ABSTRACT:
Uncertainty in Ayurveda is reflected in the interpretation of names and description of drugs found in the ancient treatises like Charaka Samhita, Susrutha Samhita, etc. Ayurvedic treatises were also handwritten before the establishment of British rule, by a handful of dedicated workers who believed that Ayurveda is built by the rationale of observation, experiment, induction and deduction. Due to lack of scientific names in the original texts, under one name, different plants are known in different parts of the country as per the description, which makes the drug controversial. These controversies lead to decline in the quality and standards of the ayurvedic compound preparations. Maharasa group of drugs explained in the various Rasashastra textbooks are said to be most nearer to Parada (Mercury). These are used in variouslohavedha (Process of conversion of lower to higher metals) anddehavedha (therapeutical action) aspects. But the drugs which are mentioned as Maharasa in the treatises and the drugs available now in market shows higher controversies.

Keywords: Maharasa, Grahya lakshana, Controversy

INTRODUCTION: Sandhigdha dravya is a term used for dravyas having controversial sources, which appears in the different ancient Indian literature. Knowledge of the science gained from ayurvedic and other Sanskrit literatures revealed various incidences where one common vernacular name is used for two or more entirely different plant species in traditional system of medicines. These controversies are also seen in the various drugs mentioned in Rasashastra that is the science of Alchemy. Controversies can be the difference of opinion among scholars regarding the identification, properties or actions of any drug. Controversies also refer to the dilemma or confusion of objective or subjective aspect of different school of thoughts in ayurvedic system of medicine.

CONTROVERSY???
1. Language - India is a country having variety of languages and a vast population. The people in different parts of the country are dependent on different tribal and folklore medicine persisting in that region. The variation in the languages sometimes is responsible for confusion in the nomenclature of different herbal or mineral drugs having similar name or same drug having different names in different regions.
2. Synonyms - The descriptions of drugs in ancient literature are found in versus with the use of synonyms. Same synonym may be given to entirely different drugs. These synonyms have caused controversy in the identification of drugs.
3. Unavailability of Literatures - Many of the ancient classical texts has been lost in the flow of time by various foreign invasions, mishandling and lack of preservation.
4. Miss-interpretation of shastra - Interpretation of the classical textbooks differs from acharya to acharya, region to
region, one school of thought to other, etc. The same sloka will be explained in 2 different ways by 2 different commentators.

Relevance in Rasashastra:
Rasashastra is the science of Alchemy mainly dealing with the metals and minerals as raw drugs along with the herbs. The science deals with lohavedha (conversion of lower to higher metals) and dehavedha (therapeutical action). There is a need to highlight or to identify the area of confusion or controversies in the field of Rasashastra, in order to come up with standard ayurvedic preparations. Understanding the controversies will help in the following aspects:-
• To remove misunderstanding
• To identify drug of better utilities
• To obtain from available sources

MAHARASA: The important substances useful in Parada karma (Mercurial processes) are categorized under Maharasa, which are said to be most nearer to Parada (Mercury). All of them are having metallic contents (satwas) which are extracted for Parada karma (Mercurial Processes). Acharyas are having difference of opinion regarding the number & substances of Maharasa and even about the identification of each dravya. Drugs which are included in the Maharasa group of drugs are²
1. Abhraka 5. Shilajatu
2. Vaikranta 6. Sasyaka
3. Makshika 7. Chapala
4. Vimala 8. Rasaka
But, another reference given in Rasaratnasamuchaya mentions a different set of 8 drugs as Maharasa in the context of Rasamandapa. The drugs included are Rasaka, Vimala, Tapya(Makshika), Chapala, Tutha, Anjana, Hingula and Sasyaka.³ But acharyas have explained the reference from 2nd chapter of Rasaratnasamuchaya as Maharasa group of drugs and are used in Rasakarmas (Mercurial processes) as well as therapeutics.

Basis of Controversy

<table>
<thead>
<tr>
<th>Basis of Controversy</th>
<th>Drugs included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of origin</td>
<td>Shilajatu</td>
</tr>
<tr>
<td>Availability of drug in genuine form</td>
<td>Makshika, Vaikranta, Rasaka, Sasyaka</td>
</tr>
<tr>
<td>Identification</td>
<td>Chapala, Vimala</td>
</tr>
</tbody>
</table>

The controversies will be explained in accordance with the grahya lakshanas of the dravya and the features of the samples which are available now.

