Intellectual Property Protection of Medicinal Plants of Cooch Behar – A Case Study of the Current Status

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I. Introduction:

Cooch Behar was a princely state up to the year 1950. Then it merged with India according to a treaty in between His Highness Maharaja of Cooch Behar and the Government of India. Subsequently it became a district of West Bengal. This district is very rich for its cultural heritage and huge natural resources. It is also very famous for its pleasant weather and scenic beauty. Apart from this, a lot of medicinal plants are grown in this area which have immense medicinal values and are used as traditional treatment for various ailments though some of these herbs and plants are known, medicinal values of a large number of medicinal plants are yet to be discovered. No comprehensive and systematic initiative has yet been taken by the government or by any Research Institute.

The district of Coochbehar has a very strong legacy of ayurvedic traditional treatment. The system of traditional treatment is dominated by the ayurvedic doctors called the vaidyas. A large number of these herbs are already within the public domain knowledge but some of them are preserved as indigenous secret knowledge of the community and the people are very reluctant to share them. As a result of which much of the indigenous knowledge relating to the medicinal plants and herbs of this district is lost. This is also the reason that there is no further scope to do research to confirm the medicinal values of these extinct plants along with their documentation. It may be mentioned here that the medicinal herbs and plants of Coochbehar are not exclusive to this district, because it is situated in a geographical region where the weather, soil condition etc., are similar to some other northern districts of West Bengal, southern districts of Assam and neighbouring country Bangladesh.

The **limitation** of the present research work is that it does not intend to either discover or catalogue the medicinal plants or herbs available in the district of Coochbehar. The researcher also does not intend to do an analysis of bio-chemical materials or genetic structures of the medicinal plants.

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The **focus** of the researcher is to see whether any of the medicinal plants of Coochbehar can be protected under the intellectual property regime and to see which of the plants already enjoy protection under Intellectual Property regime. The researcher also intends to see the level of protection of the traditional knowledge associated with these medicinal plants.

Keeping the above factors in mind, an attempt has been made to find out some of the instances of misappropriation. Furthermore the **objective** of the research is to find how many of the known medicinal herbs and plants have found place in the Traditional Knowledge Digital Library[2] of India prepared by CSIR and to focus upon the intellectual property rights protection issues regarding these plants**.**

With these **objectives, limits and focus** in view, the researcher undertook a survey through interview with the help of close ended structured questionairs of some knowledgeable persons in this field. Apart from this the researcher also has based his research on some secondary data.

II. Names and Curative Effects of the Medicinal Plants of Cooch Behar:

II.A. Information Obtained from Dr. Soumen Maitra, Associate Professor and Head, Department of Floriculture, Medicinal and Aromatic Plants, Uttar Banga Krishi Vishwa Vidhyalaya, Cooch Behar, West Bengal**.**

The Department of Floriculture, Medicinal and Aromatic Plants, in Uttar Banga Krishi Vishwa Vidhyalaya, Cooch Behar, West Bengal, is well known for its pro-active role in identification of medicinal plants and herbs in the region. Dr. Soumen Maitra the Head of this Department narrated and described several plants with unique curative properties that were commonly used by the local inhabitants of the district of Coochbehar for prevention and cure of desease.

These medicinal plants are in popular use and people use the natural extracts of various parts of these plants such as stem, leaf, seed etc.,for those purposes, in different ways. The information obtained from Dr. Maitra is given in a tabular form below:

[2] The object of TKDL is digital documentation of India's public domain of traditional scientific-medicinal knowledge. TKDL is a collaborative project between Council of Scientific and Industrial Research (CSIR), Ministry of Science and Technology, and Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry of Health and Family Welfare, Government of India.

Table No. 1: Names of Plants obtained from Department of Floriculture, Medicinal and Aromatic Plants, Uttar Banga Krishi Vishwa Vidhyalaya, Cooch Behar, West Bengal.

