

## MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made on this 10 day of April 2015 (10.04.2015).

Between

INDIAN COUNCIL OF MEDICAL RESEARCH, a Government of India undertaking body having its registered office at P.O. Box No. 4911, Ansari Nagar, New Delhi – 110029, represented by its Scientist G and Head, Dr. Neeraj Tandon (here in after referred to as ICMR)

And

PHARMACOPOEIA COMMISSION FOR INDIAN MEDICINE & HOMOEOPATHY, an autonomous organization under the Ministry of AYUSH, Government of India, having its registered address at PLIM Campus, (Opp. 'M' Block, Sector 23) Kamla Nehru Nagar, Ghaziabad-201002 (U.P.) represented by its Director, Dr. Rajeev Kr. Sharma (here in after referred to as "PCIM&H")

WHEREAS ICMR is the apex body in India for formulation, coordination and promotion of biomedical research

AND WHEREAS PCIM&H is an umbrella organization for Ayurvedic Pharmacopoeia Committee (APC), Siddha Pharmacopoeia Committee (SPC), Unani Pharmacopoeia Committee (UPC) and Homoeopathy Pharmacopoeia Committee (HPC) with an objective of development, publication and revision of the Ayurvedic, Siddha, Unani and Homoeopathy Pharmacopoeia of India.

AND WHEREAS ICMR is willing to provide certain scientific documents and phytocompounds to PCIM&H.

AND WHEREAS ICMR has an intention to transfer the isolated phytocompounds to PCIM&H on certain terms and conditions:

NOW THEREFORE, THE PARTIES WITH AN INTENTION OF BOTH BEING LEGALLY BOUND HAVE ACCEPTED THE FOLLOWING TERMS AND CONDITIONS AND HAVE A COMMON INTENT TOWARDS ENSURING PROPER USAGE OF THE PHYTOCOMPOUNDS AND THE ASSOCIATED SCIENTIFIC DATA:

### 1. OBJECT:

The main object of this MoU is to secure the isolated phytocompounds and associated scientific data in such a manner that facilitates their appropriate usage towards development of Pharmacopoeial standards and other research of national importance.

## 2. OBLIGATIONS OF PCIM&H:

- 2.1 The isolated phytochemicals that are being transferred from ICMR to PCIM&H are meant only for further research work at PCIM&H and they are not meant for any commercial use. PCIM&H shall not sell this original stock of phytochemicals for any direct or indirect commercial gains.
- 2.2 Under the advice of ICMR, the participating laboratories which have generated these isolated phytochemicals, the optimum storage conditions for each phytochemical has been clearly mentioned in the accompanying Certificates of Analysis and / or the labels at Annexure 1. PCIM&H shall exercise utmost care to store these phytochemicals as per these recommendations.
- 2.3 For each phytochemical ICMR has got the participating laboratories to compile all the relevant spectroscopic data as hard copies provided herein as Annexure 2. PCIM&H shall systematically store and preserve this spectral data for future use.
- 2.4 These isolated phytochemicals can be used as 'Phytochemical Reference Standards' for developing analytical monographs of medicinal plants, their extracts and other value added products. They can also be used for guiding the generation of larger quantities for future Pharmacopoeial use. Normally such isolated phytochemicals have a shelf life of 2 years when stored as per the recommended conditions. After this period the analysts of PCIM&H should re-check the percentage purity prior to any use. Many of these compounds are likely to be stable for several years.
- 2.5 The method of isolation, purification and characterization of these compounds has been published by ICMR in its book series titled "Phytochemical Reference Standards of selected Indian Medicinal Plants, Vol 1 to 3". PCIM&H can refer to these methods for generating larger quantities in future.
- 2.6 ICMR is not in a position to provide any further quantities of these phytochemicals in future and thus PCIM&H should make adequate arrangements to generate further quantities to support pharmacopoeial work ahead of the expiry period of these phytochemicals. ICMR cannot be held responsible for any reasons whatsoever if the isolated compounds are not treated as per the recommendations and lose their percentage purity.
- 2.7 PCIM&H shall provide due recognition to ICMR for this contribution wherever applicable.