Abhraka: Abhraka is the first drug in the group of Maharasa and is used in various lohavedha (Process of conversion of lower to higher metals) as well as dehavedha (therapeutical) procedures. Controversies are very less in case of Abhraka and it is taken as Mica in modern era based on the similar features as explained in the grahya lakshanas of Abhraka.

Grahya lakshana: The grahya lakshanas are Snigdha (smooth), Prthudala (with thick layers), Guru (heavy), Sukhanimochyapatra (easily separable layers), etc. While explaining the types of Abhraka, acharya explains Kirsna vajrabhraka as the best variety and can be used in medicinal preparations.² Kirsna vajrabhraka can be correlated with Biotite variety of Mica based on its grahya lakshanas.⁴
<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Types of Mica</th>
<th>Chemical formula</th>
<th>Chemical name</th>
<th>Type of Abhraka</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Biotite</td>
<td>(H,K)₂ (Mg,Fe)₂ (Al,Fe)₂ (SiO₄)₃</td>
<td>Black Mica or Magnesium Iron Mica</td>
<td>Krishna</td>
</tr>
<tr>
<td>2</td>
<td>Lepidolite</td>
<td>KLi[Al(OHF)₂]Al (SiO₄)₃</td>
<td>Lithium or Ruby Mica</td>
<td>Pita</td>
</tr>
<tr>
<td>3</td>
<td>Muscovite</td>
<td>H₂KAl₃ (SiO₄)₃</td>
<td>White or Potash Mica</td>
<td>Sweta</td>
</tr>
<tr>
<td>4</td>
<td>Phlogopite</td>
<td>[HK(MgF)₃]Mg₃Al(SiO₄)₃</td>
<td>Magnesium or Amber Mica</td>
<td>Rakta</td>
</tr>
<tr>
<td>5</td>
<td>Paragonite</td>
<td>H₂NaAl₃ (SiO₄)₃</td>
<td>White or Sodium Mica</td>
<td>Sweta</td>
</tr>
<tr>
<td>6</td>
<td>Fluorspar(CaF₂)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tourmaline</td>
<td>[(Na,Ca)(Mg,Li,Al,Fe²⁺)₆Al₆(BO₃)₃Si₆O₁₈(OH)₄]</td>
<td>are being used.</td>
<td></td>
</tr>
</tbody>
</table>

**Vaikranta:** Vaikranta is a highly controversial drug and the controversies are mainly pertaining to the genuinity of sample. Vaikranta is used as the substitute of Vajra (Diamond). Rasaratnasamuchaya includes Vaikranta in Maharasa whereas Rasatarangini and Rasendrachudamani includes it under Uparatna group of drugs.², 6, 7

**Grahya lakshana :** Grahya Vaikranta should have Astasra (8 borders), Astaphalaka (8 surfaces), Shatkona (6 angles), Masrina (smooth), Guru (heavy) and Sudhamisritha varna (clear white or mixed colours).⁸

**Controversies regarding Vaikranta**⁶, ⁹
- Another reference regarding “Billora Patthar” [a type of granite] having same swaroopa like 8 phalaka, 6 angles, varna etc. is available.
- Dattatreya Kulkarni & Vaman Ganesh Desai mentions Flourspar as Vaikranta.
- Yadavji Trikamji Acharya includes Tourmaline/ Flourspar as Vaikranta when mentioned as Uparatna and Manganese (Mn) as Vaikranta, when given as Maharasa.
- In Punjab, Sphatika is sold as Vaikranta.
- In present days in the name of Vaikranta –  
  1. Quartz (SiO₄)  
  2. Feldspar (KAISi₃O₈)  
  3. Fluorspar(CaF₂)  
  4. Tourmaline  
  [(Na,Ca)(Mg,Li,Al,Fe²⁺)₆Al₆(BO₃)₃Si₆O₁₈(OH)₄], are being used.

