebted for the following remarks and botanical description

"Those in the open air were all female plants; among those in the hot-house were one or two males. I have not been able to make out any specific difference between the so-called *Cannabis Indica* and the *Cannabis sativa* of Europe. - The common hemp in the Garden has not attained the same size as the plants from Indian seeds, and the segments of their leaves are narrower;

in other respects they appear alike, more especially as regards their flowers, glands &c. Both the Indian and European seeds produce plants which have a strong resinous odour. In this respect the European plants in the Garden seem to excel the Indian. On the Indian specimens even when cultivated in the hot-house, there has not appeared any of the churru described by Indian observers. The racemes and spikes of flowers have a resinous feeling when touched. -

The following is a description of the plants raised from the Indian seeds -

Flowers diceious -

Male plants in the hot-house about four feet high; circumference of stem at the base about one inch, lower part of stem woody. Stem somewhat quadrangular, grooved and roughish, surface of stem at the base of a brownish colour mixed with greenish streaks.

Leaves opposite, sap-green above, pistachio-green below, quinate to septinate; at the upper part of the stem the leaves become alternate; segments of the leaves feather-

veined, with a prominent midrib below, lanceolate acute, with large serratures -
 Stipules two, subulate.

Flowers in cymose, axillary leafy clusters, some of them abortive -

Perianth of five ovate blunt segments, which are of a pale green colour (the margins being white and the centre greenish) with a marked green midrib, covered externally and internally with glandular pubescence -
 Segments of the Perianth concave internally -

Stamens covered with glandular pubescence, opposite the segments of the perianth, oblong, bilocular, erect, with an apicular process and longitudinal dehiscence, supported on slender filaments, which are shorter than the anthers and have pyramidal bases - Pollen spherical, with three facets, each consisting of a small ring in the centre of a larger one - In the centre of the flower there is the rudiment of the pistil.

Female Plants - These are much stronger than the male plants, have attained a greater size, and have a stronger balsamic odour: - those in the hot-house attained a

height of 5 feet, and those in the open air 9 feet and a half: Stems hollow, four inches in circumference, with a tenacious stringy bark. Leaves covered with minute vesicular sessile glands, which give out a viscid resinous-like exudation, and are interspersed with glandular hairs -

Flowers in aggregated, spikes, usually three or more, unibractiate; flowers in a cluster in the axil of floral leaves which are often tripartite.

Perianth monophyllous, convoluted, swelling at the base, where it includes the ovary -

Flowers, leaves, bracts & perianth covered with glandular pubescence.

Pistil one, Ovary one, rounded, containing a single orthotropal erect ovule - style short, terminal, ending in two elongate filiform pubescent stigmata -

Fruit a careopsis - seed erect, marked with a coloured hilum.

Embryos exalbuminous."

Dried specimens of these plants are preserved in Dr Balfour's collection, and also in the medical collection of Dr Christison.

[See Plates]

From this investigation, so far as it has been possible to extend it at present, the following conclusions may be deduced.

- I. That the minute glands under favourable circumstances would act vigorously in producing the active resin, which in this case, was in very small quantity.
- II. That a certain climate which we cannot imitate in this country is essential for this action.
- III. That the *Cannabis Indica* and *Cannabis sativa* are identical.
- IV. That the hemp plant possesses a peculiar balsamic minty odour of considerable strength, which is not sufficiently insisted upon in the standard works on Botany and Materia Medica.

It may here be observed that the *Humulus Lupulus* or Hop belongs to the same natural Family, and is endowed also with narcotic properties, which, like *Cannabis*, it owes to a glandular resinous secretion.

Preparations

A short account will now be given of some of the principal forms in which Hemp is met with in the markets of the East; and, without entering on the various synonymous terms they may be conveniently classed as follows -

I. Haschich II. Bhang -

III. Gunjah IV. Churrus

V. A variety of pastes, electuaries &c, in most of which butter or some other oleaginous matter is the basis of formation.

VI. Tincture of Hemp

I. Haschich.

Haschich is the Arabian name given to the dried tops of the plant grown in upper Egypt. These tops are gathered some time before the seeds are come to maturity.

The meaning of the word is "herb", or "herbe par excellence"; and this is the name applied by French authors to the preparations of Hemp.

II. Bhang.

Bhang is an Indian preparation consisting of the larger leaves and capsules. According to Dr O'Shaughnessy it is the cheapest form used in India, and therefore in common use among the lower orders for smoking.

From it is prepared an intoxicating drink, and it forms a part of the Confection called Majoon.

III. Gunjah.

Gunjah is the principal Indian form of the dried plant, and consists of the dried tops after flowering from which the resin of the leaves has not been removed. It is chiefly sold in the Calcutta bazaars for smoking, in bundles three feet long and three inches in diameter: the colour is dusky green, the odour agreeably narcotic; the whole resinous and adhesive to the touch.

The specimens I have examined, (sent by Dr O'Shaughnessy to Dr Christison in) consist of a central stem with branches, round which are aggregated elongated oval masses, about $1\frac{1}{2}$

inches long, and closely pressed together by adhesive resinous matter - After being steeped in water these masses can be teased out, and are found to be the tops of the plant, that is - the flowers, seeds, and smaller leaflets.

IV. Churrus.

Churrus is the resinous secretion alone, and is therefore the most powerful shape in which Hemp can be used; but it is at the same time expensive, and is not met with in Europe except as a Museum specimen.

The specimens in Dr Christison's Museum are variously sized, nodulated, round masses, from the size of a pea to that of a walnut, and of greenish-black colour.

It is collected during the hot season, by scraping the leaves and tops; Dr O'Shaughnessy states that in central India and Nepal men in leathern dresses push forcibly through the plants, and the resin which adheres to them is then scraped off.

Dr Royle says the glandular secretion is collected from the plants on the hills by the natives pressing the upper part of the young plants between the palms of their hands, and

scraping off the secretion which adheres. - and Dr McKinnon states that in Nepal the resin is gathered on the backs of naked Coolies.

V. Electuaries

In the preparation of the Electuaries &c bitter is used as the means of separating the active principles, consequently these compounds are very apt to become rancid. They are thus described by M. Charriac in the *Annuaire de Thérapeutique* for 1846.

1. Preparations mixed with honey or melted sugar.
2. A more active form called *hachich kava-mesk* (musked drug) containing musk, essence of roses, and almonds; of pasty consistence and of the colour of impure honey; the quantity used being about the size of a walnut.
3. Two kinds are found at Smyrnia, called *Israël*; the one a fine powder, the other a roll of firm mastic consistence.
4. A black round kind has great aphrodisiac repute among the Fellahs, but in this case it is found that *Cantharides* is added to increase the effect of the drug.

At Cairo the compound from which the

various conserves are prepared is thus made - Equal parts of well sifted haschick, butter, and water are put in a vessel on the fire; after some boiling the water is dissipated; the residue is twisted in a cloth to isolate the fatty matter, and to this the various spices are added.

VI. Tincture

Landner describes a tincture of hemp used at Cairo, called Chatsoraky, made by infusing in spirit for three weeks with a gentle heat the varnish covered bark sliced from the stems when the plants are in flower.

The Arabians smoke the powdered plant, free of seeds, which contain fatty disagreeable tasted matter, along with Tobaces.

Haschick is to the Arabians what Opium is to the Turks and Chinese. Hachach signifies in Arabian, drunkard, and is the epithet commonly applied to those who eat haschick.

Proper Period for collecting the Plant

As the activity of the preparations of hemp depends on the presence of a resinous varnish on the leaves, and consequently as the most active of these is found to contain the largest quantity of resin, it becomes a matter of great importance to decide upon the proper period for collecting the plant.

Mr. Gastinell, an apothecary at Cairo in 1849 states that he found the active powers of hemp to depend on a resinous matter which forms on the leaves as the seeds ripen.

Again, M. de Chénias observes that in Egypt the tops of the plants, gathered at the end of flowering but before complete maturity of the seeds, are used -

And Mr. Jameson, Director of the Botanic Gardens at Saharumpore makes a like statement

in a letter to Dr. Christison dated 17th August 1849.

As this letter contains an interesting account of Hemp in that part of India, it may be appropriately introduced under this division of my subject. He writes as follows -

"In Kimaon and Gurwhal Cannabis is grown in large quantity, partly in order to obtain its resinoid secretion, and partly for its bark, from which a strong coarse cloth called Bungila is manufactured and forms the dress of the poorer inhabitants, particularly through Gurwhal. - It is sown in July and gathered in October -

From the Female plant only the churrus is obtained. Towards the beginning or middle of October the seeds begin to form, and when in this unripe state the upper part of the plant is pressed between the palms of the hands and deposits upon them a yellowish-green secretion, which is scraped off with a blunt knife; this is the well known churrus.