Sl.	COMMON NAME OF THE HERB/PLANT	SIENTIFIC NOMENCLATURE	CURATIVE EFFECT OR MEDICINAL PURPOSE
1.	Vesaza khamalu	-Dioscorea composita	Corticosteroid,Sex hormone and Oral contraceptive
2	Kalo-megh	Andrographis paniculata	Cough and cold
3	A. Pipul B. Kabab-chini C. Choi	Piper longum Piper cubeba Piper retrofractum	Cough and Cold, Obesity Sore throat and Irritable throat Cough and cold related fever, Rheumatism
4	A. Shoti B. Aam-aada C. Kali-haldi	Curcuma zedoaria Curcuma amada Curcuma caesia	Starch-rich food Loss of apetite Skin wrinkling
5	A. Arjun B. Bohera C. Horitoki	Terminalia arjuna Terminalia bellerica Terminalia chebula	Cardiac problem. Indigestion Indigestion
6	Aamloki	Phyllanthus emblica	Enhancement of digestive capacity and Vitamin C enriched
7	Vashak	Adhatoda vasica	Cough and Cold
8	Ram-vashak	Phlogacanthus thyrsiflorus	Cough and Cold
9	Curry-patta	Murraya koenigii	Cool the stomach, Blood sugar
10	Vishal-anguriya	Gloriosa superba	Artharitis and Cromozome doubling
11	Ulat-kambol	Abroma augusta	Various gyenaeco-obstetric deseases and production of sperm related problems
12	Lata-kasturi	Abelmoschus moschatus	Digestive and any type of stomac complain
13	Danda-kalosh	Leucas aspera	Headache
14	Khasi-begun	Solanum khasianum	Steroid
15	A. Nayan-tara (pink) B. Nayan-tara (white)	Catharanthus roseus var roseus Catharanthus roseus var alba	Blood sugar Blood sugar

It may be noted that some of these plants and herbs mentioned by Dr. Maitra already find a place in the Traditional Knowledge Digital Library.

II.B. Information given by Sri Bhaben Barman, Teacher, Petbhata High School, Post-Makhpala, Dist-Cooch Behar, West Bengal.

Sree Barman is considered to be a knowlwdgeable person regarding medicinal plants and herbs. However he was able to give information about only two medicinal plants/herbs that are mentioned below:

Table No. 2: Names of Plants obtained from Petbhata High School, Post-Makhpala, Dist-Cooch Behar, West Bengal.

Sl.	COMMON NAME OF THE HERB/PLANT	SIENTIFIC NOMENCLATURE	CURATIVE EFFECT AND MEDICINAL PURPOSE
1	Kanai-dinga	Oroxylum indicum	Chronic diarrhoea, Dysentery, Liver complaints, Jaundice, Pox
2	Haar-jora	Cissus quadrangularis	To treat broken bones

The word "Haar-jora" literally means "bone-join" or "bone-setter".It may be mentioned that the medicinal plant named "Harr-jora" mentioned by Sri Burman has a legendary effect in the North Bengal region of West Bengal attracting hoards of patients from length and breadth of India. The researcher has witnessed how patients with difficult cases of bone fracture have been cured. The significant part is that the community of vaidyas who specialise in this do not allow any one to see how the herb/plant is processed nor do they divulge any information. The expertise is passed on from generation to generation[3] as a secret which makes it a truly indigenous community knowledge that should be protected.

II.C. Informations given by Dr. Tuhin Sensharma, Government Ayurvediya Databya Chikitshalaya, Debattar Trust Board, Post & Dist-Cooch Behar, West Bengal.

Dr. Tuhin Sesharma is honoured by the title "Kabiraj" indicating his expertise in the field of ayurvedic medicines. Though of frail health Dr. Sensharma is an extremely busy personality and the researcher found it very difficult to obtain an appointment to meet and interview him. Even on meeting him he appeared reluctant to part with much information and the researcher could obtain the following information only.

[3] The place is called Akrahaat village in Nishiganj G. P. near Mathabhanga in Coochbehar district. The vaidyas who practice this art of curing with the help of the medicinal herb/plane called "Harjora" are commonly known as Mushuri Vaidyas.

Table No.3: Names of Plants obtained from Government Ayurvediya Databya Chikitshalaya, Debattar Trust Board, Post-Cooch Behar, West Bengal.

Sl.	COMMON NAME OF THE HERB/PLANT	SIENTIFIC NOMENCLATURE	CURATIVE EFFECT AND MEDICINAL PURPOSE
1.	Amal-betas	Rheum australe	For digestion
2.	Kutaj	Holarrhena antidysenterica	Blood dysentery and Dysentery
3.	Sharpa-gandha	Rauvolfia serpentina	High blood pressure, Sedative, Sleeplessness[4]
4.	Shata-mooli	Asparagus racemosus	Digestive capacity, Gas preventive

II.D. Informations given by Dr. R.P Nandi, Professor of Botany (Retired) and Former Head, Shyamsunder College, Raina, under University Of Burdwan, West Bengal.

Dr. R.P.Nandi has been doing in-debth and extensive study on medicinal plants of North-Bengal region, basing Siliguri. His has earned a good reputation for him and made him very famous as a teacher in this field. Worthy to be mentioned here is that he is a regular columnist in Uttar Banga Sambad, a regional well-circulated Bengali daily, published from Siliguri. He writes a column named "Kichu Porichito Banaushodhi i.e. Some Familiar Medical Plants" regularly in this newspaper. Dr. R.P.Nandi is considered as the authority in the field of medicinal plants in this region. Names of the plants and their medicinal uses obtained from him are given in a tabular form below:

Table No. 4: Names of the plants and their medicinal uses obtained from Dr. R.P.Nandi.