**Makshika:** Rasaratnasamuchaya mentions Makshika under Maharasa whereas Rasatarangini and Ayurveda Prakasha mentions under Upadhatu. Makshika is mentioned to be of 2 types – Swarnamakshika and Rajatamakshika. Makshika is correlated with the pyrites i.e., sulphide group of minerals. Swaranamakshika is correlated with Chalcopyrite and Rajatamakshika with Ironpyrite. Swarnamakshika is taken as the best variety of Makshika and used in therapeutics.², 10, 11

**Grahya lakshana of Swarnamakshika**¹⁰: Grahya Swarnamakshika lakshanas are Snigda (smooth), Guru (heavy), Synamalakanthi (bluish black shineness), Swarna samana varna (similar colour to Swarna), Niskona (without angles), on rubbing over a paper gives swarna coloured lines and on rubbing in hands gives dark spots.

**Controversies regarding Swarnamakshika**
- All the grahya lakshanas of Swarnamakshika are not found in any of the samples.
- Chalcopyrite’s are copper iron sulphides (CuFeS₂). Hardness of 3.5 to 4 on the Mohs scale. Minor amounts of ele-
ments such as Silver (Ag), Gold (Au), Cadmium (Cd), Cobalt (Co), Nickel (Ni), Lead (Pb), Tin (Sn) and Zinc (Zn) can be measured (at part per million levels), likely substituting for Copper (Cu) and Iron (Fe). Selenium, Bismuth and Arsenic may substitute for Sulphur in minor amounts. The brassy-yellow metallic colour of this group of pyrite has in many cases lead to people mistaking it for Gold, hence the common nickname ‘Fool’s gold’.

- Presently in market, Chalcopyrite is used as it satisfies most of the grahya lakshanas given in the classics for Swarnamakshika.

**Vimala:** Rasaratnasamuchaya includes Vimala under Maharasa and Rasatarangini mentions it under Upadhata. Vimala is mentioned from Rasarnava onwards, prior to that its explanation is not available. Rasatarangini mentions Vimala and Rajatamakshika as same.\(^2,12\)

**Grahya Rajatamakshika**\(^12\): Grahya Rajatamakshika lakshanas are Snigdha (smooth), Sakona (with angles), Guru (heavy), Vartula (circular in shape) and Rajatojvala (shininess similar to Silver).

**Grahya Vimala**\(^13\) : Grahya Vimala lakshanas are Vartula (circular in shape), Konasamukha (with angles), Snigdha (smooth) and Phalakanvita (with surfaces).

Grahya lakshanas of Vimala and Rajatamakshika are almost all same. So Rajatamakshika is considered as Vimala. In Ayurveda Prakasha, acharya told ‘Vimala makshikabhedena’ i.e, Vimala is a type of Makshika.\(^11\) Thus questioning the existence of Vimala and including it under Rajatamakshika.

**Shilajatu:** Rasaratnasamuchaya includes Shilajatu under Maharasa, Rasatarangini includes under Misraloha and Ayurveda Prakasha under Upadhata. The exact source of the origin of Shilajatu is still under controversy. Shilajatu is of 2 types namely Gomootragandhi Shilajatu and Karpuragandhi Shilajatu. The type used in therapeutics is Gomootragandhi Shilajatu.\(^2,12,14\)

**Grahya lakshana**\(^15\): Grahya Shilajatu lakshanas are Gomootragandhi (it smells like gomootra), Krisna (black in colour), Snigdha (smooth), Mrdu (soft in touch), Guru (heavy), rasa – Tiktha, Kasaya and Seeta veerya.

**Controversies regarding Shilajatu:** According to Charaka samhita, mountain rocks, which are abundant in metallic elements like Gold, Silver, Copper and Iron are heated up in greeshma rutu, then the lac like exudate, which is soft like clay oozes out and gets dried up by sunrays and is collected as Shilajatu. Based on the metallic composition of the rock from which the Shilajatu is obtained, it can be of different types as given in the following table:\(^16\)

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Types of Shilajatu</th>
<th>Metallic composition of rocks</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Swarnadrija</td>
<td>Gold</td>
<td>Japakusuma varna</td>
</tr>
<tr>
<td>2</td>
<td>Rajatadrija</td>
<td>Silver</td>
<td>Pandu varna</td>
</tr>
<tr>
<td>3</td>
<td>Tamradrija</td>
<td>Copper</td>
<td>Neela varna</td>
</tr>
<tr>
<td>4</td>
<td>Lohadrija</td>
<td>Iron</td>
<td>Krisna varna</td>
</tr>
</tbody>
</table>

