

**TRADITIONAL INDIAN TOXICOLOGY- A STUDY  
BASED ON SANSKRIT SOURCES**

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By

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## **CERTIFICATE**

This is to certify that this thesis, **Traditional Indian Toxicology- A Study Based on Sanskrit Sources**, submitted in partial fulfillment for the Degree of Doctor of Philosophy in Sanskrit (as a part of M. Phil/Ph.D integrated programme) in the faculty of Language and Literature in the University of Calicut, is a record of bonafide research carried out by **Ajitha.T.S** under my guidance. It is also certified that this thesis has not previously formed the basis for the award of any Degree, Diploma or Fellowship or other similar title or recognition in this University.

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## **DECLARATION**

I Ajitha.T.S, hereby declare that this thesis, **Traditional Indian Toxicology- A Study Based on Sanskrit Sources**, submitted in partial fulfillment for the Degree of Doctor of Philosophy in Sanskrit (as a part of M. Phil/Ph.D integrated programme) in the faculty of Language and Literature in the University of Calicut, has not previously formed the basis for the award of any Degree, Diploma or Fellowship or other similar title or recognition in this university.

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## LIST OF ABBREVIATIONS

<i>AÀ¶i ´gahædaya</i>	<i>AH</i>
<i>AÀ¶i ´gasamgraha</i>	<i>AS</i>
<i>Agnipuri ,a</i>	<i>AP</i>
<i>Ëyurvedavi¿vako¿a</i>	<i>AV</i>
<i>Ëyurvedic Drugs and Their Plant Sources</i>	<i>ADP S</i>
<i>Bhivapraki¿a</i>	<i>BP</i>
<i>Carakasamhiti</i>	<i>CS</i>
<i>Encyclopaedia Britannica</i>	<i>EB</i>
<i>Forensic Medicine</i>	<i>FM</i>
<i>Indian Medicinal Plants</i>	<i>IMP</i>
<i>Keralathile ViÀappimbukal</i>	<i>KV</i>
<i>Pimbukalu¶e lokam</i>	<i>PL</i>
<i>Snakes of India</i>	<i>SI</i>
<i>Su¿rutasamhiti</i>	<i>SS</i>
<i>ViÀasasya ´ ´al</i>	<i>VS</i>

## **PREFACE**

With its holistic approach, eco-friendly habits and dietary preferences, *Āyurveda* has received worldwide acclaim. Apart from India, its birthplace, almost all developed countries accept *Āyurveda* as a medical system, which can provide harmless solutions for the medical needs of the present times. It has been considered as a very effective solution for rheumatism, skin problems, mental disorders, diseases of alimentary canal etc. However even amidst such a rapport, *Agadatantra* (Toxicology) one of the eight auxiliaries of *Āyurveda* has been subjected to severe criticism by modern medicine. The grounds of that criticism are the following-

1. The herpetological details, provided in the *Agadatantra* portions are far deviating from truth.

2. The first aid measure recommended by the system like cutting, burning etc. will cause infection and hence are not scientific.
3. The results of the treatment lack experimental clarifications.
4. Bites, claimed to be cured by iyurvedic physicians are not poisonous.
5. Many works related to *Agadatantra*, mainly from Kerala are full of superstitions.
6. Treatment through *mantras*, prescribed in *Agadatantra* is not actually practiced and hence is only a myth.

Based on these, the critics assume that the toxicological details of *Ēyurveda* are full of superstitions.

Ēyurvedic physicians speak for the system but they cannot substantiate their theories with scientific evidences or experimentation and they usually cling on the idea “Let the devotees believe”. This sharpens the criticism.

In this situation, the present thesis is an impartial attempt to examine all the details of *Agadatantra* given in the original *samhiti* works. With a layman's outlook, the work conducts a thorough study of all the topics, reexamines the problematic areas, analyses the contents in the light of modern science and intends to suggest probable solutions for the existing problems, which can be introduced into the present system. As the thesis pertains to the field of Sanskrit language and Literature, I have scrupulously eschewed the practical aspects of treatment and confined my study to the theoretical side on the basis of the available data in Sanskrit.

*Carakasamhiti*, *Suśrutasamhiti* and *Aṅgīrśgahvardaya* are the primary source of the thesis. A number of journals and magazines are also referred especially to collect the ideas of the critics. Details of modern medicine and science are collected from journals and textbooks. Internet and info-net facilities are also been used. Many medical institutions and



traditional practitioners have been visited so as to know the present status of the system. Along with the original photographs, those downloaded from Internet are also been included.

The thesis consists of eight chapters among which the first chapter introduces the topic and gives the survey of literature necessary for the study. The second chapter discusses the nature of poison in detail. The third chapter is on poisonous plants. The fourth chapter elaborates the details of snakebites. The fifth chapter discusses the details of the poisonous bites of rats, dogs etc. The sixth chapter is on poisonous spiders and other lower creatures. The seventh chapter discusses criminal poisoning, which includes food poisoning and atmospheric pollution. The concluding remarks of the thesis are given as the last chapter. A description of Kerala School of Toxicology and a glossary of technical terms are given as appendices.

When the study takes its form I find my words insufficient in expressing my deep sense of gratitude to my supervising teacher, Dr. C. Rajendran, Prof. of Sanskrit, University of Calicut, whose kind help, timely evaluations, valuable suggestions and motivation converted the work from a dream to reality. I should thank

Dr. P. Narayanan Namboodiri, Prof. & Head, Dept. of Sanskrit, University of Calicut; who helped much in solving the puzzles of etymology related to some of the technical terms. I also remember the wholehearted support received from all the other teachers of the Dept. of Sanskrit, and like to use this opportunity to thank them. I would also like to acknowledge the discussions with Dr. B. Prabhakaran, Head Dept. of *Agadatantra*, Pappinissery ViÀaciktisi Kendra;

Dr. P. Manoharan; Sri. Ava, apparambu Maheshwaran Namboodiripad, Wadakancheri; Dr. Srikrishnan, head Dept of *Agadatantra*, Arya Vaidya sala ,Kottakkal; Dr. M.N.

Venugopalan; Dr. Binda Vasudevan; Dr. K. Subrahmanian; Dr. Heera Sabu; and Dr. Narendran. I would like to thank authorities of CHMK Library, University of Calicut for the collection of books, Internet and Infonet facilities from which I have benefited much. My thanks are also due to the Public library, Thrissur, Dept. Library, University of Calicut, Dept. Library, Aryavaidyasala, Kottakkal etc.

I would also like to record my gratitude to UGC for funding the research.

It would be a great fault from my part if I forget to mention the help rendered by my family. First of all I like to remember my father Dr. T. K. Sivasankaran. With great concern he had handed over some of the rare books from his library without which the present study was almost impossible. I would also like to express my indebtedness to my mother late. Dr. M. N. Usha for all that she had bestowed on me. Last but not the least I would like to thank my husband Sri. V. R. Sathish for his inspiring presence.

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CHAPTER 1  
**INTRODUCTION**

The term Toxicology finds its root in three Greek words viz., *toxon* (a bow used for shooting arrows), *toxeuma* (an arrow) and *toxicos* (poison).<sup>1</sup> Literally, Toxicology means study of poisons, and it has been defined as-

"Toxicology is the science that deals with the source, the physical and chemical properties, the physiological action, the detection, the estimation, and the treatment of poisonous substances."<sup>2</sup>

## 1.1 Toxicology: Origin and development

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<sup>1</sup> *Poisoning in Ancient Times*, 3 pp, Online, Internet. 10 November 2007.

<sup>2</sup> Guharaj, P.V., *Forensic Medicine*, Orient Longman, 1982, p. 323.

cf. "**Scientific study of poisons, its effects, manifestations and treatment**" – P.S. Shankar, *New Medical Dictionary*.

"**Toxicology is the study of harmful interactions between foreign chemicals (xenobiotics) and biological systems**". – Raymond J.M. Niesink et al., preface *Toxicology, principles and applications*, C.R.C. Press, Boca Ration, New York.

"**Toxicology is the branch of science which is concerned with the harmful effects of chemicals on organisms and with the interaction of these substances with organisms**". J.H. Koeman, "Toxicology, history and scope of the field", *Toxicology-principles and Application*.



The history of Toxicology is as old as that of human kind. Primitive nomadic races observed that some plants and some creatures exert adverse and sometimes fatal effects on life stock. This knowledge benefited them much. They extracted the juice of those particular plants and used to poison their arrows. This endowed them with the supremacy over other animals. Identification of poisonous creatures helped them to escape from latters' attacks. Gradually, the knowledge of poison also received new dimensions.

Greek mythology was familiar with poisoning, an example is that of Medea poisoning Theseus.<sup>3</sup> Ebers' papyrus scrolls belonging to 1550 BC reveals the Egyptian knowledge of a variety of poisons. They were conversant with poisons like arsenic, lead, opium, copper and antimony.<sup>4</sup> Greeks as well as Egyptians believed in ordeal poisons. These were accepted to be harmful to the guilty and harmless to the innocent. Greeks used Hemlock as the ordeal poison. They called it 'State Poison' and used to execute political opponents. The famous victim of Hemlock - poisoning was Socrates, the great Philosopher (402 BC).<sup>5</sup> Egyptians used peach kernels as ordeal poison. Peach kernels contain cyanogenic glycosides. In the presence of

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<sup>3</sup> *Bulfinch's Mythology*, Nelson Double day, Inc. USA. 1968.

<sup>4</sup> J.H. Koeman, "Toxicology, history and scope of the field", *Toxicology-principles and Application*, CRC Press, Boca Roton New York. 1996.

<sup>5</sup> "A brief history of poisoning", Online Internet, 10 November 2007.

"Socrates", Online, Infonet, 12 November 2007.

water, these glycosides release cyanide.<sup>6</sup> Menes, the earliest recorded Egyptian King (300 BC) is said to have studied the properties of poisonous plants and kept the same as a national secret.<sup>7</sup>

Around 246 BC, in China, there developed a ritual called *Chau*. This is a ceremonial dance conducted with some feathers. These feathers are prepared by fumigating with five poisons. Mercury, arsenic, copper sulphate, loadstone and a secret poison are burnt together as the fumigants. That feather is used externally.<sup>8</sup> Queen Parysalis of Persia (405-359BC) was said to have poisoned her daughter in law.<sup>9</sup>

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<sup>6</sup> “Poisoning in Ancient Times”, 3pp. Online, Internet, 10 November 2007.

<sup>7</sup> Ibid.

<sup>8</sup> “A brief history of poisoning”, Online, Internet, 10 November 2007.

<sup>9</sup> Ibid.

As poisoning became a regular practice, people looked forward for the preventive and curative measures. In this context name of the King Mithradates (114-163 BC) cannot be forgotten. He was the king of Pontos (Modern Turkey), who had conducted research on antidotes. The antidote developed by Mithradates viz. Mithridatum was kept a secret till his death.<sup>10</sup> *Theriaca* and *Alexiformaca* are the oldest extant works written on poisons. These were penned by Nicander of Colophon (275 to 130BC).<sup>11</sup> In AD 40<sup>th</sup> century Dioscorides wrote *Materia Medica*. In that work he had classified poisons and differentiated their origin.<sup>12</sup>

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<sup>10</sup> Ibid.

<sup>11</sup> A.V. Joseph, *Sarpadamānam*, Kerala Language Institute, 1988, p. 2.

<sup>12</sup> “A brief history of poisoning”, Online, Internet, 10 November 2007.

The first law against poisoning viz., *Lex cornelia* was issued by Roman dictator and constitution reformer Lucius Cornelius Sulla (82 BC)<sup>13</sup>. The following years witnessed several incidents of poisoning. In 1424 Magister States de Ardoynis wrote the *Book of Venoms*. This collects all the details of poisons of that age. Mode of action and treatment of poison are mentioned in the work.<sup>14</sup> By the close of 15<sup>th</sup> century, alchemists succeeded in producing potent poisons from classical bases.

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

The emergence of scientific renaissance put forward serious studies and discoveries in the field of Toxicology. In this context the name of a Swiss physician Paracelus (1493-1541) cannot be omitted. He introduced the principle of dose dependency of toxic substances and commented that -

"Everything is a poison... it is only the dose that makes it not a poison..."<sup>15</sup>

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<sup>15</sup> J.H. Koeman, "Toxicology, history and scope of the field", *Toxicology-principles and Application*, CRC Press, Boca Roton New York. 1996, p.4.

In 16<sup>th</sup> century in Italy, there formed a poisoner assassins' guild viz., council of Ten. From there someone could hire a poisoner.<sup>16</sup> *Neopoliani Magioe Naturalis* written by Giovanni Battista porta is the textbook for poisoners.<sup>17</sup> In those days a solution of infused arsenic viz. *Acqua toffana* came into vogue.

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<sup>16</sup> "A brief history of poisoning", Online, Internet, 10 November 2007.

<sup>17</sup> Ibid.

By 17<sup>th</sup> century, poisoning had become a fashionable crime and art, and as an outcome, rulers all over the world took their own measures of precautions. Henry IV cooked for himself while Qing dynasty kings of China served their food in a silver plate which was supposed to change its colour in the presence of poison. Louis XIV in 1662 issued a ban over the liberal exchange of poisonous substances and established a body called *Chambre Ardente* (burning chamber) to investigate all the cases of poisoning. These restrictions exerted little influence over the growing rate of poisoning. Victorian age was treated as the golden age of poisoning.<sup>18</sup> Towards eighteenth and nineteenth centuries alchemists began to be involved in toxicological experiments; as a result, astonishing conclusions came out. They successfully transformed arsenic to a

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<sup>18</sup> Ibid.



colourless, odourless, and tasteless powder so as to escape detection.<sup>19</sup>

Side by side with the criminal experiments, creative experiments exploiting the medicinal properties of poisons were also been carried out. The Spanish Chemist and physician, Bonaventura Orfila, carried out systemic research and identified poisons in tissue and body fluids. He authored an authentic work *Traite des poisons* and is considered as the father of modern Toxicology.<sup>20</sup>

Alfred Swain Taylor, a 19<sup>th</sup> century toxicologist underlined his experiments with the comment -<sup>21</sup>

"A poison in a small dose is a medicine, and a medicine in a large dose is a poison".

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<sup>19</sup> Ibid.

<sup>20</sup> J.H. Koeman, "Toxicology, history and scope of the field", *Toxicology-principles and Application*, CRC Press, Boca Roton New York. 1996.

<sup>21</sup> Ibid.

This paved the way for a new through flashing though the entire field of Toxicology. Poisons, having both biological and non-biological origin began to be used for the treatment of certain diseases. Even now research in the field of Toxicology is in progress.

## **1.2 Development of Toxicology in India**

The *ithihisas* and *puri,as* give the mythological origin of Toxicology. It is based mainly on the antagonism between Garuda and Naga. Actually they are the offspring of same father but in different mothers. Garuda asked Indra a boon to have serpents as his food, and acquired the titles *pannagabhojana*, *pannagiçana*, *bhujagendra* and *bhuja'gabhakÀya*.<sup>22</sup> In *Skandapuri, a*, it is stated that after 30,000 years of hard penance, Garuda is endowed with a stone slab bearing his name. The slab was placed in the Badarçkiçrama and by simply remembering the stone, one will get relieved of any type of poisoning.<sup>23</sup> The *puri, a* also gives the account of Vainateya

<sup>22</sup> *Mahibhirata*, I. 34.13.

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<sup>23</sup> *Skandapuri, a*, *VaiÀ,avakha, a*, II, 4-12.

ÊµÉªÉiÉÉÆ´É®ú <iªÉÖHòÉä MÉ`ûb÷Éä ½pÊ®úhÉÉ  
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establishing a śivali'ga; the worship of which, checks snake poison.<sup>24</sup> Stones with the name of Garu-a are frequently mentioned in Sanskrit literature as capable of removing snake poison.

<sup>24</sup> *Ibid*, VIII, 56-2.3.

'ÉèxÉiÉä<sup>a</sup>É<sup>o</sup>iÉÖ näù'Éä¶ÉÉä YÉÉi'ÉÉ IÉäjÉÆ iÉÖ  
 'Éè<sup>1</sup>hÉ'É"ÉÂ\*  
 Ê±ÉRÂóMÉÆ |ÉÊiÉ<sup>1</sup>`ö<sup>a</sup>ÉÉ"ÉÉ<sup>o</sup>É = 'ÉÇ{ÉÉ{É|  
 ÉhÉÉ¶ÉxÉ"ÉÂ  
<sup>a</sup>É<sup>o</sup>iÉÆ {ÉÚVÉ<sup>a</sup>ÉiÉä |ÉCi<sup>a</sup>ÉÉ {É\SÉ"ÉÉÆ iÉÖ Ê  
 'ÉvÉÉxÉiÉ&  
 xÉ Ê'É<sup>1</sup>ÉÆ Gò"ÉiÉä iÉ<sup>o</sup>aÉ<sup>o</sup>É {iÉVÉx"ÉÊxÉ<sup>o</sup>É{ÉÇVÉ"ÉÂ\*\*

As Garu·a is hostile to the Nigas, he is said to have control over their poison. Hence any measure to check snake poison is called as *Garu·avidyi*. In *Mahibhirata*, certain tribes involved in charming snakes are called as *Giru·is*.<sup>25</sup> Kaḷyapa, father of Garu·a and Nigas is endowed with *ViÀahirividyī* by the creator.<sup>26</sup> With this, he could counteract the snake poison for the well being of the people. *Ga, eḷapuri, a* mentions of *Garu·aḷistrajma* ie., he who knows the methods to control snake poison.<sup>27</sup> The *mantras* counteracting snake poisons are called *TirkÀyavidyi, Sarpavidyi* or *ViÀavidyi* indicate the lore of snake charming and the treatment of snake poisons. This tradition is also seen in the Tamil tradition.<sup>28</sup> *Agnipuri, a* mentions of *TirkÀyamantra*.<sup>29</sup> So *Garu·avidyi*

<sup>25</sup> G.V. Ketkar, Jṃinakoḷa.  
Karva & Date, *Sulbhaviḷakoḷa*.

<sup>26</sup> *Mahibhirata*, I. 20.16.  
|ÉÉnùÉiÉÂ Ê´É¹É½pÉ®úÓ Ê´ÉtÉÆ Eò¶É{ÉÉᳵÉ  
“É½pÉi”ÉxÉä\*

<sup>27</sup> *Ga, eḷapuri, a*, 134.28.  
ᳵÉÍÉÉ MÉ̄ûb÷¶ÉÉᳵjÉYÉ& ᳵÉ{ÉÈ Eò¹ÉÇÊiÉ iÉiIÉhÉÉiÉÂ\*

<sup>28</sup> Sadashiv Ambadas Dange, *Legends in the Mahibhirata*, Motilal Banarsidas, Varanasi, 1969, p. 24.

<sup>29</sup> *AP*, 295-5.

can be identified as the premature form of Toxicology. In that stage, spells, charms and superstitions were governing the treatment. Later this method was overpowered by scientific findings.

### 1.3 Toxocology in *Āyurveda*

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\$ V´É±É ¨É½pÉ¨ÉiÉä ¾pnùªÉÉªÉ MÉ´ûb÷Ê  
 ´É¶ÉÉ±ÉÊ¶É®úªÉä MÉ´ûb÷Ê´ÉÊ¶ÉÉÉªÉè  
 MÉ´ûb÷ Ê´É¹É;É\VÉxÉ|É;ÉänùxÉ |É;ÉänùxÉ Ê´ÉjÉÉªªÉªÉ  
 Ê´ÉjÉÉªªÉªÉ Ê´É¨ÉnÇù Ê´É¨ÉnÇù  
 Ê´ÉxÉiÉäxÉÉÇ¨É ¨ÉxjÉÉäªÉÆ iÉÉiªÉÇ& ¶Éxnù¨ÉªÉ&  
 ª¨ÉpiÉ&

.....  
 {ÉÊiÉ®úÉVÉÉªÉ Ê´ÉnÂù¨É½äp {ÉÊiÉnâù´ÉÉªÉ  
 vÉÒ¨ÉÊ½p  
 iÉzÉÉä MÉ´ûb÷ |ÉSÉÉänùªÉÉiÉÂ\*

*Āyurveda*, the typical Indian system of medicine defines itself as the science of life or longevity. Suśruta defines it thus-

"That which possesses life or that which provides life is called *Āyurveda*."<sup>30</sup>

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<sup>30</sup> SS, Sūtrasthina, p.4.  
 +É<sup>ā</sup>ÉÖ®úî<sup>o</sup>ÉxÉÂ Ê´ÉtiÉä +xÉäxÉ´ÉÉ<sup>ā</sup>ÉÖì´ÉxnùîxiÉ  
 <i<sup>ā</sup>ÉÉ<sup>ā</sup>ÉÖ´Éænù& - 15  
 cf +É<sup>ā</sup>ÉÖ& +xÉäxÉ YÉÉxÉäxÉ Ê´ÉxnùiÉä ±Éî<sup>ā</sup>ÉiÉä xÉ  
 ®äú<sup>1ā</sup>ÉÊiÉ <ÊiÉ +É<sup>ā</sup>ÉÖ´Éænù& -  
 EòÉ¶<sup>ā</sup>É{É<sup>o</sup>ÉÆÊ½piÉÉ\*  
 Ê½piÉÉÊ½piÉÆ °ÉÖJÉÆ nÖù&JÉÆ +É<sup>ā</sup>ÉÖ& iÉ<sup>oā</sup>É  
 Ê½piÉÉÊ½piÉ´ÉÂ  
 ´ÉÉxÉÆ SÉ iÉ<sup>oā</sup>É iÉjÉÉäHÆò +É<sup>ā</sup>ÉÖ´Éænù& °É =S<sup>ā</sup>ÉiÉä  
 – SÉ®úEò<sup>o</sup>ÉÆÊ½piÉÉ\*  
 +xÉäxÉ {ÉÖ´ú<sup>1</sup>ÉÉä °É<sup>o</sup>´ÉÉiÉÂ +É<sup>ā</sup>ÉÖì´ÉxnùÊiÉ´ÉäÊKÉ  
 SÉ  
 iÉ<sup>o</sup>´ÉÉiÉÂ ´ÉÖÊxÉ´É®èú®äú<sup>1</sup>ÉÖ +É<sup>ā</sup>ÉÖ´Éænù <ÊiÉ  
 °´ÉpiÉ&  
 +É<sup>ā</sup>ÉÖì½piÉÉÊ½piÉÆ´<sup>ā</sup>ÉÉvÉä®úÉxÉnùÉxÉÆ ¶É´ÉxÉÆ  
 iÉiÉÉ  
 Ê´ÉtiÉä °ÉjÉ Ê´ÉuùînÂùîÉ& °É +É<sup>ā</sup>ÉÖ´Éænù =S<sup>ā</sup>ÉiÉä\* -  
 ¶ÉÉ®únùÉiÉxÉ<sup>ā</sup>É\*

*Āyurveda* provides a holistic outlook in treatment. It never tries to suppress the symptoms but tries to bring back the whole body system into its natural equilibrium. Adherence to the drugs having a vegetable origin makes it a comparatively harmless system of medicine.





*nisti gado rogo asmiditi agadah*<sup>32</sup>

*agadinim tantram agadatantram*

*triyate çarçram anena iti tantram.*<sup>33</sup>

i.e., the science which protects the body from ailments caused by poisons by means of antidotes (*agadas*) is called *agadatantra* (Toxicology). It has been defined by iurvedic physicians thus-

*agadatantram nima sarpak*

*çarçram anena iti tantram.*

*vyajmanirtham*

*vividhaviçamyogopaçamanirtham*

*ca*<sup>34</sup>

Poisons of biological and non-biological origin are being included in the boundary of *Agadatantra*.

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<sup>32</sup> N.K. Rajagopal, *Samskrtaniruktakoça*, p. 3.

<sup>33</sup> Dr. U.R. Sekhar Namburi, *A Text book of Agadatantra*, p. 3.

<sup>34</sup> SS, Sçtrasthina, I, p. 3.

### **1.3.1 Āyurvedic principles governing *Agadatantra***

The very principle of *Āyurveda* as a science which imparts knowledge about what is conducive to health and what is conducive to disease is reflected in *Agadatantra*.<sup>35</sup> Thus being a philosophy and science, *Āyurveda* identifies poisons as the foreign substances invading into the body so as to disturb the equilibrium of the whole system. One peculiarity of the toxicological treatment is the nature of medicines used. When all *Āyurvedic* medicaments are commonly harmless, antidotes (*agadas*) possess poisonous properties. If applied in a healthy person they produce symptoms of poisoning. Hence detection of poisoning is an important step of toxicological treatment. This has been emphasised by *Suśruta*.<sup>36</sup> Hence

<sup>35</sup> +ÉāÉÖ<sup>1</sup>āÉÉÊhÉ +xÉÉāÉÖ<sup>1</sup>āÉÉÊhÉ SÉ pù  
 ‘āÉÉMÉÖhÉÉè”ÉÉÇÊhÉ ‘ÉänùāÉiÉÖiāÉÉāÉÖ´Éæñù&\*

<sup>36</sup> SS, Kalpasthina, VIII, p.591.  
 +MÉñùÉxÉÉÆ Ê½p °ÉÆāÉÉäMÉÉä Ê´É<sup>1</sup>ÉVÉÖ<sup>1</sup>Jö°āÉ  
 āÉÖVāÉiÉä  
 ÊxÉi´É<sup>1</sup>Éä ”ÉÉxÉ´Éä āÉÖHòÉäMÉñù&  
 °ÉÆ{ÉtiÉä°ÉÖJÉ”ÉÂ\* 77  
 iÉ°”ÉÉiÉÂ °É´ÉÇ|ÉāÉixÉäxÉ YÉÉiÉ´āÉÉä Ê  
 ´É<sup>1</sup>ÉÊxÉ¶SÉāÉ&

symptoms are to be observed closely. Food, drinks and cloths of the victim are subjected to examination. Thus *Agadatantra* becomes the branch which requires much care and vigilance on the part of the physician. All major theories of *Āyurveda* find their room in *Agadatantra*.

**a. Pañcabhāṣasidhanta**

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+YÉÉi´ÉÉ Ê´É¹ÉºÉnÂù¡ÉÉ´ÉÆ Ê¡É¹ÉM  
´³ÉÉ{ÉÉnù³ÉäzÉ®ú´ÉÂ\*\*78  
cf Ê´É¹É´Éä´É +Ê´É¹ÉäMÉnù´ÉÂ\*

This theory becomes the foundation for the very ideology of *Āyurveda* viz., the harmonious relationship between the internal as well as external constitutions. The universe consists of five elements so as food and all creations. This constitutional unity makes humans a part of the universe. When food enters the digestive system, its constitution matches with that of the body and that is why it gets absorbed. Thus humans made of and living among five elements, absorb nutrients from the food made of these elements. Medicines of same constitution can easily correct the imbalances coming in the equilibrium. The term *bhṛta* is used in a special sense to denote the matter that is experienced through each sense.<sup>37</sup> So whenever the body goes in harmony with the perceived environment, it is considered to be healthy when the harmony is broken, the state is

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<sup>37</sup> K. Raghavan Thirumulpad, “Medical Science”, *Technical literature in Sanskrit*, p. 71.

called disease. Poisons in contrast to food, have different properties and a special way of action and thus it has to be treated with special medicaments.

**b. *TridoÀasidhinta***

This is just a biological adaptation of *pañcabhūtasidhanta*. *Bhūtas* collectively make the body. *Bhūmi* (earth) provides matter, *Jala* (water) binding function, *agni* (fire) digestive function, *viyu* (air) regulating function and *ikiṛa* (ether) shaping function. Among them, earth and water combine together to form *kapha* (phlegm), *agni* or *pitta* (bile) and *viyu* along with ether constitute *vita*. These three humors are considered as the three faults (*doḌas*) of the body. They exert their influence on the *dhitus* and *malas* (tissues and residues) of the body. They are the rolling wheels of metabolism. *Vita* regulate and motivate the nervous system. *Pitta* regulates the process of digestion and *kapha* helps in building up. They simultaneously support and neutralize each other. This brings forth a special kind of equilibrium. Whenever this equilibrium is disturbed the body loses its health.<sup>38</sup>

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<sup>38</sup>      ®úÉäMÉ°iÉÖ nùÉä¹É´Éè¹É¨ªÉÆ  
nùÉä¹É°ÉÉ¨ªÉ¨É®úÉäMÉiÉÉ\*



Humors exhibit fluctuation in accordance with the climatic changes. Humoral theory has great influence on *Agadatantra*. The properties of poison were determined so as to analyse the cause of vitiation of the humors. Roughness affects *vita*, hotness affects *pitta*, and uncertainty of taste affects *kapha*. While describing poisonous plants, Suçruti says that in the fifth impulse, plant poison affects phlegm and in the sixth all the three humors are being affected. When it comes to poisonous snakes the classification itself is based on the *tridoÅa* concept *darv çkara* poison vitiates *vita*, *ma, ali* poison vitiates *pitta*, *rijçman* poison vitiates *kapha*. Symptomatic treatment is also based on the *doÅa* which is vitiating and this is emphasized by Caraka by the lines.

°|ÉÉxÉÆ VÉªÉäÊrù {ÉÚ´ÉÈ °|ÉÉxÉ°|ÉªÉÉÊ  
 ´É`ûrÆù SÉ\*<sup>39</sup>

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<sup>39</sup> CS, Cikitsisthina, 23.

This intends to control *doÅa* without agitating the poison. The *gandhahasti* agada is specifically meant for the patient in whom phlegm is vitiated. In the case of rat poisons, *Aru,a* rat vitiates *vita*, *mahikÅ,a*, *pitta*; *iveta*, *kapha* and *kapota* all the three humors. In the case of rabies *vita* as well as *kapha* is aggravated. In the case of artificial poison detection of the *doÅa*, which is being affected is very important.

Insects are also classified based on the *doÅas*. Scorpion poison affects *pitta*. Treatment of spider poison is also based on the humoral theory. Hence, without the knowledge of the body constituents of the patient and the nature of poison injected, iurvedic treatment is impossible. This attests the importance of humoral theory.

### **c. *Saptadhitusidhinta***

Based on the *pañcabhñtasidhinta*, *Ēyurveda* identifies the basic *dhitus* of the body. The term *dhitu* etymologically means "one which assists the body or which enters into the formation of the basic structure of the body as a whole".<sup>40</sup> They are seven in number, and enumerated as *rasa* (including lymph and chyle), *rakta* (blood-haemoglobin fraction) *mimsa* (muscle tissue), *medas* (fat tissue), *asthi* (bone tissue), *majji* (bone-marrow) and *ñukra* (the sperm in male and ovum in female). They also have a sequential origin.

*Rasidraktam tat° mimsah  
mimsinmedah prajiyate*

*Medaso'sthi tat° majji majmah ñukram  
tñjiyate.*<sup>41</sup>

<sup>40</sup> Vaidya Bhagwan Dash, *Fundamentals of Ēyurvedic medicine*, Srisatguru publications, Delhi, 1999, p. 37.

+ÉªÉÖ® úîº" ÉxÉÂ Ê´ÉtiÉä +xÉäxÉ´ÉÉªÉÖì´ÉxnùîxiÉ  
<iªÉÉªÉÖ´Éænù& - 15

<sup>41</sup> SS, *Cikitsisthina*.

While describing snake venom, Suŕuti identifies the seven *dhitus* as the route through which venom spreads. Passage of venom through the *dhitus* is called *viÀavega* (impulse) and the intermediate stage or transitional stage between two successive *dhitus* is called *vegintara*.<sup>42</sup> Symptoms of each stage are explained and particular treatments are prescribed. Treatment of *vegintaras* are also very important.

### **1.3.2 Development of *Agadatantra* in the History of *Ēyurveda***

The development of *Ēyurveda* can be traced in the three distinct stages. They are prevedic period, vedic period and post vedic period.

#### **1.3.2.1 Pre-vedic Period (2700 BC – 1500 BC)**

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<sup>42</sup> SS, Kalpasthina, IV.

This phase analyses the medicinal achievements of Harappan or Indus valley civilization. The excavation conducted at Mohenjo-Daro and Harappa has revealed the remainings of a highly civilized race.<sup>43</sup> Well planned town with two storied houses build in baked brick, bathrooms and latrines opening to common drain and well placed streets etc. are considered as the hall marks of Harappan architecture. These emphasise the Harappan consideration for public health and sanitation. Though undecipherable, the amulets excavated from Harappan sites attest the magico-religious approach of treatment prevalent in their age.<sup>44</sup> Evidences for the worship of tree goddesses and earth goddess are obtained from the site. Two skulls obtained from Harappan sites are cited as the examples of treatment prevalent in Harappan ages.<sup>45</sup> One skull is of

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<sup>43</sup> Kenneth G. Zysk, *Medicine in the veda*, Motilal Banarsidass Publishers, Delhi, 1985, Vol. 1, pp. 1-3.

<sup>44</sup> *Ibid.*

<sup>45</sup> *Ibid.*

an adult, exhibiting a man-made hole in the temporo-parietal region.<sup>46</sup> Other is that of a child having three small holes on the right side.<sup>47</sup> Both these are cited as the evidences for the practice of trepanation.<sup>48</sup>

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<sup>46</sup> *Ibid.*

This has been obtained from Harappa (Skull H. 796 B from cemetery R 37). How the hole is made is not determined. The authenticity of the whole is also under suspicion as the original records of the skull do not speak of such a hole.

<sup>47</sup> *Ibid.*

This (KLB-8/69) has been obtained from Kalibangan of Rajasthan deserts. The child is assumed to be experiencing hydrocephalous which is characterized by swelling of brain. The hole is guessed to be made with hot pointed instrument. Signs of healing at the site hint that the child had survived the surgery.

<sup>48</sup> *New Medical Dictionary*, P.S. Shankar. 2<sup>nd</sup> Ed., Oxford and IBH Publishing Co. Pvt., Ltd., New Delhi, 2005, p. 839.

Trepanation is the drilling of a hole in the skull to relieve distress, one of the earliest known surgical procedures.

Though these are strong enough to hint the medical practices of Harappan civilization, no definite clue for the existence of Toxicology is obtained so far.

### **1.3.2.2 Vedic period (5000 BC -1000 BC)**

During this period medicine prevalent can be termed as magico-religious medicine. Here we can see the emergence of Toxicology as a specific branch. In this age diseases were believed to be caused by evil spirits and demons. Hence in the process of treatment the irradiation of the spirit was very important. This involved rituals which lasted for hours and even for days. *Mantras* were chanted and amulets with engraved *mantras* were given to be worn. Side by side with this magico-religious medicine, another branch viz., empirical medicine also evolved. The latter gave importance to observation and experimentation. Medicaments began to be used. During this stage, herbs were praised for their merits. Invisible worms and other creatures having an evil mind were always feared of.<sup>49</sup>

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<sup>49</sup> Kenneth, G. Zysk, *Medicine in the veda*, p. 8.



*Āyurveda* is considered to be an *upaveda* of *Atharvaveda*. Some consider it to be an *upaveda* of *Īgveda*. Whatever may be the dispute, references to Toxicology are seen in both the *Vedas*. Along with demons, insects, and worms, toxins were also identified as infusers of diseases.<sup>50</sup> In the treatment of toxins magico-religious treatment enjoys equal status with that of empirical treatment. This method of treatment is adopted in certain cases of wounds or sores (*vraṇa*), mental disorders (*unmida* or *apasmira*) and fever (*jvara*).<sup>51</sup> From this itself, it is obvious that all these diseases find their cause, elements of progress and possibility of cure in the psychological condition of the patients.

### **1.3.2.2.1 The *Īgveda***

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<sup>50</sup> *Ibid.*

<sup>51</sup> *Ibid.*

The *Îgveda* which is also considered as the primary source of *Ëyurveda*, provides some evidences for the existence of the details of Toxicology. The *Madhuvidyi* found in *Îgveda* is meant for eradicating poison by means of *mantras*.

### 1.3.2.2.2 The *Atharvaveda* (C 1000 BC)

The *Atharvaveda* has always been excluded from the trio of the *Vedas*. Both in its content and style it deviates from others. Some scholars have come forward to offer explanations to this exclusion. According to them, the *Atharvaveda* is a collection of black magic. This made the same inferior to others.<sup>52</sup> Macdonell assumes that silence on sacrificial ceremonial is the reason behind the exclusion. He accepts the last book on marriage ceremony etc. as an interpolation, took place with a view to connect the work with sacred rituals.<sup>53</sup> The style of language points to the posterior origin of the *Veda*.<sup>54</sup> But even then, only the compilation may be assumed to have a later period of origin.

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<sup>52</sup> Winternitz, *History of Indian Literature*, Vol. 1, 1972, p. 125.

<sup>53</sup> Macdonell, *A History of Sanskrit Literature*, 1962. p. 155.

<sup>54</sup> Dr. Suryakant Bali, *Atharvavedasamhiti*, Vol. 1, Intro. Nag Publishers, p. xi.

Even amidst these disputes, Indian tradition and literature simultaneously accept the existence of the vedic trio and the quadruplicity of the Vedas. Some texts like *Brhadira, yakopaniAd*,<sup>55</sup> *Gopathabrahma, a*,<sup>56</sup> *Mu, akopaniAd*,<sup>57</sup> *Mahibhirata*,<sup>58</sup> *ViA, upuri, a*<sup>59</sup> and *Matsyapuri, a*<sup>60</sup> present some examples for this.

<sup>55</sup> 2.4.10  
 +<sup>o</sup>É "É½piÉÉä |ÉÚiÉ<sup>o</sup>É ÊxÉ·ÉÊ<sup>o</sup>ÉiÉ"ÉäiÉnÂù ðÉoùm  
 'ÉänùÉä ðÉVÉÖ'Éænù& <sup>o</sup>ÉÉ"É'ÉänùÉäIÉ  
 'ÉÉÇÎRÂóMÉ®ú<sup>o</sup>É&\*

<sup>56</sup> 1.2.24, 1.3.2

<sup>57</sup> 1.1.5

iÉjÉÉ{É®úÉ @ñM'ÉänùÉä ðÉVÉÖ'Éænù& <sup>o</sup>ÉÉ"É  
 'ÉänùÉäIÉ'ÉÇ'Éänù&\*

<sup>58</sup> *áalyaparva*, 41, 34, *Dro, aparva*, 51, 22.

<sup>59</sup> 4.3.20.