From the male plant Bhang and Cath are prepared - Bhang is prepared by drying the leaves and other parts of the plant, both male and female being used, and is thus used

A small quantity is put into a mortar with a little water and pounded; the refuse water being thrown away, an additional quantity of water is then added, from half a pint to a pint depending on the strength required, and well mixed; it is then strained through a fine cloth, the residue thrown away, and the liquid is ready for drinking, a wine-glassful or more being taken at a time.

Ganjah is the third preparation and is the produce of the upper portion of the stem, that is about $1\frac{1}{2}$ feet; it is only used in the hookah to smoke; this also applies to the churrus - The Ganjah is carefully dried and mixed with an equal quantity of tobacco, and well rubbed together in the palm of the hand; it is then ready for the hookah. We have thus the three preparations -

I. Churrus. II. Bhang or Lubzi. III. Ganjah or Ghangah.

The first is only prepared in the hills, and the two latter are common to both hill and plains, but Bhang is principally prepared in the latter - At Bhaeit about 16 miles from Saharunpore it is prepared in large quantity and is subject to heavy duty: yearly from

40,000 to 50,000 maunds are produced,
(a maund is equal to 80 lbs.) -

The reason why the Churrus is not prepared in the plains is because the plant does not secrete the resinoid principle, showing that its secretion is connected with climate.

But still the plants are identical in external characters, and you will I think find that the European and Indian plants are also identical.

In order to ascertain the fact I send you a small packet of hemp seeds procured at one of the Gurwhal villages where it is grown in vast quantity.

In your letter you say that the active principle forms on the stems and leaves; this is not the case, as it is only procured when the seeds are in an unripe state; - attempt to procure it before this period and none will be forthcoming.

It too will appear strange how ignorant natives can distinguish female from male plants. - Were you to see the plant growing your surprise would soon be removed. - The female plant when ready for making churrus has at its upper part a "bunchy" appearance;

whereas the male plants have become, by this time mere stems and leaves, the flowers also having fallen off.

In October in crossing the Himalayas from Almora to Missourie I have passed through dozens of villages, 6000 to 8000 feet above the level of the sea, and seen hundreds of men women and children all employed in making churru. - The plant grows to a height of from 10 to 14 feet."

The plants cultivated in the Edinburgh Botanic Garden present exactly the characteristic difference between male and female described by Mr Garneson.

From these observations then it appears to be undoubted that the only period for collecting the plant in its active state is about the time of ripening of the seeds; when therefore the tops of the plant are covered with the resinous varnish on which its properties depend.

Extract of Hemp

The resin secreted by *Cannabis* is insoluble in water, but soluble in rectified spirit; and it may also be separated by oily matters -

By the action of spirit upon gungah the extract of Hemp is formed - In this country two extracts are used - the one sent from Calcutta, the other prepared in England from the dried plant -

The best extract presents a dark green colour, and is thick and tenacious, emitting a slight aromatic odour of peculiar character - when pressed between the fingers it softens and adheres obstinately to them, a solvent being necessary for its removal - any extract which is found to rub down in the fingers and not to adhere to them should be looked upon with suspicion, and will be found to

be nearly if not almost totally inert.

The finest extract I have seen is that prepared by Mr Robertson, Professor of Chemistry at Calcutta, which however is not in the market. Of this Mr Robertson prepared about 30 lbs., from a hundredweight of the plant he obtained about 8 lbs. of extract.

His process consisted in passing the vapour of boiling alcohol through the plant packed in a cask, an ordinary warm leading from the cask to a receiver; the preparing of it cost him much time and trouble on account of the heavy duties upon hemp and also upon spirit. The expense he reckoned at 15 shillings a pound, and though he was asked from various quarters to commence the manufacture of this extract, he felt compelled to refuse the undertaking.

Specimens were sent to Europe in various quarters for experiment, and among others to Edinburgh for Dr Christian. This is now four years old, and retains its energy unimpaired. It is much more active than the extracts of the shops, which are prepared by cold percolation.

I have repeated Mr Robertson's process on a small scale, and find it to be a very complete means of exhausting the plant of its resin; while at the same time a less quantity of spirit is required than for the process by cold percolation.

Good extract should give a grass-green tincture with spirit: and when the tincture is of a brown colour it will be found to be either very weak or inert.

Active Resin

Various investigations have been made as to the nature of the Resin secreted by the leaves of Cannabis: and it has been ascertained that a resinoid principle can be separated from this which retains the properties of the plant in increased energy. And the researches of various chemists have lead to the same result.

M. Gastinell has prepared this substance at Cairo, of which he says 2 grains are as effective as 6 of alcoholic extract.

M. de Courtive of Paris says that the resin prepared by him is in the dose of $\frac{3}{4}$ grain as effective as 30 grains of alcoholic extract. He also prepared the resin from Paris grown hemp and from French hemp; 6 grains of the first, and 8 to 16 of the second, being necessary to produce the effect.

It is difficult to understand these results, for as will afterwards appear the pure resin is in the dose of $\frac{3}{4}$ grain equal in activity to about 2 or 3 grains of good alcoholic extract, while M. de Courtime compares it to 30 grains, and M. Gastivelli's resin would seem to be much inferior in activity -

The Messrs Smith of Edinburgh have made the most careful experiments on this subject that I have met with - They observe "that the narcotic action of Hemp resides in a soft neutral resin called "Cannabine" which when heated gives out a strong aromatic odour, and has a warm pungent balsamic taste; that it is insoluble in water or weak spirit, which is clearly proved in the following way - The addition of a fifth of water to a solution of the resin in strong spirit causes separation of the resin to begin, and the whole is thrown down when a half of water is added." They recommend the following process -

The plant is after being bruised digested in repeated portions of moderately warm water, pressing out each time, till the

water comes away colourless - It is then digested in a solution of Carbonate of Soda equal to half the weight of the Gunjah: this maceration is kept up at a moderate heat for two or three days, and the washing repeated till a colourless fluid is obtained. Much colouring matter is removed by the washing - and besides colouring matter a large quantity of inert fatty acid by the Carb. Soda - The dried powder is then percolated with strong spirit - A creamy milk of lime, an ounce to the pound of the plant, is added to the spirituous solution for the purpose of removing any remains of fatty acid and Chlorophyle - After filtration, excess of lime is removed by sulphuric acid, one to two drachms sufficing for each pound of the plant. Pure animal charcoal is then shaken with the liquid - After filtration, the solution is distilled, and the resulting resin is mixed with four times its bulk of water in a flat basin; the resin subsides, and should be then washed. After this it is dried spontaneously or by heat in thin layers - The resin is brown in mass, the thin layers of fawn colour - When,

strongly heated it melts, takes fire, and disappears entirely - Heated in open air for eight hours at temp. 180°F. in a thin layer, its properties were not in the least degree impaired.

It may here be observed that the really essential part of the process is the removal of the colouring and fatty matters, the subsequent treatment, as I have myself found in repeating the process, producing very little if any change. The following is a rough analysis.

| | |
|-----------------------------|-------------|
| Resin | 390 gr. |
| Nearly dry extract by water | 500 |
| Extractive by Carb. Soda | 640 |
| Vegetable fibre &c | <u>2310</u> |
| | 3840 |

This process as a whole is necessarily very tedious, and in my hands it occupied a period of three weeks: and on this account it is doubtful whether the pure resin as thus at present prepared will take the place of the alcoholic extract as a pharmaceutical preparation.

Physiological Action

The Physiological Action of Hemp is in the first place stimulant in small doses, exciting the cerebral and digestive systems; and secondly, when given in larger quantity, its effects are powerfully sedative and antispasmodic; and at last it induces insensibility.

The first question which presents itself, is whether this plant is a poison in large doses, and has it proved fatal to man?

The prolonged use of it has certainly destroyed many in India; but no mention is made by authors of its proving fatal in one or two large doses.

The only allusion to such an effect that I have seen is that by Mr Reddie, a member of the Calcutta bar, who in a letter

to Dr Christison dated July 1849 says - "the plant is a poison with many of the qualities of opium, and some singular ones peculiar to itself" - and that "it is frequently used at Calcutta as a poison" - As this information was unsolicited no details have been given, but Mr Reddie has offered to give any additional information that may be required.

Dr O'Shaughnessy performed a series of experiments upon the lower animals with the view of determining the quantity that it would be safe to administer as a medicine; but, though large doses were given, in none of these did death occur.