Sl.	COMMON NAME OF HERB/PLANT	SIENTIFIC NOMENCLATURE	CURATIVE EFFECT AND MEDICINAL PURPOSE
1	Nayan-tara	Catharanthus Roseus (Pink) Catharanthus Alba (White)	Blood Cancer[5]. Also for blood sugar as mentioned by Dr. Soumen Maitra
2	Kalo-megh	Andrographis paniculata	Proper Liver Functioning[6]. Also for cold and cough as mentioned by Dr. Soumen Mitra
3	Sharpa-gandha	Rauvolfia serpentina	High Blood Pressure. Also as sedative according to Dr. Tuhin Sen Sharma
4	Vasak	Adhatoda vasica	Cough, Cold and Asthma

[4] This is a well known medicine in homoeopathy as well used to treat the above mentioned ailments.
[5] It is to be noted that Dr. Maitra has indicated that the quality of blood sugar control for this plant. The plant seems to be having multiple medicinal values.
[6] According to Dr. Maitra, this is also good for cough and cold.

5.	Kuchila	Strychnos nuxvomica	Anaesthetical or produces insensibility
6.	Gulancho	Tinospora cordifolia	Jaundice
7.	Than-kuni	Centella asiatica	Decentry, Digestion, Memory Enhancer
8.	Kule-khara	Hygrophilla spinosa	Anemia
9.	Brahmi	Bacopa monnieri	Loss of Memory

II.E. Information obtained from the book "Raajbanshi Lokechikitsha", authored by Tanay Mandol and published by Government of West Bengal[7]

This book is the outcome of his good research work in finding out and enlisting, apart from other conventional types of methods of treatment, names of the medicinal plants and their conventional medicinal uses by the Rajbangshi community of Cooch Behar and other adjacent districts of North Bengal. It has been published under the auspices of CENTRE FOR LOKESHANSKRITI O AADIBASHI SHANSKRITI, DEPARTMENT OF INFORMATION AND CULTURE, GOVERNMENT OF WEST BENGAL. The names of these medicinal plants/herbs are given in a tabular form below:

Table No.5: Informations regarding the names of the medicinal plants and their common medicinal uses obtained from "Raajbanshi Lokechikitsha".

Sl. No.	COMMON NAME OF THE HERB/PLANT	SCIENTIFIC NOMENCLATURE	CURATIVE EFFECT OR MEDICINAL PURPOSE
1.	Chhatim (Leaf)	Alstonia scholaris	Kalazar
2.	Bakul (Bark)	Mimusops elengi	Toothache
3.	Amrul (Extract)	Oxalis corniculata	decentry
4.	Dapi-dhupi (Leaf)	Crataeva religiosa	arthritis
5.	Niltat (Whole plant)	Cissampelos pareira	Smallpox
6.	Pathar-kuchi (Leaf)	Bryophyllum calycinum	Diahrea, Urinal Problem
7.	Anarash (Leaf)	Ananus comosus	Worms
8.	Mot (Stem)	Biston betulari	Gas, Stomachache, Jaundice, Constipation
9.	Nishinda (Leaf)	Vitex negundo	High blood pressure
10.	Shefali (Leaf)	Nyctanthes arbour tristis	kalazar
11.	Alok-lata (Leaf)	Cuscuta reflexa	Jaundice
12.	Tamak (Leaf)	Nicotiana tabacum	Asthma

[7] Raajbanshi Lokechikitsha, Tanay Mandol, Published by Centre for Lokeshanskriti and Aadibashi Shanskriti, Department of Information and Culture, Government of West Bengal, Kolkata, 2011.

13.	Paat (Leaf)	Corchorus capsularis	Fever
14.	Dalim (Leaf)	Punica granatum	Decentry

II.F. Informations from an article "Traditional Medicines Used by the Ethnic Communities of Koch Behar District of West Bengal".[8]

This article is written jointly by SUBHOJIT BANDYOPADHAYA AND SOBHAN K. MUKHERJEE OF DEPARTMENT OF BOTANY, UNIVERSITY OF KALYANI, WEST BENGAL.[9] This article records some common herbal treatments for some female diseases of Cooch Behar which are given below:

Table No. 6: Informations about the names and their therapeutic uses taken from the article: Traditional Medicine Used by the Ethnic Communities of Koch Behar.