<sup>60</sup> 1.4.4.11

Whenever the size and merits of the contents are evaluated, *Atharvaveda* stands next to the *Īgveda*. It has always been called by the names *Bhīāgveda*, *Brahmaveda*, *Kāatraveda*, *A'giroveda*, *Atharvi'giroveda* and so on.<sup>61</sup> Abundance of medical references gave the work the name *Bhīāgveda*. The priest proficient in the *mantras* of the *Atharvaveda* is called *Brahman*. Thus as the *veda* connected with the priest *Brahman* it is called *Brahmaveda*. The *Atharvaveda* also contain profuse references to political science, and acquired the name *Kāatra veda*. The rest of the names connect it with the sages. According to tradition, contents of the *Atharvaveda* can be classified into seven topics viz *bhīāajyini*, *iyuāyini*, *pauāṅṅikini*, *priyaçcittini*, *strçkarmini*, *rijaakarmi,i* and *brihma,yini*. *Bhīāajyini* deals with medicaments; *iyuāyini* with longevity,

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<sup>61</sup> Dr. Suryakant Bali, *Atharvavedasamhiti*, Vol. 1, Intro. Nag Publishers, p. xv.

*pauṅṅikini* with ploughing of the field, *priyañcittini* with measures to ward off inauspicious happenings; *strīkarmiṇi* with womanhood; *rijaḥkarmiṇi* with statecraft and *brihmaṇyini* with philosophical speculations.<sup>62</sup> With this wide range of topics arranged in one lakh verses, the *Atharvaveda* remains an inevitable source of ancient Indian knowledge.

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<sup>62</sup> *Ibid.*, p.xviii.

In the *bhaiĀjyini* division of contents, we get a number of references to poison. This can be traced as the roots of iyurvedic Toxicology. Toxicological references in the *Atharvaveda* can be put under four headings i.e., those chanted against 1. poison, 2. poisonous snakes, 3. insects and 4. arrow poison. Hymns against poison and poisonous snakes appear thrice in the text.

# **1. Hymns against poison**



These hymns are present the fourth, sixth and seventh books. In the fourth book we may see the practice of curing poison by giving enchanted water. Such water will work like elixir to eradicate poison.<sup>63</sup> Here, poison is described as *arasa* (sapless). Gruel of sesame is accepted as a source of poison. The hymns assume to fly away poison as an arrow and say that their spells will fix the poison just like a boiling pot.<sup>64</sup> There we can see the plea to a herb to keep the fore-front heroes secured from the attack of poison.<sup>65</sup> Contents of sixth book discuss the eradicating measures of poison. Gods, sun,

<sup>63</sup> Nag Sharan Singh (Ed.) *Atharvavedasamhiti*, Vol. I, VI, Nag Publishers, New Delhi, p. 112.

‘ÉÉÊ®únÆù ‘ÉÉ®úªÉÉiÉè ‘É®úhÉÉ‘ÉiªÉÉ“ÉÊvÉ  
iÉjÉÉ“ÉpiÉªªÉÉÉªÉHÆð iÉäxÉÉ iÉä ‘ÉÉ®úªÉä Ê  
‘É¹É“ÉÂ\*\*

<sup>64</sup> *Ibid.*, p. 113.

Ê‘É iÉä “ÉnÆù “ÉnùÉ‘ÉÊiÉ ¶É®úÊ“É‘É  
{ÉÉiÉªÉÉ“ÉÊªÉ\*1\*  
|É i‘ÉÉ SÉ`ûÊ“É‘ÉªÉä¹ÉxiÉÆ ‘ÉSÉªÉÉ  
ªiÉÉ{ÉªÉÉ“ÉÊªÉ\*\*4\*\*

<sup>65</sup> *Ibid.*

+xÉÉ{iÉÉªÉä ‘É& |ÉiÉ“ÉÉªÉÉÊxÉ Eò“ÉÉÇÊhÉ  
SÉÊGò®äú\*  
‘ÉÒ®úÉxÉÂ xÉÉä +jÉ “ÉÉ nùvÉxÉÂ iÉnÂù ‘É  
BiÉi{ÉÖ®äú nùvÉä\*

sky, earth and three Sarasvatis strengthen us against poison.<sup>66</sup> Water is also capable of destroying poison. Seventh book abuses poison by saying that ‘you are an enemy who mixed poison in poison’ and asks it to return to the snake and smite that.<sup>67</sup>

## 2. Hymns against poisonous snakes

<sup>66</sup> *Ibid.*, VI, p. 284.

näù´ÉÉ +nÖù& °ÉÚªÉÉæ +nùÉnÂù tÈè®únùÉiÉÂ  
 {ÉÞÉiÉ´ªÉnùÉiÉÂ  
 ÊiÉ»É& °É®ú´ÉiÉÒ®únÖù& °ÉÊSÉkÉÉ Ê  
 ´É¹ÉnÚù¹ÉhÉ´´ÉÂ\*\*

<sup>67</sup> *Ibid.*, VII, p. 359.

+{ÉäÁÊ®ú®úªÉÊ®ú´ÉÉÇ +Ê°É\* Ê´É¹Éä Ê  
 ´É¹É´´É{ÉÞCIÉÉ Ê´É¹ÉÊ´´ÉnÂù´ÉÉ +{ÉÞCIÉÉ&\*  
 +Ê½þ´´Éä´ÉÉ|ªÉ{ÉäÊ½þ iÉÆ VÉÊ½þ\*\*

These are present in the fifth, sixth and seventh books. The fifth book tells that the spells given by Varuṅa are used to destroy poison. It induces the snake to be killed with its own venom.<sup>68</sup> Five varieties of snakes are mentioned by their names and are directed not to interfere in the journey of a friend. The names given in are *kaṣṛita*, *ṛṣina*, *upatṛya*, *babhra* and *asṛta*.<sup>69</sup> The hymes identify *iligṛ* and *viligṛ* as the parents of these dreadful serpents.<sup>70</sup> In these hymns we can see the clear reflection of the feeling of fear.

<sup>68</sup> *Ibid.*, V, p. 186.

SÉIÉÖ<sup>1</sup>ÉÉ iÉä SÉIÉÖ<sup>1/2</sup>Çṛîx"É Ê 'É<sup>1</sup>ÉähÉ ½ṛîx"É iÉä Ê  
 'É<sup>1</sup>É"ÉÂ\*  
 +½äṛ Ê©É<sup>a</sup>É<sup>o</sup>'É "ÉÉ VÉÒ'ÉÒ& |Éi<sup>a</sup>ÉMÉ"ÉäiÉÖ i'ÉÉ Ê  
 'É<sup>1</sup>É"ÉÂ\*\*4\*\*

<sup>69</sup> *Ibid.*

<sup>70</sup> *Ibid.*

The sixth book describes the attempts to expell the snake venom out. A seer says ‘just like sun revolving round the earth, I wandered about searching for different snakes and with that experience I destroy poison’.<sup>71</sup> He calls for the knowledge of all priests, seers, gods, and all past and future deeds to be with him while he is treating poison.<sup>72</sup> The seventh book mentions of a sweet plant used as a remedy for envenomation.<sup>73</sup> But the name of the plant is not given. About the application of the plant there are references. After the bite, the site of bite has to be sucked so as to squeeze out the venom. Then the plant has to be applied

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<sup>71</sup> *Ibid.*, VI, p. 231.  
 {ÉÊ®ú tÉÉ”É’É °ÉÚªÉÉæ½pÒxÉÉÆ VÉÊxÉ”ÉÉMÉ”ÉÂ  
 ..... iÉä ’ÉÉ®úªÉä Ê’É¹É”ÉÂ\*

<sup>72</sup> *Ibid.*, p. 232.  
 ªÉnÂù ¥ÉÀÊ¡ÉªÉæqpùÊ¹ÉÊ¡ÉªÉÇnÂù näù´Éèì´ÉÊnù¡ÉÆ  
 {ÉÖ®úÉ  
 ªÉnÂù ¡ÉÚ¡ÉÆ ¡É’ªÉ”ÉÉ°Éx´É¡ÉÂ ¡ÉäxÉÉ ¡Éä ’ÉÉ®úªÉä  
 Ê’É¹É”ÉÂ\*\*

<sup>73</sup> *Ibid.*, VII, p. 339.

on wound.<sup>74</sup> This resembles the iyurvedic method of treatment.

### 3. Hymns against arrow-poison

In the fourth book, the poison used in arrows is mentioned to be a herb. Brahman, with ten heads and mouth made the herb sapless. The herb is inactive only to the winged eagle. All the parts of the arrow are smeared with poison. There is a prayer to make all those who are indulged in the process of poisoning arrows impotent.<sup>75</sup>

### 4. Hymns against insect bites

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<sup>74</sup> *Ibid.*

᳚ÉiÉÉä nù]Æõ ᳚ÉiÉÉä vÈÒiÉÆ iÉiÉºiÉä ÊxÉ¼  
´ÉÇ᳚ÉÉ´´ÉÊºÉ\*

<sup>75</sup> *Ibid.*, IV, p. 112.

᳚Éä + {ÉÒ¹ÉxÉÂ ᳚Éä + Ênù{ÉxÉÂ ᳚É + Éº᳚ÉxÉÂ ᳚Éä +  
´ÉÉºÉpVÉxÉÂ

ºÉ´Éæ iÉä ´ÉwÉ᳚É& E᳚òiÉÉ ´ÉÊwÉì´É¹ÉÊMÉÊ®ú&  
E᳚òiÉ&\* 7

´ÉwÉ᳚ÉºiÉä JÉÊxÉiÉÉ®úÉä ´ÉÊwÉºi´É´´Éº᳚ÉÉä¹ÉvÉä  
´ÉìvxÉ& ºÉ {´ÉÇiÉÉä ÊMÉÊ®ú᳚ÉÇiÉÉä VÉÉiÉÉ´´ÉnÆù Ê  
´É¹É´´ÉÂ\*\* 8



This period witnesses the transition of the religious matter to secular thoughts. *Itihisas* and *puri,as* were composed during this period. This is followed by the *samhiti* period and modern period.

#### **1.3.2.3.1 The *Itihisas***

Without the evaluation of *itihisas* the history of Toxicology remains incomplete. Both the *Rimiya,a* and the *Mahibhirata* clearly mark the development in the field of Toxicology.

##### **a. The *Rimiya,a***

In the work, we can see that people are aware of the poisonous nature of snakes.<sup>77</sup> Usage of poisons for suicidal purposes is also frequently mentioned.<sup>78</sup> Criminal poisoning is also familiar to the society.<sup>79</sup> Rima himself fears that Kaikeyi will poison his mother and Sumitra. Poisoned liquor also appears.<sup>80</sup> Daśaratha compares Kaikeyi to poisoned liquor. While describing the churning of the

<sup>77</sup> *Vilmçkirimiya*, a, Ēra,yaki ,a, 20. p. 265.  
 Èò&EPò¹hÉ°É{ÉÇ°ÉÉ°ÉÒxÉ°ÉÉ¶ÉÒÊ´É¹É°ÉxÉÉMÉ°É°ÉÁ  
 iÉÖnùìªÉÊ¡É°É°ÉÉ{ÉzÉ°ÉÉRÂóMÉÖ±ªÉOÉähÉ  
 ±ÉÒ±ÉªÉÉ\* 1-4.

<sup>78</sup> *Ibid.*, Ayodhyiki ,a, 7, p. 486.  
 +½Æþ Ê½þ Ê´É¹É°ÉÉtè´É{ÉÒì´ÉÉ ¨É½Öþ iÉ´ÉÉOÉiÉ&  
 {É¶ªÉiÉ°iÉä°ÉÊ®ú¹ªÉÉÊ°É®úÉ°ÉÉä  
 ªÉtÉÊ¡ÉÊ¹ÉSªÉiÉä\*

*Ibid.*, 21, p. 130.  
 ªÉÊnù°ÉÉÆ nÖù&Ê¡ÉiÉÉ°Éä´ÉÆ´ÉxÉÆ xÉäiÉÖÆ xÉ  
 SÉäSUôÊ°É\*  
 Ê´É¹É°ÉÉiMxÉ VÉ±ÉÆ´ÉÉ½þ°ÉÉ°iÉÉ°ªÉä  
 °ÉpiªÉÖÈòÉ®úhÉÉiÉÁ\* 21

<sup>79</sup> *Ibid.*, Ēra,yaki ,a, 20. p. 265.  
 ÈòÉ±É{ÉÉ¶ÉÆ°É°ÉÉ°ÉVVªÉ Èòh`äö°ÉÉä½þÉzÉ  
 ¨ÉÖvªÉiÉä  
 ªÉ°i´ÉÉ°Ét°É°ÉÉ°ÉÉt{ÉÒiÉ´ÉÉîx´É¹É°ÉÉÖkÉ°É°ÉÁ\*\*

<sup>80</sup> *Ibid.*, Ayodhyiki ,a, 12. p. 490.  
 °ÉiÉÓ i´ÉÉ°É½þ°ÉiªÉxiÉÆ´ªÉ´ÉªªÉÉ°ªÉ°ÉiÉÓ  
 °ÉiÉÒ°ÉÁ\*  
 °üÊ{ÉhÉÓ Ê´É¹É°ÉÉÆªÉÖHòÉÆ{ÉÒì´Éä´É°ÉÊnù®úÉÆ  
 xÉ®ú&\*



ocean, expulsion of poison viz. *hilihala* is mentioned.<sup>81</sup> Poison was given to induce abortion. Famous king Sagara had to resist the action of an abortifacient in the womb. Thus he got the name. Treatment using medicines and *mantras* are mentioned. Snakes are charmed by *mantras*.<sup>82</sup> A snake-jewel viz., *nandana* is given to Rima by Viṣvimitra.<sup>83</sup> This is mentioned to have the capacity to kill demons. Arrows are not poisoned but are always compared with

<sup>81</sup> *Ibid.*, Bilaki, a, 45. p. 282.  
 =i{É{ÉÉÍÉÉÍMxÉ°ÉÆEòÉ¶ÉÆ ½pÉ±ÉÉ½p±É°É½pÉÉ  
 ´É¹ÉhÉÂ\*  
 iÉäxÉ nùMvÉÆ VÉMÉi°É´ÉÈ °Énäu  
 ´ÉÉ°ÉÖ®ú´ÉÉxÉÖ¹É°ÉÂ\*

.....  
 ½pÉ±ÉÉ½p±ÉÆ Ê´É¹ÉÆ PÉÉä®Æú  
 °ÉÆVÉOÉÉ½pÉ°ÉpiÉÉä{É°É°ÉÂ\*\*

<sup>82</sup> *Ibid.*, Ayodhyiki, a, 12. p. 480.  
 °Éhb÷±Éä {ÉzÉÉòÉä ûrùÉä °ÉxjÉèÊ®ú´É °É½pÉÉ  
 ´É¹É&\*

<sup>83</sup> *Ibid.*, Bilaki, a, 27. p. 211.  
 ´ÉvÉÍÉÈ®úÍÉ°ÉÉÆ æÉÉÊxÉ nùnùÉ°ÉäiÉÉÉÊxÉ °É  
 ´ÉÇ¶É&\*  
 ´ÉètÉvÉ®Æú °É½pÉ°ÉjÉÆ SÉ xÉxnùxÉÆ xÉÉ°É  
 xÉÉ°ÉiÉ&\*  
 +É½p®úixÉÆ °É½pÉæÉÉ½pÉä nùnùÉÊ°É xÉp  
 ´É®úÉi°ÉVÉ\*\*

poisonous snakes.<sup>84</sup> In the *Sundaraki*,<sup>a</sup> there is a reference to the medicinal plants losing their innate capacity to cure poisoning.<sup>85</sup>

From these accounts it can be assumed that the use of poison both for the suicidal and criminal purposes were in vogue. The treatment using medicinal plants was a regular practice. This marks the development of Toxicology during the period of the composition of the *Rimiya*,<sup>a</sup> i.e, in the beginning years of the Christian era.

<sup>84</sup> *Ibid.*, Ayodhyiki,<sup>a</sup>, 63. p. 163.

+ "ÉÖ\VÉÆ ÊxÉÊ¶ÍÉÆ æÉÉhÉ"É½p"ÉÉ¶ÉÒÊ  
 'É¹ÉÉä{É"É"ÉÂ\*

<sup>85</sup> *Ibid.*, Sundaraki,<sup>a</sup>, I. p. 1698.

Ê¶É®úÉäÊ|É& {ÉΠΙÉÖÊ|ÉxÉÉÇΜÉÉ 'αÉΗòº  
 'ÉÎºiÉÉè±ÉiÉhÉè&  
 'É"ÉxiÉ& {ÉÉ'ÉEÆè PÉÉä®Æú nùnÆù¶ÉÖnÇù¶ÉxÉè&  
 Ê¶É±ÉÉ&\*  
 iÉÉÆºiÉnùÉ °ÉÊ'É¹ÉènÇù¹]ðÉ&  
 EÖòÊ{ÉiÉèºiÉè"ÉÇ½pÉÊ¶ÍÉ±ÉÉ&\*  
 VÉV'É±ÉÖ& {ÉÉ'ÉEèÉäquò{íÉÉ ÊæÉÊ|ÉnÖù¶SÉ  
 °É½p»ÉvÉÉ  
 αÉÊxÉ i'ÉÉè¹ÉvÉVÉÉxÉÉÊxÉ iÉÎº"É\VÉÉiÉÉÊxÉ {É'ÉÇiÉä  
 Ê'É¹ÉPχÉÉxºÉÊ{É xÉÉMÉÉxÉÉÆ xÉ ¶ÉäEÖò&  
 ¶ÉÊ"ÉiÉÖÆ Ê'É¹É"ÉÂ\*\*

## **b.The *Mahibhirata***

Having a development extending upto centuries, the *Mahibhirata* pictures all aspects of Indian life and culture. In the *idiparva*, a science viz., *viÀahirçvidyi* is said to be taught to Kaḷyapa.<sup>86</sup> Then onwards he was an authority of Toxicology. On the way to protect the king ParçkÀit, Kaḷyapa encounters with the divine snake, TakÀaka and proves his proficiency.<sup>87</sup> But after the contest, Kaḷyapa withdraws from his mission. The reason given by the sage is

<sup>86</sup> *Mahibhirata*, I, 20. 16.

αÉ½Öpi´ÉÆ |Éä|ªÉ °É {ÉÉÇhÉÉÆ |ÉVÉÉxÉÉÆ  
 Ê½piÉÉðÉªÉªÉÉ\*  
 |ÉÉnùÉnÂù Ê´É¹É½pÉ®úÓ Ê´ÉtÉÆ Eð¶ªÉ {ÉÉªÉ  
 ¨É½pÉi¨ÉxÉä\*\*

<sup>87</sup> *Ibid.*, p. 291.

xªÉÓÉÉävÉ¨ÉäxÉÆ vÉIªÉÉÊ¨É {É¶ªÉiÉiÉä  
 ÊuùVÉÉäkÉ¨É

.....  
 °É´ÉPIÉiÉäxÉ nù¹]õiÉÖ {ÉzÉMÉäxÉ ¨É½pÉi¨ÉxÉÉ  
 +É¶ÉÒÊ´É¹ÉÊ´É¹ÉÉä {ÉäiÉ& |ÉVÉV´ÉÉ±É °É¨ÉxiÉiÉ&\*

.....  
 |Éº¨ÉÒ|ÉÚiÉÆ iÉiÉÉä´ÉPIÉÆ {ÉzÉMÉäxpùªÉ iÉävÉºÉÉ  
 |Éº¨É °É´ÉÈ °É¨ÉÉ¾piªÉ Eð¶ªÉ {ÉÉä´ÉÉCªÉ¨É¥É  
 ´ÉÒiÉÂ\*

.....  
 |Éº¨É®úÉ¶ÉÒEPðiÉÆ´ÉPIÉÆ Ê´ÉtªÉÉ °É¨ÉVÉÒ´ÉªÉiÉÂ  
 +RÂÓEÖò®Æú EPðiÉ´ÉÉÆºiÉjÉ iÉiÉ& {ÉhÉÇuùªÉÉÍx  
 ´ÉiÉ¨ÉÂ\*  
 {É±ÉÉÉÊ¶ÉxÉÆ ¶ÉÉÉJÉxÉÆ SÉ iÉiÉÉ Ê´É]õÊ {ÉxÉÆ  
 {ÉÖxÉ&\*

interesting. He says that if he protects the king he will get enormous wealth and if the snake is ready to provide him with that much of money he will abandon his mission.<sup>88</sup> This statement actually is thought provoking. Later physicians who dealt with cases of poisoning are very particular in refusing any type of remuneration. The complete treatment is done as a service to the society. Sometimes the story of Kaḷyapa might have given inspiration for such a belief to come into practice.

<sup>88</sup>

*Ibid.*

vÉxÉÍÉÉæ æÉÉ"æÉ½Æþ iÉjÉ iÉx"Éä näùÉ½þ  
 ¡ÉÖVÉÆMÉ"É  
 iÉiÉÉä½Æþ Ê´ÉÊxÉ´ÉiÉ¹æÄä ø´ÉÉ{ÉiÉäæÉÆ |ÉMÉÞÁ  
 ´Éè\*

Treatment of poison involved mantras and antidotes. Physicians used to specialize Toxicology. This is described in the portion explaining the precautions done to protect king ParçkÀit from the bite of snake TakÀaka.<sup>89</sup> The name of sage Èstika who was the priest of snake sacrifice conducted by Janamejaya and who has protected the snakes from extinction is held in high esteem and his name itself is capable of repelling snakes and eradicating snake poison.<sup>90</sup> In another context, Duryodhana poisons Bhçmasena with *Kilak£¶a* and when bitten by poisonous snakes the latter gets revived. Here, the general rule of

<sup>89</sup> *Ibid.*

“ÉxjÉè®úMÉnèùì´É¹É½p®èú& ®úìªÉ“ÉÉhÉÆ |  
ÉªÉixÉiÉ&\*

<sup>90</sup> *Ibid.*

+ÉºiÉÒEð& ºÉ{ÉÇºÉjÉä´É& {ÉzÉMÉÉxªÉÉä}ªÉ®úíÉiÉ\*  
iÉÆ º“É®úxiÉÆ “É½pÉ;ÉÉMÉ& xÉ “ÉÉÆ  
È½pÈºÉiÉÖ“É½ÇpIÉ  
ºÉ{ÉÉÇ{ÉºÉ{ÉÇ }ÉpÆù iÉä MÉSUô ºÉ{ÉÇ“É½pÉÈ´É¹É  
VÉxÉ“ÉäVÉªÉªÉªÉªÉYÉÉxiÉä +ÉºiÉÒEð´ÉSÉxÉÆ º“É®ú  
+ÉºiÉÒEðªÉ´ÉSÉ& ,ÉÖi´ÉÉªÉ& ºÉ{ÉÉæ xÉ ÊxÉ  
´ÉiÉÇiÉä\*  
¶ÉiÉvÉÉ Ê;ÉtiÉä “ÉÚDvxÉ È¶É¶É´ÉPIÉið±ÉÆªÉiÉÉ\*\*

toxicological treatment i.e., the antagonism of animal poisons and vegetable poisons is clearly mentioned.

These evidences prove the development of Toxicology during the period of 5<sup>th</sup> century BC and AD 5<sup>th</sup> century.

#### **1.3.2.3.2 The *Purī*, as**

The term *Purīḥa*, literally means ‘old narrative’ and is attributed to a class of books, which describe the legends and popular stories of their age. Main topics dealt with in a *Purīḥa* are 1) creation 2) re-creation of the world from its constituent elements, 3) genealogies of gods, sages and kings. 4) cosmic cycles and 5) accounts of royal dynasties.<sup>91</sup> These texts adopt a technique of a narrative peculiar to India. In them, historical matters and original description of facts are seen as if entwined with the fanciful descriptions. Even then, their encyclopedic nature throws light on various fields of traditional knowledge. A number of *Purīḥas* speak considerably about Toxicology. The date of the composition of *Purīḥas* falls in between AD 1<sup>st</sup> century and 10<sup>th</sup> century.<sup>92</sup> Now the *Purīḥas* of toxicological importance can be evaluated.

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<sup>91</sup> Pushpendra Shastri, *Introduction to Purīḥis*, Rashtriya Sanskrit Sansthan, New Delhi, 1995.

<sup>92</sup> *Ibid.*



### a. The *BhaviĀyapuri*, a

Ranking itself as a *Mahipuri*, a *BhaviĀyapuri*, a gives valuable information about sun worship.<sup>93</sup> It is considered as a book of prophecies. The work consists of four sections (*parvas*) viz. *brahma*, *madhyama*, *pratisarga* and *uttara*. The first section viz., *brahmaparva* has been placed chronologically in the 5<sup>th</sup> century.<sup>94</sup> The chapters 32 to 36 of the *pañcamçkalpa* of *brahmaparva* deal exclusively with snake bite and related matters.

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<sup>93</sup> *Ibid*, p. 20.

<sup>94</sup> *Ibid.*, p. 94.

The 32<sup>nd</sup> chapter viz., *nigapaṃcam* *çvratavar, ana* describes the rituals to be observed in the celebration of *Nigapaṃcami*.<sup>95</sup> Pictures of snakes drawn on earth, or the idols of snakes made of mud or wood are to be worshiped by offering flowers, and smoke. This ritual is a must for the liberation of the souls of those who are killed by snake bite. The 33<sup>rd</sup> chapter viz., *sarpadamÀṣṣrivar, ana* elaborates the mating habits, lying and hatching of eggs, sex of the offspring, life-span, enemies, molting habits, type and number of fangs, reasons for bite, locus of poison, signs of bite, and the prognosis. Peacock, human beings, the hoof of cow, dove, cat, tiger and scorpions are

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<sup>95</sup> *BhaviÀyapuri, a.*  
 ¡ÉÖÊ´É ÊSÉjÉ´´ÉªÉÉzÉÉMÉÉxÉIÉ´´ÉÉ  
 Eò±ÉvÉÉèiÉEòÉxÉÂ\*  
 EPòì´ÉÉ nùÉ`ù´´ÉªÉÉx´ÉÉÊ{É +IÉ´´ÉÉ´´Épx´´ÉªÉÉzÉP{É\*  
 {ÉÆSÉ´´ÉÉ´´ÉSÉÇªÉänÂù¡ÉCiªÉÉ xÉÉMÉÉxÉÉÆ  
 ú{É\SÉEÆò xÉP{É\*  
 Eò®ú´ÉÒ®èú& ṠÉiÉ{ÉjÉèVÉÉÇiÉÒ{ÉÖ¹{ÉèṠSÉ  
 °ÉÖµÉiÉÉ\*  
 iÉIÉÉ MÉxvÉèṠSÉ vÉÚ{ÉèṠSÉ {ÉÚVªÉ  
 {É\SÉEò´´ÉÖKÉ´´É´´ÉÂ\* 47-48

described as the enemies of snakes. An important matter given in the *Purīḥa* is the statement that the fangs are not the permanent carriers of poison but only the channels to transfer it.<sup>96</sup> The locus of poison is identified as the right eye. Whenever the snake finds an emergency, the poison moves on to the head and then through the arteries and blood vessels, reaches the fangs and finds an outward passage through the fangs. This corresponds with the findings of modern science. The snakes born in the unusual time are described as non

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<sup>96</sup> *Ibid.*  
 nÆù¹]ÅöÉhÉÉÆ Ê´É¹ÉÆ xÉÉÎºiÉ ÊxÉiªÉ¨Éä´É  
 ¦ÉÖVÉÆMÉ¨Éä  
 nùÊiÉhÉÆ xÉäjäÉ¨ÉÉºÉÉt Ê´É¹ÉÆ ºÉ{ÉÇºªÉ ÊiÉ¹`öÊiÉ\*  
 36  
 ºÉÆGÖòrùºªÉä½p ºÉ{ÉÇºªÉ Ê´É¹ÉÆ MÉSUôÊiÉ  
 ¨ÉºiÉÉäò\*  
 ¨ÉºiÉÉèÉrù¨ÉxÉÓ ºÉÉÊiÉ iÉiÉÉä xÉÉ]öÒ¹ÉÖ MÉSUôÊiÉ\*\*  
 37  
 xÉÉb÷Ò¦ªÉ& {ÉtiÉä nÆù¹]ÅöÉÆ Ê´É¹ÉÆ iÉjÉ ¦É  
 ´ÉiÉÇiÉä\*

poisonous.<sup>97</sup> These have only a short lifespan.

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<sup>97</sup> *Ibid.*  
+EòÉ±ÉVÉÍiÉÉ ðÉä °É{ÉÈ ÊxÉì´É¹ÉÉ°iÉä |  
ÉÈÒÒìÉiÉÉ&\*\*

The 34<sup>th</sup> chapter viz. *damizadañakadñtalakñana* describes the symptoms of incurable bites, inauspicious stars, dangerous places, the 12 vital parts, the characteristics of the messenger and the sacred snakes. The portion describing the characteristics of the messenger is noteworthy. If the messenger starts with the letter *ca, ña, ta, pa, ya, or za;* says “gone” shivers the head, names the patient and makes a mistake in it, bears a rode or rope, wears a red or black cloth on the face, and walks hastily making noise by foot, he becomes an inauspicious sign. The sign of messenger is not considered in the *Samhiti* texts but when we come to the texts from Kerala, this is given utmost importance. Hence, this *Purific* episode bears great significance.

The 35<sup>th</sup> chapter viz *dhitugataviAkriyivar, ana* gives the route of the poison in the body of a victim. Its spreading through the seven *dhitus* along with the symptoms and treatments are also enumerated.

The 36<sup>th</sup> chapter viz., *iriva, ikanigapaṃcamḥ vṛatavar, ana* describes the symptoms of a patient who is bitten by a male, female, virgin, pregnant or neuter snakes; the four fold division of snakes; the caste wise division of snakes; the symptoms produced by each, the domains of each variety and the 192 varieties of snake species.

The work is significant since it sums up the findings in the field of Toxicology.

#### **b. The *Agnipuri, a (AP)***

This *mahipurina* covers a number of fields of science. Its date is assumed to be in between AD 7<sup>th</sup> and 9<sup>th</sup> centuries.<sup>98</sup> In *AP* Toxicology and related subjects are treated in the chapters 294 and 295. The 294<sup>th</sup> chapter is on the characteristics of snakes. The details of eight divine snakes and their genealogy are also given.<sup>99</sup> The four-fold division of snakes, their internal divisions, life cycle of snakes, inauspicious time, places and stars, four types of bites, characteristics of auspicious and inauspicious messengers, good and bad omens and the route of poison in the body are the other topics given in the chapter.

<sup>98</sup> Pushpendra Shastri, *Introduction to Puri, is*, Rashtriya Sanskrit Sansthan, New Delhi, 1995, p. 101.

<sup>99</sup> *AP*, II, Hindi Sahitya Sammelan, Prayag, 1986, p. 1448.  
 ¶Éä¹É´ÉÉºÉÖÉEòìÉÍÉÉ]ªÉÉ& EòEÇò]õÉ]ªÉÉä  
 ¨É½þÉ¨ªÉÖVÉ&  
 ¶ÉÆJÉ{ÉÉ±É¶SÉ EÖðÊ±ÉEò <iªÉ¹]õÉè xÉÉMÉ  
 ´ÉªÉÇEðÉ&\* 2

The nature of a bitten snake is inferred from observing the mannerisms exhibited by the messenger. That depends mainly on the exhalation process, taking place both in the messenger and physician. If the air passes forcefully through the right side of the nose, the bitten snake is female. But if the same thing happens in a messenger the snake is male. If both the messenger and the physician are taking breath through both the holes of the nose then the snake is neuter in sex. The body part, which is unconsciously touched by the messenger indicates the position of bite. If the messenger moves his legs constantly it is inauspicious and if he sits it is auspicious. If the messenger is accompanied by an animal it is a good sign but if the same animal is wandering around it is bad.



The articulation of the message is also recorded to determine the result of the treatment. In this process, the letters of the Sanskrit alphabet are divided into two groups. Vowels are generally auspicious while consonants are of complex nature. The first, second, third and fourth letters of each penta group of consonants are dedicated respectively to the Gods, Vayu, Agni, Indra and Varuṇa while the fifth letter of each group is dedicated to both Varuṇa and Indra. These letters are considered as neuter and inauspicious in initial pronunciation. The letters dedicated to the Gods Vayu and Agni are inauspicious while those dedicated to Indra are harmless. The letters dedicated to Varuṇa are auspicious. The sound of an elephant or a cloud is considered as good omen. The physician has to encircle a fruit bearing tree. Songs heard from the left side are auspicious while lies, cries or the sound

of a chariot etc. are bad omens. Other good omens for a physician are prostitute, brihmin, king, virgin, cow, elephant, trumpets, flag, milk, ghee, curd, conch, water, umbrella, fruit, gods, rice, gold, and silver. The sight of a sculpture in untidy clothes and bearing twigs, rope, fire etc, eagle, owl, oil, skull and cloth are considered as bad omens.<sup>100</sup>

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<sup>100</sup> *Ibid.*, I, p. 1451-1454.

The 295<sup>th</sup> chapter viz., *daĀṅacikitsi* describes the treatment including enchantments, meditation and application of antidotes. The *mantra* ᳚ xÉ"ÉÉä ᳚ÉMÉ 'ÉiÉä xÉÒ±ÉÉh`öÉ᳚É is capable of eradicating any type of poison. A *mantra* viz., *viyati* is given for the treatment for snake poisons.<sup>101</sup> The performance of *Āa·a 'ganyisa*, *garu·amantra*, *paṃcira*, *idhipatimantra*, *jinuda*, *᳚mantra*, and *rudra mantra* are given.<sup>102</sup>

<sup>101</sup> *Ibid.*, 295, p. 1455.

᳚ÉÉxiÉ᳚'É®úÉĪx'ÉiÉÉä ¥ÉÀÉ ±ÉÉäÉ½piÉ᳚iÉÉ®úEò&  
 Ê᳚É'É&\*3  
 Ê'É᳚ÉiÉäxÉÉÇ"É"ÉxjÉÉä᳚ÉÆ iÉÉi᳚ÉÇ& ᳚Éxnù"É᳚É&  
 ᳚"ÉpiÉ&\*4

<sup>102</sup> *Ibid.*, p. 1459.

{ÉÊiÉ {ÉÊiÉ "É½pÉ {ÉÊiÉ "É½pÉ {ÉÊiÉ Ê'É Ê'É ᳚  
 'ÉÉ½pÉ\*  
 {ÉÊiÉ {ÉÊiÉ "É½pÉ {ÉÊiÉ "É½pÉ {ÉÊiÉ ÊiÉ ÊiÉ ᳚  
 'ÉÉ½pÉ\* 25  
 uùÉ'ÉäiÉÉè {ÉÊiÉ®úÉh"ÉxjÉÉè Ê'É¹ÉPxÉÉ  
 'ÉÊ᳚É"ÉxjÉhÉÉiÉĀ\* 28

Even though medicaments are also mentioned in the beginning verse, only the treatment through *mantras* is given in the text. The performance and muttering of each and every *mantra* are explained with the details.

In the history of *Ēyurveda*, post vedic period is further divided into *Samhiti* period and modern period.

**1.3.2.3.3 Samhiti period (800 –500BC):** In this period, medical accounts found scattered in the *Vedas* got elaborated. Experiments were conducted and results were recorded. Breaking the boundaries of religion, *Āyurveda* gained a secular outlook. Experiences of common folk were included into the knowledge base. A number of writers contributed their own portion to give a solid basis for *Āyurveda*. *CS*, *SS* and *AH* are considered as the great trio of *Āyurveda*. These works mention of the mythological origin of *Āyurveda*. According to *Suśruta* the tradition of *Āyurveda* begins right from the creator Brahma. He transmitted the science to Prajapati. The *Aśvins*, *Indra* and *Dhavantari* received the science in succession. *Dhanvantari* taught the science to *Suśruti*, *Aupadeva*, *Aurabhra*, *PuĀkalivata*, *Karavçra*, *GopurakĀçta*, *Bhoja* and *Vaitara*, a.<sup>103</sup> Each of them created their

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<sup>103</sup> *Suśrutasaṁhiti*, Sĕtrasthina, I.

own *Samhitis*, among which the one written by Suṛuti enjoyed great popularity. According to Vigbhāṣa, the tradition owes a rather lengthy succession. Vigbhāṣa agrees with Suṛuti till the procurement of the tradition by the Aṣvins. They passed it on to Indra and Bharadvija. From Bharadvija, Ētreya studied the science. Ētreya taught the lessons of *Ēyurveda* to Agniveṣa, Jatukarṣa, Bhela, Pariṣara, Hirṣta and Kāirapiṣi and directed them to compose *Samhitis* of their own.<sup>104</sup>

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¥ÉÀÉ |ÉÉä´ÉÉÉ iÉiÉ& |ÉVÉÉ{ÉÊiÉ®úÊvÉVÉMÉä  
 iÉ°´ÉÉnùÊ·ÉxÉÉè  
 +Ê·É|ªÉÉÊ´Éxpù& <xpùÉnù½Æp |ÉnäùªÉ´ÉiÉÊ|É& |  
 ÉVÉÉÊ½piÉ½äpiÉÉä&\*

<sup>104</sup> Aṣṭi'gahṛdaya, Sṭrasthina, 1-3.

¥ÉÀ °´Épi´ÉÉªÉÖ¹ÉÉä´ÉänÆù |  
 ÉVÉÉ{ÉÊiÉ´ÉÊVÉOÉ½piÉÂ  
 °ÉÉäÊ·ÉxÉÉè iÉÉè°É½p»ÉÉiÉÆ °ÉÉäÊjÉ  
 {ÉÖjÉÉèÉÊnùEòÉxÉÂ ´ÉÖxÉÒxÉÂ  
 iÉäiMxÉ´Éä¶ÉÉÊnùEòÉÆ°iÉäiÉÖ {ÉpiÉÉÂò iÉxjÉÉÊhÉ  
 iÉäÊxÉ®äú\*\*

From these accounts, it can be assumed that *Āyurveda* developed into two branches, i.e., *Kiyacikitsi* (general medicine) and surgery. Ātreya and Agniveḥa were the propagators of the former branch while Dhanvantari and Suśruta were those of the latter. All these works treated Toxicology as their branch. A brief account of the contribution of these ancient physicians is given below.