## 3. DURATION OF THE MoU / TERMINATION:

- 3.1 This MoU commences on 10.04.2015 and shall remain valid upto 09.04.2017 for a period of 2 years unless terminated earlier as provided herein below.

3.2 This MoU can be terminated by either party by providing thirty (30) days notice of termination even during the subsistence of this MoU.

3.3 ICMR has the right to terminate this MoU without any prior notice and with immediate effect if essential provisions of the MoU are violated by PCIM&H and despite written notification the default is not remedied immediately.

#### 4 CONFIDENTIALITY:

During the term of this MoU, PCIM&H shall keep strictly confidential, any and all of, the technical information, including the knowhow except the information which has been published and brought into the public domain.

#### 5 PROPERTY RIGHTS

5.1 There are no intellectual property rights associated with the transfer of the isolated phytocompounds and the associated spectral data.

#### 6 MISCELLANEOUS

##### 6.1 ASSIGNMENT OF RIGHTS AND OBLIGATIONS OF THE MoU:

PCIM&H shall not assign nor transfer this MoU or part of this MoU or any rights or obligations there under to or for the benefit of any third party without the prior written consent from ICMR, any assignment without such consent shall be null and void.

##### 6.2 NON WAIVER:

The waiver or failure of either Party to exercise in any respect any right provided for in this MoU shall not be deemed a waiver of any further right under this MoU.

##### 6.3 SEVERABILITY:

If any provision of this MoU is deemed or held by a court of competent jurisdiction, to be contrary to law or otherwise unenforceable, it shall be enforced to the extent legally permissible and as necessary to reflect the intent of the Parties and shall not affect the remaining of this MoU, which shall remain in full force and effect.

##### 6.4 JURISDICTION:

This MoU shall be governed by and interpreted in accordance with the laws of India and any disputes under this MoU shall be subject to the exclusive jurisdiction and venue of the courts of India.

6.5 ENTIRE MoU:

This MoU represents the entire agreement and understanding between the Parties with respect to the subject matter herein and supercedes all prior agreements and understandings and writings of any kind, written or oral, express or implied, with respect to the subject matter hereof.

6.6 AMENDMENTS

No amendment or modification of this MoU shall be valid unless the same is made through a written instrument duly signed by both parties, and their authorized representatives, and stating the same to be an amendment of this agreement. The amendments shall be effective from the date on which they are executed unless otherwise agreed to.

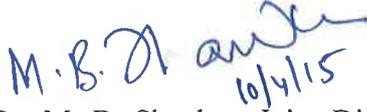
IN WITNESS WHEREOF THE PARTIES HAVE SIGNED THIS MEMORANDUM OF UNDERSTANDING OF THE DAY, MONTH AND YEAR FIRST HEREIN ABOVE MENTIONED

For and on behalf of

For and on behalf of

<p>Indian Council of Medicinal Research</p>  <p>Name : Dr Neeraj Tandon Designation: Scientist G and Head, Indian Council of Medical Research New Delhi – 110029</p>	<p>Pharmacopoeia Commission for Indian Medicine &amp; Homoeopathy.</p>  <p>Name : Dr. Rajeev Kr. Sharma Designation: Director, Pharmacopoeial Laboratory for Indian Medicine, Ghaziabad</p>
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WITNESS

<p>1. Signature:</p>  <p>Name: Dr. Satyapal Singh Yadav, Scientist C, Medicinal Plants Division, Indian Council of Medical Research, New Delhi - 110029</p>	<p>2. Signature:</p>  <p>Name: Dr. M. B. Shankar, Joint Director, Pharmacopoeial Commission for Indian Medicine &amp; Homoeopathy, PLIM Campus, Ghaziabad – 201002 (U.P.)</p>
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## Annexure 1