Sl.no.	COMMON NAME OF THE HERB/PLANT	SCIENTIFIC NOMENCLATURE	CURATIVE EFFECT OR MEDICINAL PURPOSE
1.	Shimul (Root)	Bombax ceiba	Menometorrhagia
2.	Sheora (Root)	Streblus asper	Puerperal fever
3.	Bakphul (Flower)	Sesbania grandiflora	Dysmenorrhoea
4.	Bon-rosun (Bulb)	Scilla indica	Dysmenorrhoea
5.	Kait-bel (Leaf)	Limonia acidissima	Leucorrhoea
6.	Rakto-shapla (Flower)	Nymphaea rubra	Meno-metorrhoea

As has already been pointed out in the foregoing paragraphs few of these plants are of common knowledge and are often used as houselod remedies and good health practices. Some of these plants and herbs already find a place on the Traditional Knowledge Digital Library.

III. Some Non-Documented Medicinal Plants of Cooch Behar in Traditional Knowledge Digitl Libray (TKDL):

After collecting all the above-mentioned plants along with their common medicinal uses in Cooch Behar, TKDL documents were searched through 'advance search' procedure[10] which is inbuilt in TKDL. It is found out that out of all the above-mentioned medicinal plants in Table Numbers 1-6, eleven (11) plants do not find place in TKDL documentation. The table below shows the names and curative effects of those non-documented plants in TKDL.

[8] www.academia.edu/867458/TRADITIONAL_MEDICINE_USED_BY_THE_ETHNIC_COMMUNITIES_OF_KOCH_BIHAR_DISTRICT_WEST_BENGAL_INDIA.visited on 2nd February, 2013 at 2.36 PM.
[9] Ibid.
[10] http://www.tkdl.res.in/tkdl/langdefault/common/TKDL_AdvanceQuery.asp?GL=Eng.

Table No. 7: The following medicinal plants of Cooch Behar do not find place in TKDL.

Sl. No.	COMMON NAME OF THE HERB/PLANT	SCIENTIFIC NOMENCLATURE	CURATIVE EFFECT OR MEDICINAL PURPOSE
1.	Ram-vashak	Phlogacanthus thyrsiflorus	Cough and Cold.
2.	Curry-patta	Murraya koenigii	Cool the stomach, Blood sugar
3.	Ulat-kambol	Abroma augusta	Various gyenaeco-obstetric deseases and production of sperm related problems.
4.	Lata-kasturi	Abelmoschus moschatus	Digestive and any type of stomac complain.
5.	A. Nayantara (pink) B. Nayan-tara (white)	Catharanthus roseus var roseus Catharanthus roseus var alba	Blood sugar, Blood Cancer Blood sugar, Blood sugar, Blood cancer
6.	Kule-khara	Hygrophilla spinosa	Anemia
7.	Dapi-dhupi	Crataeva religiosa	arthritis
8.	Pathar-kuchi	Bryophyllum calycinum	Diahrea, Urinal Problem
9.	Anarash	Ananus comosus	Warm
10.	Mot	Biston betulari	Gas, Stomachache, Jaundice, Constipation
11.	Bonrosun	Scilla indica	Dysmenorrhoea

IV. Some Medicinal Plants not Documented in TKDL according to the Common Medicinal Use in Coochbehar:

Though the medicinal values of some of the medicinal plants of Cooch Behar (see Table Number 1-6) find place as existing knowledge in TKDL, but it is found[11] that they are documented for some other medical properties and not for those which are common house hold knowledge in Cooch Behar. Here is the chart showing those medicinal plants along with their medicinal values.

Table No. 8: The following medicinal plants of Cooch Behar though documented in TKDL for their various medicinal values, but the above documentation is silent on the medicinal values for which these are commonly used in Cooch Behar.

Sl.	COMMON	SCIENTIFIC	CURATIVE EFFECT OR

[11] http://www.tkdl.res.in/tkdl/langdefault/common/TKDL_AdvanceQuery.asp?GL=Eng.