## **a. The early compositions**



Bharadvija is credited with the authorship of a work viz., *Bhiradvijçya*.<sup>105</sup> Ētreya (600 BC) and his disciple Agniveza (600 BC) are the preachers of *Agnivezasamhiti*. *Agnivezasamhiti* redated by Caraka, is presently known as CS. Bhela, a contemporary of Agniveza composed *Bhelasamhiti*. A work namely *Kaizyapasamhiti* is composed by Kaizyapa. Besides the famous work on paediatrics a work on Toxicology is also credited with the same title.<sup>106</sup> Atri is also mentioned to have written a *samhiti*. Sanatkumira is said to have composed a *samhiti* on eye and eye diseases. Viçvimitra is mentioned as a great preceptor. KÀirapiçi is mentioned as a great preceptor. KÀirapiçi, author of *KÀirapiçitantra* is frequently mentioned by later writers. Vædhapariçara has written a work on righteous life. This work named *Pariçarasamhiti* has been treated as an

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<sup>105</sup> Lilly Sankunni, *Vaidyaçistracaritram*, I, p. 15.

<sup>106</sup> *Ibid*, p. 25-29.

authentic work by Kaṣyapa. Another Pariśara has also written a *samhiti*. Even though the work is extinct, many authors quote the portion on digestion, described in the text. The sage Jivala is said to have composed a work viz., *Tantrasiraka. Sarvadhara Tantra* of Karata, *Vedīgasira* of Jijali, *Niṣparṅkā* of Mirki,eya, *Karavṛatantra* of Karavṛa, *Girgasamhiti* of Girgya, *Nimitantra* of Nimi, *aupadevatantra* of Aupadeva, *Aurabhra Tantra* of Aurabhra, and *Pauākali Vatatantra* of Pauākali vata are other important works on *Āyurveda*. Though not credited with the authorship of any work, Jivaka; the budhist physician, Parvataka and Bandhaka; famous for pediatrics, Ēlambiyana and Lisiyana famous for Toxicology and Karilabhaṅṅa famous for eye diseases are mentioned by the later writers for their contributions.

Like all other branches, Toxicology also finds its base in the *Samhiti* works. Now it is relevant to analyse the *Samhiti* works, with special reference to the portions on Toxicology.

**b. The *Carakasamhiti* (CS)**

This is the oldest extant work on *Āyurveda*. This has been translated into all major languages of the world and has played a crucial role in popularizing the principles of *Āyurveda*. The work records the conversation between Ātreya and Agniveṣa. Hence it is clear that the work reflects the ideas of the age as given by Ātreya and Agniveṣa. Caraka revised the work which was later on redacted by Dṛḥabala. According to the Chinese translation of CS. Caraka was the court physician of king KaniṠka. (AD 1<sup>st</sup> Century). But analyzing the contents and language P.C. Ray opines that Caraka's date may not be later than 600 BC. The former date is widely accepted. P.C. Ray's opinion is accepted by the scholars. The language reflecting the characteristics of an anterior period belongs to Ātreya and Agniveṣa, and there is nothing unusual in Caraka's revision of an ancient work.

The work consists of eight chapters which are further divided into 120 topics. Representing the Ētreya school of Ēyurveda; *Caraka Samhiti* remains the most authentic work on general medicine (*Kiyacikitsi*).

The contents of each *Sthina* can be analysed thus

*SĒtrasthina* – In this chapter all basic principles of Ēyurvedic treatment are enumerated along with their philosophy. *SvisthyacatuĀka*, *NirdeĒacatuĀka*, *KalpanicatuĀka*, *RogacatuĀka*, *YojanicatuĀka* and *AnnapinacatuĀka* are mentioned in this chapter.

*Nidinasthina* – This chapter is on the diagnosis of the diseases.

*Viminasthina* – In this chapter factors affecting drug administration are provided in detail.

*áarçrasthina* – Anatomy, embryology and Genetics are the topics dealt within the chapter.

*Indriyasthina* – Prognosis of diseases are the topic discussed in this chapter.

*Cikitsisthina* – This is the lengthiest chapter, which is on the treatment of various diseases. Among the 30 divisions of the chapter, two deals with rejuvenation and aphrodisiacs.

*Kalpasthina* – This chapter is an pharmacology.

*Sidhisthina* – In this chapter purification and detoxification procedures of the herbs used for *pañcakarma* and the signs of improper purification are discussed.

The 23<sup>rd</sup> chapter of *Cikitsisthina* discusses *agadatantra* in detail. Though not much elaborated, topics of Toxicology are mentioned in many other chapters of the text. While classifying the medicinal plants based on their action, Caraka enumerates the *ViÀaghnas* (detoxifying group). Others being *jçvançya*, *bæmhaçya*, *lekhançya*, *bhedançya*, *sandhinçya*, *dçpançya*, *balya*, *varçya*, *kaçhya*, *hædyà*, *tæptighna*, *arçoghna*, *kuÀ¶haghna*, *kaçughna*, *kæmighna*, *stanyajanana*, *stanyaçodhana*, *çuklajanana*, *çuklaçodhana*, *çnehovaga*, *vamanovaga*, *virecanovaga*, *isthipanovaga*, *anuvisanovaga*, *çirovirecanovaga*, *cchardinigraha*, *tæÀçanigrahana*, *hikkanigrahana*, *purçÀasamgrahaçya*, *purçÀavirajançya*, *mutrasamgrahçya*, *mutravirajançya*, *mutravirecançya*, *kisahara*, *çvisahara*, *çothahara*, *jvarahara*, *çramahara*, *dihapraçamana*, *ççtapraçamana*, *udarddapraçamana*, a

*ġamaradapraġamana, ġulapraġamana,  
ġo, itasthipana, vedanisthipana,  
samjuisthipana, prajasthipana and  
vayasthipana.*

While classifying diseases in the 6<sup>th</sup> topic of *viminasthina, Ēgantuka* (temporary – seasonal) diseases are said to be caused by poison (*viĀa*) air (*viyu*), fire (*agni*) and injuries (*Abhighita*).



### **c. The *Suśrutisamhiti* (SS)**

This has been treated as the earliest known treatise, dealing exclusively with surgery. Even though the work is known by the name of Suśruta, the original work seems to be a record of lessons delivered by Divodisa; the king of Kiṣi to Suśruta and others. Suśruta compiled the lessons which were later on redated by Nigirjuna. The time of composition of the work is assumed to be between the closing years of 6<sup>th</sup> century BC and beginning years of 5<sup>th</sup> century BC.<sup>107</sup> Nigirjuna's recension of the work produced in between 4<sup>th</sup> and 3<sup>rd</sup> centuries BC.<sup>108</sup>

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<sup>107</sup> Priyaranjan Ray, et al. *SS, A Scientific Synopsis*, p. 3.  
<sup>108</sup> *Ibid.*

SS treats surgery as the most useful and important branch of *Āyurvedic* treatment because it can produce immediate cure.<sup>109</sup> The work is broadly divided into five books or *Sthinas*. *Sutrasthina* – This is the first book containing forty six chapters. Here, all the basic principles of *Āyurveda* and surgery are enumerated. Importance, origin and major divisions of the science, teaching method, qualities of disciples and teachers, surgical instruments, pre-surgic and post-surgic preparations, major surgical practices, major diseases, two classifications, detection of signs, diagnosis properties of drugs etc. are the other topics given in the chapter.

*Nidinasthina* – This chapter contain sixteen chapters on pathology. *Āarçrasthina* – In ten chapters, this books deals with embryology and anatomy.

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<sup>109</sup> *Ibid.*  
 +<sup>1</sup>]öÉº´ÉÊ{É +ÉªÉÖ´ÉæñùíÉxjÉä<sup>1</sup>´ÉäiÉñäù  
 ´ÉÊÊvÉÉè´ÉÊ;É´ÉiÉ´ÉÂ,  
 +É¶ÉÖÊGèªÉÉÉè®úhÉÉtxjÉ¶ÉºjÉiÉÉ®úÉÎMxÉ|  
 ÉÊhÉvÉÉxÉÉiÉÂ ºÉ´ÉÇiÉxjÉºÉÉ´ÉÉxªÉÉSSÉ\*18

*Cikitsisthina* – In forty chapters, it discusses medical treatment in detail.

*Kalpasthina* – In eight chapters, it deals with Toxicology, *Uttarasthina*, is believed to be the contribution of redactor Nigarjuna. It contains sixty six chapters on miscellaneous topics.

*Kalpasthina* of *SS* is an important source book of iurvedic Toxicology. Eight chapters deals with food poisoning, vegetable and mineral poisoning, poisonous animals, snake venoms, snake bite treatment, sonic treatment, poisonous rats and rabies producing animals, and poisonous insects respectively. It is this portion, which has been used as the important primary source of the present thesis. All other treatises are compared with it.

#### **d. The *AAṅgi 'gasa 'graha (AS)***



The work *AS* consists of 150 chapters. The first book viz., *Sutrasthina* deals with preventive medicine, pharmacology, basic principles, pathology, and detoxification therapies. It has 40 chapters in it. Second book viz., *áarçrasthina* treats anatomy and symptoms of diseases in twelve chapters. In sixteen chapters *Nidinasthina*, the third book deals with diagnosis. Twenty four chapters in *Cikitsisthina* describe various treatments in detail. In eight chapters *Kalpasthina* prescribes the recipes and methods of detoxification processes. *Uttarasthina* in 50 chapters deals with pediatrics, psychiatry and infectious diseases, troubles of ear, nose and throat, surgery, Toxicology and rejuvenation.

In the present research thesis, chapters 40 – 48 in *Uttarasthina* are taken as the primary source. Though not elaborate as that of *SS*,

*AS* describes all the important aspects of poisoning along with their treatment.<sup>114</sup>

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<sup>114</sup> *AS*, Uttarasthina, pp. 328-379.

In the 48<sup>th</sup> chapter Vigbhaṇi gives an important account viz., *viĀopayogṭya*. In that, he enumerates the properties of *viĀa*. He says that no antidote is so powerful and fruitful than a poison, and prescribes the quantities of poison that has to be provided in each case.<sup>115</sup> He distinguishes between the medicaments used in poisoning. Nectar harmless in normal condition may prove to be fatal in the state of poisoning. Whenever poisoning is under suspicion, antidotes have to be applied.<sup>116</sup> But if the antidote is harmful to the normal state it may work like a poison. If taken with honey, milk and ghee, poison is capable of destroying other poisons.<sup>117</sup> But usage of poison as an

<sup>115</sup> *Ibid.* p. 375.

खÉ Ê´É¹É|ÉÊiÉ´ÉÆ ÊEò\SÉÊzÈÌ´É¹ÉÒEò®úhÉÆ Ê´É¹Éä\*

<sup>116</sup> *Ibid.* p. 375.

ºÉÊ´É¹Éä ºÉÖHò´É´ÉpiÉÆ Ê´É¹É´Éä ´ÉÉ Ê´É¹Éä Ê´É¹É´ÉÄ\*

´É¹É´ÉÄ\*

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+Ê´É´ûrùÉx|ÉºÉÖHòÉä Ê½p ÊxÈÌ´É¹ÉºÉÉ

MÉnùÉäMÉnù&\*

<sup>117</sup> *Ibid.*

lÉÒ®úlÉÉèpùPÉpiÉèºÉÖÇHÆò {ÉÒiÉÆ ½pîxiÉ Ê´É¹ÉÆ

Ê´É¹É´ÉÄ\*

antidote is forbidden in summer, rainy season, bad weather, inauspicious days etc. It cannot be applied in an angry man, someone with vitiated bile, enunch, king, brihmin, weak persons, pregnant women, children, old men or vital parts.<sup>118</sup> More than this, the usage of poisons as antidotes is well described. *Kilakṣṇa* poison is forbidden from medicinal applications.<sup>119</sup> Before the application, all poisonous substances need to be purified and cultured. These are also described in the text.

<sup>118</sup> *Ibid.*

ΟΕΟ<sup>1</sup>“Éä SÉÉi<sup>a</sup>ÉÊ<sup>a</sup>ÉEäò ‘<sup>a</sup>ÉÉvÉÉä xÉ SÉ ‘É<sup>1</sup>ÉEÇ<sup>o</sup>ÉÖ  
 nÖùlnùxÉä  
 xÉ GòÉävÉxÉä xÉ Ê{ÉkÉÉiÉæ xÉ C±ÉÒ<sup>α</sup>Éä ®úÉVÉÊxÉ  
 ÊuùVÉä\*  
 ΙÉÖkÉp<sup>h</sup>hÉÉ,É“ÉvÉ“ÉEÇv‘É  
 ‘<sup>a</sup>ÉÉv<sup>a</sup>ÉiÉ®úÊxÉ{ÉÒÊb÷iÉä\*  
 ΜÉì;ÉhÉÒ<sup>α</sup>ÉÉ±É‘ÉPräù<sup>1</sup>ÉÖ xÉ °üiÉä<sup>1</sup>ÉÖ xÉ “É“ÉÇ<sup>o</sup>ÉÖ\*\*

<sup>119</sup> *Ibid.*

°ÉÉHÖðEÆð “ÉÖ<sup>o</sup>iÉEÆð ¶ÉPRÂóMÉÒ ‘ÉÉ±ÉEÆð  
 °É<sup>1</sup>ÉÇ{ÉÉ<sup>1/4</sup>‘É<sup>a</sup>“ÉÂ\*  
 ‘Éi<sup>o</sup>ÉxÉÉ;ÉÆ SÉ Eò“ÉEÇhÉÆ Ê‘É<sup>1</sup>ÉÆ Î<sup>o</sup>xÉMvÉÆ PÉxÉÆ  
 ΜÉÖ<sup>~</sup>û\*  
 xÉ VÉÉi‘Éx<sup>a</sup>Éi|É<sup>a</sup>ÉÉäHò‘<sup>a</sup>ÉÆ EòÉ±ÉEÚð]Æö Ê  
 ‘É¶Éä<sup>1</sup>ÉiÉ&\*\*



**d. The *Aṅgī'gahādaya* (AH)**

*AH* of Vighna is the most popular work on *Ēyurveda*. Without showing any inclination towards any school, the work gives all the important portions of *Ēyurveda*. The language is simple and poetic and the whole form is composed in verse. This makes the work easy to be memorized. The work contains six chapters.

The first one *sūtrasthina* gives a detailed description of the philosophy of *Āyurveda* which contains the ideas of daily and seasonal regimen, the therapeutic properties of food stuffs and drinks etc. The second chapter mainly *śarīrasthina*, is on human anatomy and physiology. The third chapter *nīdinasthina* describes diseases and their symptoms. The fourth chapter viz., *cikitsasthina* is on treatment. The fifth chapter viz., *kalpidīpīsthina* is on special treatments. The sixth chapter *uttarasthina* has a miscellaneous nature and it deals with childcare, psychiatry, epilepsy, rheumatism, diseases of eyes, ears, nose and throat, wounds, fevers and poison. The portion on poison given in the *uttarasthina* is included in the primary sources of the present study. Based on these texts a number of modern works are produced.

## CHAPTER 2

# **POISON - FACTS AND CONCEPTS**

Discrimination between poisonous and non-poisonous substances was very essential for the sustenance of life. Man experienced the severity of poison from nature. Death, the only end, always horrified him. Gradually, he began to identify those animals, plants and substances that made him suffer. His zeal for existence was so profound that he developed his own theories and treatments for the management of poison. In this chapter, general notions on the nature of poison are analyzed.

### **2.1 Scientific Accounts – Modern View**

The terms poison, toxin and venom are used almost in the same sense. In the absence of correct demarcation, if we look into the definition of the terms, poison is defined as "a substance that when taken into the mouth or

stomach, or when absorbed into the blood is capable of affecting health seriously or destroying life by its action on the tissues with which it comes into contact immediately or after absorption" <sup>1</sup>. Biologically produced substances that are harmful to a living thing are called toxins<sup>2</sup> and animal poisons, delivered subcutaneously bear the name venoms. From this, it is obvious that these three terms try to narrow down the sense. Difference between the meanings of the terms poisonous and venomous is also noteworthy. Poisonous organism proves to be harmful to consume. But a venomous organism uses poison as the major

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1 *EB*, vol: 18, p.98.

*Forensic Medicine*, p: 323

" A poison can be defined as any substance which if introduced into or brought into contact with a living body produces ill health, disease or death."

[www.absoluteastronomy.com/enc3/poison](http://www.absoluteastronomy.com/enc3/poison)

"Poisons are substances that cause illness, injury or death to organisms usually by chemical reaction or other activity on the molecular scale".

*Britannica online*. Academic edition. 13<sup>th</sup> May 2006.

"A poison is a substance capable of producing adverse effects on an individual under appropriate conditions".

2 [www.absoluteastronomy.com/enc3/poison](http://www.absoluteastronomy.com/enc3/poison)

Raymond J.M.Niesink,et al,*Toxicology-principles and applications*,p.3.

"Poisonous substances of natural origin are called toxins".

tool of its defense-mechanism.<sup>3</sup> A single organism can be both venomous and poisonous. Poisons may be swallowed, inhaled, injected or absorbed by the skin or body membrane<sup>4</sup>.

### **2.1.1 Classification**

Modern science classifies poison in different ways i.e. according to their origin, physical form, chemical nature, and their action on the body<sup>5</sup>.

**2.1.1.1 Origin** : Evolutionary significance and development of toxins are rather speculative. They might have developed during the evolution of certain animal species as part of the food procurement or defense mechanisms<sup>6</sup>. Based on origin, poisons are broadly classified as bio-toxins, chemical toxins and radiation.

#### **2.1.1.1.1. Bio-toxins** - Three classes of bio-

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3        *ibid.*

4        *The world book encyclopedia*, vol.15, p.530.

5        *EB*, Vol.18, p.98.

6        Bruce,W.Halstead, "Poison", *Britannica Online*. Academic edition. 2<sup>nd</sup> Aug 2006.

toxins are there. They are

- a) Microbial poisons: Microscopic organisms like bacteria, produce these toxins. The toxin botulinus produced by *Clostridium botulinum* is an example.
- b) Plant poisons: Plants having poison in any of their body part will exert an adverse effect on the consumer. *Atropa belladonna* is notorious for producing the toxin called Belladonna.
- c) Animal poisons: These are commonly called as venoms and are caused by the bites and stings of venomous animals.

Bio-toxins are abundantly seen in warm-temperate and tropical regions. But in polar latitudes these are very rare.

**2.1.1.1.2. Chemical toxins** - Agricultural chemicals, industrial chemicals, drugs, healthcare products and cosmetics are chemical toxins. Insecticides, herbicides,

fungicides, fumigants and rodenticides are the commonly used agricultural chemicals. Carbon Monoxide, Chlorofluorocarbon and many industrial wastes are deadly poisonous to the natural functioning of the Universe. Ultraviolet radiation unopposed by the ozone layer, frequent exposure to x-rays and nuclear radiation prove to be poisonous.

**2.1.1.2 Physical form** - Poisons may exist in the form of solids, liquids, gaseous substances, vapors and aerosols<sup>7</sup>. Among these, when solids need to be dissolved in water to get absorbed, others get an easy access to the system.

**2.1.1.3 Chemical nature**- Metallic / non-metallic, organic / inorganic or acidic / alkaline divisions of poisons are based on their chemical nature. Electrophilic (electron loving) chemicals attack the nucleophilic sites of a

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<sup>7</sup> Bruice, "Poison", *Britannica online*. Academic edition. 2<sup>nd</sup> Aug 2006.

"Aerosols are the solid or liquid particles small enough to remain suspended in air for a few minutes".



living cell.

**2.1.1.4 Mode of action-** Based on their mode of action, poisons may be classified as acute poisons and chronic poisons. Acute poisons act quickly. But chronic poisons have a slow and lasting effect. Based on their physical characters, acute poisons are classified into five groups. Viz.

- a) Corrosive poisons -They destroy adjacent living tissues and mucous membrane. e.g. Hydrochloric acid, nitric acid, sodium hydroxide etc. By intake, these poisons may destroy the lining of the mouth and throat of the victim.
- b) Irritant poisons - They directly affect the mucous membranes. As these membranes line the air passages of the body, the swelling caused in the membrane may seriously affect those body parts. Stomach, intestine, and nerve centers are the major parts affected by the

inflammation of mucous membrane. Metallic poisons like Arsenic and lead are examples of irritant poisons. In diluted condition, corrosive poisons may lose their corrosive effect and become irritants.

- c) Systemic poison - Most of the vegetable poisons are included in this group. Without any irritant or corrosive effect, they directly affect important organs like the nervous system, heart, liver, lungs or kidneys. Overdose of heroine, opium or any other sedative, work like systemic poisons.
- d) Gaseous poisons - Starting with breathing difficulty, the effect of poisonous gases may culminate in death. It is very difficult to detect poisonous gases like carbon monoxide, before it produces some serious problem. This naturally adds to the ferocity of the problem.
- e) Poisonous foods -Food poisoning is the

most familiar method of poisoning. This may be caused by the unconscious usage of spoiled food materials, chemicals, insecticides or pesticides. Some vegetables may be poisonous in certain stages of their growth. e.g. green potatoes. On consumption this may cause serious problems.

With a local action, these poisons enter into the body, and after absorption they begin to inflict important body organs. These poisons may select nervous system, cardiovascular system, reproductive system, immune system, lungs, liver and kidneys as their target sites.<sup>8</sup>

### **2.1.2 Factors affecting poisoning**

There are a number of factors affecting the severity of poison. They are-

**1. Amount taken** : The body of a living being is equipped with a well-organized defense mechanism. Antibodies are produced to

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8 [www.absoluteastronomy.com/enc3/poison](http://www.absoluteastronomy.com/enc3/poison)

destroy the intruding foreign bodies. Small amounts of poison can be controlled through this natural system. But when the intake quantity is large, the system requires external measures of management. In this situation, the distinction between the fatal and toxic doses becomes important. A fatal dose is the smallest dose, which is known to have caused death, and a toxic dose is that which is capable of producing symptoms of poisoning<sup>9</sup>.

**2. Habit:** Usual intake of some poison may create a kind of tolerance in the consumer. Antibodies extracted from such a person can be used as a medicine. Frequent usage of some poisons like arsenic, morphine, alcohol, cocaine and opium leads to addiction. After such a habit formation, the intake of such poisons may not produce serious symptoms. Sudden collapse will be the inevitable end of the condition.

**3. Idiosyncrasy** - the inborn structure of a

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<sup>9</sup> *Encyclopedia Britannica*, Vol.18, p.98.

person may control the absorption of poison.

**4. Age** -A victim of younger age can overcome serious poisoning rather easily than an old man does. Regular functioning of kidneys and other mechanisms are very essential for the elimination of poison.

**5. State of health** - If the immune system of the victim is in a deplorable condition, his chance of recovery is negligible.

**6. Condition and mode of administration** - Insoluble poisons can be easily eliminated from the body. Empty stomach will facilitate the easy absorption of poison, while presence of food in stomach will delay the same.

**7. Chemical combinations** - Certain chemical substances may combine together to form deadly poisonous substances. So we should be very careful about the after-effects of the chemical substance.

**8. Cumulative action** - Poisons like mercury

and digitalin tend to accumulate within the body and exert a lasting impact.

### 2.1.3 The treatment

Treatment of poison involves a number of processes. Measures to stop the spreading of poison in the body, removal of indigested poison from the bowel, purification of blood contaminated with poison, application of antidotes, repairing the inflicted body organs etc. are important among them. All the above-mentioned details furnished by modern science will equip a common man as well as a medical practitioner in managing poison. In these circumstances, it would be interesting and informative to analyze the ideas elaborated by *Āyurveda* on poison.

### 2.2 Āyurvedic accounts

Āyurvedic system of medicine is very particular about poison and it tries to give all the details of the topic. *Viāa*, the Sanskrit counterpart of poison, finds its origin from three roots viz., *viā<sup>1</sup>/<sub>2</sub>ā*, *vyiptau*<sup>10</sup>, *viāa*

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<sup>10</sup> *Amarakośa*, I, Pitilabhogivarga,  
Ē'É'Éä<sup>1</sup>]ö EòÉ<sup>a</sup>ÉÆ – Ē'É<sup>1</sup>É''ÉÂ\*

*viprayoge*<sup>11</sup> and *viĀu secane*<sup>12</sup>. When the word originates from the former two roots, it means poison and when it gets derived from the third root, it means water. The word *viĀa* meaning poison has the etymology – ‘that which spreads the whole body to detach the soul from body’. When it means water, it simply denotes ‘that which can be poured’.<sup>13</sup> This double entendre of the word *viĀa* has been well used by the poets and rhetoricians.

e.g. षडैः एतैः उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 एतैः पृथिव्याः उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 षडैः उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 षडैः उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 षडैः उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 उद्भिर्देवैः प्रकृतैः पृथिव्याः ।

11 *Sidhintakaumudi*, p. 427.  
 उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
 12 *ibid.*, p. 372.  
*Vicaspatya*, p. 4626-9. उद्भिर्देवैः प्रकृतैः पृथिव्याः ।  
*Samskṛtaniruktakośa*, p. 207.  
 13 *Amarakośa*, III, Ninirthavarga, p. 39.  
 उद्भिर्देवैः प्रकृतैः पृथिव्याः ।



“ÉÚĐSUôîÉÉ& {ÉÊÍÉÉÈÉRÂÓMÉxÉÉ&\*<sup>14</sup>

The synonyms of the word are *garala*<sup>15</sup> and *kÀve·a*<sup>16</sup>.

CS gives a brief but comprehensive account of poison<sup>17</sup>i.e. that which originates from water, is fire like in action, having two divisions, eight impulses, ten properties and twenty-four remedial measures. Here the liquid form of poison is stressed. It causes burning sensation in the body of a victim. The two-fold division of poison into mobile and immobile is based on the carriers. The route of poison in the body is implied by the word impulse. The symptoms caused by poison passing through the seven *dhitu*-s of the body

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<sup>14</sup> Quoted in *Dhvanyiloka* and *Kivyaprakīza*.

<sup>15</sup> The word originates from the root MÉP ÊxÉMÉ®úhÉä and denotes ÊMÉ®úÊiÉ VÉÒ´ÉÆ – MÉ®ú&\* MÉ®Æú ±ÉÉÊiÉ <ÊiÉ MÉ®ú±É&\*

<sup>16</sup> *Amarakoīa* I, Pītilabhogivarga, p. 196. The word originates from the root Ê\ÊÎ´ÉnùÉ  xÉä½p ÉÉä½pxÉ ÉÉä& and denotes I´Éäb÷iÉä  ÉÉä½p ÉÉÊiÉ <ÊiÉ I´Éäb÷&\*

<sup>17</sup> CS, p.364.

tdMbusMÉv< tSmáiÖivx< pavkaepmm!, Àòveg< dzgu[< ctuivizTyup³mm!.

are discussed here. By the advent of autumn, poison seems to lose its power. During this season, the constellation *Agastya* is said to have some sort of influence on poison<sup>18</sup>. *SS* speaks of the taste of poison i.e. it derives the taste of those substances in which it resides<sup>19</sup>. For a clear analysis of the properties and action of poison, it is better to pursue the methodology accepted by Caraka. Main topics covered here are genesis, divisions, impulses, properties, and remedial measures of poison.

### 2.2.1 Genesis of poison

The history of poison is as old as that of life. Different circumstances make even a non-poisonous substance poisonous. Poison injected or imparted by animals, reptiles and insects and the poisonous portions of

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<sup>18</sup> *Ibid.*

tÖ;aRSvMbuyaeinTvadœ s→ed< gufvìtm! , spRTyMbuxrapaye  
tdgSTyae ihniSt c,  
àyait mNdvlyRTv< iv;< tSma~naTyye.

<sup>19</sup> *SS*, KS, 111, p.432.

ywaVy´rs< taeymNtrl]aNmhlgtm!,te;u te;u àdeze;u rs< t< t<  
inyCDit,  
@vmev iv;< y\*Î+Vy< VyaPyavitóte,SvÉavadev t< tSy rs<  
smnuvtRte.

vegetables always confused and perplexed primitive men. Āyurvedic treatises exemplify this fear and probably this could be the reason that ancient physicians attribute a mythological origin to poison. Just like the most complex and inexplicable concept of death, *viāa* also owes a personification. CS identifies it as a fierce looking person having originated from the sea while Gods and demons were churning it<sup>20</sup>. His dreadful appearance caused sorrow {*viāida*} hence got the name *viāa*. This bears resemblance with that given in *puri,a-s*. According to *puri,a-s hilihala* was the first product of the sea. And realizing it to be dangerous for the existence of life, lord āiva swallowed it.<sup>21</sup> It is also stated that the drops of poison spilled out were consumed by snake, scorpion etc. and they became poisonous<sup>22</sup>.

<sup>20</sup> CS p.364  
 Am&tawi smuÔe tu mWymane surasurE>, j}e àagm&taeTpÄe>  
 pué;ae "aerdzRn>

dIYtejaítudRò+ae hirkezaenle][>, jgiÖ;{[< t< t:qœva  
 tenasaE iv;s<i}t>,<

<sup>21</sup> *árçmadbhigavata*, VIII, p.983.

inMmRWymanaÊdxerÉUiÖ;m!, mhaeLb[< halhlapmçt>,<

<sup>22</sup> Ibid. p.987.

While describing the genesis of poison, Suśruta gives another story. According to him during creation, Brahma was disturbed by a demon called Kiṅabha and then Brahma's anger took a human shape and came out to destroy the demon. But even after the assigned task his anger seemed to gather momentum. Then Brahma deposited this anger in the mobile and immobile creatures of the world. And this personified anger is called *viĀa*<sup>23</sup>. *AH*, closely follows Caraka in its description of the genesis of poison. Works of Kerala tradition do not mention of such a mythological origin of poison.

### 2.2.2. Classification of poison

Classification based on the physical

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23 àSkÚ< ipbt> pa[eyRt! ikiĀ<sup>3</sup>/<sub>4</sub>g&÷> Sm ,  
 tt! v&iíkaihiv;aE;xae dNdzukaí ye=pre,  
 SS, KS.111.p.431.  
 àjaimmamaTmyaeneäRü[> s&jt> ikl Akraedsurae iv<sup>1</sup>< kEqÉae  
 nam dipRt>.  
 tSy <sup>3</sup>...ĪSy vE v±aÓ+ü[Stejsae inxe> <sup>3</sup>aexae ivϕhvan! ÉUTva  
 inppataitdaé[>.  
 s t< ddah gjRNtmNtkaÉ< mhablm! ,ttae=sur< "atiyTva  
 tĀejae=vxaRtaÑ,tm!. ttae iv;adae devanamÉvĀ< inrlúy vE ,  
 iv;adjnnaTva½ iv;imTyiÉxlyte.

characters was unknown to the iyurvedic system but they adopted another dependable mode of classification i.e. into artificial (Chemical toxins) and natural poisons (Bio-toxins). Based on the receptacles natural poison is further divided into mobile (*ja'gama*) and immobile (*sthivara*)<sup>24</sup>. Animals, reptiles, and insects having poison in their body are included in the former group. Poisonous plants and minerals come under the second category.

Artificial poison (*gara*) is a toxic combination of either poisonous or non-poisonous substances. This doesn't kill the victim instantly but exert a toxic effect after sometime.<sup>25</sup> *AH* says that even though death is not caused by *gara*, diseases like *çopha*, *pin·u*, *udaronmida*, *durnima* etc.<sup>26</sup> are common in this

24 *SS*, *KS*, 111, p.423. Swavr< j<sup>1</sup>/<sub>4</sub>m< y<sup>1</sup>/<sub>2</sub> i<sup>3</sup>iÇm< caip yiÖ;m!,  
*CS*, p .364. j<sup>1</sup>/<sub>4</sub>mSwavraya< t\*aenaE äüa Nyxaejyt!,  
*AH*, XXXV, p.902. Swavr< j<sup>1</sup>/<sub>4</sub>m< ceit iv;< àae' mi<sup>3</sup>iÇmm!.

25 *CS*,p.365.  
grs<yaegj< caNy\rs<}m! gdàdm! ,kalaNtrivpaikTvaÚ tdazu  
hrTysUn!.

26 *AH*, p.902.  
i<sup>3</sup>iÇm< grs<}< tu i<sup>3</sup>yte ivivxaE;xE> , hiNt yaegvzenazu  
icrai<sup>1</sup>/<sub>2</sub>rtra<sup>1</sup>/<sub>2</sub> tt!,  
zae)pa{f<sup>a</sup>draeNmadÊnaRmadIn! kraeit va.

case.

Another variety of *viÀa* is *d£ÀçviÀa* (chronic poison). Poison, either artificial or natural in an inactivated state can be called as *d£ÀçviÀa*. Due to its low potency it cannot kill the victim but can remain in the affected body for years and exert a bad impact on health. It gets agitated by the habitat, season, food and day-sleep and is powerful enough to contaminate the *dhit£-s*<sup>27</sup>. *CS* accepts *d£ÀçviÀa* as that caused by the contamination of blood and which produces pustules, *Kiñibha* and urticarial rashes. A person affected by *d£ÀçviÀa* can be identified by loose motions, change of colour, bad smell and taste in the mouth, profound thirst, fainting, vomiting, stammering, gloomy and timid dispositions, and symptoms of *d£Àyodara*<sup>28</sup>. Premonitory

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<sup>27</sup> SS,KS,11,p.424  
Èi;t< dezkalaÚidvaSvßErÉlÚ[z> ySmaîf;yte xatUn!  
tSmaî,;liv;< Sm&tm!.

<sup>28</sup> CS, p.423.  
tenaidRtae iÉÚpurl;v[aeR ivgNxvEraSymuo> ippasl  
mUCDRn! vmn! g`ldvaiGv;{[ae ÉveCc È:yaedril¼juò>.

symptoms produced by *dĒÀçviÀa* are excessive sleep, feeling of heaviness of the body, more yawning, looseness of joints and tingling or diffuse pain in the body. In its next stage it produces toxicity of food, indigestion, loss of taste, appearance of round patches and rashes on the skin, delusion, disease or loss of tissues, swelling of the feet, hands and face, ascitis, vomiting and diarrhoea<sup>29</sup>.

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29        *ibid.* p.424.  
inÔa guéTv< c ivj&MÉ[< c ivðe;h;aRvwva=¼mdR>  
tt> kraeTyÚmdaivpLkavraeck< m{flkaeQmaehan!,  
xatu]y< padkraSyzae)m! dkaedr< cidRmwaitsarm!.

SS gives a more comprehensive account of *dĒĀçviĀa*.

yt! Swavr< j¼mk«iÇm< va dehadze;< ydingRt< tt!,  
 jl[i iv;¹aE;ixiÉhRtm! va davai¶vatatzaei;t< va.  
 SvÉavtae va gu[ivàhln< iv;< ih Ë;liv;tamupEit,  
 ivyaRLpÉavaÚ inpatyeÄt! k)av&tm! v;Rgu[anubiNx.  
 30

In its advanced stage of action it produces discolouration of the body, fainting, irregular fever and profound thirst. Some particular *dĒĀçviĀa* produce insanity, flatulence, low production of semen, stammering or leprosy<sup>31</sup>. Vigbha¶a in his *Samhiti* closely follows his predecessors and prescribe *dĒĀçviĀairiagada* as the remedy<sup>32</sup>.

### 2.2.3 Impulses of poison

Based on the *saptadhitudhinta*,

30 SS ,KS, 11,p.423.

31 SS,KS.p.424

vEv{yRmUCDaRiv;mJvran! va k...yaRt! àv&Āa< àbla< v&a< va  
 %NmadmNy¾nyeÄwaNydanahçyt! ]pye½ zu³m!,  
 gaĪmNy¾nye½ k...ó< ta<Stan! ivkara<í b÷àkaran!.

32 AH,111,p.905.

àaGvatajl[RzItaæidvaSvßihtaznE> Êòm! Ë;yte xatUntae Ë;liv;<  
 Sm&tm!,  
 Ë;liv;ati suiSvÚmUxi cawí zaeixtm!, Ë;liv;airmgd<  
 lehyeNmxunaPlutm!.



*Āyurveda* defines the route of poison in an affected body<sup>33</sup>. These are actually the eight stages through which poison passes. Each stage makes the victim closer to death. Symptoms produced by each impulse are described in detail. *CS* enumerates them<sup>34</sup> thus - *rasa*, vitiated by poison produces thirst, mental confusion, sensitiveness of teeth, excessive salivation, vomiting and exhaustion. *rakta*, vitiated by poison produces abnormal complexion, giddiness, trembling, fainting, yawning, irritating sensation and feeling of darkness. *mimsa*, vitiated by poison produces circular patches, itching, swelling and urticaria of skin. When *doÀas* are affected by poison there would be burning sensation, vomiting, body-pain, fainting etc. When *medas* gets

33 *AH*, p.10. *rsas&'œma<smedae=iSwm¾azu³ain xatv> sÝË:ya>*,

34 *CS*, p.366.

*t&{maehdNdh;Ràsekvmxu→ma ÉvNTya\*e,vege rsàdae;ads&Kàdae;aiÖtlye tu.*

*vEv{yRæmvepwumUCDaRj&MÉa¼icimicmatmka>,ÊðipiztaÄ&tly*

*e m{fœlk{f²ñywukaeQa>. vataidjaítuweR*

*dahCD\*R¼zUlmUCDaR\*a>nlladlna< tmsídZRn< pÂme vege.*

*;œ ihŠa É¼> SkNxSy tu sÝmeòme mr[m!,*

vitiated by poison, vision of the victim will be disturbed. Vitiating of *asthi*, *majji* and *śukra* leads to hiccup, paralysis and death respectively. *SS* gives separate impulses for *sthivara* and *ja'gama* poisons<sup>35</sup>. *AH* closely follows *SS* in this aspect.<sup>36</sup>

#### 2.2.4 Properties of poison

In order to understand the real nature of poison ayurvedic treatises enlist its properties. According to *CS*, the following are the ten properties. They are 1. *laghu* (light) 2. *rġkĀa* (rough or dry) 3. *iśu* (quick in action) 4. *viśada* (non-unctous or non-slimmy) 5. *vyaviyi* (spreading all over the body). 6. *tġkĀ,a* (penetrating) 7. *vikisi* (debilitating the tissues) 8. *sġkĀma* (entering into minute pores) 9. *uĀ,a* (hot) and 10. *anirdeśyarasa* (undefined taste)<sup>37</sup>. *SS* closely follows the first nine properties and replaces *anirdeśyarasa* with *apiki*

35 *SS. KS*, 11,p.424, 444.