### List of 120 Phytochemical Reference Standards

S. No.	Marker	Plant Name
1.	1'-Acetoxychavicol acetate	<i>Alpinia galanga</i>
2.	3-O-Acetyl- $\beta$ - boswellic acid	<i>Boswellia serrata</i>
3.	Adifoline	<i>Halkina cordifolia</i>
4.	Agnuside	<i>Vitex negundo</i>
5.	Alizarin	<i>Rubia cordifolia</i>
6.	Aloin	<i>Aloe ferox</i>
7.	Amarogentin	<i>Swertia chirayita</i>
8.	Andrograpanin	<i>Andrographis paniculata</i>
9.	Arjunetin	<i>Terminalia arjuna</i>
10.	Arjungenin	<i>Terminalia arjuna</i>
11.	$\alpha$ -Asarone	<i>Acorus calamus</i>
12.	Asclepin	<i>Asclepias curassavica</i> L.
13.	Asiatic acid	<i>Centella asiatica</i> L.
14.	Asiaticosidex	<i>Centella asiatica</i>
15.	Bacopaside X	<i>Bacopa monnieri</i>
16.	Bacopoaside I	<i>Bacopa monnieri</i>
17.	Bacoside-A3	<i>Bacopa monnieri</i>
18.	Bacosine	<i>Bacopa monnieri</i>
19.	Bassic acid	<i>Mimusops elengi</i>
20.	Bergapten	<i>Ficus religiosa</i>
21.	Betaine	<i>Achyranthes aspera</i> L.
22.	Betulin	<i>Symplocos racemosa</i>
23.	Boeravinone-B	<i>Boerhaavia diffusa</i>
24.	$\alpha$ -Boswellic acid	<i>Boswellia serrata</i>
25.	$\beta$ -Boswellic acid	<i>Boswellia serrata</i>
26.	Cajanol	<i>Cajamis cejan</i>
27.	Capsaicin	<i>Capsicum annum</i> L.
28.	Carvone	<i>Nigella sativa</i>
29.	Catechin-5-O-gallate	<i>Acacia nilotica</i>
30.	Cedrol	<i>Cedrus deodara</i>
31.	Chebulagic acid	<i>Terminalia chebula</i>
32.	Chebulinic acid	<i>Terminalia chebula</i>
33.	Cirsilineol	<i>Ocimum tenuiflorum</i>
34.	Colchicine	<i>Iphigenia indica</i>
35.	Corilagin	<i>Phyllanthus amarus</i>
36.	Corosolic acid	<i>Lagerstroemia speciosa</i>

37.	Curcumin	<i>Curcuma aromatica</i>
38.	2',3'-dehydrosallanol	<i>Azadirchta indica</i>
39.	Demethoxycurcumin	<i>Curcuma longa</i>
40.	1,9-Dideoxyforskolin	<i>Coleus forskohlii</i>
41.	3,3'-Di-O-methyl ellagic acid-4'-O- $\beta$ -D-xylopyranoside	<i>Terminalia bellirica</i>
42.	Diosgenin	<i>Dioscorea bulbifera</i>
43.	Echinocystic acid	<i>Albizia lebbek L.</i>
44.	Eclalbosaponin I	<i>Eclipta prostrata</i>
45.	Ellagic acid	<i>Terminalia bellirica</i>
46.	Embelin	<i>Embelia ribes</i>
47.	Emodin	<i>Cassia occidentalis</i>
48.	Epigallocatechin gallate	<i>Camellia sinensis</i>
49.	Ethyl p-methoxycinnamate	<i>Hedychium spicatum</i>
50.	Eugenol	<i>Anethum sowa</i>
51.	Eupaitin-3-O-beta -D-galactoside	<i>Boerhaavia diffusa</i>
52.	d-Fenchone	<i>Foeniculum vulgare</i>
53.	Ferulic acid	<i>Ferula asafoetida</i>
54.	Galangin / 3-methyl galangin	<i>Alpinia galanga</i>
55.	Gardenin A	<i>Gardenia gummifera</i>
56.	Genistein	<i>Ougenia oojeinensis</i>
57.	Gentianine	<i>Enicostema littorale</i>
58.	Geraniol	<i>Cymbopogon species</i>
59.	6-Gingerol	<i>Zingiber officinalis</i>
60.	10-Gingerol	<i>Zingiber officinale</i>
61.	Glabridin	<i>Glycyrrhiza glabra</i>
62.	$\beta$ -Glucogallin	<i>Emblica officinalis</i>
63.	Guggulsterone E	<i>Commiphora mukul</i>
64.	Guggulsterone Z	<i>Commiphora mukul</i>
65.	Gymnemagenin	<i>Gymnema sylvestre</i>
66.	Harmaline	<i>Peganum harmala</i>
67.	Hayatin	<i>Cissampelos pareira L.</i>
68.	Hecogenin	<i>Woodfordia fruticosa</i>
69.	Hederagenin	<i>Mimusops elengi L.</i>
70.	Hesperidin	<i>Citrus aurantium L.</i>
71.	Hexahydrocurcumin	<i>Curcuma longa</i>
72.	Hypophyllanthin	<i>Phyllanthus amarus</i>
73.	Imperatorin (Marmelosin)	<i>Aegle marmelos</i>
74.	Indican	<i>Indigofera tinctoria</i>
75.	Jasmone	<i>Jaminum aruiculatum</i>