No.	NAME OF THE HERB/PLANT	NOMENCLATURE	MEDICINAL PURPOSE
1.	Kabab-chini	Piper cubeba	Sore throat. Irritable throat.
2.	Shoti	Curcuma zedoaria	Starch-rich food
3.	Aam-aada	Curcuma amada	Loss of apetite.
4.	Arjun	Terminalia arjuna	Cardiac problem
5.	Vishal-anguriya	Gloriosa superba	Artharitis
6.	Kanai-dinga	Oroxylum indicum	Chronic diarrhoea, Dysentery, Pox.
7.	Haar-jora	Cissus quadrangularis	To treat broken bones
8.	Shata-mooli	Asparagus racemosus	Digestive capacity, Gas preventive
9.	Kuchila	Strychnos nuxvomica	Anaesthetical use
10.	Brahmi	Bacopa monnieri	Loss of Memory
11.	Amrul	Oxalis corniculata	decentry
12.	Niltat	Cissampelos pareira	Smallpox
13.	Nishinda	Vitex negundo	High blood pressure
14.	Paat	Corchorus capsularis	fever
15.	Shimul	Bombax ceiba	Menometorrhagia
16.	Sheora	Streblus asper	Puerperal fever
17.	Bakphul	Sesbania grandiflora	Dysmenorrhoea
18.	Koitbel	Limonia acidissima	Leucorrhoea
19.	Vesaza khamalu	Dioscorea composita	Corticosteroids,Sex hormone,Oral contraceptive

TKDL Documentation of the Medicinal Values of the Plants of Cooch Behar

TABLE No. 9: The following are the examples of the TKDL documentation of the medicinal plants of Cooch Behar, the medicinal values as are in common use or in the public domain. TKDL documention shows that the medicinal values of these plants are in the written description form found in various Indian literatures. The verbatim transcriptions of these plants (as is given in Table No. 9) are given in the Appendix. The prior art or existing knowledge regarding these medicinal plants are found through 'advance search' procedure inbuilt in TKDL.

SL. No.	COMMON NAME OF THE HERB/PLANT	SCIENTIFIC NOMENCLATURE	CURATIVE EFFECT OR MEDICINAL PURPOSE
1.	Kalo-megh	Andrographis paniculata	Cough and Cold, Proper Liver Functioning

2.	Pipul	Piper longum	Cough and Cold, obesity
3.	Choi	Piper retrofractum	Cough and Cold related fever, Rheumatism
4.	Horitoki	Terminalia chebula	Indigestion
5.	Aamloki	Phyllanthus emblica	Enhancement of digestive capacity and Vitamin C enriched
6.	Vashak	Adhatoda vasica	Cough and Cold
7.	Danda-kalosh	Leucas aspera	Headache
8.	Kanai-dinga	Oroxylum indicum	Chronic diarrhoea, Dysentery, Liver complaints, Jaundice, Pox
9.	Kutaj	Holarrhena antidysenterica	Blood dysentery and Dysentery
10.	Gulancho	Tinospora cordifolia	Jaundice
11.	Than-kuni	Alstonia scholaris	Decentry, Digestion, Memory Enhancer
12.	Bakul	Mimusops elengi	Teethache
13.	Shefali	Nyctanthes arbour tristis	Kalajwar
14.	Alok-lata	Cuscuta reflexa	Jaundice
15.	Tamak	Nicotiana tabacum	Asthma
16.	Dalim	Punica granatum	Decentry
17.	Sharpa-gandha	Rauvolfia serpentina	High Blood Pressure, Sedative, Sleeplessness
18.	Vesaza khamalu	Dioscorea composita	Corticosteroid, Sex hormone, Oral contraceptive
19.	Khas-ibegun	Solanum khasianum	Steroid
20.	Amal-betas	Rheum australe	For Digestion
21.	Rakto-shapla	Nymphaea rubra	Meno-metorrhoea
22.	Bohera	Terminalia bellirica	Digestive capacity

Some Medicinal Plants of Cooch Behar Whose Medicinal Properties have been Patented in USA

With response to another objective of this research work i.e. to find out some of the instances of misappropriation cases, an attempt was made to find out only some of the patents granted by United States on the common use regarding the medicinal values of some of these plants. Here is the table (below) to show the list of some of those types of patents. The following patent documents were found by searching websites of United States Patent & Trademark Office and FREEPATENTONLINE.

TABLE No. 10: The following are some instances of patents granted by USPTO over which there is traditional knowledge associated with medicinal plants of Cooch Behar.