36 *AH*.p.903.

37 *CS*, 11,p.366-367

l"u ê]mazu ivzd< Vyvaiy tlú[< ivkais sUúm< c,  
%:[mindeRZyrs< dzgu[mu'< iv;< t]}E>.

(indigestible)<sup>38</sup>. *AH* takes the ten properties mentioned by *CS* and adds *viĀamapiki* (difficult to be digested) as the eleventh property<sup>39</sup>. All these works give their own explanation that how these properties regulate the action of poison in the body of a victim. Both *CS*<sup>40</sup> and *SS*<sup>41</sup> say that poison vitiates *vita* due to its roughness. When *CS* identifies hotness as the property, with which poison affects *pitta*, *Suśruta* says that both *pitta* and *rakta* are affected by the hotness of poison. According to *Caraka* minuteness is the property, with which poison contaminates blood . *Suśruta* says that due to its minuteness, it enters into all the organs and causes abnormalities in them.

38 SS, KS,11,p.422.

ê]mu:[< twa tlú[< sUúmmazuVyvaiy c  
ivkaiz ivzd< cEv l ,vpaik c tt! Sm&tm!.

39 *AH*, p.902.

tlú[ae:[ê]ivzdm! VyvaYyazukrm! l"u  
ivkaiz sUúmmVy´rsm! iv;mpaik c,

40 *CS*, p.367.

raEúyaÖatmzETyaiTpÄ< saEúMyads&kœ àkaepyit k)mVy  
´rsTvadÚrsa<íanuvtRte  
zlº< VyvaiyÉavadazu Vyaᅇaeit kevl< deh<, tlú[TvaNmmR¹<  
àa{a¹< tiÖkaisTvat!.

Éép³m< l"uTvaÖEz\*at! Syads´gitdae;<, dae;Swanàk«tl>  
àaPyaNytm< ýudlryit.

41 SS,KS,11.p.422.

According to Caraka with undefined taste, poison vitiates *kapha* and *annarasa*. Suśruta replaces this with *apiki*, with which it becomes difficult to be expelled out and remains a trouble for a long time. Caraka says that by the property *vyaviyi*, poison gets absorbed into the tissues. But according to Suśruta, it is a property with which it can pervade the entire body. According to Caraka *iśu* is the property making it spread the entire body. *iśu*, according to Suśruta helps poison to destroy the tissues quickly. When Caraka assumes sharpness as the property, helpful in affecting vital part, Suśruta identifies delusion of the mind too as the function of the property. According to Caraka *vikisi* is the property, by which poison affects vital breath but to Suśruta it is a property, with which poison loosens the *doṂa*, *dhitu*, and *mala* and destroys them. Both the authors identify lightness as the property by which poison becomes difficult to be cured and *viśada* as that with which it remains

adhered to the *dhiti*-s. To the latter's function, Caraka adds that it aggravates any of the *dhiti*-s according to location and constitution. An eleventh property is enumerated by Vibhakti, i.e. *viAmapiki* . This makes poison difficult to be digested.

### 2.2.5 Remedial measures

*Āyurveda* presents a complete package for the treatment of poison in which first-aid, systematic treatment, and incantation are involved. Thus we may see a holistic approach combining both the physical and psychological sides of treatment. CS is the only text enlisting all the measures accepted in the treatment of poison. Though symptomatic treatments in each case are mentioned in other works, they lack a general outline. CS enlists twenty-four remedial measures. They are

mUairòaeTktRnin:plfncU;[ai¶pir;eka>,  
 Avgahr´mae][vmnivrekaepxanain.  
 ùdyavr[aÑnnSyxUmlehaE;xàxmnain,  
 àitsar[< àitiv;< s<}as<Swapn< lep>.

m&tsiÃvnmev c iv<zitrete ctuiÉRrixka>. <sup>42</sup>

Even though incantation has been identified as the first measure, Caraka has furnished no further detail. But during the process of *dhamançbandha* (binding of vessels) *mantra*-s are advised to be chanted<sup>43</sup>. During the description of the merits of *agada* viz. *mahigandhahastç*, one *mantra* is mentioned<sup>44</sup>. That *mantra* is directed to be recited during the preparation of the *agada*. When these portions are analysed, it can be noticed that in CS both *mantra*-s and medicines have been considered as complementary to each other. But

42 CS, p.368.

43 ibid.p369.

mÛExRmnlbNxaevmajRn< kayRmaTmr]a c,

44 ibid. p.373.

ip:yma[ #m< caÇ isĩ< mÛmudlr̥yet!, mm mata jya nam jyae nameit me ipt̥a.

saeh< jyjyapuÇae ivjyeaw jyaim c, nm> pué;is<hay iv:{ve ivñkmR[e.

snatnay k«:[ay Évay ivÉvay c, tejae v&akpe> sa]aÄejae äýeNÔyaeyRme.

ywah< naiÉjanaim vasudevprajym!, matuí pai[çh[< smuÔSy c zae;[m!.

Anen sTyvaKyen isXytamgdae ýym!, ihilimils<Sp&ðe r] svRÉe;jaeÄme Svaha.

treatment through *mantra*-s is not mentioned by Caraka.

As far as Suśruta is concerned, *mantra*-s have little importance in treatment. But in his work, he dedicates a whole passage for explaining and justifying his stand. Suśruta considers those sages, who can quickly cure poison with their *mantra*-s with reverence. But he is very sceptical about the authenticity of *mantra*-s. He also believes that only those who observe strict rules of life can successfully practise these *mantra*-s. Acknowledging his age as that of deterioration, Suśruta prefers medicines to *mantra*-s<sup>45</sup>. In *AH* two *mantra*-s

<sup>45</sup> SS,KS,V,p.451

Airòmip mÙEí b×IyaNmÙkaeivd>, sa tu rJJvaidiÉbRĪa iv;àitkrl  
mta. deväüi;RiÉ> àae´a mÙa> sTytpaemya>, ÉviNt naNywa  
iv;< hNyu> suÊStrm!  
iv;< tejaemyEmRÙE> sTyäütpaemyE>,ywa invayRte i]à< àyu  
´EnR twaE;xE>.  
mÙa[a< çh[< kayi ôlma<smxuvijRna, imtahare[ zuicna k...  
zaStr[zaiyna. gNxmaLyaepharEí biliÉiaip  
devta>,pUjyeNmÙisĪ(wi jphaemEí yÆt>.

mÙaSTvivixna àae´a hlna va Svrv[Rt>, ySmaÚ isiĪmayait  
tSma\*aejyae=gd<sup>3</sup>m>.

are mentioned, among which, the former<sup>46</sup> and the latter<sup>47</sup> should be chanted before and after the preparation of the *agada* respectively. From these accounts it can be assumed that *samhiti* works do not follow the *mantra* tradition.

*AriĀṅga* (binding), *utkartana* (incision), *niĀpḥana* (compression), *cĒĀa, a* (sucking), *agni*, (heating), *pariĀeka* (sprinkling), *avagiha* (bath), and *raktamokĀa* (blood letting) are the accepted first aid implementations. *Vamana* (emesis) and *vireka* (purgation) are the means to expel unabsorbed poison. *Upadhina* (medication on incised scalp), *hṛdayivara, a* (protection of heart), *aṃjana* (collyrium), *nasya*

<sup>46</sup> *AH*, p.904.

nm> pué;is<hay nmae naray[ay c.ywa=sae naiÉjanait r[e k«:  
[prajym!,

@ten sTyvaKyen Agdae me àisī(tu, nmaevEf<sup>a</sup>yRmate ÷lu÷lu r]  
ma< svRiv;e\_y>,

gaEir gaNxair ca{fail mati¼ Svaha.

<sup>47</sup> *Ibid.*

hirmai Svaha, Aze;iv;vetalḥkamR[paPmsu,

mkrVyaixÊiÉR]yuĭazinÉye;u c,

pannSyaĀanalepmi[bNxaidyaeijt>, @; cNÔaedyae nam  
zaiNtSvSTyyn< prm!.



(snuffing), *dh£ma* (smoking), *leha* (linctus), *auÀadha* (other medicament,), *pradhamana* (blowing up through nose), *pratisiᵛa,a* (local application), *prativiÀa* (antidotes), *samjµisamsthipana* (rasuscitation), *lepa* (pastes) and *mᵛtasamjµvana* (revival) are the measures of symptomatic treatment.

Caraka gives a description of the utility of these measures. According to him incision stops poison from spreading. Sucking gives a passage for poison to come out. *AriaÀ¶a*-s work like water bunds and protect affected tissues. Heating burns away the poison situated in skin and flesh. Bloodletting oozes out the vitiated blood. Ingested but unabsorbed food can be eliminated either by emesis or by purgation<sup>48</sup>.

Caraka also warns of certain dangers. While sucking, the attendant should fill his mouth with barley powder or dust. Otherwise poison

<sup>48</sup> CS, 23, p.370.

tnuirv mUl½edaÎ<z½edaÚ v&iïlmeit iv;m!, AacU;[manyn< jISy setuyRwa twairða>.

Tv'œema<sgt< dahae dhit iv;< öav[< hrit r'at!, plt< vmnE> s\*aehreiÖrekEiÖRtlye tu.

may penetrate through some infected portion in this mouth to his body<sup>49</sup>.

All these measures are advised only when, the patient is not exhibiting the signs of death. Caraka gives a list of the signs by which death can be confirmed. They are prostration, falling of hair, loss of movement and thrown out limbs, no horripilation with cold, no mark of stick on blowing and no bleeding on injury<sup>50</sup>. These signs seem to be harmonious with the modern definition of death i.e. "the irreversible cessation of circulatory and respiratory functions or irreversible cessation of all functions of brain, including the brain stem"<sup>51</sup>.

These are the general details provided in *samhiti* works on poison. The properties of poison deserve special attention. Even though

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49 Ibid.

in:plfyeÑ̄; < d<zmuĩreNmmRvji va, t< d<z< va cU;Nmuoen  
yvcU[Rpa<zupU[eRn,

50 ibid.p.367

nllaEódNtzEiwLykezptna<sup>1/4</sup>iv]epa>, izizrEnR laemh;aeR naiÉhte  
d{frajI Syat!,

]tj< ]ta<sup>1/2</sup> nayaTyetain ÉviNt mr[il<sup>1/4</sup>ain.

51 New medical dictionary, p.205.

all the characteristics of poison are enumerated here, Ayurvedic physicians were well aware of the peculiarities of each poison. The treatment was decided by analyzing the nature, health, and mental condition of the patient. Nature as well as the quantity of poison was also kept into mind. By a thorough analysis it can be noted that ancient physicians sincerely worked with their abacus to formulate these principles that survived the ravages of time and maintained their significance till date.

## CHAPTER 3

# **POISONOUS PLANTS**

Plants, as a general rule remain harmless and complementary to the existence of life. But a very few of them deviate from this common trait and exhibit poisonous properties. Poisonous plants are defined as-

" Plants that produce adverse physical effects and sometimes death when eaten or touched by man or animals"<sup>1</sup>.

While some of them are poisonous in ordinary conditions, others become poisonous under special conditions like exposure to heat etc. On the other hand in certain circumstances even a poisonous plant may lose its poisonous property. Tapioca root is an example for this. On heating it loses its poison. The study of plant poisons is called Phytotoxicology<sup>2</sup>.

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1 Bruce,W. Halstead, "Poison", *Britannica online*, Academic Edition. 2<sup>nd</sup> Feb. 2006.

2 *EB*, Vol:18, p-103.

### 3.1 Modern accounts

Now-a-days science has developed its knowledge base enough to identify the organic compounds, which make plants poisonous. These compounds are 1. Alkaloid 2. Glycoside 3. Resin and 4. Organic acid<sup>3</sup>. An alkaloid is a colourless, odourless, insoluble organic base with bitter taste. This nitrogen containing organic compound makes mushrooms and flowering plants poisonous. Glycosides are water soluble, carbohydrates with bitter taste and bad odour<sup>4</sup>. On hydrolysis and in the presence of aminoacids<sup>5</sup> or enzymes, they produce toxic substances. These make wild cherries and almonds poisonous. Resins are the insoluble, gummy material of complex organic structure located in the ducted resin or latex<sup>6</sup>.

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3 *Ibid.*

4 *Illustrated Oxford Dictionary*, p-126.

Carbohydrate- any of the large group of energy producing organic compounds containing Carbon, Hydrogen and Oxygen like starch, glucose and other sugars.

5 *Ibid.*p.38.

Aminoacids- any of a group of simple organic compounds, many occurring naturally in plant and animal tissues and forming the basic constituents of proteins.

6 *Ibid.*p.456.

These make the milkweeds and water hemlock poisonous. Organic acids -even though natural amount of organic acid is harmless, in excess, it produces irritant properties. Presence of any of these will make the plant poisonous.

### **3.1.1 Classification of poisonous plants**

Based on the physiological action, plant poisons are classified<sup>7</sup> as (A) Blood poisons e.g. castor bean. (B) Nerve poisons e.g. poisonous mushrooms. (C) Neuromuscular poisons e.g. curare. (D) Muscular poisons e.g. false hellebore. (E) Skin irritants e.g. poison ivy. Based on the mode of poisoning, plants can be divided into 1.plants poisonous on contact and 2.plants poisonous on ingestion. Among them the first category produces Dermatitis. The severity of the disease may vary from mere irritation, causing an itching rash to painful inflammation, causing watery blisters lasting for days or weeks. The second category

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Latex- fluid of mixed composition found in various plants and trees.

7 *EB*, Vol:18, p-104.

produces a fatal effect on the victim. As most of the poisonous higher plants are flowering plants (Angiosperms) the status of angiosperms in Kingdom Plantae can be analysed.

### 3.1.2 Details of kingdom plantae

Biologists classify the whole living system into five kingdoms and Kingdom Plantae; the kingdom of plants ranks itself as the fourth kingdom of this classification, others being Kingdom Monera, Kingdom Protista, Kingdom Fungi and Kingdom Animalia. Among the divisions of Kingdom plantae, angiosperms are the largest group.

#### KINGDOM PLANTAE

LYCOPODOPHYTA    FILICINOPHYTA    GINKGOPHYTA    GNETOPHYTA  
 ANGIOSPERMOPHYTA

BRYOPHYTA    PSILOPHYTA    SPHENOPHYTA    CYCADOPHYTA  
 CONIFEROPHYTA



MONOCOTYLEDONEAE                      DICOTYLEDONEAE  
Angiosperms      produce      seeds      inside  
protective ovaries, which will later ripen to  
form fruits. A typical flowering plant rises  
above the surface with a shoot system and  
fixes itself to the soil with an underground root  
system. Almost all the parts of a flowering  
plant may carry poison. Toxic plants are  
frequently mentioned in Sanskrit literature.  
Statements like

iv;v&]aeip s<vXyR Svy< DeÄumsaMàdm!,<sup>8</sup>  
mxuraip ih mUCD(Rte iv;ivqipsmaiïta v'l,<sup>9</sup>

### 3.2 Ēyurvedic accounts

Ēyurvedic tradition is well aware of the  
toxicity of plants.

#### 3.2.1 Classification of poisonous plants

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8            *Kumirasambhava*  
9            *Ve,çsanhira*



Based on the locus of poison the system classifies poisonous plants into seven groups. i.e. those having poison in their roots, leaves, fruits, flowers, bark, sap, and tubers<sup>10</sup>. A list of plants belonging to each group is also given. Even though these plants cannot be accurately pointed out, it would be interesting to discuss the identity of these plants.

### **3.2.1.1 Plants with poisonous roots**

Suśruta enumerates eight varieties of plants with poisonous roots<sup>11</sup>. They are 1. *kl̥taka* 2. *aśvamira* 3. *guṃji* 4. *sugandhi* 5. *gargaraka* 6. *karaghita* 7. *vidyucchikhi* and 8. *vijayi*.

#### **1. *Kl̥taka***

In all iyurvedic *nighaṅṅus*, *kl̥taka* has been identified as a synonym of *madhuka* or *madhuyaṅṅi*. In *Abhidhinamaṃjar̥* it has been stated that

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10 SS, KS. II. p.419.

11 *Ibid.*

mxuk< mxuÖva Syat! mxuyòl c yìòka c yò(aṗa  
yìòmxuk< mxu c ñltinka l][a ceit.

*Bhivaprakiṣa*<sup>12</sup>, *Rijanigha*, ṡu<sup>13</sup> and  
*kaiadevanigha*, ṡu<sup>14</sup> attest the same. In  
*Bhivaprakiṣa* another variety of *madhuka*  
growing in water is termed as *klṡtanika*. This  
plant has been identified as liquorice  
(*Glycyrrhiza glabra* Linn.<sup>15</sup>)(Fig.3.1). This is an  
undershrub with compound leaves. According  
to iyurvedic physicians the underground stems  
and roots of the plant are of medicinal value. It  
has violet flowers. Roots are sweet, refrigerant,  
emetic, tonic, diuretic, demulcent, mild,  
lexative, aphrodisia, expectorant, and intellect  
promoting. Many diseases like hyperdipsia,  
cough, bronchitis, fever, skin diseases, vitiated  
conditions of *vita* etc. are treated by liquorice.  
Its medicinal properties are enumerated as

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12 yìòmxu twa yòl mxuk< ñltk< twa  
ANyTñltnk< tÄu ÉveÄaeymxuilka>.

13 yìòmxumRxuyòl mxuv'l mxuöva  
mxuk< mxuka yòl yò(aṗm! vsusiMmtm!  
ANyTñltnmu' < ñltnk< ñltnlyk< mxukm!.

14 yòl mxuk< mxuk< mxuyòl mxuöva  
yòl mxu ñltnkm! yò(aṗ< ñltk< mxu.

15 *IMP*, Vol:3, p.84.

mxuk< r'ipÄ<sup>1</sup>< ì[zaexnraep[m!

gué SvaÊihm< v&y< ca]u:y< Svrv[Rk«t!.<sup>16</sup>

The extract of the root is used for the treatment of gastric ulcer. A decoction of the root is a good wash prescribed for good health of hair. Cuts and wounds are externally treated with liquorice. From these accounts we may clearly arrive at a conclusion that *klçtaka* mentioned by Suçruta is not the same as that of other iciryas.

## **2. Açvamira**

This is an evergreen shrub commonly called as Indian oleander or sweet-scented oleander. Its botanical name is *Nerium oleander* Linn<sup>17</sup>(Fig.3.2). Its roots are identified to be deadly poisonous, so as to kill even a horse. Thus the plant is called as *açvamira* or *hayamira*. Its commonly used name is *karav çra*<sup>18</sup>. All ancient *nigha, ¶us* attest the

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16 *Madananigha, ¶u*

17 *IMP, Vol:4,p.126.*

*AV, p.19.*

18 *BP,*

poisonous properties of oleander<sup>19</sup>. They also mention of the controlled use of oleander in cases of leprosy, scorpion stings and snakebites. On careful administration, it works like a cardio-tonic. Skin complaints are treated with a paste of root, bark and leaves of Indian oleander. Fresh juice of its leaves will cure ophthalmia and improve eyesight<sup>20</sup>. It is also used as an abortifacient<sup>21</sup>.

The root, stem and seed of the plant contain toxic glycosides viz. *Nerin* and *Karabin*<sup>22</sup>. Its leaves have the glycoside, *oleadrin*<sup>23</sup>. All these glycosides are identified to

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krvlr ñetpu:p> ztk...MÉae=ñmark>  
VS, p.14.

- 19 *Rijanigha*, ¶u  
krvlr> kquStlú[> k...ók{f<sup>ai</sup>itnazn>  
ì[aitRiv;ivS)aeqzmae=ñm&itad>,  
r´Stu krvlrSSyat! kquStlú[ae ivzaexk> TvGxae;ìnm{f<sup>ai</sup>itk...óharl  
iv;aph>.  
*Kaiyadevanigha*, ¶u  
krvlr> kquit´ae vlyaeR:[Stuvrae l"u Éi]tae  
iv;êpae=i]kMpk{f<sup>ai</sup>[aph>,  
r´añ<sup>1</sup>> kqupake it´ñae:[ae iv;aphac]u:y> k«imk{f<sup>ai</sup>> àlepadoe  
iv;mNywa,  
20 *ADPS*,p.224.  
21 *FM*, p.371.  
22 *VS*, p.16.  
23 *Ibid*.

be cardio-toxic in nature<sup>24</sup>. 17 gms. of the root of Indian oleander may prove to be fatal for a human being<sup>25</sup>. Nervous breakdown, diarrhoea, vomiting and coma are the symptoms of oleander poisoning. Finally the patient dies of cardiac arrest<sup>26</sup>. Usually after getting poisoned the patient lives for about 24 to 36 hours<sup>27</sup>. Due to its poisonous nature, the plant needs to be purified before it can be used as a medicine. Processing in cow milk is the accepted method for the purification of the plant<sup>28</sup>. In its medicinal usage, the practitioner should carefully monitor the dosage. Otherwise the unfortunate death of the patient would be the result. However an antibiotic viz. oleandomycin is said to be extracted from the plant<sup>29</sup>. In ancient times oleander poison mixed with wine and hue had been used as an antivenin for snakebites. This has been recorded by

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24 *Ibid.*

25 *Ibid.*

26 *ADPS*, p. 223.

27 *VS*, p. 16.

28 *Ibid.*

29 *FM*, p.372.

Dioscorides, the personal physician of the roman emperor Nero<sup>30</sup>.

From prehistoric times, the plant has been notorious for the suicidal and homicidal purposes for which it was used. It is identified to be a serious threat for livestock and human beings of Asia, Europe and Africa. Ancient war chronicles are saturated with the cases of oleander poisoning. The military animals of Alexander are recorded have been poisoned by oleander. This is mentioned by Theophrastus, the historian<sup>31</sup>.

Based on the colour of the flower, the plant is said to have many varieties<sup>32</sup>. *Bhivaprakiza* and *Dhanvantarinigha, ¶u* identify two varieties i.e. *ivetapuÀpa* (white oleander) and *raktapuÀpa* (red oleander). *Rijanigha, ¶u* has included yellow flowered and black flowered oleanders into the list.

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30 *ADPS, p.225.*

31 *Ibid.*

32 *IMP, Vol:4, p.129.*

*VS, p.14.*

*ADPS, p. 224.*

Now-a-days three varieties of oleanders are seen. They are white, red and yellow. Among these, the first two belong to the same family and species while the latter is a rather resembling species. viz. *Cascabela thevetia*, belonging to the same family (Fig 3.3). Both in its appearance and properties, the latter resemble oleander.<sup>33</sup> The seed, root, milk, bark and leaves of the plant are poisonous. 12gms. of its powdered bark will produce manifestations of poisoning. The intake of 8 to 10 seeds of the plant may be fatal. 15 to 20 gms. of root will also cause death. Autopsy of the victim of *Cascabela*-poisoning would clearly indicate the cause of death. There would be signs of bleeding in bowels and small intestine. The residues of the ingested seed can be detected through chemical analysis. Swelling of the liver and the bluish red scar on the middle portion of the intestine are the manifestations of *Cascabela*-poisoning. Processing in cow milk

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33 VS, p. 20.

is the purification method of Cascabela.

### **3. Guuji**

This is a climbing shrub, commonly called as Indian liquorice or crab's eye<sup>34</sup>(Fig.3.3). Its seeds may be scarlet with black spot or white with black spot. Sometimes pure white or pure black seeds are also seen. Āyurvedic treatises were well aware of the two varieties of liquorice i.e. the white liquorice and red liquorice<sup>35</sup>. The seeds of both the varieties are poisonous in nature. But if ingested as a whole it may not cause poisoning. The hard shell of the seeds resists digestion. But if chewed before swallowing or crushed into powder even half a seed can produce symptoms of poisoning

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<sup>34</sup> AV, P-448, p-95.  
Vaidyakaśābdasindhu, p-374.  
FM, p-359.  
ADPS, p.158.  
Medicinal plants of India.  
IMP, Vol:1, p.10.  
VS, p.80.

<sup>35</sup> Madananigha, १७  
कः[kaMbaeijka guĀa ri'ka kak[iNdka cUfami[> zltpakl izo{fl kः  
[la lta,  
iÖtlya ñetkaMbaeji ÊmuRoa kakplluka kaddnl kakiÉ{fl v<sup>3</sup>zLya  
ikrliqka.



in human beings<sup>36</sup>. A toxic albumin viz. *Abrin* and a glycoside viz. *Abraline* make the seeds poisonous, *Abrin* is seen in its leaves too. The leaves and root contain glycyrrhizin<sup>37</sup>. The seeds of the plant have been used for suicidal and homicidal purposes. In India, the needle made of crushed liquorice is accepted as an agent for cattle poisoning. 90-120 mgs. of the powdered seed is powerful enough to kill a human being. Death may occur within one day or it may be delayed for 3-4 days<sup>38</sup>. Liquorice poisoning produces various symptoms resembling cholera. The agglutination of red cells, hemolysis and enlargement of the spleen and lymph glands are the other manifestations of liquorice poisoning<sup>39</sup>. When applied on a wound, it spreads into the blood and becomes fatal. It directly interacts with the red blood corpuscles, hemoglobin, and plasma. Anaemia,

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36 *FM*, p. 359.

37 *Ibid.*

38 *Ibid.*

39 *VS*, p.81.

oedema and bleeding are the consequences<sup>40</sup>.

In the postmortem results of a victim of liquorice poisoning, the residues of the consumed poison can be clearly detected. Oedema and blood clots may substantiate that the poison is injected. There would be swelling in the intestine, and scars in the lungs, liver etc<sup>41</sup>.

Cooking in cow milk can purify the liquorice seeds. After purification the seeds can be powdered and used as a tonic<sup>42</sup>. In *SS*, liquorice is used for various purposes<sup>43</sup>. It is an ingredient of ointment used for the treatment of wide spread skin eruptions. Leaves and fruits are the ingredients of a medicinal plaster used for the treatment of goiter and scrofula. Roots are also used in the preparation of another kind of plaster used for curing glandular swellings. A

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40 *Ibid.*

41 *Ibid.*

42 *Ibid.*

*FM*, p. 359.

43 *SS, A Scietific Synopsis*, p.161.

*SS, S£trasthina*, 11,7.

*Ibid.Cikitsisthina*,7,4,17,18,20,15.

paste of the seeds is the remedy for baldness. (*Indralupta*)<sup>44</sup>. Sanskrit *nigha*, *¶us* enlist all these qualities of liquorice. In *Bhivaprakiṣa*, both the varieties of liquorice are identified to be capable of producing hair, destroying the fever caused by vitiated air or bile, eradicating leanness, thirst, eye diseases, itching rashes, etc<sup>45</sup>. Both the varieties have same bitter taste and properties. But ayurvedic physicians prefer white liquorice to red<sup>46</sup>. Red liquorice has been used as a standard in measuring precious metals like gold and silver. The average weight of a red liquorice seed is 113mg<sup>47</sup>.

44 *SS, A Scietific Synopsis*, p-61.  
*SS, Cikitsasthana*, 20-15.

45 *BP*  
guĀaÖym! tu keZy< Syat! vatipĀjvraphm! , muozae;æmñast&:  
[amdivnaznm!,  
neÇamyhr< v&y< bLy< k{fṛi[aphm!,k«mIn! àluÝk...óain r´a  
c xvlaip c.

46 *IMP*,Vol:I p.14.  
*Dhanvantarçnigha*, ¶u-  
guĀa ê]a twa it´a vlyaeR:[a c àklitRta iv;vE;MyjNtu^¶I raeg  
çamÉyapha,  
guĀaÖym! tu zltae:[< blj< vaiNtkr< iz)a zUI¶I iv;ùTpÇ< vZye  
ñeta àzSyte,  
*áalçgramanigha*, ¶u

47 *VS*,p.-83.  
ñetguĀa ivze;e[ vzlkr[k«Nmta,

From these accounts it can be concluded that *gumji* mentioned by Susruta is identical with Indian liquorrice having the botanical name *Abrus precatorius* Linn <sup>48</sup>.

#### **4. Sugandhi**

According to *Ēyurvedaviśvakośa* , a number of plants are said to have the name *Sugandha*. The name implies that the plant is a sweet-scented one. The plants bearing the name *sugandha* are<sup>49</sup> -

a. *eliparni*, b. *puṣṭaraka*, c. *asraphali*, d. *kanakaprabhi*, e. *anadamūla*, f. *ahibhuk*, g. *śiṅvari*, h. *gandhaniśa*, i. *ghoṣā*, j. *kanduli*, k *kila*, l. *indriṣi*, m. *kacoraka*, n. *asitajṣṭraka*, o. *tṣimulla* and p. *arjjaka*. To identify the plant intended by Suśruta, the details of the above mentioned plants have to be analysed.

a. *Eliparṣi*<sup>50</sup>- This is a plant with bitter taste. Its root has medicinal properties. It is used for the

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48 *Ibid.*p.80.

*IMP,Vol:1 p.10*

49 *AV* , p-952.

50 *Ibid.* p-157.

treatment of oedema, respiratory disorders, vitiation of blood etc. It destroys poison, fever, skin rashes etc. *risna*, *yuktarasa*, *risya*, *suvaha*, *rasna*, *rasa*, *surasa* and *sreyasç* are its synonyms. According to *ADPS*, the plant *risna* has two varieties. i.e. the one with light brown colour and aromatic odour (*Alpinia calcarata*) and the other less aromatic and cultivated for rhizomes *Alpinia galangal* <sup>51</sup>(Fig.3.4). Among these the nature of the latter corresponds with a poisonous plant.

b. *Pu, raka* - this is a plant with bitter taste and having the names *madhavi* and *vçrapu, ari*. Its flowers are white in colour and are used for the treatment of cough, wounds, vitiation of bile etc<sup>52</sup>.

c. *Asraphali* - this plant with bitter taste would become sweet on cooking. The root, skin etc. are of medicinal values. It is used to treat diarrhoea, wounds vitiation of phlegm, bile etc.

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51 *IMP*, Vol:I p.110

52 *AV*. p. 673.

it is also called as *çallaki*, *gairahbhakÀya*, *suvahi*, *surabhi*, *rasa*, *maheru\_a*, *kunduruki*, *vallaki* and *bahusrava*. The plant is identified as *Boswellia thurifera*<sup>53</sup> (Fig 3.5). The gum of the tree is used as frankincense for fumigation<sup>54</sup>.

d. *Kanakaprabhi* - this has been identified as balloon vine or winter cherry. It is bitter and astringent. This will control phlegm and air, reduce constipation, induce vomiting and stimulate intelligence and memory. *jyotiÀmati*, *kañabhi*, *suvar\_alatika* and *anibhisa* are the other name of *kanakaprabhi*<sup>55</sup>. In *IMP*, the plant has been identified as *Cardiospermum helicacabum* Linn. (*indravalli*)<sup>56</sup> (Fig.3.6). Various names of the plant are also provided in the texts<sup>57</sup>. Ancient texts enumerate several other properties of the plant<sup>58</sup>.

53 *Ibid*.p.38.

54 C. Madhavan Pillai, *Malayalam English Dictionary*, p. 265.

55 *AV*, p.-219.

56 *IMP*,Vol.I,p.377-378.

57 *Ibid*.

*Abhidhinamañjarç*

#NÔahevENÔI ceNÔv'I kiwteNÔai[keit c #NÔaiÉxanpUvRNtu  
v'Inama c t< vdet!,

58 *Hçdayapriyi*

#NÔv'I Jvrhra vat¹I v&iñnaiznl,

Another plant with the name *hemapuÀpiki* (yellow jasmine) is also called by the name *kanakaprabhi*<sup>59</sup>. Its commonly used names are *y£thika*, *migadhi* and *s£cimalliki*<sup>60</sup>. According to Sanskrit treatises white flowered and yellow flowered *y£thikas* are known<sup>61</sup>. Though the latin name for *hemapuÀpiki* or yellow flowered *y£thika* is *Jasminum humile* Linn. It is known as *Jasminum auriculatum* Linn<sup>62</sup> (Fig.3.7). From the name itself we may conclude that the species mentioned by the name *kanakaprabhi* is the yellow flowered variety of *y£thika*. This plant has bitter taste and can vitiate phlegm and air, cure wounds, inflammation of blood and oral cavity, eye diseases headache and poisons<sup>63</sup>.

59 AV, p.219.

60 IMP, Vol.III, p247,248.

61 Ibid, p. 245.

*Rijanigha, ¶u*

yUiwka gi[kaMbóa magxl blpui:pka maedain b÷mNwa c

É¼anNda gjaþya,

ANya yUwl suv[aRþa sugNxa hemyUiwka yuvtlòà Vy´gNxa izo{fl  
nagpui:pka,

hir[l pltyUwl c paeitka knkàÉa mnaehra c gNxaF(a àae´a

Çyaedzaþya.

62 Ibid.

63 Ibid. p.247.

BV

e. *Anantamēla*- this plant has been identified as *Hemidesmus indicus* Linn<sup>64</sup>(Fig.3.8). This is commonly called as *īriba* and has two varieties. viz. black variety and white variety. Each variety has its own names<sup>65</sup>. According to *Abhidhinamaṃjarṭ*, *sugandhi* is the name given to black variety of the plant<sup>66</sup>. The roots of the plant are bitter, sweet, astringent, aromatic, refrigerant, appetizer, alternant, expectorant and tonic. Vitiated conditions of bile, burning sensation, lecoderma, leprosy, skin diseases, pruritus, asthma, bronchitis, hyperdypsia, ophthamopathy, dysentery etc. can be caused by the plant<sup>67</sup>. Botanists identify white *īaribha*

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yUwlyug< ihm< it' < kqupakrs< l"u,mxur< tuvr< ù\*< k)vatlm!,  
 ì[aömuodNtai]izraeraegiv;aphm!.

64 AV, P.8.

65 IMP, Vol: p.143.

*Abidhinamaṃjari-*

gaepsutae' a ÉÔa cNdngaepa c zairba k«:[ak«:[lta c sugNxa  
 sugiNxka gNxmuLa c,  
 gaepa gaepI cNdna c kNya cNdnzairbak«:[mUla dl"RpÇI twa  
 caeTplzairba  
 gaeppuÇI iÖtIya tu mhagaepI c gaepura sugiNxnl gaepv'I  
 ltS)aeta ing\*te,

66 *Ibid.*

67 IMP, Vol: p.143.

**BV-**

zairbayugl< SvaÊ iöGx< zu→kr<  
 guéAi¶maN\*aéicñaskasamiv;naznm!,  
 dae;Çyaöàdrjvratlsarnaznm!,



as *Hemidesmus indicus* Linn. And black *iriba* as *Ichnocarpus frutescens* Linn. But in Kerala, both the names are used to denote the same plant.

f. *Ahibhuk* - This is an evergreen shrub with white flowers and red calyx<sup>68</sup>. It has been identified as *Rauwolfia serpentina*<sup>69</sup>(Fig.3.9). More than 30 alkaloids are present in the plant. Among them the yellow coloured alkaloids viz. rauwolfianin, reserpin, serpentine, serpentinin and white coloured alkaloids viz. ajmaline and ajmalinin are important<sup>70</sup>. Besides the alkaloids roots contain a sedative substance viz. olioryzin. The alkaloid reserpin is an accepted remedy for hypertension and the exceeding use of the alkaloid for the purpose has made the plant medicinally and economically important<sup>71</sup>. Overdose of *sarpagandhi* may

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68 AV, p.42.

69 *Ibid.*

IMP,Vol:IV, P409

ADPS,p.439..

70 VS, p.183.

71 *Ibid,*

ADPS,p.439.

IMP,Vol:IV, P409.

become poisonous. One to two grms. of serpentine can be used for medicinal purposes<sup>72</sup>. Three to six grams of the plant can be provided as a sedative agent<sup>73</sup>.

Sanskrit *nighaṭus* identify the plant by specifying the features and also enumerate the names by which the plant is called<sup>74</sup>. They are also conscious of the medicinal properties of the plant<sup>75</sup>. Besides its sedative properties and use for hypertension, it has been used in the cases of strangury. Fever, wounds, colic, insomnia, epilepsy, giddiness, dyspepsia, and vitiated conditions of phlegm and air and uterine contractions are treated with the

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72 . **VS**,p.184.

73 *Ibid.*

74 *IMP,Vol:IV, P409*

*Dravyagunavijñāna*

spRgNxa naggNxa cNÔzUra c ciNÔka, mhaihgNxa r´a c ñeta  
cEvaihgNxa,

ḥ;doe nllaé[sumdla pui:pta ḥl:mkale, v;aRkale )lpiricit< nllr´a<  
dxait,

mUl< ySya hir[xvl< SwUlMntSwc³m!, cNÔaOya sa xvlivqpa  
spRgNxa àisā,

75 *Ibid.*

spRgNxaitit´ae:[a ê]a kquivpaiknl ipÄv&ixkrl éCya zulàzmnl sra,  
k)vathra inÔaàda ùdvsaidnl kamavsaidnl cEv hinit zUlJvrk«mIn!.  
AinÔa< ÉUtmuNmadmpSmar< æm< twa AiḥmaN\* < iv;< r  
´vataixKy< Vypaehit.

decoction of the root. The juice of leaves is a remedy for eye diseases.

g. *Ìvarç*- This is also identified as *Rauwolfia serpentina*<sup>76</sup>.

h. *Gandhaniçi* - This is a species of zedoary having bitter, sweet and astringent tastes (Fig.3.10). The root of the plant will cleanup oral cavity, prevent diarrhoea, oedema, cough, wounds, skin diseases etc<sup>77</sup>. It vitiates bile and refines sound. Several other names of the plant are also provided<sup>78</sup>.

i. *GhoÀi* - Five different species of plants bear the name *ghoÀi*<sup>79</sup>. They are:

i - *áatapuÀpi*-. This is commonly called as dill. Its botanical name is *Anethum graveolins* Linn<sup>80</sup> (Fig.3.11). It is an aromatic annual herb, used for cooking purposes. On heating, the plant

76 AV. p.103.

77 Ibid.p.425.

78 Ibid.

*çathç, paliçi, Àa·gandhi, suvçati, gandhamçliki, gandhirika, gandhavadhu, vadhu, pçthu, pilççiki.*

79 Ibid.p.475.

80 Ibid.

IMP, Vol:I, p.154.

acquires the power to stimulate *pitta*, increase digestion and produce taste. Presence of the plant as an ingredient, adds to the aroma<sup>81</sup> of the food. Twenty four names are given to the plant by ancient sages<sup>82</sup>. Its fruits are of medicinal value and are accepted to be acrid, bitter, thermogenic, deodorant, digestive, carminative, stomachic etc. This is used for the treatment of many diseases like fever, ulcers skin diseases and syphilis<sup>83</sup>.

ii. *Kapilç*- This is also called *viÀilari*. It increases appetite, stimulates digestion and reduces constipation<sup>84</sup>.

iii. *Karkka᳚a᳚᳚gi* - this is also called as *᳚᳚᳚gç*, *karkka᳚ihvaya*, *cakra*, *mahighoÀa*, *navi᳚ginç*. *candrispada*, *viÀiç*, *vanaja* and *m᳚rthaja*<sup>85</sup>.