76.	Karanjin	<i>Pongamia pinnata</i>
77.	Koenimbine	<i>Murraya koenigii</i>
78.	Lupeol	<i>Creteva nurbala</i>
79.	Mahanimbine	<i>Murraya koenigii</i>
80.	Malkanguniol /celastrine	<i>Celastrus paniculatus</i>
81.	Maslinic acid	<i>Ziziphus jujuba</i>
82.	Naringin	<i>Citrus sinensis</i> L.
83.	Negundoside	<i>Vitex negundo</i>
84.	Neoandrographolide	<i>Andrographis paniculata</i>
85.	Neriifolin	<i>Thevetia peruviana</i>
86.	Nimbin	<i>Azadirachta indica</i>
87.	Norepinephrine	<i>Portulaea oleracea</i>
88.	Oleanolic acid	<i>Ocimum sanctum</i>
89.	Palasonin	<i>Butea monsperma</i>
90.	Parkinsonin-A or B	<i>Parkinsonia aculeata</i>
91.	Picoside II	<i>Picrorrhiza kurrooa</i>
92.	Piperylene	<i>Piper nigrum</i>
93.	Proscillaridin A	<i>Drimia indica</i>
94.	Protopine	<i>Fumaria vaillantii</i>
95.	Pseudopelletierine	<i>Punica granatum</i>
96.	Psoralen	<i>Psoralea corylifolia</i>
97.	Pulegone	<i>Lavandula bipinnata</i>
98.	Purpurin	<i>Rubia cordifolia</i>
99.	Randialic acid B	<i>Catunaregan spinosa</i>
100.	Rebaudioside –A	<i>Stevia rebaudiana</i>
101.	Rosmarinic acid	<i>Ocimum tenuiflorum</i>
102.	Rutin	<i>Ruta chalepensis</i>
103.	$\alpha$ -Santonin	<i>Artemisia nilagirica</i>
104.	Scopoletin	<i>Evolvulus alsinoides</i>
105.	Serratol	<i>Boswellia serrata</i>
106.	Shatavarin IV	<i>Asparagus racemosus</i>
107.	6-Shogaol	<i>Zingiber officinalis</i>
108.	Swertiamarin	<i>Swertia chirayita</i>
109.	Taraxerol	<i>Chitoria ternatea</i>
110.	Tecoside / Tecomelline	<i>Tecomella undulata</i>
111.	N, N, N', N'- Tetramethylhorrhimine	<i>Holarrhena pubscens</i>
112.	Tribulosin	<i>Tribulus terrestris</i>
113.	Trigonelline Hydrochloride	<i>Trigonella foenum-graecum</i>
114.	ar-Turmerone	<i>Curcuma longa</i>

115.	Valerenic acid	<i>Valeriana officinalis</i> L.
116.	Vicine	<i>Momordica charantia</i>
117.	Vocangine	<i>Ervatamia divaricata</i> L.
118.	Withanolide-A	<i>Withania somnifera</i>
119.	Withanoside IV	<i>Withania somnifera</i>
120.	Xanthinin	<i>Xanthium strumarium</i>