SL. NO.	PATENT NUMBER & ABSTRACT	DATE OF PATENT , INVENTOR	TITLE	MEDICINAL PLANT AND ITS CURATIVE EFFECT
1.	US 8,372,452 An oral herbal composition comprising a therapeutically effective amount of an extract derived from the berries of a plant, **Piper cubeba**, wherein the composition is provided for use in the treatment of oral candidiasis (oral thrush)[12].	12TH FEB, 2013 (1). V.S. Chauhan and (2). K.S.Slakar	ORAL HERBAL COMPOSITION FOR THE TREATMENT OF ORAL CANDIDIASIS	PIPER CUBEBA-(Kabab chini) Sore Throat or Irritable throat
2.	US 7,438, 932 The invention provides a method for treating stomach discomfort, stomachache, intestinal discomfort, gastric ulcer, duodenal ulcer or diarrhea by administration of extracts of **Asparagus racemosus**, Utleria solicifolia, Foeniculum vulgare and Ficus glomerata[13].	21ST OCT, 2008 (1). P Palpu (2). R.Venkateswara	METHOD FOR TREATING STOMACH ULCERS WITH HERBAL EXTRACT COMPOSITION	ASPARAGUS RACEMOSUS-(Shatamuli)-Digestive capacity and Gas preventive
3.	US 6,162,438 Edible herbal compositions for use as agents for the control of hypertension, hypercholesterolemia and hyperlipidemia in mammals. The edible composition is a mixture of at least three, preferably at least six herbs selected from the group consisting of **Terminalia arjuna**, Cynara scolymus, Zingibar officinale, Allium sativum, Crataegus oxycantha, Curcuma longa,	19TH DEC, 2000 (1). Onkar Tomer (2). Peter Glomski	HERBAL COMPOSITION AND THEIR USE AS AGENTS FOR CONTROL OF HYPERTENSION, HYPERCHOLESTEROLEMIA AND HYPERLIPIDEMIA	TERMINALIA ARJUNA-(Arjun)-Cardiac problem

[12] http://www.freepatentsonline.com/US8372452.pdf.visited on 12th February, 2013 at 11.30 PM.
[13] http://www.freepatentsonline.com/US7438 932.pdf. visited on 13th February, 2013 at 1 AM.

	Boerhaavia diffusa and Trigonella foenumgraecum[14].			
4.	US 5,529,778 An ayurvedic composition for prophylaxis and treatment of AIDS, flu, TB and other immuno-deficiency conditions and for liver diseases such as hepatitis and sclerosis etc, The first multi-component drug LIVZON consists of **Terminalia belerica,** Phyllanthus niruri, Tinospora cordifolia, Phyllanthus emblica, Terminalia chebula[15].	25TH JUNE, 1996 (1). Surendra Rohatgi	AYURVEDIC COMPOSITION FOR THE PROPHYLAXIS AND TREATMENT OF AIDS, FLU, TB, AND OTHER IMMUNO-DEFICIENCIES AND THE PROCESS FOR PREPARING THE SAME	Terminalia belerica (Bohera)-Digestive capacity
5.	US 6,759,061 A food supplement formulation effective to inprove the function of the liver comprises **Andrographis paniculata**, selenium, milk thistle seed, phosphatidyl choline, dandelion root, 1-methionine, 1-taurine, N-acetyl-cysteine, alpha lipoic arid, artichoke leaf, green tea leaf, turmeric root, belleric myrobalan fruit, boerhavia diffusa, eclipta alba, wedelolactones tinospora cordifolia, and picrorhiza kurroa[16].	6Th JULY, 2004 (1). Brenda F. Watson (2). Leonard. O. Smith	LIVER FUNCTION IMPROVEMENT FORMULATION	Andrographis paniculata (Kalomegh)-Proper Liver Functioning
6.	US 8,431,167 Plant extracts compositions comprising extracts of **Phyllanthus emblica,** Curcuma longa and Gymnosporea Montana and at least a carrier. The compositions can be used to treat liver dysfunction[17].	30Th April, 2013 Mukesh H.Shukla	PLANT EXTRACTS COMPOSITION FOR THE TREATMENT OF LIVER DYSFUNCTION -JAUNDICE	Phyllanthus emblica (Amloki)-Enhancement of digestive capacity

[14] http://www.freepatentsonline.com/US6162438.pdf. Visited on 22nd February, 2013 at 6.45 PM.
[15] http://www.freepatentsonline.com/US5529778.pdf. Visited on 22nd February 2013 at 7.30 PM.
[16] http:// www.freepatentsonline.com/US6759061B2.pdf. Visited on 2nd March, 2013 at 9.15 AM.
[17]http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-

V. An Analysis and Concluding Comment:

The Traditional Knowledge Digital Library (TKDL) documents give information regarding the written descriptions (ancient and modern) of existing traditional knowledge along with their medicinal values as are in common use or in public domain in Cooch Behar. It is found that many medicinal plants of Cooch Behar (see Table No. 1-6) are not documented in TKDL (see Table No.7) and also all the medicinal values of these plants are also not recorded. This means that TKDL documentation process is not complete. In a biorich country like India, little is done, vast remains to be done. The goal is very far away considering the slothness of the process. This also means that the undocumented medicinal herbs and plants are vulnerable to biopiracy till such time they find a place on the traditional Knowledge Digital Library. As a result, the traditional knowledge can be claimed (in fact it is being claimed) by others as their invented knowledge-novel, non-obvious and patents could be obtained and there remains no scope to challenge these patents. As a result, India would be loosing its due share in the profit accruing from the commercialisation of its traditional intellectual property by others. Hence, it is suggested that as early as possible documentation of all traditional knowledge associated with medicinal plants, must be completed. TKDL should compile all the traditional knowledge documents from every corner of this country. A little delay will cost the country dearly and the time is running out.