81 AV,P.103.

82 IMP,Vol:I.,p.155.

*Rijanigha, ᳚u*

zta᳚a ztpu:pa c imis"aeR;a c paeitkaAihDaÇaPyvaKpu:pl maxvl karvl iz)a,

s<"atpiÇka DaÇa v᳚pu:pa supui:pka ztàsUna bhla pu:papa ztpiÇka,

gNxairkaitCDÇa c ctuivizit namka,

83 IMP,Vol-I,p.155.

84 AV, p.

85 *Ibid*.p.253.

This has been identified as gall. Tuberculosis, fever, hiccup, bad appetite, vomiting etc. are treated with the plant<sup>86</sup>.

iv. Wild *iatapuÀpa*. This is identified as the fennel seed<sup>87</sup>(Fig.3.12). It shares the properties of *iatapuÀpa*. Besides that it induces constipation, fights with rheumatoid, arthritis and stimulates digestion.

v. *Karkkaìacchada*-this has been identified as bitterluffa and its tendrils and fruits are accepted to be of medicinal value (Fig.3.13). It fights against the vitiation of phlegm and bile, oedema, piles etc. It purifies bowels and intestine. Fruits are used to treat poison. They stimulate appetite, induce digestion and constipation. This climber plant has yellow coloured flowers and is seen abundantly in forests<sup>88</sup>.

j. *Kanduli*- this plant seems to cure rheumatism

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86 *Ibid.*

87 *Ibid.* p.475.

88 *Ibid.*p-255.

and vitiation of phlegm. It destroys parasites and rheumatic arthritis<sup>89</sup>.

k. *Kili* - the name is given to seven different plants. They are *ĪĀa,a*, *kilakezi*, *kisanižika*, *kin·iri*, *ažvagandha*, *kimavænda*, *prumjçraka*<sup>90</sup>.

i. *ĪĀa,a*: this is a slender aromatic climber cultivated throughout the land<sup>91</sup>. It is identified as Indian long pepper or long pepper. (*Piper longum* Linn)<sup>92</sup> (Fig.3.14). The roots seen at the nodes of the plant and the dried spikes are of medicinal value. It also bears several names<sup>93</sup> and properties<sup>94</sup>.

ii. *Kilakezi* : this is identified as true indigo<sup>95</sup>. Its roots are of medicinal value. It reduces constipation and stimulates hair-growth. It is

89 AV , p.213.

90 *Ibid.*p.301.

91 *Ibid.*

92 *IMP,Vol IV, p.290.*

93 *Ibid.*p.291.

*BP*

ipPpII magxl k«:[a vEdehl cpla k[a  
%pk...Lyae:[a saE{fl kaelaSyāĀlú[t{fula.

94 *Ibid.*

*Dhanvantarç nigha, ¶u*

ipPpII kquka SvaÊihRma iõGxa içdae;ijt!  
t&fœjvraedrjNTvamnaiznl c rsaynl.

95 AV, p.292.

used for the treatment of rheumatic arthritis, poison etc<sup>96</sup>.

iii. *Kisaniçika*: This is also known by the name *Aru, a*<sup>97</sup>.

iv. *Ki, iri*. It is identified as madder root<sup>98</sup> (Fig.3.15). It improves sound and colour and destroys poison, phlegm, infections of vagina, diseases of ear and eye, wound etc. *maµjiÀ¶hi, vijayi, rakta, rakti ´gi, rakta, Kila, kilameÀika* etc. are the synonyms of the plant<sup>99</sup>.

v. *Açvagandhi*: This has been identified as winter cherry <sup>100</sup>(*Withania somnifera* (Linn.) Dunal)(Fig.3.16). This is an erect branching under shrub, seen in the drier parts of India. *Rijanigha, ¶u* enumerates the twenty three names of the plant<sup>101</sup>. The tuberous roots of the

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96 *Ibid.*

97 *Ibid*,p.297.

98 *AV*, p.284.

99 *Ibid.*

100 *Ibid*.p-19.

101 *IMP*,Vol V,p.409.

AñgNxa vaijgNxa kMbukaóá vraihka vrahm[IR turgl vnja vaijnl hyl, puiòda blda pu{ya hygNxa c plvra plazp[IR vat<sup>1</sup>I Zyamla kamêip[I

plant are astringent, bitter, acrid, somniferous, thermogenic, stimulant, aphrodisiac, diuretic and tonic. They are used in the treatment of the vitiated conditions of *vata*, leucoderma, constipation, insomnia, tissue building and nervous breakdown<sup>102</sup>.

vi. *Kimavānda*-this is also called as *kimadḥtiki* and *nigadanti*<sup>103</sup>.

vii. *Perumjṭraka*: This has been identified as sweet fennel <sup>104</sup>(Fig.3.17). The plant is a stout, erect, glabulous aromatic herb. Linear leaves, small yellow flowers on terminal umbrels, oblong fruits etc. are the characteristic features of the plant<sup>105</sup>. *Rijanigha*, *Ṁu* enumerates the fifteen names of the plant. Its

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kaliàykrl bLya gNxpḤI hyiàya vrahpḤI iv}eya  
 Ḥyaeiv<zitnamka. AṅgNxa vaijgNxa kMbukaóá vraihka vrahm[IR  
 turgl vnja vaijnI hyl,  
 puiòda blda pu{ya hygNxa c plvra plazp[IR vat<sup>1</sup>I Zyamla  
 kamêip[I  
 kaliàykrl bLya gNxpḤI hyiàya vrahpḤI iv}eya Ḥyaeiv<zitnamka.

102 *Ibid*, vol.V, p.410.

**BV**

AṅgNxainlðe:miñḤzae)]yapha bLya rsaynl it´ak;ayae:  
 [aitzu-la.

103 *AV*. p. 287, 288.

104 *Ibid*, p.301.

105 *IMP, Vol III, p.50*.



botanical name is *Foeniculam vulgare* Mill<sup>106</sup>. Its fruits are of medicinal value<sup>107</sup>.

l. *Indri, i*: This has been identified as the three leaved chaste tree (*Vitex trifolia* Linn.)<sup>108</sup> (Fig.3.18) It is an aromatic shrub with grey bark, trifoliate leaves, light blue or purple flowers and purplish black fruits<sup>109</sup>. *Bhivaprakīṣa* mentions of its other names<sup>110</sup>. Roots, leaves, flowers and fruits of the plant are useful. The roots which are bitter, acrid, and astringent are used mainly in the treatment of the vitiated conditions of air and phlegm, leprosy, skin diseases, verminosis, cough etc<sup>111</sup>.

m. *áaṅhç* -: This has been identified as *Kaempferia galangal* Linn<sup>112</sup> (Fig.3.19). It is an

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106 *Ibid*, p.50.

107 *Ibid*.

108 *Ibid*. VolV, p.392.

109 *Ibid*.

110 *Ibid*.

isNÊvar> ñetpu:pa isNÊk> isNÊvark> ,

111 *Ibid*.

*Rijanigha, ṅu,*

isNÊvar> kquiSt' > k)vat]yaph> k...ók{f²itzmn> zUlùt!

kasisĭd>.

112 AV, p.178.

aromatic herb with fragrant tuber. Two or more leaves will spread flat over the ground. White flowers with purplish dots are its another peculiarity. Besides the prominent root stock, the underground rhizome has secondary roots and tubers. Their tips would also become tuberous<sup>113</sup>. It also bears several names<sup>114</sup>. The rhizomes are bitter, thermogenic, acrid, aromatic, digestive and stimulant. This has been used for the treatment of leprosy, piles, wounds, cough, rheumatism, intermittent fevers etc<sup>115</sup>.

n. *Asitajçraka* - it is commonly called a black cumin or small fennel<sup>116</sup>. Its botanical name is *Nigella sativa* Linn<sup>117</sup> (Fig.3.20). This plant has been cultivated throughout Punjab and Bihar. This is a small herb with compound leaves,

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*IMP, Vol III, p.274.*

113 *IMP, Vol III, p.274.*

114 *Ibid, BP*

kcURrae vedmuOyí Ôaivf> kaiLpk> zql.

115 *Ibid,*

kcURrae dlpnae éCy> kqukiSt´ @v c, sugiNx> kqupak> SyaTk...  
óazaeRì[kasnut!,

%:[ae l"uhRreCDœvasguLmvatk)k«mIn!.

116 *AV, p.29.*

117 *IMP, Vol IV, p.139.*

pale blue flowers and black fruits. Seeds of the plant are used for medicinal purposes<sup>118</sup>. *Rijanigha*, ¶u enumerates fourteen names of the plant<sup>119</sup>. The bitter seeds of the plant are used for the treatment of haemorrhoids, infections of uterus, vitiation of bile and phlegm and helminthiasis<sup>120</sup>.

o. *Karu*, *amallç* : This plant with bitter taste is also called *Navamilika*. Its flowers are useful in the vitiation of three humours and blood<sup>121</sup>.

p. *Arjjaka* : This is an erect aromatic branching herb with a bitter taste<sup>122</sup>. It is commonly called as sweet basil or common basil<sup>123</sup> (Fig.3.21). Its botanical name is *Ocimum basilicum* Linn.<sup>124</sup> This also bears several names and

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118 *Ibid.*

119 *Ibid.*

idPyaepk...iÂka kall p&Wvl SwUlka [a p&wu> mnae}a jr[I jI[aR té[I SwUljrka> ,

su;vl karvl }eya p&Wvlka c ctudRz.

120 *Ibid. Madanapilanigha*, ¶u.

r'ipÄhr< it' < gÉaRzyivzaexnm!, k)ipÄhr< cEv zUl<sup>1</sup>< k«:

[jlrkm!.

121 AV. p.252.

122 *Ibid*, p.13.

123 IMP, Vol IV, p.160.

124 *Ibid.*

properties<sup>125</sup>. The whole plant is used as a medicine. It is acrid, bitter, anti inflammatory stimulant and antipyretic. It has been used for the treatment of poisons of mobile and immobile origins, inflammation of blood, vitiation of phlegm and air, eye diseases and loss of appetite. During delivery, it has been applied for the easy expulsion of the child<sup>126</sup>.

Here sixteen plants are enumerated to have the name *Sugandhi*. But only one *Rauvolfia serpentina* is proved to be of poisonous nature. Others are used for cooking purposes. It is to be noted in this context that almost all the listed plants exhibit the taste of a typical poisonous plant. i.e. bitter, acrid, astringent etc. Many of them are also used in

125 *Ibid.* p.162. *Rijanigha*, ¶*u*.

AjRk> ]uÔtulsI ]uÔp[IR muoajRk> %çgNxí jMblr> k...Qerí  
kiQÃr>,  
istajRkStu vEk...{Qae vqpÇ> k...Qerk> jMblrae gNxb÷I>  
sumuo> kqupÇk>,  
k«:[ajRk> kalmalae malUk> k«:[maluk> Syat! k«:[mi'ka àae´a  
gr<sup>1</sup>ae vnbbRr>.

126 *Ibid.*, *Rijanigha*, ¶*u* and *Dhanvantarçnigha*, ¶*u*.

AjRk> zltlit´> ðe:mamyivnazn> iÖivx< c iv;< hNyadœ Êòr  
´ivnazn>,  
ÇyajRka> kq<sup>a</sup>: [a> Syu> k)vatamyapha> neÇamyhra éCya  
suoàsvkarka>.

the treatment of poisons. But this is not just enough to identify the plant as poisonous. So the real identity of the plant *Sugandhi* leads us to *Rauvolfia serpentina*.

**5. Gargaraka** - The identification of the plant is not done.

**6. Karaghita** - This plant is not identified.

**7. Vidyucchikhi** - Nothing is known of this plant.

**8. Vijayi** - According to AV, ten different plants are said to have the name *vijayi*<sup>127</sup>. They are, A. *hirçtakç* (Chebulic myrobalans - *Terminalia chebula* Retz.<sup>128</sup>). B. *çzinç*. (Spung tree)<sup>129</sup>. C. *ædhivaca* (hariilç)<sup>130</sup>, D. *agnimandha* (*Premna corymbosa* Rottl.)<sup>131</sup>. E. *kilabhi, iki* (madder root)<sup>132</sup>, F. *candriki* (*Rauvolfia serpentina*

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127 p.490.

128 *IMP, Vol.V, p.263.*

129 AV, P. 103.

130 *Ibid.*, p.149.

131 *Ibid.* p.4.

*IMP, Vol.IV, p.348.*

132 AV. p.300.

Linn.)<sup>133</sup>, G. *pirāḷikavaca*<sup>134</sup>, H. *ugragandhi* (sweet flag-*Acorus calamus* Linn.)<sup>135</sup> I. *ibhanimḷlika* (Indian Hemp-*Cannabis sativa* Linn)<sup>136</sup> and J. *bhogavatḷ*<sup>137</sup>. Among these only two are poisonous. They are *Ibhanimḷliki* and *Ugragandhi*. To specify the identification, these two plants have to be analysed closely.

a.*Ugragandhi* : This is a semi aquatic herb having rhizomes (Fig.3.22). These rhizomes are much branched, thick, cylindrical and pinkish brown in colour<sup>138</sup>. These rhizomes are acrid, bitter, thermogenic, aromatic, intellect promoting, anthelmintic, emetic, laxative, insecticidal, antipyretic, and anticonvulsant. It is useful in the treatment of air (*vata*) and phlegm, indigestion, depression and other mental disorders<sup>139</sup>. This plant has been

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133 *Ibid.*p.484.  
 134 *Ibid.* p.659.  
 135 *Ibid.*,p.105. *IMP,Vol I, p.51.*  
 136 *Ibid.*p.356. *AV, P..97.*  
 137 *Ibid.*p.856.  
 138 *IMP,Vol.I,p.51.*  
 139 *Ibid.*

identified by ancient authors. They have listed the names in which the plant was denoted<sup>140</sup>. They also mention of its properties<sup>141</sup>. In almost all ancient treatises its anthelmintic property is emphasized<sup>142</sup>. Hence we may conclude that the plant is poisonous to a considerable level, which was known to the ancient community.

*b.Ibhanimçliki* - This is a large aromatic annual herb commonly called as true hemp, soft hemp or Indian hemp. (*Cannabis sativa* Linn.).<sup>143</sup> (Fig.3.23) This has been cultivated throughout the world and bears other names like *Cannabis americana* and *Cannabis mexicana*<sup>144</sup>. Male and female varieties of the plant are seen. The former would be taller and leaner than the latter. In the males, distribution of leaves near

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140 *Ibid. Rijanigha, ¶u.*  
vcaeçgNxa gaelaeml jiqlaeça c laemza r]ae<sup>1</sup> ivjya ÉÔa  
m<sup>1</sup>/<sub>4</sub>Lyeit dzabya.

141 *Ibid. BV,*  
vcaeçgNxa kquka it´ae:[a vaiNtviûk«t! ivbNxaXmanzUL<sup>1</sup>  
zk«NmUÇivzaeixnl, ApSmark)aeNmadÉUtjNTvinlan! hret!,

142 *Ibid.*

143 *Ibid.*Vol.I, p. 356.

AV. p.97.

VS, p. 49.

144 *FM*, p.361.

flower buds is rare. Females have abundance of leaves. In them, flowers are more poisonous than leaves<sup>145</sup>. Dried leaves and flowering shoots are of great economic value. The chemical called delta-9-tetrahydrocannabinol is the major constituent of the plant. It is an unstable chemical which readily produces its isomer delta-8- tetrahydrocannabinol. On hydrogenation the isomer produces cannabinalol. This will provide a narcotic action to the plant<sup>146</sup>.

A number of narcotic drugs are prepared from the plant<sup>147</sup>. They are i) Bhang - When the dried leaves and flowering tops of the plant are mixed with spices and honey, the resultant infusion is called bhang<sup>148</sup>. This is a popular beverage of northern part of India.

ii) Majun - When bhang is treated with sugar, flour, milk, butter, honey and almonds and the

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145 *VS*, p. 50.

146 *FM*, p.362.

147 *Ibid.*

148 *Ibid.*



confection made of it is called majun<sup>149</sup>.

iii) Gaṃja - Dried flowering top of the plant with green rusty colour and specific odour is called ganja. The same when mixed with tobacco can be used in a cigarette, beedi or hookah<sup>150</sup>.

iv) Hashish - This is popularly called as dope or shit. This is actually the resin, obtaining from the flowering top of the plant. It is heated to make a powder. This powder when mixed with tobacco can also be smoked<sup>151</sup>. This exerts its impact in the eyes and brain of the victim<sup>152</sup>.

v) Cannabene - This is an extract of dried herb interacting with petroleum ether<sup>153</sup>.

vi. Momea - This is a Tibetan preparation in which the hemp is treated with human fat<sup>154</sup>.

vii. Schira - This is a preparation popular in Moroco. Besides these, certain cigarettes like

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149 ***Ibid.*** p.362.

150 *Ibid.*

151 *Ibid.*

152 *Ibid.*

153 ***VS***,p-51.

154 *FM*,p-362.

Reefer and Joints contain cannabis<sup>155</sup>.

Indian hemp affects the central nervous system of the victim. Its action occurs in two distinct stages<sup>156</sup>. In the first stage, the victim is elated to an artificial state of pleasure. The consequent steps coming under this stage are a). Breath begins to carry the characteristic odour of hemp, b) Dryness of mouth and throat, c) Intense thirst, d) Anorexia, e) Anxiety, f) uncontrollable pleasure, g) hallucinations, h) loss of the sense of space and time, i) Impairment of thought and memory and j) Stimulated imagination and sexual desire<sup>157</sup>. The second stage of hemp poisoning leads the victim to a deep sleep. After the sleep of five to six hours the victim wakes up with a clear mind. He also experiences thirst and hunger<sup>158</sup>.

Usually 4 to 10 gms of hemp causes

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155 *Ibid.*

156 *VS*,p-51.

157 *Ibid.*

158 *FM*,p.362.

intoxication. But death hardly occurs in hemp poisoning. In rare cases respiratory failure may result in death<sup>159</sup>. Habitual use of hemp may result in the failure of nervous system leading to fatigue and emaciation<sup>160</sup>. The intake of 8gms of tetra-hydro-cannabinole becomes fatal. Death occurs within half to several days<sup>161</sup>. The postmortem report of a victim will show the signs of death caused by respiratory failure<sup>162</sup>. Āyurvedic texts give different names of the plant<sup>163</sup>. They also name the narcotic effects exerted by the plant<sup>164</sup>. The plant has been treated as an analgesic, abortifacient, narcotic, aphrodisiac, tonic etc<sup>165</sup>. Due to its intoxicating capacity, the plant needs to be purified before it can be used as a medicine. Cooking with milk is the accepted method of purifying hemp<sup>166</sup>.

159 **VS**, p.51.

160 *Ibid.*

161 *Ibid.*

162 *Ibid.*

163 *IMP, Vol I, p.356, Dhanvantarinighantu*

ivjya riĀka É¼a tNÔak«dœ b÷vaidnl maidnl maidka matu>  
àae´a gĀaikinStwa.

164 *Ibid., Āyurvedavijñāna*, mdnaeĀpnl inÔajnnl h;Rdaiynl  
xnuSt<É< jlÇas< iv;Ucl— c mdaTyym!, àv&iĀ< rajsae bip<  
hNTypTyàsUitk«t!.

165 *Ibid., Atreyasamhita*

Aaŀleyl tpR[l bLya mNmwaēĀpnl cla, inÔasĀnnl gÉRpatnl c ivkai;  
[l.

vedna]epkair[l }eya c mdkair[l.

166 *Ibid. Ayurvedavijnani*

After that the plant should be washed, dried and fried in ghee<sup>167</sup>. Another method adapted for the purification of hemp is drying in shade. For that the plant has to be powdered and mixed with milk. When the milk is dried the plant can be used for medicinal purposes<sup>168</sup>. 60 to 125 mgs of hemp and 30mgs of charas can be used internally for medicinal purposes<sup>169</sup>. It is also used as an insecticide<sup>170</sup>. The fibre obtained from the stem of the plant is used to make ropes and fabrics<sup>171</sup>. Its properties are clearly mentioned in ancient treatises<sup>172</sup>.

Regarding the term *Vijayi* used by Suśruta certain facts are to be taken earnestly. Among the three poisonous plants having the name, one is mildly poisonous while the rest are seriously poisonous. In the latter group *Rauvolfia serpentina* has already been stated

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smaNyzaexnm!- ]lre[ pirpU[aRya< SwaLyamupiv;< suxI>  
faelayUe pctet! sMykœ ivzuXyit n s<zy> ,

167 **VS**,p-52.

168 *Ibid.*

169 *Ibid.*

170 *Ibid.*

171 *Illustrated Oxford Dictionary*,p.379.

172 *IMP,Vol I,p.359.*

AzaeRVywkra cEv ikiÂJJvrinvairka ì[kaehsmuÑftizîzae)Vywahra.  
nafldaEbRLys<ÉUt< twa]epsmuiTwtm!, rj>zUI< inhNTyazu  
ÉaSkriStimr< ywa.

and hence can be omitted. Then the options are to select between the mildly poisonous and seriously poisonous plant, naturally one would resort to assign the term *Vijayi* to the latter. But the point which should be analysed is that the plant part identified by Suśruta to be poisonous is root. In the case of Indian hemp the whole plant is considered to be poisonous. But the toxic chemicals are localized mainly in leaves and flower buds. Nothing is mentioned of their roots. It is considered only as a biological waste. On the other hand sweet flag exhibits all the characteristic features of a poisonous plant and is an accepted insecticide. And the main thing which has to be emphasized is that the rhizomes are the locus of poison. More than that, if the analgesic and narcotic properties of Indian hemp was known to Suśruta, he might have used it in his surgical practices. But we cannot find such a single instance in *SS*. It can be concluded that, though more poisonous and important than sweet flag, Indian hemp was not

familiar to Suśruta. Hence the name *Vijayi* in this context seems to imply sweet flag.

### **3.2.1.2 Plants with poisonous leaves**

**1. ViĀapatriki:** The word literally means the plant with poisonous leaves. But no plant has been identified to bear the name.

**2. Lambi :** This is commonly called as bitter bottle gourd<sup>173</sup>. Its botanical name is *Legenaria sicerara* (Mol)Stadley<sup>174</sup> (Fig.3.24). It is cultivated throughout India. This is a climbing herb with simple leaves, white flowers, and dumb-bell shaped fruits<sup>175</sup>. The leaves of the plant are bitter, refrigerant, emetic, purgative, anodyne, expectorant, depurative and febrifuge. It is used for the treatment of constipation, inflammations, leprosy, skin diseases, and baldness<sup>176</sup>. Its other names and properties are mentioned in ayurvedic treatises

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173 AV, p.819,82.

174 IMP, Vol.III ,p.293.

175 Ibid.

176 Ibid.

177 Ibid.BV

#úvak... kqutuMbl Syat! sa tuMbl c b&hT)la,

. There it is mentioned to be used for the treatment of poison. The poisonous nature of its leaves is not established and no other identification is possible.

**3. *Varadiru*** : This is a big deciduous tree of great economic value<sup>178</sup>. (Fig.3.25)It has simple leaves, small white flowers and bony fruits<sup>179</sup>. Its botanical name is *Tectona grandis* Linn<sup>180</sup>. The whole plant is considered to be of medicinal value<sup>181</sup>. On analysis, the leaves are refrigerant, haemostatic, anti-inflammatory and vulnerary. They are used in the treatment of inflammation, leprosy, skin diseases, hemorrhages etc<sup>182</sup>. Āyurvedic dictionaries give all the names of the tree and list the properties of the same<sup>183</sup>.

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*Dhanvantarānigha*, १७  
 kqutuMbl kquiSt´a vatk«t! ñaskasijt! k)¹I zaexnl  
 zae)ì[zUliv;apha.

178 AV. p. 837,363.

179 IMP, Vol.V, p.245.

180 *Ibid.*

181 *Ibid*

182 *Ibid*

183 *Ibid Abidhinamaµjarç*

zaekae ÉUimshñ iSwrk> orpÇkae mhapÇ>  
 vrdaé> zblsarae hll;kae Öardar> Syat!,  
 BP

**4. Karambha** : According to AV two plants have the name *Karambha*<sup>184</sup>. They are

a. *Ka'gu* - This has been identified as Indian millet<sup>185</sup>. Its botanical name is *setaria italica* (Linn.) P.Beauv<sup>186</sup>. Its grains are useful for the maintenance of horses<sup>187</sup>.

b. *Uttamira,i* - This is a foul-smelling milky twining herb seen in the hotter parts of India<sup>188</sup>(Fig.3.26). It has simple leaves, greenish yellow flowers, spiny fruits and numerous seeds<sup>189</sup>. Its botanical name is *Pergularia daemia* (Forssk.) Chiov<sup>190</sup>. The leaves of the plant are bitter, thermogenic, anthelmintic, antipyretic and depurative. Vitiating conditions of kapha, helminthiasis, haemorrhoids and leprosy are treated with the leaves of the plant<sup>191</sup>. *Rijanigha, ¶u* gives several names of the

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ÉUimshStu izizrae r'iptàsadn>

184 *Ibid.* p.250

185 *Ibid.*p.173.

186 *IMP,Vol V,p.121.*

187 *Ibid*

188 *AV, p.114.*

189 *IMP,VolIV,p.236.*

190 *Ibid*

191 *Ibid*



plant. Many of the properties of the plant are also enlisted there<sup>192</sup>. Though not poisonous, *Uttamira*,<sup>i</sup> seems to be nearer to the term *Karambha*.

**5. Mahikarambha** : Identification of this plant is also has not done.

In the above mentioned list, two viz. *ViĀapatriki* and *Mahikarambha* escape identification. The rest too cannot be identified of having poisonous leaves. One peculiarity of the three plants viz. bitter bottlegourd, tek and pergularia is that their leaves are used for medicinal purposes. They cure skin diseases and troubles caused by worms. But this is not enough to substantiate their toxicity.

### 3.2.1.3 Plants with poisonous fruits

Suĉruta enlists twelve plants having poisonous fruits. They are 1. *kumudvatç*,

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<sup>192</sup> *Ibid*  
 #Ndlvra yuGm)la dl"Rv&ĀaeĀmar[I pu:pmĀirka Ôae[I krMÉa  
 nilka c sa,  
*Ibid*. #Ndlvra kqu> zlta ipĀĊe:maphairka c]u:ya kasdae;¹  
 ì[k«imhra pra.

2. *ve\_uka*, 3. *karambha*, 4. *mahikarambha*,  
5. *kirko᳚aka*, 6. *re\_uka*. 7. *khadyotaka*, 8.  
*camari*, 9. *ibhagandha*, 10. *sarpaghiti*, 11.  
*nandana* and 12. *sarpaka*<sup>193</sup> .

**1. Kumudvati** : Identification of the plant is not done.

**2. Ve\_uka** : Identification of the plant is not done.

**3. Karambha** : This has been already identified and is already stated. Its fruits are acrid, thermogenic and digestive. Dyspepsia and vitiated conditions of phlegm are treated with the same<sup>194</sup> .

**4. Mahikarambha** : As mentioned earlier it is not identified.

**5. Kirko᳚aka** : Identification of the plant is not done.

**6. Re\_uka:-** This is said to be a spice resembling pepper. It is bitter, thermogenic and astringent. The grains of the plant are used in the treatment of wound, thirst, poison etc. It vitiates bile. It is an abortifacient. It

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193      *SS, KS.*

194      *IMP, Vol. IV,, p.236.*

purifies mouth and stimulates digestion<sup>195</sup>.

**7. Khadyotaka:** Identification of the plant is not done.

**8. Camari:** A white deer is said to have the name. But in this context that interpretation does not suit. A plant having the name is not known<sup>196</sup>.

**9. Ibhagandhi:** This has been identified as *Nigadanti*. (*Baliospermum montanum* (willd.) Muell-Arg<sup>197</sup> (Fig.3.27). But the *Nigha*, quoting the synonyms of the plant the name *Ibhagandhi* is not seen<sup>198</sup>. This is an under shrub with a number of flowers. Male and female flowers occur in the same plant<sup>199</sup>. Roots, leaves and seeds of the plant are used for medicinal purposes. The seeds cause diarrhoea. When taken excessively, there would be irritation and inflammation in the

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195 AV. p-812,232.

196 *Ibid*, p.484.

197 *Ibid*.p.97.

*IMP*,Vol.I,p.240.

198 *IMP*,Vol.I,p.240.

*Abhidhinama*jarç

iniîRZyNte ink...MÉae dNtl icÇa muk...lka zl<sup>9</sup>a %picÇa c ivzLya

"u[iàya tlú[recl ceit,

sEver{f)la àae´a kakaeÊMbrpiÇka s<snl c muk...Nteit zBdE>

pyaRyvackE>,

199 VS,p-111

body. Hallucinations and intoxication are the other symptoms<sup>200</sup>. The purification of *Nigadanti* is a long process. First of all the plant has to be covered with honey and long pepper paste. Then it should be tied tight with grass (sacrificial grass *darbhi*) and covered with clay. It should be put in fire and dried in shade<sup>201</sup>.

The leaves of the plant are used in the treatment of asthma<sup>202</sup>. The oil extracted from the seed is used in cases of anuria and constipation. This is also used to treat urine-stone<sup>203</sup>. If applied externally, the paste of the seed works like a stimulant and causes discolouration to the skin<sup>204</sup>.

**10. *Sarpaghiti*:** This has been identified as *Rauvolfia serpentina* and has been stated earlier<sup>205</sup>.

**11. *Nandana*:** This has been identified as long

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200 *Ibid*  
201 *Ibid*  
202 *IMP, Vol. I, p. 240.*  
203 *VS, p. 113.*  
204 *Ibid.*  
205 *Ibid.. 16.*

leaved pine<sup>206</sup>. It is a bitter, astringent, sweet, and thermogenic. Its timber is used for the treatment of ear diseases, eye diseases, throat troubles, vitiation of phlegm and air, perspiration, hunger, cough, wound etc. It fights with skin diseases, oedema and wounds<sup>207</sup>.

**12. *Sarpaka*:** Identification of the plant is not done.

In this section twelve plants are listed, of which seven remain unidentified. *karambha*, *nandana* and *re,uka* exhibit the characteristics of poisonous plants. The grains of *re,uka* are used to cure wounds, poisons etc. but about the fruit of *nandana*, nothing is mentioned. The timber of the plant is of medicinal use. *Ibhagandhi* and *sarpaghiti* are the two poisonous plants mentioned in this section. There too the locus of poison remains a matter of controversy. The seeds not the fruits are

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206 AV. p.618.  
207 *Ibid.*

said to be poisonous in *ibhagandhi* while the plant *sarpaghiti* is notorious for its poisonous leaves, roots and bark.

### **3.2.1.4 Plants with poisonous flowers**

Five plants are enlisted here. They are 1. *vetra*, 2. *kadamba*, 3. *vallçja*, 4. *karambha* and 5. *mahikarambha*<sup>208</sup>.

**1. *Vetra*:** This has been identified as common rattan (*Calamus rotang* Linn.)<sup>209</sup> (Fig.3.28). This plant is characterized with cylindrical yellowish stems, unisexual flowers and pale yellow fruits. The whole plant is said to be of medicinal value<sup>210</sup>. *Kaiyadevanigha, ¶u* enumerates two properties and potentials of its sprouts. Thus that they are refrigerant, digestive, bitter, anthelmintic, pungent, light, receptive, fighting against bile, rheumatic and appetizing. The seeds are used in the treatment of vitiated

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208 *ss, kalpasthina, p*

209 *AV, P.876, 506. IMP, Vol-I, p.331.*

210 *IMP, Vol-I, p.331.*

conditions of phlegm, cough, skin diseases and pruritus<sup>211</sup>. In *Nigha, ĩuratnikara* the properties of all parts of *Vetra* are enumerated. But nothing is mentioned of flowers<sup>212</sup>.

**2. Kadamba:** This has been identified as Bristly luffa<sup>213</sup>. It is bitter and thermogenic. Fruits and roots are of medicinal value. It induces vomiting. Fruits are used for the treatment of worms, bile, piles, rheumatism, leprosy etc<sup>214</sup>.

**3. Vallĉja:** This has been identified as pepper<sup>215</sup> (*Piper nigrum* Linn.)<sup>216</sup> (Fig.3.29) It is

211 *Ibid*

zlt< ivpake kquk< k«im<sup>1</sup>< it' < l"u ĉaih inhiNt ipÄm!,  
meh< vlas< c kraeit vatm!, veĉaĉmu' < éick«iÖze;at!.  
veĉkSy )l< ùG<sup>1</sup>< ĉe:mmehk«imà[ut!,  
]Irae:[aMl< gué iöGx< vatl< caiĩ dlpnm!.

212 *Ibid, Nigha, ĩuratnikara.*

veĉStu tuvr> zlt> it' > kqu> k)avh>,vat< ipÄ< c dahÂ  
zae)azaeR=Zmirk«CÄkan!,  
ivspaRitsar< r' < yaeinraeg< t&;a< jyet!, r'dae;< ì[< meh< r  
'ipÄÄ k...ókm!.  
iv;< vE nazyTyeva»,ra> ]arae l"u Sm&t>, kq<sup>â</sup>:[> k)vat<sup>1</sup>>  
p[i Éedkr< mtm!,  
tuvr< l"uzltÂ it' < kqu c vatlm!, r'dae;< k)< ipÄ< nazyeidit  
klitRtm!,  
veĉBljNtu tuvr< SvaÖMl< ê]ipÄlm! r'dae;< k)ÂEv< nazyeidit  
klitRtm!,

213 AV, p. 216.

214 *Ibid.*

215 *Ibid.*p.842,138.

216 IMP, Vol IV,p.297.

an economically important spice, cultivated throughout India. It is a climber with roots at the nodes. Two varieties of pepper are known. They are black pepper with black pericarp and white pepper without the fleshy portion of the pericarp<sup>217</sup>. *Rijanigha*, ¶u enumerates several names of pepper<sup>218</sup>. The fruits of the plant are pungent, bitter, light, thermogenic, appetizing, digestive, stimulant and stomachic. They are used for the treatment of air, bile and phlegm, cough, heart diseases, piles and diabetes<sup>219</sup>.

**4. *Karambha*:** This has been already stated.

**5. *Mahikarambha*:** as mentioned earlier the identification of this plant is not made.

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217 *Ibid.*p.303.

218 *Ibid.*p.298.

marlc< pilt< Zyam< kael< v'ljÉU;[m!, yvneò< v&Ä)l< zaka¼< xmRpÅnm!.

kquk< v izraev&Ä< vlr< k)ivraeix c, ê]< svaRiht< k«:[< sÝÉUOy< inêiptm!.

219 *Ibid. Nigha*, ¶uratnikara.

mirc< kquk< it' < l"u cae:[< éicàdm!, Ai¶dliÝkr< tlú[mv&y< DidR zae;km!.

ê]< ipÄkr< cEv k)< vat< k«mln! jyet!, ñas< kas< c ùÔaeg< zUl< cEv ivnazyet!, àmeh< cazRraeg< c pWy< àae' < puraivdE>.



### 3.2.1.5 Plants with poisonous bark, sap and resins

Suśruta treats bark, sap and resin of a plant as a whole and classifies the plants having poison in these portions into a single group. Seven plants are listed in this class. They are

1. *intrapicaka*, 2. *kartarçyaka*, 3. *śaurçyaka*, 4. *karaghita*, 5. *karambha*, 6. *nandana* and 7. *niricaka*<sup>220</sup>.

**1. Ēntrapicaka:** No detail of the plant is available.

**2. Kartarçyaka:** This plant is not identified.

**3. áaurçyaka:** No detail of the plant is available.

**4. Karaghita:** As mentioned earlier no detail of the plant is available<sup>221</sup>.

**5. Karambha:** The identification of the plant

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220 SS, *Kalpasthina*, p  
221 p.28

has already been done<sup>222</sup>

**6. *Nandana*:** This plant has already been identified<sup>223</sup>.

**7. *Niricaka*:** This plant is not identified. In this section five are not identified and the rest two are identified to be non-poisonous in nature.

### **3.2.1.6 Plants with poisonous sap or milk**

Even though sap has been treated with former groups. áu¿ruta enlists three plants with poisonous sap as a separate class. They are *kumudaghnç*, *snuhç*, *jilakÀçra*,<sup>i</sup><sup>224</sup>.

**1. *Kumudaghnç* :** It is not identified yet.

**2. *Snuhç*:** This has been identified as milkhedge<sup>225</sup>. Its botanical name is *Euphorbia lingularia* Roxb.<sup>226</sup> It is a plant seen throughout India. The plant has fleshy leaves, spiny body and greenish brown seeds<sup>227</sup>. It has several

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222 p.36  
223 p.40  
224 *SS, kalpasthina, p*  
225 **VS**, p. 33.  
226 *IMP, Vol-III, p.1.*  
227 *Ibid.*

names and many of them are mentioned in ancient Ayurvedic texts<sup>228</sup>. The milk or sap of the plant is very important 70 to 94 % of which is water and water soluble substance like euphorbone, resin, gum, malate of calcium etc. 0.2 to 2.6 % kauchuk is also detected.<sup>229</sup>

The substance euphorbin makes the sap poisonous. The sap dries to produce foul smell<sup>230</sup>. Excessive intake of the sap of milk hedge will lead to the swelling of internal organs, diarrhoea, vomiting etc. Sometimes the victim may lose his consciousness. On external application, it stimulates and burns the skin. When applied to the eyes it leads to swelling of the eyeballs and blindness. It is also used as an abortifacient. It is used to intoxicate fishes. The quantity proved to be fatal is 15 mls<sup>231</sup>. The purification of milkhedge sap is an easy

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228 *Ibid.* BPna  
se÷{f> is<htu{f> SyaÖzl vîÔ,mae=ip c, suxa smNtÊGxa c  
õukœ iôya< Syat! õuhl gufa.