## Annexure 2

## Spectroscopic Data

S. No.	Marker	Plant Name
1.	Adifoline	<i>Halkina cordifolia</i>
2.	Agnuside	<i>Vitex negundo</i>
3.	Alizarin	<i>Rubia cordifolia</i>
4.	Aloin	<i>Aloe ferox</i>
5.	Amarogentin	<i>Swertia chirayita</i>
6.	Arjunetin	<i>Terminalia arjuna</i>
7.	Arjungenin	<i>Terminalia arjuna</i>
8.	$\alpha$ -Asarone	<i>Acorus calamus</i>
9.	Asclepin	<i>Asclepias curassavica</i> L.
10.	Asiatic acid	<i>Centella asiatica</i> L.
11.	Bacopaside X	<i>Bacopa monnieri</i>
12.	Bacopoaside I	<i>Bacopa monnieri</i>
13.	Bacoside-A3	<i>Bacopa monnieri</i>
14.	Bacosine	<i>Bacopa monnieri</i>
15.	Bassic acid	<i>Mimusops elengi</i>
16.	Bergapten	<i>Ficus religiosa</i>
17.	Betaine	<i>Achyranthes aspera</i> L.
18.	Betulin	<i>Symplocos racemosa</i>
19.	Boeravinone-B	<i>Boerhaavia diffusa</i>
20.	$\alpha$ -Boswellic acid	<i>Boswellia serrata</i>
21.	$\beta$ -Boswellic acid	<i>Boswellia serrata</i>
22.	Cajanol	<i>Cajamis cejan</i>
23.	Capsaicin	<i>Capsicum annum</i> L.
24.	Carvone	<i>Nigella sativa</i>
25.	Cedrol	<i>Cedrus deodara</i>
26.	Chebulinic acid	<i>Terminalia chebula</i>
27.	Cirsilineol	<i>Ocimum tenuiflorum</i>
28.	Colchicine	<i>Iphigenia indica</i>
29.	Corilagin	<i>Phyllanthus amarus</i>
30.	Corosolic acid	<i>Lagerstroemia speciosa</i>
31.	Curcumin	<i>Curcuma aromatica</i>
32.	2',3'-dehydrosallanol	<i>Azadirchta indica</i>
33.	Demethoxycurcumin	<i>Curcuma longa</i>
34.	Diosgenin	<i>Dioscorea bulbifera</i>
35.	Echinocystic acid	<i>Albizia lebbeck</i> L.
36.	Ellagic acid	<i>Terminalia bellirica</i>
37.	Emodin	<i>Cassia occidentalis</i>

38.	Epigallocatechin -3-O-gallate	<i>Camellia sinensis</i>
39.	Eugenol	<i>Anethum sowa</i>
40.	d-Fenchone	<i>Foeniculum vulgare</i>
41.	Ferulic acid	<i>Ferula asafoetida</i>
42.	Galangin	<i>Alpinia galanga</i>
43.	Gardenin A	<i>Gardenia gummifera</i>
44.	Genistein	<i>Ougenia oojeinensis</i>
45.	Gentianine	<i>Enicostema littorale</i>
46.	6-Gingerol	<i>Zingiber officinalis</i>
47.	Gymnemagenin	<i>Gymnema sylvestre</i>
48.	Harmaline	<i>Peganum harmala</i>
49.	Hayatin	<i>Cissampelos pareira</i> L.
50.	Hecogenin	<i>Woodfordia fruticosa</i>
51.	Hederagenin	<i>Mimusops elengi</i> L.
52.	Hesperidin	<i>Citrus aurantium</i> L.
53.	Hexahydrocurcumin	<i>Curcuma longa</i>
54.	Hypophyllanthin	<i>Phyllanthus amarus</i>
55.	Imperatorin (Marmelosin)	<i>Aegle marmelos</i>
56.	Indican	<i>Indigofera tinctoria</i>
57.	Jasmone	<i>Jaminum aruiculatum</i>
58.	Karanjin	<i>Pongamia pinnata</i>
59.	Mahanimbine	<i>Murraya koenigii</i>
60.	Malkanguniol	<i>Celastrus paniculatus</i>
61.	Maslinic acid	<i>Ziziphus jujuba</i>
62.	Naringin	<i>Citrus sinensis</i> L.
63.	Neoandrographolide	<i>Andrographis paniculata</i>
64.	Neriifolin	<i>Thevetia peruviana</i>
65.	Nimbin	<i>Azadirachta indica</i>
66.	Norepinephrine	<i>Portulaea oleracea</i>
67.	Palasonin	<i>Butea monsperma</i>
68.	Parkinsonin-A	<i>Parkinsonia aculeata</i>
69.	Picroside II	<i>Picrorrhiza kurrooa</i>
70.	Proscillaridin A	<i>Drimia indica</i>
71.	Protopine	<i>Fumaria vaillantii</i>
72.	Pseudopelletierine	<i>Punica granatum</i>
73.	Pulegone	<i>Lavandula bipinnata</i>
74.	Purpurin	<i>Rubia cordifolia</i>
75.	Randialic acid B	<i>Catunaregan spinosa</i>
76.	Rebaudioside -A	<i>Stevia rebaudiana</i>
77.	Rutin	<i>Ruta chalepensis</i>
78.	$\alpha$ -Santonin	<i>Artemisia nilagirica</i>