In one experiment he gave 10 gr. of churru to a middling-sized dog - "in half an hour he became stupid and sleepy, dozing at intervals, starting up and wagging his tail as if extremely contented; he ate some food greedily; on being called to, he staggered to and fro, and his face assumed a look of utter and hopeless drunkenness - These symptoms lasted about two hours - In six hours he was perfectly well and lively" - and again -
Twenty grains of extract of Guryah, dissolved

in spirit were given to a dog of very small size, - In a quarter of an hour he was intoxicated; in half an hour he had great difficulty of movement; in an hour he had lost all power over the hinder extremities, which were rather stiff but flexible; sensibility did not seem to be impaired, and the circulation was natural; he readily acknowledged calls by an attempt to rise up. In four hours he was quite well."

"In none of these experiments was any pain evinced, or any convulsive motion."

The dose mentioned above was the largest he gave, and it may be asked, would yet larger doses have had a fatal effect? One point is however determined that so large a dose as 10 gr. of churru did not prove fatal to a dog, and it will be seen afterwards that Dr O'Shaughnessy administered large and repeated doses in the treatment of disease.

The above facts may serve as encouragement to those who are sceptical with regard to the safety of administering Indian Hemp

The effects of Hemp will in general be found to correspond to the natural disposition of the individual.

In some mere laziness and stupidity are induced, in others a pleasing state of reverie, without other remarkable condition; and many are attacked with loud laughter, fits of dancing and singing, venereal appetite, inclination to quarrel, according to the various dispositions.

In all there is a remarkable desire for food, which the individual eagerly devours; while at the same time he does not appear to be satisfied, and can with difficulty control his appetite.

After the stage of excitement sleep supervenes; and on waking the experimenter returns to his natural state, except that his ideas are often confused for a little, and in some cases vertigo is present to a slight extent.

It has been noticed by Dr O'Shaughnessy and others in India that in most cases the effects of hemp are powerfully aphrodisiac; this action is regarded by most authors as a peculiar one, but on the other hand there

are some who regard this effect as merely depending on the disposition of the individual.

It is in consequence of these remarkable properties that the compounds of hemp have come into such extensive use among the Eastern nations.

An example of the great extent to which the use of hemp is pushed in India is given by M. Liantaud in his communication to the Academie des Sciences, as follows -

"The Grand Feast of Dourga Poudja is terminated by the ceremony of immersing the Idol in the river; after which the people retire to intoxicate themselves with a drink from the leaves of Hemp, and the whole ends in a scene of disgraceful drunkenness." and in allusion to the physiological action M. Liantaud remarks that "there is peculiar ecstasy without convulsion - that the drinks excite the nervous system more than the powder or smoke - This intoxication has appeared to him much less intense than that of Opium, and that of the Chinese opium smokers: the consequences are not so deadly,

but the moral degradation the same."

Dr O'Shaughnessy thus describes the delirium induced by the incautious use of Hemp - "The state is at once recognized by the strange balancing gait of the patient, a constant rubbing of the hands, perpetual giggling, and a propensity to caress or chafe the feet of all bystanders of whatever rank - The eye wears an expression of cunning and merriment which can scarcely be mistaken - There is no increased heat or frequency of circulation, and the skin and general functions are in a natural state."

The effects of hemp are in the generality of instances highly pleasurable, while in a few cases most disagreeable sensations are produced. The ideas which enter the mind are often very fantastic and of most interminable variety -

In illustration I have selected the following cases - several of which are from personal observation, and one a very remarkable case which occurred in the Royal Infirmary.

Case I

In the interesting and elaborate work "Morcan du Haschich", we find M. Théophile Gautier describing his sensations as follows -

After a feeling of numbness, it appeared to him that his body became transparent and that he saw within his breast the haschich which he had eaten in the form of an emerald, from which issued millions of little sparks - At the same time his eye-lashes became indefinitely elongated and began to roll as gold threads upon small ivory wheels, which revolved with great velocity - A very curious effect was an increase of his power of hearing, whereby slight noises became as loud as thunder, and he heard the noise of colours - green, red, blue, and yellow sounds coming to him in perfectly distinct waves; he did not dare to use his voice, in case he should knock down the walls or burst himself like a bomb. His calculation of the time he enjoyed these dreams was about 300 years: when in reality he had only been $\frac{1}{4}$ of an hour in this condition.

Case II

Dr. Christison describes the action upon himself as follows -

On trying Mr. Robertson's Extract once for toothache, I found that about 4 grains taken about 3 A.M. caused in an hour cessation of pain, a pleasant numbness in the limbs, giddiness, a rapid succession of unassociated ideas, and impossibility to follow a train of thought, frequent intervals of sleep, and slight increase in the force of the pulse - At the same time he felt no pain, while he was quite conscious that the toothache was present.

Next morning there was an ordinary appetite, much torpidity, great defect and shortness of memory, extreme apparent protraction of time, but no peculiarity of articulation, or other effect: and these symptoms lasted till 2 P.M., when they ceased entirely in a few minutes after taking lemonade.

Case III

This case illustrates the less powerful, and more gradual action of the hemp extract when taken in the solid state, compared with the effect of the tincture in the two

following cases.

On the 3^d April last a friend along with another gentleman and myself subjected himself to the influence of hemp.

At 4 P.M. he took 2 grains of the extract prepared by Mr Robertson - At a quarter past 6 he felt as if weak, chiefly about the knees, with slight inclination to laugh, stupidity, and forgetfulness, but without reverie; he continued in this state till he retired to bed, when he slept soundly - Next day he was perhaps more stupid than before, but was enlivened by drinking lemon-juice; he was not exactly himself till the following day: his appetite was strong, but he was not affected in any other way -

Case IV

The second of these experimenters thus describes his sensations on the same day -

I took 2 grains dissolved in spirit, and one grain in the solid form shortly afterwards - this was at 4 o'clock - At $\frac{1}{4}$ to six, when seated at dinner, and after taking a copious draught of water, I experienced a curious buzzing in my ears, with slight tinnitus

aurium and giddiness - Two minutes after, I burst into an immoderate fit of laughter without any cause, and was obliged to retire on account of repeated recurrence of the fits - My limbs became unable to support me; and upon lying down a variety of delightful dreams came over me, the laughter continuing at intervals - At 8 o'clock I got tea and ate voraciously, after which I lay down again and recommenced laughing and singing - and while in this position I am informed I for a long time kept raising my right leg and letting it fall on the other at regular intervals - I slept soundly. Next day the symptoms continued to a moderate degree, and did not fairly leave me till the afternoon, previous to which time I got lemon-juice, which had great effect in restoring my faculties.

Case V

On the same day I took 1 grain of the same extract dissolved in spirit, and though only half what was used in the first cases, the effects were much more apparent.

At $\frac{1}{4}$ past 5, when sitting down to dinner,

I felt a peculiar numbness creeping through my body and limbs. I did not think this was the action of the hemp, and began to fancy I was very ill, so that I could not eat my dinner - I lay down, and the numbness continued, for a quarter of an hour, after which my sensations became agreeable - I laughed heartily several times, answered questions incoherently, and immediately forgot what they were about and what I had answered -

Delightful reveries came over me, and whatever I looked at became lost as it were in a maze; the lamp appeared to be slowly turning round, and when I lost sight of this, the red lines on the paper of the room appeared to intertwine in a most beautiful manner - The most remarkable effect was the constant succession of new ideas, each of which was almost instantly forgotten. - When roused to tea, I ate ravenously without feeling satisfied with what I got - I slept soundly - Next day I was stupid and forgetful, but was much improved by drinking lemon-juice.

Case VI

This case was remarkable for the intensity of the action of a single grain of Hemp extract, and for the extraordinary hallucinations produced.

James Cumming, a stupid Highland porter, about 50 years of age, was admitted into the Royal Infirmary on the 4th December 1845; under the care of Dr Robertson - on account of attacks of chronic asthma and bronchitis.