229 VS,p-35.

230 *Ibid.*

231 *Ibid*

process. First of all the sap should be mixed with  $\frac{1}{4}$  of the total quantity of the juice of the leaves of *Tamarindus indica*, then the mixture should be kept in sunlight to dry. After evaporation we get purified mikhledge sap.<sup>232</sup> Its properties are enumerated in ancient texts. It is capable of destroying the diseases of stomach, inflammation caused by artificial poison viz *gara*, vitiated conditions of phlegm and air. It is bitter, astringent, thermogenic and fiery in nature<sup>233</sup>.

**3. *JilakAçra*, ç :** This plant is not identified

### **3.2.1.7 Plants with poisonous stem or tuber**

According to Suśruta this is the most dangerous class of poisonous plants. He enumerates 13 plants with poisonous tubers. Due to their vigorous nature, the serious effects caused by each are also given<sup>234</sup>. The

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232 *Ibid.*

233 *Ibid.* p.36.

234 *SS, kalpasthina.*

plants listed are

**1. *Vairitaka*:** No detail of the plant is available..

**2. *Mustaka*:** this has been identified as nut grass<sup>235</sup>. Its botanical name is *Cyperus rotundus* Linn.<sup>236</sup> (Fig.3.30)The plant is characterized fragrant tubers<sup>237</sup>. It also bears several names. 25 of them are listed in *Rijanigha, ¶u*<sup>238</sup>. The tubers are accepted to be bitter, acrid, astringent, cooling, promoting and digestive. It fights with the vitiation of phlegm and bile and fever<sup>239</sup>. According to Suçruta the plant is of two types and induces stiffness of the body and shivering.

**3. *Kilak¶a*:** This has been identified as snake

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235 AV. p.771.

236 IMP, Vol. II, p.296.

237 Ibid

238 Ibid. p.298.

muSta ÉÔa vairdaMÉaedmae"a, jlmUtæ=Bdaæ nlrdaæ=æ< "ní, ga<gey< SyaÑÔmSta vrahI, guÅa çINwÉRÔkasI kseé>.

<sup>3</sup>aefeóá k...éivNdaOya sugiNxçRiNwla ihma, vNya rajkzeéí kCDæTwa pÂiv<zit>.

239 Ibid. p.296. *Rijanigha, ¶u*.

ÉÔmuSta k;aya c it´a zIta c pacnI ipÄjvrk)¹I c }eya s<çh[I c sa.

wood<sup>240</sup> (poison nut, quaker button, nuxvomica strychnine tree<sup>241</sup>)(Fig.3.31). Its botanical name is *Strychnos nuxvomica* Linn.<sup>242</sup> This is a deciduous tree characterised by dark grey or yellowish bark, greenish white flowers, orange red fruits and seeds with concave and convex surfaces and grey silky hair<sup>243</sup>. *Rijanigha*, *flu* enumerates the other names of the plant<sup>244</sup>. Alkaloids like striknin, brumin and vomisin and glycoside viz. loganin make the whole plant poisonous.<sup>245</sup>

Habitual use of poison nut may exert a bad impact on the central nervous system and muscles of the victim. Irritation, fatigue, difficulty in respiration, convulsion etc. are the major symptoms of poisoning. Then there would be a sudden rise in the blood pressure and the muscles of neck experience sudden

240 AV. p.299.

241 IMP, Vol V, p.202.

242 Ibid.

243 Ibid.

244 Ibid

karSkrStu ik<pakae iv;itNÊivR;Ô,m>, grÔ,mae rMy)|> k...

pak> kalk<sup>a</sup>qk>.

245 VS, p. 58.

contraction. There would be emission of foam from mouth, which would be followed by death. Symptoms of poisoning would be manifested within 10-30 minutes of intake while death will occur in one to two hours<sup>246</sup>. 30 to 120 mgs of the alkaloid streknin may cause death. The powder of a single seed of poison nut may result in death. If the seed is swallowed, it would not be poisonous. The seed will be excreted undigested. But there is possibility of death, by the obstruction created by the seed in the trachea. It always poisons fishes. The leaves and the mistletoe growing in a nux vomica tree are equally poisonous to livestock. If the root of the tree enters into the root system of other trees their fruits would also taste bitter<sup>247</sup>. In the postmortem reports of a victim, who has succumbed to its poison, the contracted condition of the heart will be mentioned. Sometimes the right portion of the heart may be filled with blood. The lymphatic

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246 *Ibid.*

247 *Ibid.* p. 60.

structure of the intestine and bowels would be swollen. Clotted blood and white patches on the body are the other symptoms of nuxvomica poisoning. Generally the death may resemble that caused by respiratory failure<sup>248</sup>. Purification of nuxvomica is a long process. First of all that should be dipped in cow's urine for seven days. Then remove the pericarp and put in cowmilk and dry in shade<sup>249</sup>.

In adults 60-250 mgs. of nuxvomica can be used as medicine. It stimulates respiration and heart beat. Actually the nephrons of central nervous system are stimulated. Leaves are used to cure paralysis. The sap is used to destroy cholera and inflammation of the bowels. The paste of the bark is a remedy for headache<sup>250</sup>. Its properties are enumerated in ancient sources<sup>251</sup>. According to Suśruta the

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248 *Ibid.*

249 *Ibid.*

250 *Ibid.*

251 *IMP, Vol V, p.205., Rajanighantu.*

kaySkr> kq²:[í it' > k...óivnazn>  
vatamyäök{f²itk)amazaeRì[aph> ,



plant produces loss of sensation in the skin, shivering and stiffness of the body<sup>252</sup>.

**4. *Vatsanibha*:** this has been identified as Indian aconite or monk's hood<sup>253</sup>. Its botanical name is *Aconitum napellus* Linn<sup>254</sup>. The plant is identified by the shape of its leaves and seeds. It is also mentioned that by the sides of the aconite plant, other plants would not exist<sup>255</sup>. All the synonyms of the plant clearly indicate its poisonous nature<sup>256</sup>. The plant is abundantly seen in the hilly areas of Himilaya and Assam. According to *Yogaratrikara* and *AuÀadhanigha*, ¶u the plant is of nine varieties<sup>257</sup>. But to Suçruta, the plant has only one variety<sup>258</sup>.

The plant contains poisonous alkaloids like nappelis (pseudo aconitin), picro aconitin and

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252 **SS**, *kalpasthina*.

253 AV. p.434.

254 IMP, Vol.I, p.47.

255 VS,p.158

256 IMP,Vol.I, p.48., BV,

isNÊvarstKpÇae vTсна\_yak«itStwa, yTpañeRn  
traev&RiivRTснаÉ> s Éai;t>.

257 VS, p.158

258 SS, *kalpasthina*.

benzine aconitine. Though the whole plant is poisonous, the roots are considered to be excessively poisonous. First it stimulates the nephron tip and then degenerates their function; as a result, the whole nervous system approaches a breakdown. Heart and lungs stop functioning and gradually death will occur. The most unfortunate thing is that, upto his last breath the victim sustains his consciousness. Two grams of aconite root may cause death within 8 hours. In small quantity it inflames throat and intestine. Then it causes vomiting and diarrhoea and obstructs respiration<sup>259</sup>. The autopsy of a victim may detect the swelling and inflammation of intestine. Lungs would be filled with froth. There would be bleeding under the lymphatic structure. There would be swelling in the lungs, kidneys and cerebrum<sup>260</sup>. The plant can be purified by putting it into the urine of cow for three days. Another method of purification is cooking with cow milk. The taste

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259      *VS*, p.160.

260      *Ibid.*

of aconite root always betrays us. Since it has very sweet taste hence it gets the name *m* *çñhavi* (sweet poison) in Hindi<sup>261</sup>.

15 mgs. of the plant can be provided internally as a medicine. It is said to be sweet and thermogenic. It is used to treat dysphonia, vitiation of air, phlegm and bile, fever, pneumonia etc<sup>262</sup>. According to Suśruta the plant causes stiffness of neck and yellow colour in urine, excreta and eyes<sup>263</sup>.

**5. *Sarāpa*:** This has been identified as Indian mustard<sup>264</sup>. Its botanical name is *Brassica juncea* Czern and Coss<sup>265</sup>. The plant is characterized by long leaves and yellow flowers<sup>266</sup>. Three varieties of Indian mustard are mentioned in *Rijanigha*, *ñu* i.e. black mustard, red mustard and white mustard along with

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261 *IMP*, Vol I, p.47.

262 *Ibid*, p.50. *Dhanvantarçnigha*, *ñu*.

vTsnāēae=itmxur> sae:[ae vatk)aph> , k{QéKsiÚpat<sup>1</sup>>  
ipÄs<zaexnae=ip c.

263 **SS**, *Kalpasthina*.

264 *AV*. p.214.

265 *IMP*, Vol I, p.301.

266 *Ibid*.

their properties<sup>267</sup>. But no where it is mentioned as a poisonous plant.

**6. *Pilaka*:** This has been identified as fire plant, or rosy flowered leadwort<sup>268</sup>. Its botanical name is *Plumbago indica* Linn<sup>269</sup>. According to *Yogaratanasamucaya* the plant is of three varieties. i.e. redflowered, white flowered and blue or black flowered<sup>270</sup>. In *AH*, the blue or black coloured variety is mentioned as non-white flowered one and red flowered one is replaced by yellow flowered one<sup>271</sup>. Actually yellow coloured plant is not seen while white coloured is seen in the regions of Bengal, Uttarpradesh and northern parts of India. The red coloured variety is said to be superior to

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267 *Ibid.* p.303.

Aasurl rajjka rajl ri'ka r's;Rp> tlú[gNxa mxuirka ]vk> ]uvk> ]  
v>.  
raj]vk> k«:[tlú[)]la rajrajjka ra}l sa k«:[s;RpaOya iv}eya  
rajs;RpaOya c.  
tlú[kí Êrax;aeR r]ae<sup>1</sup>> k...ónazn> , is'àyaejn> is'saxn>  
ists;Rp>.

268 *AV.* p 660./

269 *IMP*, Vol.IV, p.321.

270 *Ibid.* p.326.

iÇivx> stu iv}ey> k«:[> ñetae=w r'k> ,

271 *Ibid.* ywaSv< icÇk> pu:pE> }ey> pltistaistE>, ywaeÄr< s  
gu[van! ivixna c rsaynm!.

the others both in its poisonous nature and medicinal properties<sup>272</sup>. Hence the red variety is accepted as the plant intended by Suśruta. The plant is characterized by red flowers, yellow roots and yellowish sap<sup>273</sup>. The toxic substance plumbagin with bitter taste and yellow colour makes the plant toxic. It occurs only in roots. No trace of the toxic substance is present in the leaves or stem of the plant. Plumbagin is insoluble in cold water, partially soluble in hot water and completely soluble in ether, chloroform etc<sup>274</sup>.

If taken internally the plant will inflame the whole body. Vomiting, diarrhoea, bleeding etc., are the other symptoms of poisoning. Anuria and thirst will follow this. In excess it would disturb the functioning of central nervous system. It works like a sedative and respiratory failure leads to death. The victim may remain in coma state for several days before death. It

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272 *Ibid.*

273 *VS*, p. 90.

274 *Ibid.*

is used as a quick abortifacient<sup>275</sup>.

The plant can be purified, putting either in cow-dung or quicklime for 24 hours<sup>276</sup>. Its properties are enumerated in *Nigha, Āuratnikara*<sup>277</sup>. The bark of the plant is made into a paste and applied on skin afflicted with leucoderma and elephantiasis. At first it will inflame the skin. When the wound heals, the diseases also vanish<sup>278</sup>. Paralysis and anorexia are treated with the plant. According to Suśruta, the plant produces weakness of neck and obstructed speech<sup>279</sup>.

**7. Kadambaka:** Some texts give the word *Kardamaka*. *Kadambaka* is identified as Indian mustard and the latter is not identified.

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275 *Ibid*

276 *Ibid*

277 *IMP, Vol IV, p.322.*

icÇk> packae ê]ae l"uíaiñàdlpn>, pake kquçarhki it'ae:[ae éicdae mt>.

rsaynae=iñstz> zae)k...óazR>kasha,k«mINvataedr< k{fª yk«t< çh[l— twa.

Aam< ]y< caedr< c nazyeidit klitRt>, %:[TvaÖatha àae'ae muiniÉ> tTvdiZRiÉ>.

278 *VS, p. 93.*

279 *SS, Kalpasthana, p*

**8. áṅgṅviĀa:** According to *Vaidyakaśābasindhu*, the name áṅgṅ is applied for a number of plants<sup>280</sup>. But *ADPS* specifically identifies the term as that of *Nyagrodha* (banyan)<sup>281</sup> (Fig.3.32). This identification is attested by *BP*<sup>282</sup>. This is one among the *kāṅṅravākās* (lateciferous trees) others being *āśvatha*, *plakā* and *udumbara*<sup>283</sup>. Almost all parts of the plant body are used for medicinal purposes<sup>284</sup>. Sometimes lateciferous trees are numbered as five adding *śirṅā* or *vetasa* to the list<sup>285</sup>. No where in these accounts the tree is mentioned as of poisonous nature.

**9. Prapu, -arṅka:** This plant is not identified.

**10. Mṅlaka:** The plant has been identified as

280 p. 1066.

281 p. 333

282 *IMP, Vol IV, p.24.Ficus benghalensis* Linn.  
vqae r' )|> z&¼| Nyṅaex> SkNxjæ Øuv>, ]|rl vEiv[avasae  
b÷padae vnSpit> ,

283 *ADPS, p.333.*

284 *IMP, Vol. IV, p. 24. Kiadevanigha, ¶u.*

vq> k;yae mxur> izizr> k)iptijt!,

Jvrdaht&;amaehi[zae)aphark>.

285 *Ibid.*

radish<sup>286</sup>(Fig.3.33). Its botanical name is *Raphanus sativus* Linn.<sup>287</sup> This plant is used for many medicinal purposes. But the plant is not poisonous<sup>288</sup>. Other plants mentioned in this section are not identified.

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286 AV. p.326,771.

287 IMP, Vol. IV,p.407.

288 *Ibid.*



**Table 1: Identification of Poisonous Plants**

Sl. No.	Name of the plant	Identification	Botanical name	Whether poisonous or not	Varieties if any	Symptoms of poisoning	Medicinal properties/ diseases cured by the plant
Plants with poisonous roots							
1	<i>Kl̥taka</i>	Liquorice	Glycyrrhiza glabra Linn.	No	..		Skin diseases, cough, bronchitis, gastric ulcer.
2	<i>Ḁvamira</i>	Indian oleander	Nerium oleander Linn.	Highly poisonous	1. White 2. Red 3. Yellow	Nervous breakdown, diarrhoea, vomiting coma etc.	Leprosy, scorpion stings, snake bites, ophthalmia.
3	<i>Gu̥ji</i>	Indian liquorice	Abrus precatorius Linn.	Highly poisonous	1. Red 2. White	Symptoms of cholera, agglutination of rbc, hemolysis, enlargement of lymph and spleen	Skin eruptions, goitre, glandular swellings, baldness.
4.	<i>Sugandhi</i>	a. <i>Elipar</i> , $\phi$ ( <i>risni</i> )	<i>Alpinia calcarata</i>	1. Not poisonous	1. Light brown		Poison, fever, skin diseases.

			<i>Alpinia galanga</i>	2. slightly poisonous	2. Rhizome producing		
		b. <i>Pu, ar çka</i>		Unknown			
		c. <i>Asaphalç</i>	<i>Boswellia thurifera</i>	No			
		d. <i>Kanakaprabhi</i>	<i>Cardiospermum helicacabum</i> Linn.	No			
		e. <i>Anadamfla</i>	<i>Hemidesmus indicus</i> Linn.		1. black 2. white.		
		f. <i>Ahibhuk</i>	<i>Rauvolfia serpentina</i> Linn.	Highly poisonous		Nervous breakdown respiratory failure	Hypertension, insomnia, fever, wounds, epilepsy, dyspepsia, colic etc.
		g. <i>ìivarç</i>					
		h. <i>Gandhaniçi</i>	zedoary	No			Diarrhoea, oedema, cough cough, wounds, skin diseases.
		i. <i>GhoÀi</i>	<i>Anthum gravelens</i> Linn.	No			Anorexia, vitiation of pitta

		j. <i>Kanduli</i>		No			Rheumatic arthritis
		k. <i>Kili</i>	Piper longum Linn.	No			Indigestion, anorexia
		l. <i>Indra, ç</i>	Vitex trifolia Linn.	No			Leprosy, skin diseases.
		m. <i>áa¶hç</i>	Kaempferia galaga Linn.	No			
		n. <i>Asitaj çraka</i>	Nigella sativa Linn.	No			Haemorrhoids, helminthiasis.
		o. <i>Karu, amalli</i>					
		p. <i>Arjjaka</i>	Ocimum basilicum Linn.				
5	<i>Gargaraka</i>	Not identified		Unknown			
6	<i>Karaghita</i>	Not identified		Unknown			
7	<i>Vidyucchi ki</i>	Not identified		Unknown			
8	<i>Vijayi</i>	a. <i>Uragandhi</i>	Acorus calamus Linn.	Slightly poisonous		Kills insects	Indigestion, depression, mental disorders
		b. <i>Candriki</i>	<i>Rauvolfia serpentina</i> Linn.	Highly poisonous		Nervous breakdown and	Hypertension, insomnia, fever

						respiratory failure	wounds, epilepsy.
		c. <i>Ibhanim çliki</i>	<i>Cannabis sativa</i> Linn.	Dangerously poisonous		Thirst, hallucinations impairment of thought, sexual desire	Nervous breakdown, piles, fever
		d. <i>Hirçtakç</i>	<i>Terminalia chebula</i> Retz.	No			
		e. <i>İzini</i>		No			
		f. <i>Rddhivaci</i>		No			
		g. <i>Agnimandhi</i>	<i>Premna corymbosa</i> Rottl.	No			
		h. <i>Kilabhi, iki</i>		No			
		i. <i>Piras çkavaca</i>		Unknown			
		j. <i>Bhagavat ç</i>		unknown			
II. Plants with poisonous leaves							
1	<i>ViÅapatrici</i>	Unknown		No			

2	<i>Lambi</i>	Bitter bottlegourd	<i>Legendria siceraria</i> Mol.	No			Constipation, inflammations, leprosy, skin diseases, baldness.
3	<i>Varadiru</i>	Tek	<i>Tectona grandis</i> Linn.	No			Leprosy, skin diseases
4	<i>Karambha</i>	a. <i>Ka'gu</i>	<i>Setaria italica</i> Linn.	No			
		b. <i>Uttamira, i</i>	<i>Pergularia daemia</i> Chiov.	No			Helminthiasis, hae morroids.
II. Plants with poisonous fruits							
1	<i>Kumudvat ç</i>	Unknown		Unknow n			
2	<i>Ve, uka</i>	Unknown		Unknow n			
3	<i>Karambha</i>	a. <i>Ka'gu</i>	<i>Setaria italica</i> Linn.	No			
		b. <i>Uttamira, ç</i>	<i>Pergulariad aemia chiov.</i>	No			Helminthiasis, hae morroids.
4	<i>Mahikara mbha</i>	Unknown		Unknow n			
5	<i>Karko᳚aka</i>	Unknown		Unknow n			
6	<i>Re, uka</i>	A spice like		No			

		pepper					
7	<i>Khadyotaka</i>	Unknown		No			
8	<i>Camari</i>	Unknown		No			
9	<i>Ibhagandhi</i>		<i>Baliospermum montanum</i> Muell.Arg.	Moderately poisonous		Diarrhoea, irritation, hallucinations, inflammation	Asthma, anuria, constipation, leusoderma.
10	<i>Sarpaghiti</i>		<i>Rauvolfia serpentine</i> Linn.	Highly poisonous		Nervous breakdown, respiratory failure	Hypertension, insomnia, fever, wounds, epilepsy etc.
11	<i>Nandana</i>	Long leaved pine		No			Eye diseases, excessive perspiration, cough, wounds etc.
12	<i>Sarpaka</i>	Unknown		Unknown			
IV. Plants with poisonous flowers							
1	<i>Vetra</i>	Common rattan	<i>Calamus rotang</i> Linn.	No			
2	<i>Kadamba</i>	Bristly luffa					Piles, rheumatism, leprocy.

3	<i>Vallçja</i>	Pepper	<i>Piper nigrum</i> Linn.	No	1. White 2. Black		Cough, heart diseases, piles and diabetes.
4	<i>Karambha</i>	a. <i>Ka'gu</i>	<i>Setaria italica</i> Linn.	No			
		b. <i>Uttamira,i</i>	<i>Pergularia daemia</i> Chiov.	No			Helminthiasis, haemorrhoids.
5	<i>Mahikarambha</i>						
V. Plants with poisonous bark, sap and resins							
1	<i>Ēntrapicka</i>	Unknown		Unknown			
2	<i>Kartarçyaka</i>	Unknown		Unknown			
3	<i>áaurçyaka</i>	Unknown		Unknown			
4	<i>Karaghita</i>	Unknown		Unknown			
5	<i>Karambha</i>	a. <i>Ka'gu</i>	<i>Setaria italica</i> Linn.	No			
		b. <i>Uttamira,i</i>	<i>Pergularia daemia</i> Chiov.	No			Helminthiasis, Haemorrhoids
6	Nandana	Long leaved pine		No			Eye diseases, excessive

							perspiratives, cough, wounds, etc.
7	<i>Niricaka</i>	Unknown		Unknown			
VI. Plants with poisonous milk or sap							
1	<i>Kumudag hnç</i>	Unknown		Unknown			
2	<i>Snuhç</i>	Milk hedge	<i>Euphorbia lingularia Roxb.</i>	Highly poisonous		Diarrhoea, vomiting, swelling of internal organs	Stomach ache, inflammation etc.
3	<i>JilakÀçra,i</i>	Unknown		Unknown			
VII. Plants with poisonous stem							
1	<i>Vairitaka</i>	Unknown		Unknown			
2	<i>Mustaka</i>	Nutgrass	<i>Cyperus rotundus Linn.</i>	No			Fever, vitiation of bile
3	<i>Kilakçra</i>	Snake wood	<i>Strychnos nuxvomica Linn.</i>	Highly poisonous		Irritation, fatigue, convulsions.	Paralysis, cholera, inflammation of bowels
4	<i>Vatsanibha</i>	Indian aconite	<i>Aconitum nepelus Linn.</i>	Highly poisonous		Nervous breakdown, heart and lung failure	Dysphonia, pneumonia



5	<i>SarÀapa</i>	Indian mustard	Brassica juncea Czern & Coss.	No			
6	<i>Pilaka</i>	Fire plant	<i>Plumbago indica</i> Linn.	Highly poisonous	1. White 2. Blue 3. Red	Vomiting, diarrhoea, bleeding, anuria, thirst	Leucoderma, elephantiasis
7	<i>Kadambaka</i>	Unknown		Unknown			
8	<i>áx´gçviÀa</i>	Banyan		No			
9	<i>Prapundarçka</i>	Unknown		Unknown			
10	<i>Hilahala</i>	Unknown		Unknown			
11	<i>MahiviÀa</i>	Unknown		Unknown			
12	<i>Karka᳚laka</i>	Unknown		Unknown			
13	<i>Mçlaka</i>	Raddish		No			

### 3.2.2 Symptomatic treatment

Suśruta also enumerates the eight impulses of poisonous plants along with their symptomatic treatment. This can be represented in a table.

**Table 2: Symptomatic treatment of plant poison**

<b>No. of impulse</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
1	a. discolouration and paralysis of tongue. b. Fainting c. Frequent respiration	a. Clean the stomach by inducing vomiting. b. Cold water should be provided as a drink c. Give the solution of antidote in ghee and honey
2	a. Tremor, b. Fatigue, c. Thirst, d. Pain in throat and heart	Cleaning up of the stomach by inducing vomiting and purgation
3	a. Inflammation of the palate b. Severe pain in the intestine c. Discolouration of eyes	1. Drinking antidotes 2. Inhalation 3. application of collyrium
4	a. hiccup b. cough	1. antidote mixed with

	c. Disturbance in the bowels d. Heaviness of the head portions	oils should be given internally
5	a. Increase of phlegm b. Discoloration of the body c. Breaking of the knee joints	Antidote mixed with the decoction of honey, and liquorice should be provided
6.	a. Vitiation of all the three humors b. Pain in the abdomen c. Fainting d. Acute diarrhoea	Treatment for diarrhoea should be done
7.	a. Hardening of shoulder, back and waist bones b. Cessation of respiration	Make a wound in the shape of the leg of a crow in the head and apply the paste of antidote into it.
8.	<b>Death</b>	

The antidote mentioned here is *dĒĀ çviĀiriagada*. According to Suĉruta, the transitional period of these impulses are very important and he advises to give the gruel made of plants like *kauĀitakç*, *igniki*, *pithi*, *sĒryavallç*, *amĉta*, *abhaya*, *ĉiriĀa*, *ki, ihi*, *ĉelu*, *giri*, two varieties of the plant *rajani*, *punarnava*, *hare, u*, *trikaġu*, *siriba* and *bala* in

that period.

While considering the poisonous plants enumerated by Suśruta, the following conclusions can be drawn. Nine of them are highly poisonous. Twenty four of them are unidentified. The rest are identified to be harmless. From this, it cannot be assumed that the details provided by Suśruta are unauthentic because time plays a crucial role in the identification of these plants. The gap of centuries has influenced and changed the name of plants. More than that, there are regional and linguistic variations in names. All the commentators of Suśruta recommend consulting traditional and tribal practitioners for the identification of plants. However this portion on poisonous plants exemplifies the keen observation and professional excellence of Suśruta.

## CHAPTER 4

# **POISONOUS SNAKES**

Snakes inspire human beings with feelings of worship, reverence and of course fear. Quite a large number of mythological accounts and superstitions have been centered round snakes. Their ability to shed skin is connected with immortality and ever-open eyes are connected with omniscience.<sup>1</sup> And these beliefs lifted them to the level of supernatural powers. As a result, snake-worship has become a part and parcel of almost all ancient societies. Egyptians worshipped the sun God and accepted snakes as the totem of the same. This tradition was later on adopted by the Greeks.<sup>2</sup>

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1 Van Wallach, "Snakes", *Britannica Online*, Infonet, 8th August 2006.

2 P.J. Deoras, *SI*, P. 19.

In India serpents, especially hooded ones are considered as sacred creatures and to worship them *Nag Panchami* or *Ariva, a panchami* is observed.<sup>3</sup> (Fig. 4.1) The festival comes on the fifth day of the month *Ariva, a*.<sup>4</sup> Goddess Minasa is worshipped on the day. One who dies of snakebite is denied of heaven. He falls down and becomes a nonpoisonous snake.<sup>5</sup> By the *Aridha* ritual performing on the day, such a wretched soul will be revived to entitle heaven. Hence the day is called as "the fifth for freeing the person who died of snake bite. (*dañodhara, a panchami*).<sup>6</sup> Worship of snakes on the day is believed to be capable of bestowing a son even to a hundred year old lady.<sup>7</sup> The worship enhances the resistance of a

3 *Ibid.*, P.9.

4 *Skandapuri, a*, ÉÉ´ÉhÉä ¨ÉÉ°Éä nù¶Éæ SÉ {É\SÉ¨°ÉÉÆ °ÉÉä¨É´ÉÉ°É®äú

5 *BhaviAyapuri, a*, 32-41,

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6 Sadashiv A. Dange, *Encyclopaedia of Purific Beliefs and Practices*, IV, p. 1267.

7 *Skandapuri, a*, VII, 3.3.33

person so as to cope with snake venom.

Sanskrit sources mention divine serpents viz. *Nigas* or *Mahinigas*. They are 18 in number<sup>8</sup> and are capable of destroying their enemies by their glance or breath.<sup>9</sup> These divine snakes are said to be originated from water. Elephants, mountains and clouds also share the same source.<sup>10</sup> According to some *puri,ic* accounts, serpents originated from the tears of Brahma, while some others accept them as born out of the perspiration of áiva.<sup>11</sup>

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 8 AP, 219.44-46.  
 9 SS, KS., III, P. 428.  
 10 *Brahmi, apuri, a*, I, 2.22.48.  
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 11 Sadashiv A. Dange, *Encyclopaedia of Puri,ic Beliefs and Practices*, P. 1267.



Snakes are always connected with our culture and religion. *Puranas* identify snakes, as the offspring of Kasyapa and Kadru and they are the half brothers of Garuda; the divine eagle. Visuki and Ananda are the leaders of snakes. During *Pilizhimadhana*, Visuki was appointed as the churning rope. Snakes are burnt in the *sarpayajna* of Janamejaya. All the major divine figures of the land are connected with the snakes in some way or other. Vishnu accepts Ananda as his bed while Shiva accepts snakes as his ornaments (Fig. 4.2). In most of the Buddhist accounts, snakes appear as major characters and the idols of Buddha seen all over the world are covered with a serpent hood (Fig. 4.3). Krishna also has an adventurous account in which he conquers the ferocious serpent Kiliya (Fig. 4.4).

#### **4.1 Scientific accounts – Modern science**

Before going to the iyurvedic accounts of snakes, it would be beneficial to know some basic details of their natural history. The evolutionary history of snakes places them in between Amphibians and Birds.<sup>12</sup> Coming under the family reptiles, they accepted different adaptations for existence. Fossil records substantiating the existence of snakes are obtained from 150 million years back.<sup>13</sup> Origin of snakes has always been a matter of debate. Even in the 21<sup>st</sup> century, there occurs only a hypothesis, according to which snakes might have originated from some burrowing lizards.<sup>14</sup> No wonder that Indians resort to find mythological solutions for the problem.

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12 Herndon G. Dowling, "Reptiles", *Britannica Online, Infonet*.  
8<sup>th</sup> Aug 2006.

13 *Ibid.*

14 Van Wallach, "Snakes", *Britannica Online, Infonet*  
*EB*, Vol: 20, p.717.

### 4.1.1 Natural history of snakes

Snakes are cosmopolitan in distribution. However they are not seen in the arctic and Antarctic regions, New Zealand, Ireland and Oceanic Islands.<sup>15</sup> Nearly 3,500 species of snakes are seen in the world, among which only 300 are identified to be poisonous to human beings.<sup>16</sup> In India, 52 species of poisonous snakes are seen.<sup>17</sup>

Snakes have a slender, elongated body with keratinized outer covering. Poorly developed brain, absence of limbs, external ear openings, eyelids and left lung characterize them.<sup>18</sup> (Fig. 4.5) To understand the real physiology of snakes, the internal as well as external constitutions need to be analysed closely.

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15 *Ibid.*

16 *Forensic Medicine*, P. 414.

17 Joseph L. Mathew, "Ophitoxaemia (Venomous Snake bite)", avail. at [www.priory.com](http://www.priory.com).p.1

18 P.J. Deoras, *SI*, p. 23. Mathew Karikulam, *Pimbukalulelokam*, P. 17,

Malcom A Smith, *The Fauna of British India Ceylon and Burma*, London, Taylor & Francis, 1961, p. 1-35.

#### 4.1.1.1 Sense Organs

Snakes have all the five sense organs.

a) Eyes - Though notorious for their stern glance, snake's eye sight is not far better than mere blindness.<sup>19</sup> Their eyes are placed on the rear side of the head so as to provide a binary vision. In a limited area, just before the nose, they get a blurred but single vision. They lack movable eyelids but have a removable, transparent outer covering viz. Brille.<sup>20</sup> They have the capacity to adjust the size of the pupil. Round pupil characterizes nocturnal snakes and the elliptical ones the others.<sup>21</sup> During molting they are totally blind. So with this poor eye sight they can only detect the presence of an adjacent object, but the identification of the object is almost impossible.

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19 P.J. Deoras, *SI*, p. 50.

20 *Ibid.*

21 K.G. Adiyodi, *KV*, p. 28.

b) Nose - Odours have a crucial role in the life cycle of a snake and they have a well functioning nose for the detection of smell.<sup>22</sup> Many snakes like rat snake, secrete a foul smelling substance in self-defense.<sup>23</sup> During mating season, female snakes produce a secretion with specific odour.<sup>24</sup> Males are attracted by the smell. Snakes usually show the capacity to follow a detected smell.

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22 *Ibid.*

23 Mathew Karikkulam, *PL*, p. 52.

24 Deoras, *Sl*.p. 50.  
K.G. Adiyodi, *KV*. p. 46.

c) Tongue - A bifurcated tongue, common to all snakes is a highly developed organ. Through the gaps of lower jaw, the tongue frequently comes out of the mouth. Unlike in other creatures, this tongue has no role in the reception of taste. But it has much complex tasks to carry out. Chemosensing is the major function of tongue.<sup>25</sup> By this they can easily and accurately detect the chemical and thermal changes occurring in their surroundings. With its aid, snake can easily identify an approaching object. Minute particles from the atmosphere are received by the tip of the tongue and are transferred to a specialized portion called Jacobson's organ (Fig. 4.6). This organ identifies, classifies and analyses the received matter and passes a message to take an action suitable to the situation. So tongue is

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<sup>25</sup> Van Wallach, "Snakes", *Britannica Online*. Infonet. 8<sup>th</sup> Aug. 2006.

Herndon G. Dowling, "Reptiles", *Britannica Online*, Infonet. 9<sup>th</sup> Aug. 2006.

Deoras, *Sl*. p. 48.

Malcom A Smith, *The Fauna of British India, Ceylon and Burma*, p. 5.

very essential for the functioning of the body and is complementary to the functioning of other senses.

d) Ears - Snakes lack external ear openings. This has created an illusion that they are deaf. But a well organized internal ear is furnishing all the functions of an ear. Actually a freely suspended bone viz. columella auris works like the tympanic membrane to receive sound pressure (Fig. 4.7). With its help, they can detect even the minute vibrations obtained from the crawling surface.<sup>26</sup> More than that they are sensitive to the air-born sounds of low frequency. Even though individual differences are there, snakes are accepted to be sensitive to the sounds with the frequency ranging from 100 to 700 Hz.<sup>27</sup> The gourd of a snake charmer producing sounds of varying frequency somewhat confuses the creature and makes it feel the presence of an enemy and its attempts to bite are mistaken as the dance (Fig. 4.8).

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26 Ernest Glen Wever, "Sound reception", *Britannica Online*, Infonet. 9<sup>th</sup> Aug. 2006.

27 Malcon A Smith, *The Fauna of British India, Ceylon & Burma*  
P.J. Deoras, *SI*, p. 24.



e) Skin - Snake body is covered by keratinized scales. These scales facilitate locomotion and are devoid of any glands. The skin is sensitive even to a feather touch. This skin subjected to wear and tear is cast off occasionally. This process is called molting (Fig. 4.9). During this the eyesight is obstructed by the formation of a white coating and the skin begins to break off from the lower jaw. Usually the interval between two casting offs are calculated as 72 to 210 days.<sup>28</sup> When the upper portion of the body facilitate snake's existence in the environment, the lower part exhibits the characteristics of the species. The scales on the head are called shields. These too play an important role in the identification of snakes. Lower scales touching both the sides of the body distinguish poisonous snakes from others.

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#### **4.1.1.2 Oral Structure**

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28 P.J. Deoras, *Sl.* p. 24.

29 Sherman A. Minton, "Identification of Poisonous snakes", *Snake Venoms and Envenomation*, Pp. 1-16.

Snakes swallow their prey. They have pointed teeth on both the upper and lower jaws (Fig. 4.10). They clutch the prey and facilitate its intake. Mechanical reduction of the size is not necessary and hence not done. In poisonous snakes there are two modified teeth placed on the pre-maxilla. These modified teeth viz. fangs help the snake to inject venom either on a prey or on an enemy. These fangs may either be hollow like an injection syringe or having a groove on the surface. Syringe like fangs are about 1cm in length and can be moved downwards. Usually they are folded and kept in a cover like structure. In an emergency, they are taken out and used to inject venom. Grooved fangs are smaller in size and stationary in nature. The former type of fang is seen in viper while the latter in cobra. At the base of the fang, there exist the buds of reserve fangs, which will grow to serve the function of a removed fang. This growth takes place within 3 to 6 weeks. Hence the removal

of poisonous fangs is not a permanent solution for snake envenomation. Towards the roof of the fang, there is a canal leading to a sack like structure viz. poison gland. Actually this gland is a modification of salivary gland. The gland produces venom of complex constitution. The venom works like a paralyzing agent and digestive juice. It plays a decisive role in the digestion of the prey.

#### **4.1.1.3 Life and behaviour**

Snakes prefer a solitary life. Mating is the only social activity known to them. They are carnivorous by nature and they feed on eggs, rats, frogs and other insects. Cannibalism is also prevalent. King cobra and many other snake species feed on other snakes. Snakes consume food only when they are hungry and another intake occurs only when the ingested food is removed. There may be two to three days' interval between successive intakes. Snakes always have excess of thirst.<sup>30</sup> They cannot regulate their body temperature, hence are poikilothermic.<sup>31</sup> i.e., having the temperature of the surroundings. The ideal temperature for the existence of a snakes is calculated to be 29°C to 32°C. They can withstand a higher temperature but when the temperature goes down the optimal level,

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30 Van Wallach, "Snakes", *Britannica Online*, Infonet. 8<sup>th</sup> Aug. 2006.

31 Herndon G. Dowling, "Reptiles", *Britannica Online*, Infonet. 9<sup>th</sup> Aug. 2006.

they may either migrate or lead a sluggish life. During rainy season, all the body activities are abandoned. This period is called hibernation or dormant period. After that, molting occurs. This is usually followed by mating and reproduction.