79.	Scopoletin	<i>Evolvulus alsinoides</i>
80.	6-Shogaol	<i>Zingiber officinalis</i>
81.	Swertiamarin	<i>Swertia chirayita</i>
82.	Taraxerol	<i>Chitoria ternatea</i>
83.	Tecoside	<i>Tecomella undulata</i>
84.	N, N, N', N'- Tetramethylhorrhimine	<i>Holarrhena pubscens</i>
85.	Trigonelline Hydrochloride	<i>Trigonella foenum-graecum</i>
86.	Valerenic acid	<i>Valeriana officinalis</i> L.
87.	Voacangine	<i>Ervatamia divaricata</i> L.
88.	Withanolide-A	<i>Withania somnifera</i>
89.	Withanoside IV	<i>Withania somnifera</i>
90.	Xanthinin	<i>Xanthium strumarium</i>

## Volume 4

1.	1'-Acetoxy chavicol acetate	<i>Alpinia galanga</i>
2.	3-O-Acetyl- $\beta$ - boswellic acid	<i>Boswellia serrata</i>
3.	Andrograpanin	<i>Andrographis paniculata</i>
4.	Asiaticoside	<i>Centella asiatica</i>
5.	Catechin-5-O-gallate	<i>Acacia nilotica</i>
6.	Chebulagic acid	<i>Terminalia chebula</i>
7.	1,9-Dideoxyforskolin	<i>Coleus forskohlii</i>
8.	3,3'-Di-O-methyl ellagic acid-4'-O- $\beta$ -D-xylopyranoside	<i>Terminalia bellirica</i>
9.	Eclalbosaponin I	<i>Eclipta prostrata</i>
10.	Embelin	<i>Embelia ribes</i>
11.	Ethyl <i>p</i> -methoxycinnamate	<i>Hedychium spicatum</i>
12.	Eupalitin-3-O-beta-D-galactopyranoside	<i>Boerhaavia diffusa</i>
13.	Geraniol	<i>Cymbopogon martini</i>
14.	10-Gingerol	<i>Zingiber officinale</i>
15.	Glabridin	<i>Glycyrrhiza glabra</i>
16.	$\beta$ -Glucogallin	<i>Emblica officinalis</i>
17.	Guggulsterone E	<i>Commiphora wightii</i>
18.	Guggulsterone Z	<i>Commiphora wightii</i>
19.	Koenimbine	<i>Murayya koenigii</i>
20.	Lupeol	<i>Creteva nurbala</i>
21.	Negundoside	<i>Vitex negundo</i>
22.	Oleanolic acid	<i>Ocimum sanctum</i>
23.	Piperlyline	<i>Piper nigrum</i>
24.	Psoralen	<i>Psoralea corylifolia</i>
25.	Rosmarinic acid	<i>Ocimum tenuiflorum</i>
26.	Serratol	<i>Boswellia serrata</i>
27.	Shatavarin IV	<i>Asparagus racemosus</i>
28.	Tribulosin	<i>Tribulus terrestris</i>
29.	ar-Turmerone	<i>Curcuma longa</i> L.
30.	Vicine	<i>Momordica charantia</i> L.