As sulphuric ether and Laudanum produced little effect, it was resolved to give Hemp extract in doses of a grain - The first and only pill was given at 9 P.M. and at 10 he called the nurse "for he was about to die" - he seemed to have awaked suddenly and stared wildly about him - The Clerk and Apothecary were summoned, and found him conversing with great volubility, very happy to see them, and begging them to stay with him "as he was at the point of death" - his face was pale and anxious - pulse good - respiration unembarrassed. He informed them "that he had been transported to heaven" His language (usually commonplace) was quite enthusiastic. ℞solut. mur. morph. was administered, soon after which he became jocund, & like a person drunk; in a short time he

fell into a sort of trance, and imagined he was conversing with the Deity, using two different tones of voice to express the conversation - He was now awakened, said he had "seen visions", and seemed sensible. He then fell asleep, but was roused, as the respirations became very faint, and he exclaimed "I have just come out of another fit"

It was 5 A.M. before the intoxication ceased, and even at noon visit he was pale and tremulous. His asthma was and continued much relieved

7th December. Asthma less urgent, and though the paroxysm occurs every day at 6 A.M. there is no longer a sense of constriction at the epigastrium. On the evening of the 6th Hemp was discontinued for 48 hours, but resumed in the form of tincture - m_{XX} immediately, to be continued every 6th hour in m_{X} doses. The first dose was followed by nausea and a want of feeling in the limbs - The pulse became slow, and he fell asleep; without delirium; says he dreamt much. About 2 A.M. the effects of the first dose having gone off, ten minims were given. He soon had a return of the sensations already described, had a presentiment of death, "was inclined to see visions, but resisted the inclination to sleep". At 6. A.M. the usual paroxysm was very mild

At noon of the 7th had five minims, acting precisely like the ten given at 2 a.m. When told that his lugubrious anticipations are groundless, he laughs and seems happy - he says that "his limbs seem not to belong to him", is pale, breathes freely - At his urgent solicitation the medicine was for a few days discontinued.

28th December. Has frequently since last report taken five-minim doses, apparently with great benefit to his pectoral complaints - The small dose usually cuts short the paroxysm, and produces none of the alarming symptoms induced by the larger quantity -

Dismissed relieved.

Notes of the case were taken at the time, and these were kindly furnished me by Dr Robertson. The words the man made use of were noted, but from their nature they cannot be given here.

Uncertainty of Action.

What has lead, perhaps more than any thing else to distrust of Hemp as a medicine is its uncertainty of action. While on one person large doses have but little effect, on another most violent and even alarming symptoms are induced by comparatively small doses. And though it is possible to explain such results from peculiarity of constitution of the individual, still a doubt remains in what cases these unpleasant consequences must be looked for.

In illustration Case VI already detailed may be taken, where disagreeable consequences ensued on the administration of one grain only of the extract.

Professor Miller informs me that he was occasioned considerable anxiety after giving a small dose of the tincture to a young lady. Soon after taking it she complained of a sense of weight in the region of the heart, coldness of the surface, prostration, and the pulse at the same time very feeble. These symptoms however gradually passed off, and she recovered completely.

In the Monthly Journal for November 1844, several cases are given by Dr Laurie of Glasgow where alarming symptoms presented themselves.

A nervous young lady had been treated for a constant hacking cough without benefit, when recourse was had to Indian Hemp. 15 drops of the tincture were given at bed-time - In an hour and a half Dr Laurie found her in a state of great alarm: pulse 130, feeble; with severe palpitation, feeling of contraction of the throat, dryness of the mouth, spasmodic twitching of the limbs, drowsiness but dread of sleep - she was relieved after taking an emetic - The same results were produced a few days after; no emetic was given, and the following day she was quite well.

As this patient was aware of what was given her and therefore might have been influenced by a dread of the remedy - it was determined that others should be similarly treated without knowing it. In these, all females patients in the Lock Hospital, the usual physiological results followed in the greater proportion, but some suffered from the drug.

One of them, after some sickness and vomiting, was seized with convulsions; tongue protruded and rolling from side to side with great rapidity; opisthotonos alternated with convulsions of the

extremities: the pupils were dilated and insensible: the pulse so small and irregular that it could not be reckoned. Heart's action feeble and tumultuous. In an hour the convulsions ceased, but the other symptoms continued, and she did not recover till 3 hours afterwards, when the symptoms gradually passed off.

Another patient, about two hours after taking the hemp, slept but was restless with convulsive movements of the hands - 20 minutes after this she awoke, when the convulsive twitching extended to the limbs, and tremors to the whole body: the pupils were dilated but contractile - Pulse 80, weak, fluttering. In half an hour the twitchings had ceased; she got up, walking unsteadily and talking incoherently; complaining of severe headache, thirst, and sense of constriction in the throat and chest - The effects did not pass off for several hours.

These unpleasant occurrences however took place so frequently in the patients experimented on by Dr. Laurie, that it is reasonable to suppose that the sex of the patient had a good deal to do with the manifestations of the drug - [most of them are stated not to have been accustomed to the use of opium or spirits] -

The principal annoyances then seem to be a sense of constriction of the throat and oppression of the chest, alarm, prostration, headache, convulsive motions.

Cases like the above have been met with occasionally by most of those who have used the hemp, and more of them might be detailed, but perhaps enough has been said on the subject to prevent any one from being taken by surprise by such an occurrence.

Still I must insist that these cases are only exceptional ones; that they are for the most part met with in persons of nervous or excitable constitutions, particularly females; and that therefore the practitioner should not be deterred from administering the drug on this account alone. For as before mentioned I have not met with any case where the result was fatal, and the alarming cases have in the end done perfectly well.

It will not do however as a means of avoiding such consequences to administer small doses. It appears to be much better to give full narcotic doses at once, by which means the stage of excitement will be as much as possible avoided.

Effects on different Animals

One other point in the physiological action of hemp must be here alluded to -

From Dr O'Shaughnessy's experiments the following curious result has been obtained, viz - that Carnivorous animals of various kinds, as dogs, swine, vultures, fish &c invariably and speedily exhibit the intoxicating influence of the drug; while graminivorous animals, as the horse, deer, sheep, cow &c experience but trivial effects from any dose administered.

These experiments I have not had an opportunity of verifying.

Means of modifying or increasing its action

The means of modifying or increasing the effect of the drug is a matter of considerable interest and importance - and this appears to be the best place to introduce a few remarks.

Lemon juice is stated by various authors to have great influence in modifying the action. From my own observation I am persuaded that it possesses this property to a high degree - that it will arrest the action entirely in many cases, but not during the intensity of the effects - and that where it does not arrest it, great modification of the action will be produced.

It is stated by Landruer that at Cairo the administration of an emetic of salt water is found effectual in removing at once the highest state of intoxication.

On the other hand, among substances that increase the action, it is well known to the inhabitants of the East that the admixture of Tobacco has a marked effect, while the practice of coffee drinking is generally admitted to increase and sustain the action.

The last observation I have to make on this head is - that a great difference will be observed, according as the extract is given in the solid form, or dissolved in spirit. The action in the first case is gradual and less energetic; in the second a much more sudden and violent effect is produced.

It appears to me also that an error is often committed in administering too small doses; the exciting effect is thus induced, when a larger dose would lead more quickly to the sedative influence of the drug.

Therapeutic Uses

The Therapeutic Uses of Hemp have been as yet little studied in this country; and this is the more remarkable after the forcible arguments brought forward by Dr O'Shaughnessy in its favour.

Some practitioners have dismissed it entirely in consequence of having witnessed unpleasant effects in their first attempt at its use, and others have not given it that attention which it appears to deserve.

In discussing this subject, I shall in the first place allude to the use of Hemp by Dr O'Shaughnessy; and the diseases to the treatment of which he more particularly applied it - and secondly, some cases of its use in this country will be given, as also those which have come under my own observation.

In the treatment of Acute and Chronic Rheumatism, Dr O'Shaughnessy describes three cases, where the benefits of Hemp were well marked, after a fair trial of antiphlogistic means.

The action in one of these cases was very remarkable. "At 2 P.M. a solution of 1 grain hemp resin was administered: at 4, the man became noisy, calling for food, and declaring he was in perfect health - at 6 he appeared to be falling asleep - At 8, on being hastily summoned, I found him lying quite insensible, breathing regularly, pulse and skin natural, pupils freely contractile - On his arm, being raised, it retained the posture it was placed in - The other parts of the body were like it perfectly pliant, but when left alone retained their new position - He was insensible to impressions; a sinapism to the epigastrium producing no sign of pain. The condition was that of genuine Catalepsy - At 2 A.M. these symptoms left him, and in three days he was discharged cured - The other patients were likewise dismissed cured.

How much of the cure is to be attributed to the action otherwise than as a sedative cannot be determined.

During an Epidemic of Cholera hemp was alleged to be of great efficacy and Dr Gooden, gave a favourable report of its virtues - The diarrhoea was in every instance checked, and the stimulating effects of the drug clearly manifested - The author however does not conceive that any great benefit will follow its use in this disease.