Now a day’s only, loha Shilajatu is available and it is having the similar colour as mentioned in grahya lakshana of Shilajatu.
• Many researchers claim that Shilajatu exuding from the rocks of mountains is basically derived from vegetative source. References of Susrutha Samhita also maintain this point of view. According to Susrutha Samhita, in the months of sukra-suchi (May-June) the sap or juice of plants comes out as gummy exudation from the rocks of mountains due to strong heat of sun.17
• Shilajatu is the latex of Asphaltum punjabinum tree. There are several hypotheses regarding the origin of Shilajatu:18
  • Earlier work on Shilajatu showed that it is mainly composed of humus—the characteristic constituent of soils-together with other organic components.
  • Some researchers opines that Euphorbia royleana Boiss. plants are responsible for origin of Shilajatu, because this plant has very rich latex.
  • The chemical analysis of Shilajatu by researchers at Banaras Hindu University in India revealed that humification of some resin/latex bearing plants is the most likely source of Shilajatu.

The recent discoveries suggest that the humification of resin-bearing plants was responsible for the major organic mass of Shilajatu. And chemical analysis showed that about 80% of the humus components are present in Shilajatu.
• Another recent research claims that the mosses like species of Barbula, Fissidens, Minium, Thuidium and species of Liverworts like Asterella, Dumortiera, Marchantia, Pellia (Monosolenium tenerum), Plagiochasma and Stephenrencella-Anthoceros were present in the vicinity of Shilajatu exuding rocks and these bryophytes are responsible for formation of Shilajatu. The bryophytes reveal occurrence of minerals and metals in their tissue such as Copper, Silver, Zinc, Iron, Lead etc, which are similar to the elements present in Shilajatu.
• The composition of Shilajatu is influenced by factors such as the plant-species involved, the geological nature of the rock, local temperature profiles, humidity and altitude.

Controversies pertaining to Karpura Shilajatu19,20

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Reference</th>
<th>Controversial drug used as Karpura Shilajatu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasaratnasamuchaya, Rasamrutam</td>
<td>Suryaksara (Potassium Nitrate – KNO₃)</td>
</tr>
<tr>
<td>2</td>
<td>In South India (Sindhu region)</td>
<td>Gypsum or Calcium Sulphate or Godanti (CaSO₄.2H₂O)</td>
</tr>
<tr>
<td>3</td>
<td>In Nepal, Bihar,Bengal</td>
<td>Aluminium Sulphate{Al₂(SO₄)₃}</td>
</tr>
</tbody>
</table>

In the present times, Black Bitumen is taken as Gomootragandhi Shilajatu and Potassium Nitrate as Karpura Shilajatu. Shilajatu is considered as Mineral bitumen. Bitumen is a sticky, black and highly viscous liquid or semi-solid form of petroleum. The grahya lakshanas explained in classics can be seen in Bitumen also.

SASYAKA: In case of Sasyaka, the controversy pertains to its nomenclature. While explaining Maharasa in 6th chapter of Rasaratnasamuchaya, acharya includes Sasyaka and Tutha in the group as 2 different drugs.3 But now a days, these 2 are used as synonyms.
• Maharasa - Rasaratnasamuchaya, Rasarnava, Rasapadhati2,21,22
• **Uparasa** - Rasamanjari, Rasendra Sara Sangraha.\(^{23,24}\)
• **Upadhatu** (of Tamra) – Rasajalanidhi.\(^{25}\)

**Controversies regarding Sasyaka**

- **Sasyaka - Sasyaka** is the natural form, which is available in mines.\(^{26}\) It is a sulphate ore of Copper (Bornite) and is having colour similar to mayurakandha.
- **Tutha - Tutha** is the artificially prepared variety of Sasyaka. Chemically it is Copper Sulphate and is blue in colour.
- Presently, Sasyaka and Mayuratutha are taken as synonyms. Acharya in Rasaratnasamuchaya, while explaining shodana of Sasyaka has given swedana procedure. Presently if we take Copper Sulphate as Mayuratutha, the whole material will dissolve in liquid taken for swedana.\(^{27}\) It is very evident that acharya could never suggest a swedana karma for a totally soluble substance. It means Sasyaka used at that time was different from the present day Copper Sulphate. Thereby we can conclude that the Sasyaka mentioned in classical textbooks is an ore of Copper and Tutha is the artificially made variety.