It is also observed that most of the medicinal plants of Cooch Behar (see Table No. 1-6) associated with traditional knowledge, which people of this region have been applying for different treatment purposes, do not have any written description in any book or in any other printed material. The disadvantage of this situation is that the

TKDL basically deals with only the documented traditional knowledge in medicinal plants. In the absence of such documentation, the traditional knowledge gets relegated to the realm of indigenous knowledge of the community to be passed on from generation to generation. Such a situation only raises the vulnerability of these plants for bio-piracy and also extends an invitation for the foreign element to carry on research ans claim an Intellectual Property regime protection. When people around the world are fighiting to

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protect this huge informal knowledge of medicinal plants as part of intellectual property system or as a seperate 'sui-generis' system and EPC countries have already recognised this knowledge as 'prior art', there is no justification not to include this knowledge for documentation. But as the traditional knowledge of medicinal plants of Cooch Behar does not have those written descriptions, naturally this common knowledge either held by the community or some selected people, are out of the reach of TKDL. Therefore, it is also suggested that TKDL should look into the matter and takes up for documenmtation of those traditional knowledge over which there is public use in the society about the use of the medicinal plants. It is strongly recommended that the second phase of TKDL documentation starts the process of documentation of oral description related traditional knowledge. It means that informal knowledge has also to be documented. Otherwise, this treasure of vast knowledge either would be lost one day or it would be misappropriated by the developed countries in the name of their invention-as a matter of novelty or non-obviousness. A thorough micro-survey should be initiated to find out all unwritten informal common traditional knowledge from every corner of this country including Cooch Behar. It is also advised that before documentation, there is a need to prove and confirm the medicinal values of those plants in the state-of-the-art laboratory by identifying the active ingredients or bio-chemical components, gene structure etc., and singling out that bio-chemical component responsible to cure the particular disease. So that it will have scientific base in a better way and satisfy the requirements of the developed countries to ensure novelty and non-obviousness.

The finding reveals that there are village kabirajs i.e. ayurvedic practitioners, who do not want to disclose their knowledge. They have been using those medicinal plants for different types of diseases since generations after generations but keeping this knowledge very secretly only within their family members or within close confidants, who do not disclose to others. It is absolutely impossible to get information from them. They religiously maintain this secrecy. They are under a fear that if it is disclosed, it would be misappropriated by others. Take for example; Nishiganj village of Cooch Behar is very famous as being the centre to treat broken bones. Thousands of people come from different parts of the state for this purpose. There are a dozen of Kabiraj i.e. medical practitioners; basically the lineal descendants of 'Mushuri Vaidya' and his deciples treat the people with broken bones. They use some medicinal plants, either leaef or root or bark or flower, no one knows that. The

combinations of the parts or whole of the medicinal plants and method of preparing the herbal medicine are still not known. The researcher after a painstaking effort of several years got the information of one medicinal plant i.e Boneset (Cissus quadrangularis) which is used as one important (probably the main element) item to treat broken bones. It has an inherent miraculous medicinal property to re-set the broken bones. But how the herbal medicine is prepared or what are the combinations of other things and quantity of all the ingredients is under mistry. But finding this information is good achievement because it can be the beginning to find some other important plant elements of that medicine. There have to be some special packages to entice and encourage these knowledge holders to transfer their knowledge for further research and development which not only will benefit the whole mankind but also can document the knowledge to protect it strongly from bio-piracy. But at present there is no initiative from the part of the government to offer such types of special packages. Moreover, there has to be massive awareness campaign to dispel the fear from their minds. If this policy of special packages and awareness campaign are not launched, this vast knowledge will remain unaccessible for India. One day the rich foreign multi-national corporations would come, approach them with huge amount of money and take the knowledge from them. They will do clinical trials on these medicinal plants and confirm the established facts of their intrinsic medicinal values. Then this knowledge would be their intellectual property and India has to bite the dusts in the air.

It is found out that some plants have become endangered species. If immediately in-situ or ex-situ preservation measures are not taken, very soon these plants will disappear and required quantity will for research and preparation of medicine not be available as per demand. Take for example Kutaj-Holarrhena antidysenterica. This plant is grown basically in Cooch Behar[18]. This plant with immense medicinal values will become extinct. It would be a great loss for the society and the country.