#### **4.1.1.4 Reproduction**

When most of the snakes are oviparous in reproduction, vipers are ovoviviparous. Here eggs are kept inside the mother body but no placental connection is established between the mother and the foetus. Egg is nourished by the yolk. For the exchange of gases there occurs a specific process. The outer shell of the egg degenerates in a small portion, so as to keep the mother and embryonic tissues in high proximity. This enhances diffusion and as a result, exchange of gases occurs. The interval between mating and egg formation is two months. After that the young ones take six to ten weeks to hatch out. Usually, eggs are laid in the nests or burrows of other animals. King cobra is the only snake interested in making a nest for the protection of eggs. Number of eggs laid or young ones produced may vary from one to two hundred. Young ones are born with egg teeth and need no external help to come out. After hatching they are abandoned by the

parents.<sup>32</sup>

It is very difficult to distinguish between the male and female snakes. The only method is the length of the tail.<sup>33</sup> Male snakes have a longer tail than the females. Young ones attain sexual maturity within 2 years and till then, they grow rapidly. After that growth rate reduces but still they have the capacity to grow until they die. In laboratory conditions a snake can live for about 20 years. Natural conditions may extend its life for five more years.<sup>34</sup>

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32 Herndon G. Dowling, "Reptiles", *Britannica Online*, Infonet. 9<sup>th</sup> Aug. 2006.

33 P.J. Deoras, *SI*, p. 56.

34 K.G. Adiyodi, *KV*, p. 45.

Thermoregulation and procurement of prey are the only activities indulged in by the snakes. In the latter, they prefer passive waiting to active searching. Hence they are very idle in nature. But when agitated, they resort to quick alert. Avoidance is the first step of defense. But when their path is obstructed, they strike aggressively. Locomotion is mainly done by pressing down the lower scales on the rough surface. They can climb, swim, spit, exhibit colours and hiss. Non poisonous snakes always try to imitate the poisonous snakes. With a poorly developed brain, they cannot memorize anything or indulge in intellectual exercises. These are the general characteristics of snakes.<sup>35</sup>

## **4.2 Āyurvedic accounts**

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35 *Ibid.*



Āyurvedic system gave utmost importance to the treatment of snake poisoning. Physicians formulated their laws based on observation and experience. For the treatment, a first hand knowledge of the varieties and behaviour of snakes is necessary. It would be interesting to go through the herpetological details provided in ayurvedic treatises.

#### **4.2.1 Classification**

Apart from the divine serpents, iyurvedic system identifies and classifies terrestrial snakes. Caraka gives the three fold division of terrestrial snakes<sup>36</sup> i.e., into 1. hooded snakes (*Dravçkara*), 2. snakes with stripes on the body (*Rijçmin*), and 3. snakes with patches on the body (*Ma, ·ali*)<sup>37</sup>. Suçruta adds two more to the list. viz., non poisonous snakes (*nirviÀa*) and hybrid snakes (*vaikaraµja*).<sup>38</sup> Suçruta also calculates the total number of snake-species as eighty. According to him hooded snakes are of 26 varieties. Snakes having patches on the body occur in 22 varieties. 10 varieties of snakes with stripes on their body are seen.<sup>39</sup> 12 varieties of non poisonous snakes and three

36 CS, *Cikitsisthina*. 124.

37 *Ibid.* <1/2p nù´ÉÔÈð®ú& °É{ÉÉæ ¨Éhb÷±ÉÒ ®úÉVÉÒ¨ÉÉÊxÉÊiÉ jÉªÉ&\*

38 SS, *Kalpasthina*, IV, p. 437.

nù´ÉÔÈð®úÉ ¨Éhb÷Ê±ÉxÉÉä ®úÉÊVÉ¨ÉxiÉ°iÉiÉè´É SÉ ÊxÉÊ´É¹ÉÉ´ÉèÈð®ú\VÉÉ¶SÉ\*

39 *Ibid.*

iÉä¹ÉÖ nù´ÉÔÈð®úÉ VÉäªÉÉ È´É¶ÉÉÊiÉ ¹É]Âð SÉ {ÉzÉMÉÉ&

uùÈ´É¶ÉÊiÉ¨Éhb÷Ê±ÉxÉÉÆ ®úÉÊVÉ¨ÉxiÉ®úiÉiÉÉ nù¶É\*

ÊxÉi´É¹ÉÉ uùÈnù¶É VÉäªÉÉ´ÉèÈð®ú\VÉÉ°iÉªÉ°iÉiÉÉ\*\*

varieties of hybrid types are mentioned in *SS*.

This mode of classification seems to be very scientific. The classification adopted by Caraka, is based mainly on appearance while Suśruta moves one step ahead of his predecessor. For him presence of poison is also important. Modern science strongly deny the existence of hybrid snakes.<sup>40</sup> But increasing research on the biochemistry of snake venom puts some light on its heterogeneous composition and these researches reveal that in certain situations it would be very difficult to identify the venom, as belonging to some particular species.<sup>41</sup> This gives a strong clue to clarify Suśruta's stand. As a physician, Suśruta was not so particular about the biological aspects of snakes. His criterion of classification was the symptoms produced by the venom. The complex nature of venom produced different symptoms. Sometimes these symptoms resembled that produced by two or

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40 K.G. Adiyodi, *KV*, P. 162.

41 Jesus M. Jimenez, Porras. "Biochemistry of Snake Venoms", *Snake Venoms and Envenomation*, P. 43.

more species of snakes. And to a physician adopting a reverse mode of identification, it was better to assume the existence of a new species having the properties of the suspected species. So before criticizing the whole system of *Ēyurveda*, based on the reference to hybrid snakes, it has to be kept in mind that the system is not dealing with Zoology or Herpetology in detail and as far as a physician is concerned all that matters is the symptom produced by the venom. To our surprise, the multiplicity of effects evoked by the venom components is much complex to handle. To a physician, resorting to provide symptomatic treatment to each and every stage of the patient, it provides some ease if he groups those complexities into special classes. By this he can better observe the patient and prescribe treatment suitable to the situation. This view is supported by the traditional practitioners of the system.<sup>42</sup>

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<sup>42</sup> V.M. Kuttikrishnamenon, App. 3, *Kriyikaumudi*, p. 875, 883.

We can find some sort of harmony between the Ayurvedic as well as herpetologic classifications of snakes. Most popular classification accepted by Herpetology is the fourfold division of snakes. i.e., into the classes a) Elapidae b) Viperidae c) Colubridae and d) Hydrophidae.<sup>43</sup> Elapidae is a group of highly poisonous snakes with cylindrical tail.<sup>44</sup> Numerous cobra species, kraits, mambas, corals, tiger snake, death adder, taipan etc come under this class.<sup>45</sup> (Fig. 4.11) Viperidae is a class of snakes which are ovoviviparous in reproduction and are known as the producers of necrosis.<sup>46</sup> Different viper species including Russel's viper are included in this class. Colubridae is a class of non-poisonous snakes and a single exception Boomslang with powerful poison.<sup>47</sup> Rat snakes, Python and

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43 Mathew Karikkulam, *Pimbukalude lokam*, p. 18.  
Sarpadamānam, p. 5.

44 *Sarpadamānam*, p. 5.

45 Jesus M. Jimenez Porras, "Biochemistry of snake venoms",  
*Snake Venoms and Envenomation*, p. 44.

46 *Ibid.*

47 *Sarpadamānam*, p. 6.

African boa are included under this class.<sup>48</sup>(Fig. 4.12) Hydrophidae is a class of sea snakes which are highly poisonous.<sup>49</sup> (Fig. 4.13)

If we compare the snake species identified by the iyurvedic system with the above mentioned ones we may realize that the *darvçkaras* and *rijçmin* are actually the cobras and kraits respectively.<sup>50</sup> They can be included under the class Elapidae. *NirviÀa* come under colubridae, and *ma, ·alis* under viperidae. The venom of sea snakes seems to be causing little trouble to the ancient seers. However they remain silent of the sea snakes.

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48 Mathew Karikkulam, *PL*, p. 18

49 *Ibid.*

50 V.M. Kuttikrishnamenon, App. 3. *Kriyikaumudi*, p. 915.

Caraka mentions of a quadraped snake with the name *Gaudheyaka*. This is the offspring born to a snake in an alligator (*Godha*).<sup>51</sup> Suśruta omits this topic while *Vigbhāṣa* follows the idea of *Caraka*.<sup>52</sup> This has been strongly criticized by zoologists. According to them, no such creature is there. Above all, due to the biological peculiarities a snake and an alligator cannot mate with each other. The creature termed as *Gaudhera* or *Gaudheyaka* is supposed to be a reptile lizard, they say.<sup>53</sup>

#### 4.2.2 Features of Snakes

<sup>51</sup> CS, Cikitsasthina, ०É{ÉÉæ MÉÉèvÉäúªÉÉèÉä xÉÉ"É MÉÉävÉÉªÉÉÆ ०ªÉÉSSÉiÉÖ¹{Énù& EPò¹hÉºÉ{ÉæhÉ iÉÖ±ªÉ&\*

<sup>52</sup> AH, 36, p. 812. MÉÉävÉÉºÉÖiÉºiÉÖ MÉÉèvÉä®úÉä Ê´ÉÉä nù´ÉÔEè®èú& ०É"É& SÉiÉÖ¹{ÉÉnÂù\*

<sup>53</sup> K.G. Adiyodi, KV, p. 159-160.



According to Suṣruta, venom is embedded in the whole body of snake. When enraged it comes to its fang. In action venom resembles semen.<sup>54</sup> From this it is obvious that Suṣruta was unaware of the presence of poison gland in snakes.

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<sup>54</sup> SS, Kalpasthina, II, p. 433.  
 ¶ÉÖGò´ÉiÉÂ °É´ÉÇ°É{ÉÇhÉÉÆ Ê´É¹ÉÆ °É  
 ´ÉÇ¶É®úÓú®úMÉ´´ÉÂ  
 GÖòrùÉxÉÉ´´ÉäÊiÉ SÉÉRÂóMÉä|°É& ¶ÉGÆò  
 ÊxÉ´´ÉÇxIÉxÉÉÊnù´É\*  
 iÉä¹ÉÉÆ ¢ÉÊb÷¶É´ÉqÆèù¹]ÅõÉ°iÉÉ°ÉÖ °ÉVVÉÊiÉ  
 SÉÉMÉi´´ÉÂ\*

According to him, snakes are cruel by nature and when trampled down by feet they bite. When they are in pursuit of food the possibility for bite is very high.<sup>55</sup> Vigbhaṅga says that snakes bite not only by these things. According to him, fear, abundance of venom, wicked nature, feud, the instructions of seers and the intimation of God of death etc. make them bite.<sup>56</sup> This clearly substantiates the transition of ideas. Suṅruta believed that snakes would not bite unless otherwise enraged.<sup>57</sup> But when we come to the ideas of Vigbhaṅga, snakes are said to bite by feud, sin, etc. These emotional changes occur only in an organism with highly developed brain. Science has undoubtedly proved the deplorable state of snake brain, and claimed it to be incapable of

<sup>55</sup> *Ibid*, IV, p. 437.  
 {ÉÉnùÉÉ|É"ÉP<sup>1</sup>]öÉ nÖù<sup>1</sup>]öÉ 'ÉÉ GÖòrùÉ  
 OÉÉ°ÉÉìlÉxÉÉä□É{É 'ÉÉ  
 iÉä nù¶ÉîxiÉ "É½pÉGòÉävÉÉî°jÉÊ 'ÉvÉÆ  
 |ÉÒ"Énù¶ÉÇxÉÉ&\*

<sup>56</sup> AH, p. 813. +É½pÉ®úÉlÉÈ  
 |É³ÉÉi{ÉÉnù°{É¶ÉÉÇnùÉiÉÊ 'É¹ÉÉnÂù GÖòvÉ&

<sup>57</sup> SS, Kalpasthina, III, p. 433. +xÉÖnÂùù 'ÉPkÉÉ Ê 'É¹ÉÆ  
 iÉ°"ÉÉzÉ "ÉÖ\SÉîxiÉ SÉ |ÉÉäÊMÉxÉ&\*

memorizing anything for more than one or two hours.<sup>58</sup> If they are said to be enslaved to some seers or Gods, the matter is beyond the reach of science and there is no evidence to prove the same. However it is worth mentioning that Suśruta, keen in his observations was well aware of the production of poison and he had written down all the acquired knowledge in his treatise. But as the time passed and reached the period of Vighṇa, the supernatural ideas and superstitions crept into the science. Even then it is surprising that the original ideas of Suśruta were not brushed aside or replaced.

### **4.2.3 Dentition of snakes**

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<sup>58</sup> Herndon G. Dowling, "Reptiles", *Britannica Online*, Infonet. 9<sup>th</sup> Aug. 2006.

Malcom A Smith, *The Fauna of British India Ceylone and Burma*, Van Wallah, "Snakes", *Britannica Online*, Infonet. 8<sup>th</sup> Aug. 2006.

Caraka speaks of four types of fangs. They are placed on the upper jaw. Two of them are placed on the front side while others on the rear. They differ in colour. The left upper fang is yellow in colour while the left lower fang is white. Right lower fang is red in colour while right upper one is black.<sup>59</sup> In *Agnipuri*,<sup>a</sup> these teeth are named as the terrible one (*karili*), the crocodile (*mikari*), the dreadful night (*kilaritri*) and the servant of the god of death (*yamad&tika*).<sup>60</sup>

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<sup>59</sup> CS, Cikitsisthina, 137.  
 °É{ÉÇnÆù¹]ÅðÉ¶SÉiÉ°jÉ°iÉÖ iÉÉ°ÉÉÆ ´ÉÉ°ÉÉvÉ®úÉ  
 Ê°ÉiÉÉ\*  
 {ÉÒiÉÉ ´ÉÉ°ÉÉäkÉ®úÉ nÆù¹]ÅðÉ  
 ®úHò¶ªÉÉ°ÉÉvÉ®úÉäkÉ®úÉ\*  
<sup>60</sup> AP, 294.9.13.

We have already seen that the number of fangs present in a poisonous snake is only two. Sometimes the reserve fangs might have been treated as the additional ones. Otherwise the marks of non poisonous teeth on a victim, might have confused Caraka and made him assume the presence of more than two fangs. However, the colour of the teeth can only be seen as the result of imagination. All the teeth including the fangs are evidently identified as white in colour.

Caraka speaks of the quantity of poison injected through the left lower teeth as equal to the drop fallen from the cow's hair taken out of water.<sup>61</sup> Caraka also mentions that the capacity of the fangs to inject venom increases as we go from the left side to the right.<sup>62</sup>

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61 CS, Cikitsisathina.  
 62 *Ibid.*

Snakes possess limited amount of venom. Normally they hesitate to waste it. But when provoked they inject venom of considerable amount. The quantity of venom, however lesser it be may prove fatal to a human being. The pressure with which the venom is led to the fangs, the position of fangs, timing etc. play crucial role in determining the bite as a fatal one or a harmless one.<sup>63</sup> When we consider the matter of dentition, we cannot follow the details provided by Caraka. However Suśruta and Viṅbhava omit this portion in their treatises. This suggests that Caraka's conception of fangs was wrong.

#### **4.2.4 Mode of Bite**

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<sup>63</sup> VanWalach, "Snakes", *Britannica Online*, Infonet. 8<sup>th</sup> Aug. 2006.

SS mentions of four kinds of snake bites. viz a) poisonous bite (*sarpita*) b) lacerated bite (*radita*) c) poison free bite (*nirviĀa*) and d) hurt by the snake body (*sarpi 'gibhihata*).<sup>64</sup> Each of the bites is described with its characteristics.

*Sarpita* bite - If the spot of bite carries mark of one, two or more teeth, it is identified as a *sarpita* or poisonous bite. The teeth-marks will be deep but would not emit blood. If squeezed the wound produces sprout like eruptions and other abnormalities. Though minute, the wound will swell soon.<sup>65</sup>

<sup>64</sup> SS, Kalpasthina, IV, P. 438.  
 °Éì{ÉiÉÆ ®úÊnùiéÆ SÉÉÊ{É iÉpiÉÒªÉ"ÉiÉ ÊxÉì´É¹É"ÉĀ  
 °É{ÉÉÇÇRÆóMÉÉÊ!É½piÉÆ EäðÊSÉÊnùSUÎxiÉ JÉ±ÉÖ  
 iÉÉÊuùnù&\*

<sup>65</sup> SS, Kalpasthina, IV, p. 438.  
 {ÉnùÉÊxÉ ªÉjÉ nùxiÉÉxÉÉ"ÉäEÆð uäùù ´ÉÉ  
 ªÉ½ÚpÉxÉ ´ÉÉ  
 ÊxÉ"ÉMxÉÉxªÉ±{É®úHðÉÊxÉ ªÉÉxªÉÖnĀùvÉpiªÉ  
 Eð®äúÊiÉ Ê½p\*  
 SÉ\SÉÖ"ÉÉ±ÉÉðªÉÖHðÉÊxÉ ´ÉèEÞðiªÉÉð®úhÉÉÊxÉ  
 SÉ\*  
 °ÉÉÊc÷iÉ{ÉÉÉÊxÉ °É¶ÉÉäiðÉÊxÉ Ê´ÉtÉkÉiÉĀ  
 °Éì{ÉiÉÆ Ê!É¹ÉĀð\*\*

*Radita* bite - If the wound carries scratches of blue, red, yellow or white colours, it is identified as the laccrated bite. The quantity of poison, passed through the bite would be considerably small.<sup>66</sup>

*NirviÀa* bite - If there is no swelling, nor the expulsion of vitiated blood, the bite may not alter the natural functioning of the body. Then that mark or marks of bite have to be identified as poison free marks.<sup>67</sup>

*Sarpi ´gibhihata* - A person who is too sensitive, if touched by a snake, exhibits the symptoms of poisoning. Fear will vitiate his *vita* which will result in swelling.<sup>68</sup>

<sup>66</sup> *Ibid.*  
 ®úÉVªÉ& ºÉ±ÉÉäÊ½piÉÉ ºÉjÉ xÉÒ±ÉÉ& {ÉÒiÉÉ&  
 ÊºÉiÉÉºiÉiÉÉ  
 Ê´ÉYÉäªÉ& ®úÊnùiÉÆ iÉkÉÖ YÉäªÉ´´É±{ÉÊ´É¹ÉÆ SÉ  
 iÉiÉÂ\*

<sup>67</sup> *Ibid.*  
 +¶ÉÉäiò´´É±{ÉnÖù¹]õÉºÉPEÂð |ÉEPðÊiÉºiÉºªÉ  
 näùÊ½pxÉ&  
 {ÉnÆù {ÉnùÉÉxÉ´ÉÉ Ê´ÉtÉnùÊ´É¹ÉÆ  
 iÉiSSÉÊEòìºÉEò&\*\*

<sup>68</sup> *Ibid.*  
 ºÉ{ÉÇº{ÉP¹]õºªÉ |ÉÒ®úÉäì½p |ÉªÉäxÉ  
 EÖðÊ{ÉiÉÉä□xÉ±É&  
 EòºªÉÊSÉiÉÂ EÖð´´ùiÉä ¶ÉÉäiÆò



AS gives another mode of division and accepts a different nomenclature.<sup>69</sup> They are *Tu, ·ihata* - (Struck by the mouth) - If the spot of bite is devoid of any mark of the fang and is covered by saliva that is termed as *tu, ·ihata*.<sup>70</sup>

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<sup>69</sup> SS, *Kalpasthina*, 36, p. 813.

<sup>70</sup> AH, *Kalpasthina*, 36, p. 813.

<sup>69</sup> SS, *Kalpasthina*, 36, p. 813. *MÉÉjÉä* |  
<sup>70</sup> AH, *Kalpasthina*, 36, p. 813. *Éóùùù¶ÉiÉä*  
*χÉ iÉÖ nÆù¹]ÅðÉÉPòìÉÆ nÆù¶ÉÆ*  
*iÉkÉÖÆhb÷É½piÉÉÉÊnù¶ÉäiÉÂ\*\**

*Vyilç·ha* - If there is no bleeding from the wound and if it carries the marks of one or two fangs the bite is called *vyilç·ha*.<sup>71</sup> The term *vyilç·ha* has to be discussed in detail. It can be split up into *vizeÀe, a ilç·ha* and the word *ilç·ha* is used to denote a particular attitude in shooting, the right knee being advanced and the left leg refracted.<sup>72</sup> So the word probably denotes that in this bite the snake can only locate one or two fangs on the spot of bite. Others remain refracted.

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<sup>71</sup> *Ibid*  
 BEÆð nÆù<sup>1</sup>]ÅðÉ{ÉnÆù uäù ´ÉÉ  
 ´ªÉÉ±ÉØfØÉ]ªÉÉ´´É¶ÉÉäÊhÉiÉ´´ÉÂ\*

<sup>72</sup> *Ibid,* nù<sup>1</sup>]ÅðÉ{Énäù °ÉHäð uäù ´ªÉÉ±ÉÖ{iÉÆ  
 jÉÒÊhÉ iÉÉÊxÉ iÉÖ\*

*Vyilupta* - If the spot of bite clearly exhibits the marks of two of the fangs the bite is called *vyilupta*.<sup>73</sup> The word has to be split up as *viṣeṣa lupta* which, means that which is greatly injured.<sup>74</sup>

*Damāṅṅraka* - (The Fanged) - the bite in which skin is pierced to have continuous bleeding and which is imprinted with the marks of three fangs is called *damāṅṅraka*.<sup>75</sup>

*Damāṅṅranipṭṭita* (Beaten by the fangs). If the wound exhibits marks of four fangs it is called *damāṅṅranipṭṭita*.<sup>76</sup>

73 V.S. Apte, *The Students Sanskrit - English Dictionary*, p. 87.

74 *Ibid*, P. 483.

75 *Aṅṅti, gahṅdaya*, Kalpasthina, P. 813.  
 jÉÒÊhÉ iÉÉÊxÉ iÉÖ "ÉÉÆ°ÉSUAônùÉnùÊ  
 'ÉîSUôzÉ®úHò'ÉÉÊ½pxÉÒ nÆù¹]ÅõEò"ÉÂ\*

76 *Ibid*  
 nÆù¹]ÅõÉõ{ÉnùÉÊxÉ SÉi'ÉÉÊ®ú  
 iÉuùqù¹]õÊxÉ{ÉÖÊb÷iÉ"ÉÂ\*

According to Vigbhaṅga, the former two ie., *tu, ·ihata* and *vyilç·ha* are non-poisonous bites while the rest (*vyilupta*, *damÀṅraka* and *damÀṅranipç·ita*) are poisonous.<sup>77</sup> Though not identified as bites *sarpi´gibhihata* and *áa´kiviÀa* are also mentioned in the same place. According to him by a mere touch, the air (*vita*) of a coward man gets vitiated to produce swelling. This condition is called *sarpi´gibhihata*.<sup>78</sup> If some one is struck by a thorn while he was passing through a dark place, the fear of poisoning produces symptoms like fever, tremor, thirst etc. This condition is called *áa´kiviÀa* (the suspicion of poison).<sup>79</sup> A poisonous bite is distinguished by

77 *Ibid*  
 ÈxÉÌ´É¹ÉÆ uùªÉ¨ÉjÉÉt¨ÉºÉÉvªÉÆ {ÉÎṅSÉ¨ÉÆ ´Énäu\*

78 *Ibid*  
 ;ÉÒ®úÉäúºiÉÖ ºÉ{ÉÇºÉÆº{ÉṅÉÉæänÂùù;ÉªÉäxÉ  
 EÖðÊ{ÉiÉÉä□ÊxÉ±É&  
 ÈòùÉÊSÉiEÖð`ÆûiÉä ṅÉÉäiÆð  
 ºÉ{ÉÉÇRÂóMÉÊ;É½piÉÆ iÉÖ iÉiÉÂ\*\*

79 *Ibid*  
 nÖùMÉÉÇxvÉEèÉ®äú Ê´ÉrùªÉ  
 EäðxÉÊSÉÊuù¹ÉṅÉÉRÂóEðªÉÉ  
 Ê´É¹ÉÉäüüMÉÉä V´É®úSUðìnù¨ÉÚÇSUðÉÇÇ  
 nùÉ½pÉä□Ê{É´ÉÉ ;É´ÉäiÉÂ\*  
 M±ÉÉÊxÉ¨ÉÉæ½pÉä□ÊiÉºÉÉ®úÉä´ÉÉ

itching, swelling and pricking pain. If bound with a tourniquet, it causes burning sensation. If these signs are absent the bite is a non-poisonous one.<sup>80</sup>

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<sup>80</sup> iÉSUôRÂóEòÉÊ´É¹É¨ÉÖSªÉiÉä\*

<sup>80</sup> AH, Kalpasthina, 36, p.814.

iÉÖtiÉä °ÉÊ´É¹ÉÉä nÆù¶É& EòhbÚ÷¶ÉÉäiò°üVÉÉîx´ÉiÉ&

nù½ÂppªÉiÉä OÉÊiÉiÉ& ÊEòÎSÉnÂù Ê´É{É®úÒúiÉºiÉÖ ÊxÉì´É¹É&\*\*

This topic seen in Ayurvedic treatises seems to echo the well accepted principle of modern snake bite treatment i.e., poisonous snake bite is not synonymous with snake bite poisoning.<sup>81</sup> It has been undoubtedly proved that over one half of the victims of poisonous snake bite escape without poisoning. The biological peculiarities of snakes reveal the secret behind this fact. Snakes use their bite only in defense. Hence it rarely results in the injection of venom. Though injected it may not reach the fatal dose. The marks of fangs are very important in determining whether it is a poisonous or non-poisonous bite. If the bite is a poisonous one, the mark of the fangs will be visible at the upper portion. This will be accompanied by the small marks of teeth. Marks of fangs can be distinguished from that of others by analysing their depth and size. If a non poisonous snake is biting, all the marks will be of same size and depth.

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81 H.A. Reid. "The principles of snakebite treatment", *Snake venoms and envenomation*, p. 127.

It should also be kept in mind that, the snake bites of fear and the victim also will be in a state of confusion. Hence the fangs may not be located correctly on the body of the victim. Though placed they may not be visible. Sometimes certain scratches or pits may be seen.<sup>82</sup>

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82      *Ibid.*

Even though iyurvedic system is aware of determining the presence or absence of poison by analysing the marks of fangs, their ideas are coloured by the belief that there are four poisonous fangs in a snake. They assume that the increasing number of marks points to the fatality of the bite.



## **4.2.5 Some other details**

In *SS* it is said that when the snake is diseased, caught by emotions, very old or young in age its venom will be reduced in quantity.<sup>83</sup> This receives no support from science. Even though increasing age can deteriorate its external beauty, age has little influence on the quantity of venom produced in a snake.<sup>84</sup> More than that young vipers and cobras are notorious for their poisonous bite. Quantity of venom is dependent only on the pressure with which it is thrust forward through the fangs.<sup>85</sup> If a poisonous bite takes place at regions inhabited by red eagle, gods, divine sages and semidevine spirits, *Suṛruta* says that then poison would not spread. Presence of antipoisonous plants also has this power.

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83 *SS, Kalpasthina, IV, p. 439.*  
 'aÉÉÉvÉiÉÉäÊuùMxÉnùù¹]öÉÉxÉ VÉäªÉÉxªÉ±{ÉÊ  
 ´É¹ÉÉÊhÉ iÉÖ  
 iÉiÉÉÊiÉ ´ÉPrùxÉÉ±ÉÉÊ;Énù¹]´Éö±{ÉÊ´É¹ÉÆ  
 °´ÉpiÉ´ÉÂ\*  
 °ÉÖ{ÉhÉÇnäù´ÉÏÉÀ¹ÉªÉiÉÊ°ÉrùÊxÉ¹Éä´ÉiÉä  
 Ê´É¹ÉÉPxÉÉè¹ÉÊvÉªÉÖHäð Sé näù¶Éä xÉ Gò´ÉiÉä Ê  
 ´É¹É´ÉÂ\*\*

84 K.G. Adiyodi, *KV*.

85 *SS, Kalpasthina, IV, p. 439.*

## **4.2.6 Caste wise division of snakes**

In *SS*, the characteristics of snakes belonging to four castes are given. These castes correspond with that of humans. Snakes with the glowing colour of pearl or silver, whitish yellow colour and pleasant smell are identified as *Brihma, as*.<sup>86</sup>

The snakes with unctuous colour and marks of sun, moon or umbrella on the body are identified as the *KĀatriyas*. They can be agitated easily. They dwell in water.<sup>87</sup>

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<sup>86</sup> *SS*, Kalpasthina, p. 439.  
 "ÉÖHòÉ°ü{ªÉ|É|ÉÉªÉä SÉ EòÊ{É±ÉÉªÉä SÉ {ÉzÉMÉÉ&  
 °ÉÖMÉxvÉªÉ& °ÉÖ´ÉhÉÉÇ|ÉÉ°iÉä VÉÉiªÉÉ ¥ÉÉÀhÉÉ  
 °ÉpiÉÉ&\*

<sup>87</sup> *Ibid.*  
 ÍÉÊjÉªÉÉ& Î°xÉMvÉ´ÉhÉÉÇ°iÉÖ {ÉzÉMÉÉ  
 |ÉP¶ÉÉèÉä{ÉxÉÉ&  
 °ÉÚªÉÇSÉxpùÉEPòÊiÉSÚôjÉ±Él´É iÉä¹ÉÉÆ  
 iÉiÉÉ"ªÉÖVÉ"ÉÂ\*\*

The snakes with black or red colour and dove like or smoky in nature are called the *Vaiçya* class.<sup>88</sup> Snakes which resemble buffalo or leopard in colour and which have rough skin are considered as *á£dra* by caste.<sup>89</sup> These accounts can only be cited as fanciful accounts reflecting social situation.

#### 4.2.7 Characteristics of snakes and snake bites

Suçruta vividly describes the nature and divisions of snakes along with the common symptoms produced by each class.

##### a) Hooded Snakes - (*Darvçkara*)

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<sup>88</sup> *Ibid.*  
 EPò¹hÉÉ ´ÉXÉÊxÉ|ÉÉ ¢Éä SÉ ±ÉÉäÊ½piÉÉ  
 ´ÉhÉÇiÉºiÉIÉÉ  
 vÉÚ©ÉÉ& {ÉÉ®úÉ´ÉiÉÉ|ÉÉ¶SÉ ´Éè¶ªÉÉºiÉä  
 {ÉzÉMÉÉ& º´ÉpiÉÉ&\*

<sup>89</sup> *Ibid.*  
 ¨É½pÒ¹ÉÉÊuùÊ{É´ÉhÉÉÇ|ÉÉºiÉIÉè´É {É´û¹Éi´ÉSÉ  
 Ê|ÉzÉ´ÉhÉÉÇ¶SÉ ¢Éä EòÉÊSÉ&UÖðuùÉºiÉä  
 {ÉÊ®úÉEòÒiÉiÉÉ&\*

*Darvçkaras* are hooded snakes having marks of wheels, plough, umbrella, cross, elephant-goad etc., on their hood. They move fast.<sup>90</sup> *Darvçkara* is said to be of 26 types.<sup>91</sup> They are 1. *Kṛ̥ṣṇā, asarpa* (Black cobra) 2. *Mahikṛ̥ṣṇā, a* (Cobra that is exceedingly black in colour) 3. *Kṛ̥ṣṇā, odara śvetakapota* (Cobra with black stomach and whitish grey outer scales) 4. *Mahikapota* (Grey cobra) 5. *Balihaka* (Resembling the cloud appearing at the destruction of the world)<sup>92</sup> 6. *Mahisarpa* (King cobra) 7. *śākhakapila* (Cobra with conch like skull bone) 8. *Rohitikā* (Cobra with red eyes) 9. *Gavedhuka* (Cobra resembling a particular grass eaten by the cattle)<sup>93</sup> 10. *Parisarpa* (Encircling cobra)<sup>94</sup> 11. *Kha, apha, a* (The cobra with a half hood) 12. *Kakuda* (The cobra with a hump on the body) 13. *Padma* (Cobra resembling a lotus either in colour or in shape) 14. *Mahipadma* (Cobra resembling a big lotus)

<sup>90</sup> SS, Kalpasthina, IV, p. 439.

© úÍÉÉRÂóMÉ±ÉÉÉRÂóMÉ±ÉSUSUôjÉ°

´Éî°iÉÉèÉRÂóEÖò¶ÉvÉÉÊ®úhÉ&

YÉäªÉÉ& nù´ÉÔEè®úÉ& °É{ÉÉÇ& iòÊhÉxÉ&



About the identification of these subclasses, nothing is mentioned. Obviously the criterion of classification is their external appearance. *ĒsçviÀa* is mentioned in many Sanskrit works like *Îgveda*<sup>97</sup> and *Ve, çsamhira*.<sup>98</sup>

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97 *Îgveda* , 3.57.  
 MÉ`ûi`ÉnùÉ¶ÉÔÊ´É¹É;ÉÒ`Énù¶ÉÇxÉè&

98 *Ve, isamhira*, 6.1  
 EòhÉÉÇ¶ÉÔÊ´É¹É;ÉÉäÊMÉÊxÉ |É¶ÉÉÊ`ÉiÉä\*



Herpetology identifies cobras as with cylindrical tail, lower shields touching both the sides of the body, single shield in between eyes and nose, certain marks on hood, and stationary fangs.<sup>99</sup> (Fig. 4.14) General attempts have been made by herpetologists to classify cobras. But most accepted classification is that which is based on the mark on hood. Based on hood pattern they are called binocellate cobras (*forma typica*), monocellate cobras (*Naja kaouthia*) and barred cobra (*Naja oxiana*)<sup>100</sup>. We can compare this classification with the Ēyurveda counterpart. The system clearly specifies the difference in hood patterns. King cobra (*Naja hanna*) seems also to be included under the class *Darvçkara* (Fig. 4.15).

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99 Mathew Karukkulam, *PL*, p. 25.

100 Malcom A. Smith, *The Fauna of British India, Ceylon, and Burma*, p. 430.

Caraka, Suṣruta and Viḡbhaṡa unanimously say that, cobra poison vitiates air (*vita*).<sup>101</sup> Science says that cardio toxin present in cobra venom causes depolarization of cell membranes. This results in paralysis of muscles. Circulatory and respiratory failure and systolic arrest are the ultimate results.<sup>102</sup> Though terminology is different iyurvedic system also points to the same fact. According to Suṣruta cobras or hooded snakes are diurnal but it has been proved by experiments that they have no discrimination between day and night.<sup>103</sup> Suṣruta identifies the young cobra as the terrific one.<sup>104</sup>

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<sup>101</sup> SS, Kalpasthina, IV, p. 44.

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´É iÉÖ

<sup>102</sup> Jesus M. Jimenez Porras, "Biochemistry of Snake Venoms", *Snake Venoms and Envenomation*, p. 47.

<sup>103</sup> Mathew Karikkulam, *PL*, p. 25. *Sarpadamānam*, p. 5.

<sup>104</sup> SS, Kalpasthina IV, p. 440.

Symptoms of cobra bite are enumerated as blackening of skin, eyes, teeth, face, urine, faeces and the site of bite; dryness, feeling of heaviness of the head, pain in the joints, debility of the waist, back and neck; more of yawning, shivering, feeble voice, rough sound in the throat, lassitude, dry belching, cough, dyspnoea, hiccup, upward movement of gas, twisting pain in the abdomen, thirst, more salivation, appearance of froth in the mouth, blockage of channels and other symptoms produced by the vitiation of air.<sup>105</sup>

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105      *SS, Kalpasthina, IV, p. 443.*

Modern medicine attests the symptoms identified by *Ēyurveda*.<sup>106</sup> Blackening of the wound is followed by the formation of blisters. The patient loses the power to control the movement of eyes, tongue and neck. Broken neck syndrome is a common feature of cobra poisoning, they say.

Obeying the principle of seven *dhitus*, *Ēyurveda* describes the path of cobra venom through the body of a victim. This can better be illustrated with the help of a table.

### **Table 3: Route of the venom in a body**

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<sup>106</sup> Mathew Karikkulam, *PL*, p. 26.

*Sarpadamānam*, p. 40-43.

K.G. Adiyodi, *KV*, p. 53.

Joseph L. Mathew and Tarun Gera, "Ophitoxamia (Venomous snake bite)", Internet, avail.at [www.priory.com](http://www.priory.com). 19 pages,

*Forensic Medicine*, p. 421.

No. of stage or vega	Name of the Dhitu vitiated	Symptoms produced	Prescribed treatment
1.	<i>Rakta</i> (Blood)	Blackening of face etc feeling of ants crawling on the body	The vitiated blood should be extracted through the mouth of the wound
2.	<i>Mimsa</i> (muscles)	Black colour would spread throughout the body. Swelling and development of tumours	Antipoisonous medicine should be applied with ghee and honey
3.	<i>Medas</i> (fat)	Moistness of the site of bite, feeling of heaviness of the head, sweating and loss of movement of eyeballs	Antipoisonous nasal medicines and eye-salves should be applied

4.	<i>DoÅas</i> with the prominence of <i>kapha</i> present in the abdomen	Stupor, more salivation and loosening of the joints	Vomittings should be induced and thick rice gruel should be provided
5.	<i>Asthi</i> (bone)	Pain in the joint, hiccup and burning sensation	Cold treatments followed by the administration of strong emetics and purgatives. Thick gruel should be given to the patient
6.	<i>Majji</i> (Marrow)	Feeling of heaviness in the body, diarrhoea heart pain and fainting	

7.	<i>śukra</i> (semen)	Appearance of wick of <i>kapha</i> from minute channels, cutting pain in the waist and back, loss of all movements, more elimination of saliva and sweat and obstruction of expiration	Powerful nasal drops, collyrium etc should be applied while a wound resembling the foot mark of a crow should be made on the head and the wound should be kept covered by a piece of skin or muscle containing blood.
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**b) Snakes having patches on the body  
(Ma, ·ali)**

These are big snakes with patches on their body. The patches will be of varying kinds. They resemble fire or sun in their lusture.<sup>107</sup> They move very slowly. Caraka identifies it as the coiled snake devoid of hood.<sup>108</sup> Vigbhaṅga follows his predecessors in defining the snake.