A peculiar efficacy has been claimed for Cannabis by Dr O'Shaughnessy as an anti-convulsive remedy in the treatment of Hydrophobia and Tetanus -

A case of Hydrophobia was treated by him with this remedy -

The patient had unequivocal symptoms of the disease - 2 gr. hemp extract were given every hour, and after the third dose he became slightly intoxicated and quite cheerful; he talked calmly of drinking, but said it was vain to try; but he would suck an orange, the juice of which he swallowed without difficulty. He slept for some hours after the sixth dose. On awaking, the severity of the symptoms increased - Three more doses were then given, and he again became calm, and could then

suck some sugar cane. The doses were continued for four days. The symptoms returning whenever he awoke. He could then partake of solid food, and once drank water without suffering. The patient expired in profound stupor on the sixth day.

The author concludes that great alleviation of suffering was produced in this case, and that from the action of the drug, he would be induced to give much larger doses in similar cases.

Several cases of Tetanus were also treated by him in this way.

The first of these resulted from an ulcer on the hand, which was produced by the application of a red-hot mixture of charcoal and Tobacco by a native empiric [the patient's brother was similarly attacked, refused European aid, and died after 3 days illness]. The patient suffered from severe spasms at intervals of a few minutes, and after the failure of other remedies recourse was had to the hemp. The patient, soon after taking 2 gr. of the resin, became intoxicated and slept at intervals during the night;

in the morning convulsions returned; 2 gr. were then given every third hour, and the stiffness of the muscles became much less towards evening - The pulse and skin were natural - Three days after, 3 gr. doses were given every two hours, and the spasms became fewer and milder - Two days after, the spasms were trivial, no permanent rigidity, the patient passed two Dysenteric stools; after this he was very well for several days - Five days after, the symptoms of dysentery became well marked, the tetanic spasms gone - The lemp was omitted, and treatment directed to the dysentery - During all this time the ulcer was quite intractable - Nine days after, he seemed to be recovering from the dysentery, but the slough on the hand was spreading much - The patient refused to permit amputation - the mortification spread rapidly, and in a few days he died, without any return of the spasm.

Another patient consumed $13\frac{1}{4}$ grains of extract, and was ultimately discharged from the hospital cured. A third case is detailed with similar results.

At the native Hospital at Calcutta Mr O'Brien treated 7 cases of Tetanus in this way, and in four of these he employed 10 grain doses - The result was almost immediate relaxation of the muscles and interruption of the convulsive tendency - Four of these cases recovered.

A short abstract of a case in the practice of Mr Richard O'Shaughnessy, and detailed by him to the Medical and Physical Society of Bengal, will now be given.

David Joseph at 26, A Few, presented himself at the Medical College Dispensary on the 26th July, with his jaw firmly locked, complaining of pain down the whole spine, and in a state of excessive nervous excitement - He had two suppurating wounds on the scrotum, which were caused by caustic - He was ordered 1 gr. hemp extract every two hours - 27th - no improvement and no action of the drug - 29th - worse; spasm of trunk for about two minutes - two grains hemp with difficulty administered, to be repeated every two hours. 30th - no action of drug; several spasms, purgatives prescribed, and hemp intermitted.

31st much worse yesterday, spasms every ten minutes - hemp resumed at night; he became gradually more tranquil, and the paroxysms were less frequent - sores on scrotum healing - ordered today 5 gr hemp every two hours, and turpentine enema - appetite good ever since hemp administered August 1st - better; slept a little and feels happy - pain of back continues, paroxysms much fewer.

3^d - to have 3 gr. of tincture every two hours.

4th - slept well: only one paroxysm since the 3^d.

5th - hemp stopp'd to allow purgatives to be given.

6th - much worse than he has been since taking large doses: has had no hemp for eight hours; no motion of bowels - Hemp resumed, a drachm of tincture every two hours, day and night, unless when asleep -

10th - slept well, pain diminished, bowels open: no paroxysm for several days

12th - can open his jaw, and eat and drink without pain - The hemp has latterly excited him much, and was now gradually discontinued. appetite gone, great weakness - copious discharge from sores - Attendance discontinued.

Soon after recovery he had direct Inguinal Hernia on both sides, proving the violence of the spasms.

In this case it is well worthy of remark that intermission of the Hemp was the signal for exacerbation of the disease, and that a return to the remedy was the means of very soon arresting the parosysm. The same fact was observed, though not so decidedly, in the cases of Dr O'Shaughnessy.

This gentleman is confident that the resin is capable of arresting the progress, and in a large proportion of cases, of curing the disease - and on reviewing the whole facts it cannot be doubted that in India this substance has proved a valuable remedy for this dreadful disease.

Before proceeding to compare these facts with the experience of our own country, allusion must be made to a remarkable case of Infantile Convulsions, successfully treated, and where very large doses were required to produce narcotism.

In this case, that of a female infant aged 40 days - the disease advanced to an alarming extent after 20 days ineffectual treatment with the usual remedies.

The child had lost its appetite, was rapidly emaciating, and seemed to be sinking -

Hemp was now resorted to - One drop of the tincture, equal to $\frac{1}{10}$ gr. extract, was given, and in an hour and a half two drops more -

The child fell asleep for four hours, then awoke, screamed for food, took the breast freely, and fell asleep again; and next day, October 1st, was perfectly well, but drowsy - Oct. 4th convulsions returned:

5 drops of tincture hourly; no effect after 44 drops.

Oct. 5th - It was discovered, that owing to the bottle being left open the resin had separated, and the child had therefore got no hemp on the preceding day.

On the 5th and 6th - eight-drop doses diminished the violence of but did not prevent the paroxysm.

7th - hemp discontinued; sinapism to epigastrium. castor oil and turpentine; tetanic spasm for $4\frac{1}{2}$ hours.

Hemp resumed in evening; 30 drops given at once; immediately limbs relaxed, and the child slept for 13 hours with narcotic influence of drug.

8th - severe fit at 4 A.M.; 25 fits between that time and 10 P.M., when she was again narcotised; 130 drops having been given, 30 at a time, equal to 15 gr. resin - From that hour no return of fit. Recovery -

On three following days there was considerable griping and after large doses of almond oil several dark green lumps of resin were voided with complete relief.

Having now described the experience of Dr O'Shaughnessy with Indian Hemp, a brief account will be given of the success of the remedy in this country - and to avoid extending my observations to too great a length I shall limit my remarks to the treatment of Tetanus as observed in cases in private practice and in the Royal Infirmary, as also to the use of Hemp for general purposes as a hypnotic.

Professor Miller has provided me with the following remarks.

"My own experience speaks loudly in favour of the Hemp - I can now record three fortunate cases under its use - all traumatic tetanus - and a case which proved fatal, but where great alleviation of suffering was produced.

The first of these was a girl aged 7, admitted to the Royal Infirmary October 18th, 1844. She had received an extensive injury of the middle

finger of the right hand a fortnight previously - inflammatory swelling and pain became intense, and there was a tendency to spasmodic flexion of the fingers and wrist, in consequence of which she was admitted - On the 23^d she was observed by the nurse to take a "kind of fit", becoming rigid, having difficulty in opening the mouth and in swallowing, and complaining of pain in the jaws. At visit she seemed perfectly well - a brisk purge was ordered, and lest the case should prove Tetanus Indian Hemp was prescribed - 10 drops of the tincture every 4 hours - On the 24th the symptoms of Tetanus were well marked, without any influence from the hemp - It was determined to amputate the finger, which was done without ligatures or any thing that could cause irritation, and water-dressing was applied to the wound - dose of Cannabis increased to 20 drops - 25th - Slept after taking five doses of 20 drops, but now the symptoms are aggravated - turpentine enema ordered - 30 drops Cannabis every hour - ice to spine. In the evening - no return of spasm, but continued rigidity - Hemp to be given in 30 drop doses every $\frac{1}{2}$ hour - 26th 2 a.m. - since last report drowsy, but without exacerbation of Tetanus - 12 noon - much improved.

Hemp was now discontinued, and on the 28th Aconite was substituted; but as on the 29th the spasmodic attacks were more frequent and severe, the Aconite was stopt, and Hemp again given - 30 drops per hour - and on the following days she was improved, having slept well. She continued to improve till the 25th November, the dose of Hemp being gradually reduced: producing when given drowsiness and calm sleep; it was soon discontinued as it then seemed to excite the circulation - Throughout the whole period of its use its effects on the appetite were most obvious - the craving for food being at times absolutely voracious. After this no more medicine was given, and her recovery was complete.

The second case occurring in private practice was that of a boy about the same age, who had simple fracture of the thigh, with compound and comminuted fracture of the great toe.

The treatment and result were the same.

The third was a boy rather older, who had compound fracture of the bones of the arm. Treatment again resulted in cure.

In these cases a few doses generally induced sleep with marked mitigation

of the spasm - the period of narcotism did not exceed two or three hours - the sleep was deep and unbroken and seemed to be refreshing - it was followed by no headache or other apparent inconvenience - The most remarkable effect observed was the tolerance of the remedy, whereby a girl aged 7 took every half hour and sometimes many hours in succession doses of hemp sufficient to narcotise an adult."