Another important finding shows that the traditional and common practices of applying any medicinal plant, either its bark or root or stem or leaf or flower or seed etc., to treat some diseases or to keep the health good, are not clinically tested in modern scientific laboratory by the researchers of various educational institutions. This is one of the serious drawbacks of the research institutes in this region. Had there been clinical trials to establish

[18] As was told to the researcher by Dr. Tuhin Sensharma, Government Ayurvediya Databya Chikitshalaya, Debattar Trust Board, Post & Dist-Cooch Behar, West Bengal.

and confirm their medicinal values, by maping their genetic structures, by finding and analysing the bio-chemical components of their genes, DNA etc., these would have been the basis of systematic documentation according to the national or international norms by the TKDL itself. These results of the clinical trials would have been accepted and recognised by the foreign patent offices as conclusive proofs of 'prior art' i.e. existing knowledge and would have been considered before granting patents in their countries as well. Moreover, there is no such systematic study from the preliminary level upto documentation on each and every species of a particular medicinal plant, where a group is assigned to do the work with complete devotion only for one particular plant, in a very organised and institutionalised way. Hence, TKDL should take-up another project accordingly for further research in the above-mentioned way.

It is also found out that though some of the medicinal plants grown in Cooch Behar or used as medicinal plants (either its bark or leaf or root or seed etc.) by the people of this district (see Table No. 1-6), find place in Traditional Knowledge Digital Library (TKDL) but the medicinal values of those plants for which they are used and applied to treat diseases, are not mentioned in the TKDL documentation (see Table No. 8) Though those medicinal plants are documented in TKDL along with the descriptions of the names of diseases under the heading of "Useful in the Treatment of following Diseases" but the treatment of diseases i.e. the purpose for which the people use them, the names of those diseases are not mentioned over there. These medicinal plants are documented for the purpose to treat other deseases. This finding shows that these medicinal plants or their genetic resourses still have some other important medicinal properties or have the capacity to treat some other diseases which still remain unexplored and not researched. This fact brings to the fore the urgent necessasity to start and pursue research on these medicinal plants.

The shabby experience regarding failed neem battle in US shows another lacuna in the TKDL documentation which is equally true to the existing traditional knowledge on herbal medicine of Cooch Behar; there the patent was not on the particular medicinal value, as the invention claimed to be fulfilling the criterion of novelty and non-obviousness, rather the patent was on process to prepare a pesticide from the neem seed extracts as an invention fulfilling the above-mentioned criterion. As TKDL does not document the process of making the ayurvedic medicines and related products, all the processes of preparing of the medicines and related items remain vulnerable and defenceless in India and elsewhere and prone to be

bio-pirated or misappropriated. In this particular case, TKDL documentation of prior art regarding medicinal values of neem was also of no use in US. The traditional knowledge associated with medicinal plants of Cooch Behar is faced with same type of difficulty and lack of protection. What matters most is the method of preparation of the herbal medicine. The method of preparation is also important to ensure the herbal medicine works properly-method of preparation sometimes preserves the medicinal value of the plant or sometimes ensures its efficacy. Much of the curative effect of the medicine depends largely on the method of preparation. This knowledge should not be lost and not to be thrown to the global bio-pirators. Hence, it is strongly recommended that TKDL should start the process for process documentation i.e. the method and manner of preparing of ayurvedic medicines.

Regarding the US patents granted on the medicinal values of plants, commonly used in Cooch Behar (documented or non-documented), the list (see Table No. 10) is not exhaustive but illustrative in nature. There might be many more such instances of patents granted by other developed countries. The list is just the tip of the icebarg. The list of some patents (see Table No. 10) on the known medicinal values, just conveys to the stakeholders i.e. the holders of the traditional knowledge associated with medicinal plants either the country or the society that misappropriation is taking place and the danger of bio-piracy is looming large over the medicinal plants of Cooch Behar. The traditional knowledge remains vulnerable and could be easily misappropriated. In spite of that, there is existing traditional knowledge in Cooch Behar associated with some of those medicinal plants, patents have been granted by United States Patent and Trademark Office (USPTO). The chart is the indicater of this unfortunate trend and examples where the medicinal values of those plants are claimed to be novel and non-obvious by the others by denying the fact that these are in public domain and part of existing knowledge. Unless preventive, precautionary, defensive or offensive actions are not taken, all the traditional knowledge are going to be robbed very soon and “we” the people of Cooch Behar and larger society of India will not get their due share in the profit arising out of the commercialisation of society’s intellectual property i.e. traditional knowledge.