**Chapala:** Chapala is that which melts like Vanga. It is obtained from mines of Lead and Tin.\(^{27}\)

**Artificial manufacturing of Chapala**\(^{28}\)

1. Nagasambhuta Chapala
2. Vangasambhuta Chapala

Naga and Vanga after 1000 puta is mentioned as Nagasambhuta Chapala and Vangasambhuta Chapala respectively. This points to the less availability of Chapala in ancient times itself. 6 types by Rasakamadhenu –Swarna, Tara, Tamra, Naga, Vanga, Teekshna. Classification is due to the colour change or due to the presence of traces of the respective metals in it. Due to controversy, this drug is not used now days.

**Controversies regarding Chapala:**

- According to Rasaratnasamuchaya, it melts quickly like Vanga.\(^{27}\)
- Ayurveda Prakasha mentions it as an Upadhatu and as an associate of Makshika (Makshikabhumyudbhavo)\(^{29}\)
- Difficult to identify Chapala by its grahya lakshanas, as mentioned in classics i.e., Shadasra (6 surfaces), Sphatikachaya (resembles Sphatika), Snigdha (smooth), Guru (heavy), etc.\(^{27}\)
- There are opinions, regarding Chapala as Bismuth or Selenium. When we compare properties of Bismuth / Selenium, the therapeutic action mentioned are entirely different to each other, but some of the properties of Bismuth / Selenium are related with properties explained for Chapala.

**Chapala and Bismuth**

In Bharatiya Rasashastra written by Dr.V.G.Desai, the author mentions that Chapala can be taken as Bismuth. He explains it on the basis of the following features:-

- Appearance is similar to Sphatika, having 6 facets.
- Specific gravity of Bismuth is 9 and Chapala is said to be guru(heavy).
- Bismuth is available from Sulphur containing minerals.

But one of the property of Chapala is given that it melts like Vanga(232\(^{o}\) C), but Bismuth melts at 271\(^{o}\) C.

**Chapala and Selenium**

Acharya Narendranath Misra has proved that properties of Chapala match with that of Selenium.
Selenium | Chapala
--- | ---
Looks like steel and shiny grey in colour | Sweta Chapala
Red variety of Selenium melts between 170°C - 180°C | Aruna and Krishna Chapala
Pure Selenium melts at 217°C | Melts like Vanga (232°C)

**Rasaka:** Rasaratnasamuchaya mentions it under Maharasa, Rasatarangini mentions as Upadhatu and Rasa Prakasha Sudhakara mentions it as satva like Lead.\(^2,30,31\)

**Controversies regarding Rasaka**
- Ayurveda Prakasha mentions Rasaka as a type of Tutha.\(^32\)
- Rasajalanidhi as upadhatu of Yashada.\(^33\)
- Rasarnava gives the synonyms Tutha and Reetikrut for Rasaka.\(^34\)
- According to Rasakamadhenu, it is the kita of Rajata, Swarna.\(^35\)
- According to Dr. Vaman Desai, Mitrikabha Rasaka is Calamine (ZnCO\(_3\)) , Gudabha Rasaka as Zincite (ZnO) and Pashanabha Rasaka as Zinc Blende (ZnS).\(^36\)

Due to the above mentioned controversies, it is not used now a days.

**DISCUSSION:** Substantial efforts to standardize the Ayurvedic crude drugs as well as finished Ayurvedic medicines has become a subject of intensive research for various aspects. However, these initiatives would imperatively need establishing the correct identity of the raw drugs. The long history of safe usage of Ayurvedic medicines can be extrapolated only when the correct identity of the raw drugs used in those medicines is established and standardized. The classical references of Rasashastra available in different textbooks gives the grahya lakshanas of different rasadravyas. On the basis of these grahya lakshanas, acharyas try to specify the variety of the drug to be used therapeutically among the different varieties available. This can also be taken as a criteria for determining the uniqueness of drugs. The best sample among the market samples should be selected on the basis of these criteria.

**CONCLUSION:** Proper identification of raw drugs is a must in case of any formulation used in Ayurveda. In case of Rasashastra, the proper identification of the raw drug is needed for its prescribed usage for both lohavedha (Process of conversion of lower to higher metals) and dehavedha (therapeutical action) as well as to avoid the harmful effects.

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