In these cases Mr Miller is inclined to give Hemp credit for a chief share in the cure.

In 1846 the virtues of Hemp were tested in a case of Tetanus in the Ward of Dr Duncan. In 1847 another case presented itself where hemp was administered - At that time Sulphuric Ether was much used as an Anæsthetic, and it was thought probable that it would be of service in this case - the patient inhaled it at frequent intervals during a whole afternoon with decided but only temporary relief - after this Cannabis was given without its physiological action being attained by nearly an ounce and a half of the tincture: it was not persevered with - ether was again tried, also opiates with some benefit - The patient died on the 13th day.

I propose to give a pretty full detail of the first of Dr Duncan's cases, both on account of its general interest as a case where the hemp seemed to be of considerable service, and as a most complete and accurate report of the effects of the medicine was taken during the whole progress of the case.

James Mackay Oct 22. Railway Labourer.

admitted to the Surgical Hospital - Oct. 20th 1846.

Received a slight lacerated wound of the hand a week before admission - was admitted at $\frac{1}{2}$ past 6 P.M. on account of commencing Tetanus.

The wound appeared to be healing completely and kindly - He complains of great general uneasiness, particularly about the neck and spine, of some rigidity of the jaws, which can only be separated $\frac{3}{4}$ of an inch, of inability to protrude the tongue, of commencing spasm of the neck and upper part of the back - Complains also of a "burning about the heart" - On his being put to bed, the face wears an anxious expression, but with little of the usual "risus" - The extremities can be bent and moved without difficulty - There is decided difficulty of swallowing, but he does not refuse liquids, which his great thirst makes acceptable to him.

he perspires most profusely, and the exhalations have a peculiar rather fetid odour.

The spasms are generally one or two per minute, lasting however only a few seconds - Pulse 115 to 120, soft, seems not to be affected by the individual spasms.

Bowels not moved for two days.

R *Scammonii* grviii

Calomel. grviii ~~℞~~ *statim sum.*

About 11 o'clock Tincture of Indian Hemp was given at first in frequently repeated doses of 15 to 20 drops.

without appreciable effect. Bowels not acted on, medicine to be repeated in the morning.

21st October, at visit.

Bowels not moved,

though turpentine enema administered

Spasms more violent and general, once or twice a minute, head thrown back, spine slightly arched, muscles of abdomen slightly rigid - "risus" distinct but not intense - Teeth more locked - Thighs rigid and arms flexed only during the exacerbations - He lies with the eyelids half closed, but has not slept - A slight touch produces general spasm - Perspiration profuse.

120 to 140 drops of tincture given without effect; to be continued in increased doses.

R *Ol. croton.* gr^{ss} j

Ol. sicini ℥ss ~~℞~~ *sum. stat.*

Vespere - the bowels freely moved this afternoon; 60 to 80 drops tinct. have been given almost every $\frac{3}{4}$ hour during the afternoon.

Spasms somewhat abated - no physiological effect of Herap. except he has appeared to dose at intervals.

to have 75 drops tinct. every two or three hours.

Strong beef-tea to be drunk during the night.

22^d at visit - has taken a good deal of beef-tea, but prefers water which he takes copiously. Swallowing easier this morning - says he feels better.

Spasms less violent, though still as frequent - spine more straight - abdomen soft, except during spasm.

100 drops tinct. were given at $\frac{1}{2}$ past 11.

Vespere - 7 o'clock. Drowsiness became decided at 4 o'clock. after having during the afternoon

100 drops tinct. every $\frac{1}{2}$ to $\frac{3}{4}$ hour.

he now lies very quiet, without apparent excitement - is not readily roused, even by the spasms, which are still as frequent but less intense - Average number of spasms during afternoon 20 to 24 in 15 minutes.

9 o'clock. No medicine since 4 P.M. - drowsiness passing off - copious stool containing scybalous masses and colouring matter like the remedy was brought away by injection

130 drops tincture given.

Midnight - 130 drops again given -
is much relieved, but somewhat sick - coughs a good
deal - large mucous râles in chest. Heart beats jerkingly -

23^d at visit - This morning "spasms
appeared again gaining strength, no hemp having
been given from last report till 9 A.M."

at 9 a drachm of tinct. was given and again at 11.
"is now quiet" - bowels opened naturally - much râle in chest.

Vespere 9 o'clock - spasms counted in several 15 minute
periods vary from 5 to 10 in that period

has had several doses from \mathfrak{zj} to \mathfrak{mLXX}
is drowsy; has taken mince-collops without difficulty,
besides drinking beef-tea - Bowels copiously relieved.

24th at visit. Spasms now absent, or
not appreciable - but chest symptoms worse, - sputa
frothy mucus mixed with blood - general mucous râles
drowsiness kept up since yesterday by \mathfrak{zj} to \mathfrak{zjss} doses.

Vespere - no relief to chest by Sulphate of Zinc
emetic - Pulse weaker - engorgement of lungs advancing;
râle almost tracheal - Is quite sensible; takes food,
though without eagerness - says he feels well.

25th at visit - Perfectly free from spasm -
but is evidently dying from accumulation of mucus in chest
little hemp has been given today - is quiet; conscious
when roused. Pulse very feeble - Died at 8 P.M.

In this case 6 ounces of O'Shaughnessy's tincture of Indian Hemp were given in all; equal to 144 grains of the extract - The extract for the tincture was partly from Smith, of Duke Street, and partly from Duncan and Flockart, and was reputed the best in Edinburgh -

The doses at first were evidently too small.

The examination of the body was not permitted.

A few remarks will now be made on the use of Hemp as a calmative and hypnotic in diseases in general.

While acting as Clinical Clerk in the Royal Infirmary in the summer of 1849, I had frequent opportunities of administering hemp in various diseases as a hypnotic - The object was in general attained, and no evil results followed. I regret there is no record of these cases, as at the time I did not pay particular attention to the subject -

I am informed that Hemp is frequently given as a hypnotic to the patients in the Infirmary -

In cases of phthisis and other lingering diseases where opiates have for a long time been administered, but have at last ceased to have their effect; Indian Hemp may often be given with advantage - thus - in the Infirmary it was given to a patient in the advanced hectic of phthisis, where other means failed to induce sleep: 5 to 10 drops of tincture were given at first with complete effect in producing sleep - the dose was afterwards increased to 15 drops. - but again this result will sometimes not be attained.

D^r Christison has had occasion to administer Hemp to several cases: he gives the following account of two of these -

I. A gentleman had suffered from palpitation of the heart for 21 years, and at night the attacks were generally most severe - he had used one medicine after another with the hope of relief, but he did not derive any benefit - D^r Christison advised him to try Indian Hemp - the patient's wife states that he passed the night on taking it without suffering from the palpitation, though still he was perfectly conscious of its presence, and that the attack left him entirely at 8 A.M. instead of continuing 24 hours, as previously it did.

II. A gentleman was afflicted with severe eczema of the whole body with intense itching - A large dose of solution of muriate of morphia caused extreme sleepiness, but so much increased the itching that he was kept awake scratching - 25 drops Cannabis tincture gave him 6 hours sleep and he continued to enjoy sleep for four to six hours every night for 6 weeks, without increasing the dose, until the eruption was nearly removed; during all this time the itchiness continued as before when he was awake -

Dr Christison has observed that in the generality of cases Hemp has had the effect of causing sleep, without disturbing the functions of the stomach or bowels - Given where morphia and hyoscyamus had failed, it had also repeatedly failed to cause sleep - But in one or two cases he has found it to succeed when morphia and Opium disagreed. In one case it failed completely, while the "black drop" night after night was completely successful.

An interesting series of cases is given by Mr Donovan in the Dublin Journal of Medical and Chemical Science for 1845.

This gentleman was much impressed with the advantages of the remedy, and was convinced of its beneficial effect in several of his cases, particularly those of neuralgia.

One or two of these I will now shortly detail.

I. Mr Donovan had himself from early life occasionally suffered from a neuralgic pain at different times in the heel, ankle, sole, instep, and sometimes in the back of the thigh - lasting one or two days, but sometimes a week - returning every 4 or 6 months - The pain was severe, and often excruciating - Large opiates gave no relief, but immersion of the limb in very cold water did so completely - During an attack he took ℥v of a weak tincture of Hemp: in 20 minutes the pain was gone: at the same time "he had hardly any consciousness of the motion of his limbs when walking: they appeared not to belong to him".

Some months after, while under a severe attack in the foot, he took ℥vi weak tincture without effect. On the third night he took gr^{xii} weak resinous extract, and in 20 minutes he was free of pain, & slept 4 hours.

This was successfully repeated on the fourth night. On the 5th night he took gr^{XIV} - a wonderful variety of sensations was produced - when he rose the next morning he felt giddy, lay down again, and ate heartily - he was in no other way inconvenienced.

On another occasion he took 8 minims of strong tincture (grij to the drachm) night and morning for three days without effect, but, in two hours after taking 15 minims on the 4th day, the peculiar effects were induced, the pain passed off and did not return.

Again, when pain intolerable he took m_{XXX} of the same without benefit, and in 6 hours m_{XV} . Pain suddenly ceased in half an hour; the pain returned in half an hour, but bearable - and wore off by degrees.

"It would have been at once banished if both doses had been taken at once"

On the next occasion he took immediately when pain began m_{XV} , and in half an hour was perfectly free from all suffering - The stinging pain returned after 12 hours - a repetition of the dose gave very little relief, and the pain continued for several hours longer.

II. A lady had suffered from a severe attack

of brow-ache for several days, which came on at 9 A.M. and lasted till 1 P.M. - she tried several remedies in vain; at length she took ζij weak tinct. an hour before the accession of the fit; several disagreeable symptoms were produced; she lay with cold shuddering sensations for some hours, and finally after dozing a few minutes awoke quite well about 4 o'clock. The pains did not again appear.

III. A female of full habit and very nervous temperament was treated by Dr Keligan in Serwis Street Hospital - The pupils were enormously dilated - she suffered from dull pain shooting from the right shoulder to the back of the neck, and thence up and down the spine - the pain was of three months standing - was worst between 12 and 3 in the day, accompanied by headache and palpitation, fluttering in the chest; and terror. Many remedies had been tried for a month without any decided benefit - The report proceeds thus - 14th Dec^r grv weak extract of hemp to be taken morning and night - 15th pupils more contracted - patient feels better - very slow improvement till the 20th when pain in back of neck decidedly better - that in the shoulder increased - giddiness has been

becoming more marked - pupils nearly natural -
has now taken 12 pills of 5 grains - Dose to be increased
to gr VIII every 6th hour -

21st. better, no giddiness nor headache - pain
of neck entirely gone - ordered gr X every 6 hours.

22^d - excessive giddiness & headache - pupils natural.

23^d discharged, expressing herself perfectly cured.

IV. Mr D. describes his case as follows.

"I was attacked on going to bed with excruciating^{pain}
in left side of the upper jaw, extending upwards
and to the nose. I was kept awake by it till
7 A.M. - slept till 9 when I awoke in torture - then
took 2 doses of ^{mXX} hemp tincture without effect,
and again at night, after which I slept profoundly
till 8 next morning, when the pain was much
abated - same dose at night, sleep, return
of pain in morning - again took ^{mXX} in the evening
which deadened the pain, but it soon became as
bad as ever - embrocations of laudanum and,
camph. spirit were then tried, with another dose
of ^{mXX}. - I immediately afterwards fell asleep; next
morning the pain was nearly gone, and it soon
left me altogether."

Mr Donovan remarks that in this case the

control of the Hemp over the pain was obvious, and eventually the disease was subdued by it - that the embrocation would have no effect in such violent cases.

V. A gentleman had excruciating sciatica for 13 weeks - his sufferings caused groans, cries, & tears - he passed sleepless nights - the only relief he obtained was from firm pressure on the hips, and for a short time from laudanum. Two doses of hemp at short intervals produced sound sleep for 8 hours, and on awaking he was perfectly relieved - Five doses more so completely subdued the pain that it gave little farther trouble - He experiences slight return on entering a cold room, but only transitory - The drug had very little of the usual effect on the head.

A number of other cases will be found in Mr Donovan's paper, in which the Hemp, if it did not effect a cure, yet was of great service in the treatment of the complaints to which he alludes - but in some no good followed, and on the contrary unpleasant effects were produced - thus

A lady suffering from neuralgia of various parts of the body was ordered 5 drops of strong tinct:

at night - next morning she was giddy and weak; and, without authority, took 5 drops more. She became faint and universally cold, had some apprehension of death, and remained disagreeably affected during the whole day - Pain not relieved. The effects reappeared at intervals for 2 or 3 days.

A female with severe rheumatic pain of the leg took 8 grs. weak extract at night - pain vanished in an hour - she slept soundly till 4 A.M. and at 8 the pain returned - at night she took 6 grs, but she remained awake and in pain for 5 hours - she then slept, and awoke nervous, fearful, confused, and giddy, with palpitation. There were alternations of pain and relief: but in the morning she was as bad as ever and nothing would induce her to take another dose.

Another patient, accustomed to hemp, had on one occasion alarming depressing symptoms - He sat extremely agitated, with eyes open; head reclining on chest; unconscious - tremulous respiration with interruptions of sobbing - whole frame in an indescribable shudder - he seemed to shiver with cold. The pulse was quite good all the time; and in half an hour he recovered.

Indian Hemp in different forms has been recommended, principally by the older writers, for several other purposes: as in the treatment of Diarrhoea, and Gonorrhoea - and locally as an anodyne lotion, or in the form of poultice for Hemorrhoids - For these purposes I am not aware that it is now used.

But there is one affection where it has proved of considerable service, viz - Uterine Haemorrhage. and it is only lately that Hemp has been applied to this purpose -

I shall only quote the following - from Dr Churchill's work on "Diseases peculiar to Women" - edition of 1849. [note to the essay of Fothergill on cessation of the menses].

"We possess two remedies for these excessive discharges, at the time of the menses going off, which were not known to Fothergill - Ergot, and Tincture of Indian Hemp.

The former has been long known to possess the power of restraining haemorrhage after delivery &c. - The property of Hemp, of restraining Uterine

Hæmorrhage, has only been known to the profession a year or two. It was accidentally discovered, by my friend Dr Maguire of Castleknock, and since then it has been extensively tried by different medical men in Dublin, and by myself with considerable success.

The tincture of the resin is the most efficacious preparation; and it may be given in doses of from 5 to 15 or 20 drops three times a day in water.

Its effects in many cases are very marked, often instantaneous; but generally complete after three or four doses.

In some few cases of ulceration in which I have tried it on account of the hæmorrhage, it seemed to be equally beneficial.

Use in Midwifery

Indian Hemp seems to possess a peculiar power over the Uterus, which has not hitherto been described.

If administered during Labour, the contractions of the Uterus are powerfully increased.

By permission of Professor Simpson I gave the Tincture of the extract in Dr Christison's possession to a series of cases in the Maternity Hospital. I have to express my obligation to the House-Surgeons, Mr Landel and Mr Jobling, for their kindness, and the great trouble they took in promoting my object.

Before entering upon these however, the following cases, shortly noticed in the Case-Book of the Hospital, may be adduced, as proving in a general way this property of Hemp.

I. Sarah Lindsay at 17. First labour. Nov^r 24th 1849.
had m^{XXI} Tinct. Cannab. of the shops one hour before
the birth of the child - the os was then the size
of a shilling - the parts very tender - indurations
around os - The pains soon became very strong,
so much so as to burst the membranes and
send the liquor amnii to the other side of the room,
and soon the head was born. The Uterus
subsequently contracted well.

II. Bridget Mahony at 20. First labour. Nov^r 20th 1849.
had ʒj Tinct. at 4 P.M. when os rigid and of the
size of half a crown - from this the labour
became very rapid - Haemorrhage to 8 ounces.
one hand born with head.

III. Semima Taylor at 23. First labour. Dec^r 2^d 1849.
had ʒj Tinct. when os of the size of half a crown;
labour advanced very rapidly; and the child
was born in $1\frac{1}{2}$ hour - Severe after pains.

IV. Agnes Sutherland at 17. First labour. Dec^r 8th 1849
This woman had ʒiij tinct. in divided doses,
which much accelerated and increased the pains;
she had then chloroform for 6 hours. No bad effects.
[I have been since informed the severity of the pains
in this case was so great, as to cause some alarm;
and chloroform became necessary to produce insensibility]

The following Tables are drawn up in a similar manner to those of Prof. Simpson, in his experiments on the action of Galvanism on the Uterus. They are intended to illustrate the duration of the Pains and the Intervals, before and after Cannabis is given: and to each case the necessary remarks will be added.

Case I

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|-----------------------------|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .65 | 6. | 8 drops tinct. given | |
| | | .50 | 4.45 |
| | | 1.45 | 5.45 |
| | | 12 drops after half an hour | |
| | | 1.45 | 4. |
| | | 2.45 | 4. |
| | | 1. | " |
| | | .45 | 5.15 |

This was a Natural Labour - 8th Pregnancy -
 The first stage of labour was not completed till 24 hours after the woman was seized - Hemp was given 4 hours before its completion - after the first dose of hemp little effect was observed; but after

the second dose. the Duration of the pains was increased, and the Interval shortened - And it was very obvious that the intensity of the pains, counting from the second pain after the hemp was given, was increased.

By the fourth or fifth pain the effect wore off - and the Hemp was not again given. [in the Tables the counting of the Pains begins always with the second pain after the Hemp was given]

Case II.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|-----------------------|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .50 | 3.20 | 17 drops Tinct. given | |
| .57 | 1.50 | 1.15 | .15 |
| .57 | 2.32 | .20 | 1.58 |

This was a second Pregnancy - Hemp was given in the second stage - The second pain after it was given was lengthened, and the Interval shortened: this was not the case with the third pain - but the intensity of the Pains was much increased, and the woman was speedily delivered.

Case III.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|--|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .20 | 3.35 | 20 drops Tinct. given | |
| .40 | 3.5 | .47 | 3.25 |
| .42 | 3.15 | .57 | 3.15 |
| .45 | " | .55 | 2.5 |
| | | .40 | 2. |
| | | 30 drops given Twenty minutes after | |
| | | .40 | 2.15 |
| | | .60 | 2.10 |
| | | .50 | 1.35 |
| | | .40 | " |

First Pregnancy - Hemp given in second stage of labour

The chief fact observed here was increased intensity of the pains - The duration of the pains was slightly increased - and the intervals shortened decidedly after the second dose of hemp.

24 hours after; as there were no after pains, 12 drops Tinct. were given, and pains immediately came on, which the woman said were "quite as bad as when she took in labour first".

Case IV.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|-----------------------------------|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| 1.45 | 1.10 | 25 drops Tinct. given | |
| 1.45 | 1.15 | 1.5 | 1.3 |
| | | 30 drops given half an hour after | |
| | | 1.25 | .43 |

First Pregnancy - Hemp given at completion of first stage of labour -

After the first dose of Cannabis both the pains and the intervals were shortened - The Intensity of the pain increased - After one or two pains the effect wore off, and a second dose was given half an hour after the other - The third pain after this became very intense, and pain succeeded pain without intermission; and this state continued several hours, but the pains gradually wore off in degree -

As there was deformity of the pelvis; chloroform was given, and delivery accomplished by the Forceps.

Case V.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|--------------------------------------|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .45 | 2. | 30 drops Tinct. given | |
| .45 | 2.23 | .45 | 1.35 |
| .45 | 2.23 | .35 | 0.58 |
| | | .47 | 3.20 |
| | | 1.40 | 4.30 |
| | | 35 drops given half an hour after | |
| | | .38 | 1.50 |
| | | .40 | 1. |
| | | .40 | 2.20 |

First Pregnancy - Hemp given during second stage of labour, and patient delivered during its action. The effect of the first dose was chiefly shortening of the interval at first - and prolongation of the pain. But the effect on the intervals was more marked after the second dose - the pain again being rather shortened.

The pains were observed by the patient to be more intense - and this was also ascertained by examination.

Case VI.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|-----------------------|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .40 | 2.19 | 30 drops Tinct. given | |
| .48 | .30 | 1.52 | 3.12 |
| .40 | " | .38 | 3.30 |
| | | .35 | " |

First Pregnancy - Hemp given in second stage -
Its effects were very decided -

Previous to the administration of the Hemp there had been no progress of the case for an hour; the patient was nervous and excitable, and though she complained much of the pains, the contractions of the uterus were feeble and the head of the child did not move.

But on the second pain after the cannabis, the contractions became very strong, forcing down the head; and the child was expelled in 10 minutes after the Hemp was given.

At the same time it is to be observed that there was no decided effect on the duration of the pains and intervals.

Case VII.

| Before Cannabis | | After Cannabis | |
|-------------------|-----------------------|--|-----------------------|
| Duration of Pains | Duration of Intervals | Duration of Pains | Duration of Intervals |
| .35 | 6.25 | 32 drops Tinct. given | |
| .50 | 5.25 | .40 | 3.40 |
| .50 | 5.45 | .40 | 2.5 |
| | | 40 drops given 1/2 hour after - Effects not observed | |
| Before 50 drops | | 50 drops given 1/4 hour after. | |
| .40 | 5.30 | .45 | 9.25 |
| .38 | 4.30 | 1.3 | 10.50 |
| .40 | " | .40 | 6.35 |
| | | .35 | 6. |

Sixth Pregnancy - First stage not completed.

The action of the Hemp was well marked after the first dose - the woman states that the second pain after it was the strongest she had had.

The action of the second dose was not observed.

But after the third dose there was no action on the pains: they became irregular, and the intervals became very long - at the same time however there seemed to be a tolerance of the drug, for no physiological effect followed.

The case after this was allowed to proceed naturally.

Upon reviewing these cases it does not appear that the duration of the pains and intervals was materially affected in all; but in Cases I. II. IV. prolongation of the pain and shortening of the interval were most obvious - while in Case V will be observed a shortening of the interval corresponding to each dose of the hemp: shortening of the interval was a more conspicuous phenomenon in general than prolongation of the pain.

Upon the whole I would not be inclined to lay much weight upon these effects; but there can be no doubt that the intensity of the pains was greatly augmented by the Hemp, except in Case VII, where after the effects of the first dose passed off, no action followed the repetition of the hemp: this case was an exception to all the others -

It is remarkable too that in none of the cases were the usual physiological effects produced: there was no excitement, nor was there any subsequent depression.

The Tincture was given with a little water, and its action on the Uterus appeared about the 2^d pain after.

This property of Hemp points to several uses of it in Midwifery, but I forbear entering on these at present, as I have not yet had an opportunity of applying it -

Forms. Doses.

Indian Hemp may be administered in several ways.

The resin, in the form of pill, is best to induce a gradual action, and the nauseating taste of its solution is thus avoided: but its effects in this way are uncertain.

The following emulsion has been recommended. Ext. Cann. Ind. ℥j, rubbed in a warm mortar with Ol. oliv. opt. ℥j - gradually add, Mucilag. ℥ss, aqua, distill ℥viiss [Bromfield].

But the simplest method is to use the tincture; which should be dropped into a little water, and immediately swallowed. The water may be sweetened with sugar; or an aromatic, as compound Tincture of Cardamoms, may be added.

The Edinburgh Tincture is prepared by dissolving 3 grains of the extract in a drachm of Rectified Spirit.

The Dose of the Extract is 2 to 6 grains.
That of the tincture, from 5 or 10 drops to 30 for
ordinary purposes. But much larger doses may
be given where there is tolerance of the remedy - as
in Tetanus and Hydrophobia.

A less dose than 30 drops is of little service in
promoting uterine contractions.

The pure Resin, as prepared by the Messrs
Smiths, is active in the dose of $\frac{2}{3}$ of a grain.

Alexander Christison,

Explanation of Plates

- Plate I. *Cannabis Indica* - female plant.
from the drawing in Dr O'Shaughnessy's paper.
- Plate II. *Cannabis Sativa* - common Hemp plant.
female plant in fruit. Edin. Bot. Garden
8 Sept 1849 - The drawing reduced one half.
- Plate III. *Cannabis Indica* - female plant - not in flower.
raised from seeds obtained from Bombay Gunjah
purchased in 1848 by Mr Henry Johnston, in the
Bombay Bazaars - A twig of this plant, which
was 9½ feet high, is represented in the drawing,
reduced one half.
- Plate IV. *Cannabis Indica*. Male plant -
raised, from the seeds obtained by Mr Johnston,
in the Hothouse of the Edin. Bot. Gard. Oct. 17th 1849.
The plant was 4 feet high, and in flower.
The drawing shows the upper part reduced one half.
also a magnified view of the five divisions of the
Perianth, with the prominent green midribs and
transparent scaly lateral parts of the sepals.

and one sepal is more highly magnified to show the midrib dividing, its central division passing to the apex of the sepal. The glandular hairs are seen covering the sepal.

The pollen is shown highly magnified, with three facets, each with a central ring.

As the stamens were not examined till they had shrivelled, it will be better to delay the description till they are fully examined next summer.

Plate V. *Cannabis Indica* - female plant, in fruit raised in the same way as the last.

The plant was 5 feet high. The drawing shows the upper part reduced one half.

The fruit also is magnified to show the carpels enveloped by its convoluted perianth.

[see Pages 4 and 9].

I owe my best thanks to my brother Mr David Christison for these drawings.