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<sup>107</sup> SS. Kalpasthina, IV, p. 439.  
 “Éhb÷±Éèì´ÉÊ´ÉvÉèì¶SÉjÉÉ& {ÉPIÉ´ÉÉä

“ÉxnùMÉÉÊ´ÉxÉ&  
 YÉä<sup>ä</sup>ÉÉ “Éhb÷Ê±ÉxÉ& °É{ÉÉæ V´É±ÉxÉÉÉÇò°É”É|  
 É|ÉÉ&\*\*

<sup>108</sup> CS, Cikitsisthina, 23, p. 25 “Éhb÷±ÉÒ  
 “Éhb÷±ÉÉiòhÉ&\*

<sup>109</sup> AH, Kalpasthina, 36, p. 812.  
 YÉä<sup>ä</sup>ÉÉ “Éhb÷Ê±ÉxÉÉä¶ÉÉäMÉÉ “Éhb÷±Éèì´ÉÊ  
 ´ÉvÉÉî¶SÉiÉÉ&\*

Patched snakes are said to be of 22 types.<sup>110</sup> They are 1. *Ēdarīama, āla* (snakes having patches resembling a mirror), 2. *īvetama, āla* (snakes with white patches), 3. *raktama, āla* (snakes with red patches), 4. *citrama, āla* (snakes with patches of different colours), 5. *pṛāta* (the snake which is big in size), 6. *rodhrapuāpa*, 7. *milindaka* (a particular snake), 8. *gonasa*, 9. *Vādhagonasa*, 10. *Panasa* (the snake resembling a jack fruit), 11. *mahapanasa* (the snake resembling a big jack fruit), 12. *ve, upatraka* (the snake with a slender body resembling the bamboo-leaves), 13. *āīzuka* (the young snake), 14. *Madana*, 15. *Pilindira*, 16. *Pi'gala*, 17. *Ta, duka* (a snake resembling a string), 18. *Puāpapi, u* (a snake having the pale colour of a flower), 19. *Sa·a'ga* (a snake with six limbs), 20. *Agnika* (snake resembling the power of agni), 21. *Babhru* (brown snake), 22. *Kaāiya* (the snake which is saffron in colour), 23. *Kaluāa* (the snake which

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110 SS, Kalpasthina, IV, P. 441.

is confusing either in appearance or in disposition), 24. *Pirivati* (snake resembling a parrot), 25. *Hastibhara*,*a* (snake resembling a bangle), 26. *Citraka* (the snake which is very colourful in appearance) and *e'çpada*.

Even though the total number of *Ma*,*·alis* are cited as 22 when enumerated they become 26. The significance of this change remains an unsolved problem.

If we look into the account of modern science, *Ma, ali* is identified as viper. Vipers are ovoviviparous is reproduction and are with pear-shaped head, narrow neck, vertical pupil<sup>111</sup> and foldable fangs. A number of species are included under the class Viperidae. Russel's viper (*Vipera russelli*) (Fig. 4.16), Laventine viper (*Vipera labetina*), Saw scaled viper (*Echis carinatas*), Horned viper (*Pseudocerastes persieus*), McMahan's viper (*Eristocophis memahoni*), Pit viper (*Ancistrodon himalayanus*), (*Trimeresurus malabaricus*)<sup>112</sup> Bamboo pit viper (*Trimeresurus gramineus*) etc. come under this class. Certain subclasses are also identified.

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<sup>111</sup> *Forensic Medicine*, p. 414,  
Mathew Karikkulam, *PL*, p. 31.

<sup>112</sup> Malcom A. Smith, *The Fauna of British India Ceylon and Burma*, pp. 482 - 526.

Āyurvedic treatises identify viper poison as that vitiates bile (*pitta*).<sup>113</sup> Modern medicine says that in viper poisoning, blister formation, especially in places other than the site of bite is common. Necrosis is also found. In the bite of certain species, discoloration and swelling of lymphatic glands are also seen. Neurotoxic effect of viper poison badly affects the functioning of nervous system.<sup>114</sup>

Suśruta enumerates the symptoms of viper poisoning. They are yellowish tint in the body, desire for cold, burning sensation- local and general, thirst, intoxication, fainting, fever, bleeding from upper and lower orifices, falling of muscles, swelling and putrefaction of the site of bite, yellow sight, quick anger etc.<sup>115</sup>

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113 SS, Kalpasthina, IV, p. 440.

114 *Sarpadamānam*, p. 42-43.

115 SS, Kalpasthina, IV, p. 441.

Thromboplastin present in the poison of Russel's viper converts fibrinogen content of blood into crystals. Thus the blood loses its coagulating capacity. This state is termed as afibrinogenemia. Then blood comes out even through a small wound. Bleeding occurs in internal organs, eyes etc, and the bleeding in brain results in sudden death. Otherwise the patient experiences renal failure, by the cumulation of Fibrinogen crystals in the kidneys. Toxic elements like urea get cumulated in the blood and the patient dies of impure blood.<sup>116</sup>

Āyurvedic treatises enlist the symptoms produced by viper poisoning passing through the seven *dhitus*, those details can be represented in a table.

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116 *Sarpadamānam*, p. 44-77.  
Joseph L. Mathew and Tarun Gera. Ophitoxaemia  
"(Venomous snake bite)" Internet, avail.at [www.priory.com](http://www.priory.com).  
19pages.

**Table 4: The route of viper poison in human body**

No. of stage or vega	Name of the <i>Dhitu</i> vitiated	Symptoms produced	Prescribed treatment
1.	<i>Rakta</i> (Blood)	Burning sensation and yellow colouration of the body	The vitiated blood should be extracted through the mouth of the wound
2.	<i>Mimsa</i> (muscles)	Burning sensation and swelling of the site of bite	<i>Agada</i> mixed with honey and ghee should be given. After inducing vomiting rice gruel should be given
3.	<i>Medas</i> (fat)	Loss of movement of eye, thirst, moistness at the site of bite and perspiration	Induce vomiting. After purgation give thick rice gruel.

4.	<i>Rasa</i> (body fluids)	fever	Vomitting should be induced followed by the intake of thick rice gruel
5.	<i>asthi</i> (bone)	Burning sensation all over the body	Cold treatments followed by the administration of strong emetics and purgatives. Thick gruel should be given
6.	<i>majji</i> (Marrow)	Feeling of heaviness in the body, diarrhoea, heart pain and fainting	<i>Agada</i> should be provided along with the gruel prepared from the drugs of <i>kikolyidiga, a</i>
7.	<i>śukra</i> (semen)	Appearance of wicks of <i>kapha</i> from minute channels, cutting pain in the waist and back, loss of movements, more elimination of saliva and sweat and obstruction of expiration	Antipoisonous nasal drops and <i>agadas</i> should be applied



**c) Snakes with stripes on their body ( $R_{ij}$   
 $\phi_{min}$ )**

These snakes occur in different colours. They are characterized with stripes on the upper part and sides of their unctous body.<sup>117</sup> They are said to be of 10 types and are enumerated as follows: 1) *Pu, arçka* (with the colour of a white lotus), 2) *Rijçcitra* (unique with stripes), 3. *A'gulariji* (stripes with the length of a finger), 4. *Binduriji* (stripes formed of dots), 5. *Kardamaka* (the dirty snake), 6. *Tx, aïoÀaka* (that which destroys grass or that resembles grass), 7. *SarÀapaka* which resembles mustard 8. *ávetahanu* (that with white jaws), 9. *DarbhapuÀpa* (that resembles the flower of *darbha* grass), 10. *Cakraka* (resembling a wheel), 11. *Godh£maka* (that which resemble wheat), 12. *Kikkiçida*.<sup>118</sup>

<sup>117</sup> SS, Kalpasthina, IV, p. 439  
 Î°xÉMvÉ Ê´ÊÊ´ÉvÉ´ÉhÉÉÇÊ;ÉÎ°iÉªÉÇΜÉÚv´ÉE SÉ  
 ®úÉÊVÉÊ;É&  
 ÊSÉÊjÉiÉÉ <´ÉªÉä ;ÉÉÎxiÉ ®úÉÊVÉ´´ÉxiÉ°iÉÖ iÉä  
 °´ÉpiÉÉ&\*

<sup>118</sup> *Ibid.*, p. 441.

According to Caraka, Suśruta and Vibhakti, the poison of a *Rijçmin* vitiates phlegm (*kapha*). The symptoms produced by poison have been enumerated as follows - anaemia, chilling fever, horripilation, rigidity of the body, swelling of the site of bite, elimination of thick saliva and froth from the mouth, continuous vomiting, irritation of the eyes, swelling, husky voice in the throat, obstruction of expiration, darkness before the eyes etc.<sup>119</sup>

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119 *SS, Kalpasthina, IV, p. 443.*

Modern science identifies striped snakes as kraits (Fig. 4.17). These are characterized by cylindrical head, white or yellowish stripes, and unctous body.<sup>120</sup> A number of krait species are known to the modern world. They are Common Indian Krait (*Bungaris caeruleus*), Banded Krait (*Bungarus fasciatus*), Yellow headed krait (*Bungarus flaviceps*), Many banded krait (*Bungarus multi cinctus*). Malayan krait (*Bungarus candidus*), Black krait (*Bungarus nigar*), Lesser black krait (*Bungarus lividus*), Wall's krait (*Bungarus Walli*)<sup>121</sup> etc. Even though these varieties are known, we cannot accurately determine which one is signified by the names given by Suśruta.

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120 K.G. Adiyodi, *KV*, p. 28.

121 Malcom A. Smith, *The Fauna of British India, Ceylon and Burma*, 406-418.

Krait poisoning is characterized by pricking pain in the abdomen.<sup>122</sup> The symptoms resemble very much that produced by cobra. Neurotoxic effect of the venom causes Broken Neck Syndrome. The bite of a krait may not be noticed as there would be little pain on the spot. A patient subjected to a bite of lethal dose (the dose needed for killing an organism) may die within 18 to 60 hours.<sup>123</sup> The diagnosis and treatment of Ayurvedic system can be given in a table.

### **Table 5: Treatment of krait poison**

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122 *Sarpadamānam*, p. 41-44.

123 *Ibid.*, p. 47.

<b>No. of stage or vega</b>	<b>Name of the <i>Dhitu</i> vitiated</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
1.	<i>Rakta</i> (Blood)	Blood becomes yellowish white in colour. There will be horripilations in the body and body becomes anaemic.	Blood should be removed with the help of a gourd ( <i>alimbu</i> )
2.	<i>Mimsa</i> (muscles)	The body becomes yellowish white in colour lassitude and ordema are seen on face	After inducing vomiting antipoisonous recipes should be given
3.	<i>Medas</i> (fat)	Loss of movement of eyes, moistness at the site of bite. Perspiration and exudation from the nose and eyes	Antipoisonous nasal medicines and eye salves should be applied

4.	<i>Rasa</i> (body fluids)	Stiffness of the neck and feeling of heaviness of the head	Vomiting should be induced and thick rice gruel should be provided
5.	<i>asthi</i> (bone)	Obstruction of speech and fever with rigors	Cold treatments followed by the administration of strong emetics and purgatives. Thick gruel should also be given to the patient
6.	<i>majji</i> Marrow	Feeling of heaviness in the body, diarrhoea heart pain and fainting	Application of strong eye salves

7.	<i>śukra</i> (semen)	Appearance of wicks of <i>kapha</i> from minute channels, cutting pain in the waist and back, loss of all movements, more elimination of saliva and sweat and obstruction of expiration	Powerful nasal drops are to be applied
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Suṅruta has mentioned that the striped snakes move about during the last three hours of night.<sup>124</sup> This is well-attested by herpetology. Even though the hours are not specified these snakes are identified as nocturnal ones.<sup>125</sup>

#### **d) Non-poisonous snakes**

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124 SS, Kalpasthina, IV, p. 440.

125 K.G. Adiyodi, KV, p. 29.

Along with the poisonous snakes Suśruta enumerates non-poisonous snakes. They are 12 in number.<sup>126</sup> 1. *Galagoli* (The snake with a round neck), 2. *áḥkapatra* (The snake resembling the leaf of barley), 3. *Ajagara* (A huge snake swallowing goats), 4. *Divyaka* (A divine serpent), 5. *Varāihika* (The snake seen during the rainy season), 6. *Puāpaśakali*, 7. *Jyotçratha*, 8. *KÀir çkipuÀpaka*, 9. *Ahipatika*, 10. *Andhihika* (The blind snake), 11. *Gaurihika*, 12. *VṛkÀeśaya* (The snake resting on the tree).

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126 SS, Kalpasthina, p. 441.

Among these snakes, many are not identified. *Ajagara* has been inferred as boa constrictor. Herpetology includes non-poisonous snakes under the class Colubridae. These are characterized by broken scales on the lower part of the body.<sup>127</sup> Rat snake (*Ptyas mucosus*), Green tree racer (*Elapha prasina*), Indian python (*Python molurus*), Rassel's sand boa (*Eryx conicus*) etc come under this class.<sup>128</sup>

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127 *Sarpadamānam*, p. 18.

128 Malcom A. Smith. *The Fauna of British India, Ceylon and Burma*, pp. 102-152.

## e) Hybrid snakes

Suśruta identifies *vaikarṃja* as the offspring born out of the cross-breeding of the major three poisonous snakes.<sup>129</sup> When male *Kṣā,asarpa* mates with female *gonasa* the young one born is called *Mikuli* interchange of sex among the parents may also not cause any difference. *Poṅṅagala* is the young one of *Rijila* and *Gonasa* snakes. *Snigdhariji* is the offspring of *Kṣā,asarpa* and *Rijimin*. *Mikali* shows the characteristics of *Kṣā,asarpa* while *Poṅṅagala* and *Snigdhariji* exhibit the characteristics of *Gonasa* and *Rajçmin* respectively. These hybrid snakes are further divided into seven groups ie., *Divyalaka*, *RodhrapuÀpaka*, *Rijicitraka*, *Poṅṅagala*, *PuÀpibhikçr,a*, *DarbhapuÀpa* and *Vellitaka*.

### 4.2.8 Action of Poison in the Body of a Victim

129 SS, Kalpasthina, IV, p. 442.

According to Suṛuti, poison resembles a sharpened sword, lightning and fire, in its action. Negligence for minutes may prove to be fatal. So every movement is precious.<sup>130</sup> The complexity of snake venoms still remains a puzzle to science. Researches are going on different aspects of the biochemistry and pharmacology of snake venoms.<sup>131</sup> From its heterogeneous composition studies have identified a number of proteins, minerals like Phosphorus, Chloride, Sodium, Potassium, Iron, Zinc, Cobalt etc, a number of enzymes and Histamin. Even now, the unidentified matter of snake venom confuses the scientists.

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<sup>130</sup> *Ibid.* É´É¹ÉÆ Ê½þ ÊxÉÊ¶ÉiÉÊxÉİ¶jÉ¶ÉÉ¶ÉÊxÉ½ÖpiÉ´É½pnäù¶É¶É¶É¶ÉÖEðÉÊ®ú

¶ÉÖ½ÚpiÉÇ¶É{¶ÉÖ{ÉäÊiÉiÉ¶ÉÉiÉÖ®ú¶ÉÊiÉ{ÉÉiÉ¶ÉÊiÉ\*  
<sup>131</sup> Jesus M. Jimenez, Porras, "Biochemistry of snake venoms", *Snake Venoms and Envenomation*, p. 43.

The enzyme viz, Phosphatase, degenerates the chemical and biological compounds of Phosphorous. Chollin Asatate; this enzyme destroys Acetyl chollin required for the functioning of body muscles. This enzyme is present in the venom of the family Elapidae and absent in that of Viperidae. Certain contents present in cobra venom help in increasing blood pressure, while other in viper help to decrease the same. Hence these, after purification have been used for pharmacological purposes.<sup>132</sup> Though unaware of the chemical composition, iyurvedic treatises were conscious of the quickness in the action of venom.

#### **4.2.9 Treatment**

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132 *Ibid.*

Āyurvedic texts seem to classify the cases as to be treated or not to be treated. Though this thought is not discussed by Caraka or Suśruta, Viḅhaṅga elaborates it in detail. The bite occurring at a burial place, sacrificial place, Buddhist monastery, ant hill, liquor shop etc; on the 5<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> days of months, in the afternoon, noon or midnight and in certain constellation like *iḅleĀi*, *migha*, *viḅikha* etc should not be treated. When the day is divided into 15 parts, the part which is dedicated to the deity *Niryati* ie., which becomes the 12<sup>th</sup> part of the day is the vulnerable period and the bite occurring at that period should not be treated. The bite occurred at the vulnerable parts of the body should also left untouched.<sup>133</sup>

<sup>133</sup> AH, Kalpasthina, 36, p. 815.  
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 +¹]öÉÈxÉ´ÉÉÈ°ÉxvÉÉÉÉÉvÉÉ®úÉÉjÉ ÊnùxÉä¹ÉÖ SÉ\*  
 ÉÉÉÉÉÉMxÉäÉÉÉÉÉÉ¶±Éä¹ÉÉÉ´É¶ÉÉjÉÉ{ÉÚ  
 ´ÉÇxÉè@ñiÉä  
 xÉè@ñiÉÉjÉäÉä ÉÖ½ÚpiÉæ SÉ nù¹]ÆööÉÉÉÇ°ÉÖ SÉ  
 iaÉVÉäiÉĀ\*\*

The symptoms of a dying man is anaemic look, fainting and cold breath. Such a man will die soon.<sup>134</sup> The victim who instantaneously experiences vomiting, cough, hiccups etc., will soon die. Signs of an ailing man are enumerated as elimination of froth from the mouth, fainting, darkening of limbs and face, obstruction in respiration and deformation of joints.<sup>135</sup>

<sup>134</sup> *Ibid.*  
 nù<sup>1</sup>]õ"ÉÉjÉ& Ê°ÉiÉÉ°ÉÉiÉ&  
 ¶ÉÒ°ÉÇ"ÉÉhÉÊ¶É®úÉä`û<sup>1/2</sup>p&  
 °iÉxvÉÊVÉ<sup>1/4</sup>'ÉÉä "ÉÖ<sup>1/2</sup>Öp"ÉÚÇSUÇôxÉÂ ¶ÉÒiÉÉäSUÂô  
 'ÉÉ°ÉÉä xÉ VÉÒ'ÉÊiÉ\*  
 Ê<sup>1/2</sup>p v"ÉÉ ·ÉÉ°ÉÉä 'ÉÊ"É& EòÉ°ÉÉä nù<sup>1</sup>]õ"ÉÉjÉ°ÉÉ  
 näùùÊ<sup>1/2</sup>p xÉ&  
 VÉÉ°ÉxiÉä °ÉÖMÉ{Ét°ÉÉ °É <sup>3/4</sup>p pSUÚô±ÉÒ xÉ VÉÒ  
 'ÉÊiÉ\*

<sup>135</sup> *Ibid.*  
 iäòxÉÆ 'É"ÉÊiÉ ÊxÉ&°ÉÆYÉ& ¶°ÉÉ  
 'É{ÉÉnùEò®úÉxÉxÉ&  
 xÉÉ°ÉÉ'É°ÉÉnùÉä |ÉRÂóMÉäRÂóMÉä Ê'ÉbÂ÷;ÉänùÉ&  
 ¶±ÉiÉ°ÉiÉxvÉiÉÉ  
 Ê'ÉiÉ{ÉÒiÉ°ÉÉ nù<sup>1</sup>]õ°ÉÉ ÊnùMvÉäxÉÉÊ;É<sup>1/2</sup>piÉ°ÉÉ SÉ  
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The man who never responds to the application of strong nasal drops, whose wounds never bleed, whose body never exhibits the marks of biting is to identified as dead.<sup>136</sup> If the patient is neither sinking nor exhibiting the signs of death he has to be treated with great care so that the poison may be destroyed. Caraka systematically explains the 24 remedial measures. Suśruta and Viḅhaḅi follow these steps and sometimes add their own contributions.

#### 4.2.9.1 Steps of treatment

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<sup>136</sup> *Ibid.*  
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Poison injected through a bite moves through the seven *kalas* to disturb the equilibrium. The intermediate period between two successive *kalas* is known as *vegintara*.<sup>137</sup> Treatment is prescribed for each stage. The transitional period or *vegintara* is also very important. Among the 24 remedial measures enumerated by Caraka *mantra* (incantation) is the foremost one.<sup>138</sup> But when we came to SS, incantation is driven back to the 5<sup>th</sup> position.<sup>139</sup> Caraka, might have referred to it as an auspicious one. But Suśruta keeps the first aid treatments in the forefront and then real medications. They are explained as follows.

#### 4.2.9.1.1 First aid treatments

137 SS, Kalpasthina IV.  
 138 CS, Cikitsisthina, p. 35.  
 139 SS, Kalpasthina, p. 450-451.

**a. Binding:** Āyurvedic system was well conscious of the speed with which poison spreads in the body. Hence a number of measures for slowing down the pace are taken. The first measure advocated by the system is the application of tourniquet. This is useful in blocking the passage of venom. This is beneficial only when the bite is occurring in the hands or legs of a person. Suśruti says that ligature should be tied tight four *aṅgulas* (8cm) above the bite. He also emphasizes that the tourniquet should not be so tight that the blood circulation might be blocked.<sup>140</sup>

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<sup>140</sup> *Ibid.*  
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Even now binding of tournique has been treated as a best measure to prevent the spreading of poison in the body. The position of tournique is estimated to be 4 inches above the spot of bite. The binding should be tight enough to stop the spreading of venom through the lymphatic gland. For assuring circulation, in every 10 minute the ligature may be released. This binding have to be retained until systematic treatment begins to work.<sup>141</sup>

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141      *Forensic Medicine*, 422.

**b. Incision:** Incision through the fang marks is the second step. Suśruta says that this is applicable in those cases where binding of a ligament is not possible.<sup>142</sup> While incising it should be kept in mind that the knife or other things used for the task are neat and tidy, otherwise it will lead to inflammation of the wound. Incision proved to be a fruitful one provided it is done immediately after the bite.

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**c. Compression:** If the bite is not occurring at a vulnerable part, and a part of the fang is remaining in the spot, it should be compressed to remove it.<sup>144</sup>

142 SS, Kalpasthina V p. 451.

143 Forensic Medicine, p. 422.

144 CS, Cikitsisthina, 23.

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**d. Sucking:** After incision suction is the step advocated by the physicians. Though oral suction is the easiest one, mechanical one is advocated, because in oral suction a number of things have to be kept in mind. The operator of the suction should not have any oral lesions. As a precaution, the man, who is going to do oral suction is advised to fill his mouth with barley powder or dust.<sup>145</sup> Suçruta advices to keep a piece of cloth in the mouth. He also says that if he is not keeping the cloth in the mouth he had to bite the snake which has bitten or a piece of stone. The latter part may be given in assurance of confidence and courage.<sup>146</sup> Vigbhaṅga advises to take the powder, antidotes, cow dung etc. in mouth before going to suck the wound.<sup>147</sup>

<sup>145</sup> *Ibid.*

<sup>146</sup> *SS, Kalpasthina, V, p. 451.*

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<sup>147</sup> *AH, Uttarathina, 36, p. 817.*

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**e. *Diha* (Heating):** Heating is the method done in all the cases, except in that made by viper venom. Heating is capable of destroying the poison instantaneously. Vigbhaṅga elaborates the method of heating i.e., done with hot metals like gold.<sup>148</sup> On heating viper venom vitiating bile, may spread to other places.<sup>149</sup>

**f. *PariĀeka* (sprinkling):** The wound which is subjected to heating, incision and sucking should be sprinkled with antidotes.<sup>150</sup>

**g. *Avagiha* (bath):** The wound sprinkled with antidotes has to be washed continuously with a solution of sandal wood paste and *uḷira*.<sup>151</sup>

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148 *Ibid.*  
 149 {iĒè½æpĒ±ĒĒä½pĒtänÇù½äpnùĒĒĒ±ĒÖEäðxĒĒĒ

**h. Raktamokāśa (blood letting):** This is also very important. If done immediately after the bite, it is helpful in the elimination of poison. A vein near the site of bite has to be punctured. It will help to eliminate poison along with the flowing blood.<sup>152</sup> Vigbhāṣa says that blood impure with poison, will come out with a bad odour. When put in fire it produces crackling sound. He also opines that blood letting should be continued until blood retains

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149 SS, Kalpasthina, V, p. 451.

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150 AH, Uttarasathina, Vi, p. 817.

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151 *Ibid.*

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152 SS, Kalpasthina, V, p. 452.

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its pervious form.<sup>153</sup> Caraka underlines the role of blood in the harmonious functioning of the body and advises to let the blood come out by scraping or applying horn, leech etc. The powders of *trikaṅgu*, soot, *haridri*, fine salts, *gorocana*, and *virtaka* are to be applied as a scrubber to facilitate blood letting.<sup>154</sup> Even though this has been identified as a fruitful one, modern medicine warns of the dangers coming through this. Sometimes venipuncture may result in uncontrollable bleeding and quick absorption of the venom. Inflammation caused

<sup>153</sup> AH, Uttarasthina, 36, p. 817.  
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<sup>154</sup> CS, Cikitsisthina, 23.  
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by wound infection may result in local tissue damage.<sup>155</sup> However venipuncture can only be done by a trained person. *Āyurveda* puts forward<sup>156</sup> the measures to handle the problems arising from venipuncture. On excessive bleeding, the wound has to be treated with cold medicaments. These cold applications will fight with narcosis, fainting, affliction and palpitation of heart.<sup>157</sup> The patient should also be fanned until there arises horripilation.

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155 *Forensic Medicine*, p. 422.

156 *AH*, Uttarasthina, 36, p. 817.

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157 *CS*, Cikitsisthina, 23.

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But we have to be very careful before resorting to venipuncture because, viper poison acting against the coagulation of blood would remain a menace. If venipuncture is adopted in the case of viper-poisoning, the patient will suffer from continuous bleeding through the site of wound. In those cases, where necrosis is seen, washing with cold water will prove to be dangerous. So determination of the species of bite is very relevant for the treatment. In the first stage, ingested poison can be eliminated by emesis and in the second stage i.e., before absorption it can be eliminated by purgation.<sup>158</sup>

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<sup>158</sup> *Ibid*, {ÉÒiÉÆ´É´´ÉxÉè& °ÉtÉä ½p®äúÊuù®äúEèè& ÊuùiÉÒªÉä iÉÖ\*  
*AH, Uttarasthina*, 36, p. 817.  
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These are the ten measures prescribed by the system of *Āyurveda* to eliminate poison. Incantation is useful in all these stages. For a victim, it is very essential to sustain his presence of mind. This psychological treatment begins just from the binding of tourniquet. Caraka summarises the action of major first aids. A tree cannot grow further, after cutting its roots, similarly after incision of the bite poison can not advance. Sucking will let the poison come out. Bindings, block the passage of venom just like bunds block that of water. Heating is useful in destroying poison situated in the skin and flesh. Blood letting oozes out the poison.<sup>159</sup>

159 CS, Cikitsasthina, 23, 44-45.

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These first aid measures are relevant even today. The equipments used should be clean and tidy, otherwise they will cause opposite results. In the case of snake bite, poison spreads through lymphatic structures. The lymphatic glands from the leg, meet with that of stomach and end in cisterna chyli. From this, venom spreads to blood vessels. In all cases, passage of venom is similar, provided the bite has not occurred in the vein. Poison, entered into a blood vessel will be detoxicated by liver. If the whole blood is spread by the venom, detoxication becomes impossible. Thus the measures helpful in the removal of poisonous lymph from the victim's body have to be adopted. These measures described in iyurvedic texts reveal the wide spectrum of treatment adopted by the ancient society. Modern science is much skeptical about the outcomes of first aid treatments. For a better understanding

these are defined as the "Measures taken by the victim or associates before receiving medical treatment"<sup>160</sup> and are advised to be short, simple, practicable and more beneficial than harmful. Amputation of limbs is discarded as that is impracticable. Even though incision and suction are beneficial in laboratory conditions, in real condition they become harmful. Hence modern science advises to clean and cover the site of bite with a kerchief or cloth. After binding a tight ligature above the site of bite, the patient is advised to approach a doctor. Emotional outcomes arising from fright are treated with the application of placebo injection.<sup>161</sup>

#### **4.2.9.1.2 Medical treatment**

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160 A. Reid, "Principles of snake bite treatment", *Snake venoms and Envenomation*.

161 *Ibid.*

Caraka enumerates 13 measures of the treatment.<sup>162</sup> They are 1. *Upadhina* (Medication on incised scalp), 2. *Hṛdayivara*,<sub>a</sub> (Protection of heart), 3. *Aṃjana* (collyrium), 4. *Nasya* (snuffing), 5. *Dhṛma* (smoking), 6. *Leha* (linctus), 7. *Auśadha* (other medicament), 8. *Pradhamana* (blowing up through nose), 9. *Pratisira*,<sub>a</sub> (local application), 10. *Prativi*Āa (antidotes), 11. *Samjuisamsthipana* (rasuscitation), 12. *Lepa* (paste) and 13. *Mṛtasamjṣvāna* (revivification).

#### **4.2.9.1.3 Symptomatic treatment of snake bite**

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162 CS, Cikitsisthina, 23, 35-37.

The above mentioned measures have to be applied in symptomatic treatment of snake bite. Careful observation of the symptoms produced by the victim helps the physician, in prescribing the medicine (Fig. 4.18). These symptoms and their treatment prescribed by Suśruta can better be represented in table.



## **Table 6: Symptomatic treatment of snake bite**

	<b>Symptoms</b>	<b>Prescribed treatment</b>
1.	The body is discoloured hard, swollen and experiencing pain	Blood letting
2.	Excess of hunger and predominance of air	Meat soup, ghee, vinegar, honey or curd should be given to drink
3.	Excess of thirst, burning sensation, increase in body temperature, delusion and symptoms of aggravation of <i>pitta</i>	Cold massage, bath and poultices
4.	Fainting, intoxication and symptoms of aggravation of <i>kapha</i> (phlegm)	Vomiting should be induced along with the administration of medicines for the mitigation of <i>kapha</i>
5.	Burning sensation and pain in the abdomen, flatulence, pain of obstruction of urine and faeces	Induce purgation

6.	Swelling around the eye, loss of sleep, discoloured and dirty eyes, blurred vision	Application of collyrium
7.	Pain and feeling of heaviness of the head, lassitude, rigidity of the lower jaw, obstruction in the throat and severe pain in the neck	Purgate the head

Suśruta prescribes the treatment after observing the habitat, body constitution, season, strength and weakness of the stages of poisoning etc. He further explains the treatments presented in a case. Here each symptom is treated with a particular medicine. The subsequent symptoms and their medicaments can be represented in table.

**Table 7: Case study**

	<b>Symptoms</b>	<b>Prescribed treatment</b>
1.	Loss of consciousness wide open eyes, bent neck	a) Strong nasal insufflations ( <i>Pradhamana</i> ) with powder of drugs b) Head is made to purge c) Veins of limbs and forehead are to be punctured
2.	In the absence of bleeding	a) A wound resembling the shape of a crow's foot should be made on the head. When blood comes out, it should be either covered with muscles or skin or decoction or paste of <i>carmavakā</i> A drum smeared with anti-poisonous drugs should be beaten near by
3.	When the patient wakes up	a) Vomitting and purgation should be induced

4.	Discolouration of the body, fever, cough, headaches, oedema, consumption, nasal catarrh, transient blindness, loss of taste and rhinitis	<p>a) Medicaments should be prescribed by analyzing the predominant <i>doÅa</i>.</p> <p>b) After removing the ligature the site of bite should be incised to let the coagulated blood come out. Antipoisonous medicines should be smeared over the site</p>
5.	Aggravation of <i>doÅas</i>	
	i) aggravation of <i>vita</i>	Oil processed with antipoisonous drugs should be applied. Fish, oil, <i>kulatthi</i> , sour substances etc. should be excluded from the diet

	ii) Aggravation of <i>pitta</i>	Medicines useful in caring the fever of <i>pitta</i> origin. Administration of a decoction of enema and oil enema
	iii) Aggravation of <i>kapha</i>	Administration of the decoction of drugs of <i>iragvadhidiga</i> , a mixed with honey

*AH* prescribes treatment for the bite of each species. Before applying a medicine the physician has to observe and understand the species of the bitten snake, the nature of venom, the constitution of the venom and the body features of the victim and his present stage etc.<sup>163</sup> Medicaments prescribed for each species can be represented in a table.<sup>164</sup>

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<sup>163</sup> *AH*, Uttarasthina, 36, p. 818.

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<sup>164</sup> *Ibid.*



## **Table 8: Treatment for different types of snakes**

No.	Snake Species	Prescribed Treatment
1.	<i>Darvçkara</i>	d) A solution of the root of <i>sinduvira</i> (three leaved chaste tree; <i>Vitex trifolia</i> Linn <sup>165</sup> ), <i>çiveta</i> (Sissoo, <i>Dalbergin sissoo</i> Roxb <sup>166</sup> ) and <i>girikar, iki</i> (clitoria, <i>cliforia ternatea</i> Linn <sup>167</sup> ) is to be given to drink. Honey mixed with <i>pilaka</i> (Beetroot, <i>Beta vulgaris</i> Linn <sup>168</sup> ) should be applied nasally

165 *IMP*, Vol. V, p. 392.

166 *Ibid*, Vol. II, p. 304.

167 *Ibid*, Vol. II, p. 129.

168 *Ibid*, Vol. 1, p. 265.

2.	<i>Kṣā, asarpa</i>	b) After the removal of vitiated blood, the wound should be covered with a paste of <i>ciraṅgi</i> (Marking nut tree, <i>Semecarpus anacardium</i> Linn <sup>169</sup> ), <i>nikuli</i> (Greater galangal, <i>Alpinia galanga</i> Linn <sup>170</sup> ) or any other poisonous root. Internally a solution of <i>kāudra</i> (Poison berry. <i>Solanum anguivi</i> Linn <sup>171</sup> ), <i>maṃjiṅhi</i> , Indian Madder ( <i>Rubia cordifolia</i> Linn <sup>172</sup> ) and <i>gṛhadhṛma</i> (?) mixed with ghee should be provided
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169 *Ibid*, Vol. V, p. 103.

170 *Ibid*, Vol. I, p. 110.

171 *Ibid*, Vol. 5, p. 154.

172 *Ibid*, Vol. V, p. 17.

3.	All poisonous snakes and <i>Rijçmin</i> in particular	The plants <i>ta,·ulçyaka</i> (prickly amaranth, <i>Amaranthus spinosus</i> Linn. <sup>173</sup> ), <i>Karîmarya</i> (Comb teak, <i>Gmelina arborea</i> ), <i>Ki,ihç</i> ( <i>Crotalaria retusa</i> Linn. <sup>174</sup> ) and <i>girikar,iki;mitulu'gç</i> (pomegranate, <i>Punica granatum</i> Linn. <sup>175</sup> ) given to drink, <i>siti</i> (molasses <sup>176</sup> ) given as nasal snuff, and <i>selu</i> (?) applied as collyrium and the administration of <i>agada</i> with the name <i>hita</i> .
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173 *Ibid*, Vol. I, 121.

174 *Ibid*, Vol. 3, p. 91.

175 *Ibid*, Vol. II, p. 218.

176 *Ibid*, Vol. IV, p. 402.

4.	<i>Ma, ·ali</i>	An agada with the name <i>himavin</i> made of <i>paṃcavalca</i> (Castor, <i>Ricinus communis</i> Linn. <sup>177</sup> ), <i>vari</i> (?), <i>yaÀḥi</i> (Liquorice, <i>Glycyrrhiza glabra</i> Linn. <sup>178</sup> ), <i>nigapuÀpa</i> (iron wood tree, <i>Mesua nagassarium</i> <sup>179</sup> ), <i>j çva</i> ( <i>Holostemma adakodien scheltes</i> <sup>180</sup> ), <i>karÀabha</i> (?), <i>Kauççra</i> (Oak gall, <i>Quercus infectoria Olivier</i> <sup>181</sup> ), and the buds of white <i>padmaka</i> mixed with <i>kÀaudra</i> (Poison berry) (Himalayan wild cherry, <i>Pranus cerasoides</i> <sup>182</sup> )
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177 *Ibid*, Vol. V, p. 1

178 *Ibid*, Vol. III, p. 84.

179 *Ibid*, Vol. VI, p. 27.

180 *Ibid*, Vol. III, p. 167.

181 *Ibid*, Vol. IV, p. 403.

182 *Ibid*, Vol. IV, p. 353.

		<p>A solution of the buds of <i>kiçmarya</i> and <i>vaçça</i> (Banyan, <i>ficus benghalensis</i> Linn.<sup>183</sup>), <i>jçva</i> (<i>Holostemmaada-Kodien scheltes</i>), <i>karÀabhaka, siti</i> (molasses), <i>maççijÀçhi</i> (Indian madder), and <i>madhuka</i> (South Indian Mahna, <i>Madhuca longifera</i><sup>184</sup>) should be drunk.</p>
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183 *Ibid*, Vol. III, p. 20.

184 *Ibid*, Vol. III, p. 362.

		<p>An antidote with the name <i>hita</i> made of <i>sami</i>, <i>sugandhi</i>, <i>mædvçki</i>, <i>gajadandiki</i> with the name <i>çveti</i>, half the quantity of the leaf of <i>saurasa</i> (Holy basil, <i>Ocimum tenuiflorum</i> Linn<sup>185</sup>), <i>bilva</i> and <i>di·ima</i> (Pomegrante, <i>Punica granatum</i> Linn.<sup>186</sup>) applied with <i>kÀaudra</i> (Poison berry, <i>Solanum anguivi</i> Linn.<sup>187</sup>)</p>
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185 *Ibid*, Vol. IV, p. 168.

186 *Ibid*, Vol. III, p. 327.

187 *Ibid*, Vol. IV, p. 154.

5.	<i>Gonasa</i>	<p>The powder made of the bark of <i>vamza</i> (thorny bamboo, <i>Bambusa arundinacea</i> Wild.<sup>188</sup>), <i>bçjaka·uki</i> (Picrorhiza, <i>Picrorhiza scrophularii flora</i> Pennell<sup>189</sup>), <i>piñalç</i> (Yellow snake tree, <i>Stereospermum colous</i><sup>190</sup>), <i>bçjanigara</i> the seed of <i>çirçÀa</i> (siris tree, <i>Albizia lebbeck</i> Linn.<sup>191</sup>), <i>ativiÀa</i> (Atis root, <i>Aconitium heterophyllum</i> Wall. dexRoyle<sup>192</sup>), root of <i>gavedhuka</i> (Job's tree, <i>Coixly cryma jobi</i> Linn.<sup>193</sup>) and <i>vaci</i> (Sweet flag, <i>Acorus calamus</i> Linn.<sup>194</sup>) When mixed with the urine of a cow becomes a medicament 1/8<sup>th</sup> of which can be used to cure the envenomation caused by <i>gonasa</i> snakes.</p>
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188 *Op.cit.*, Vol. I, p. 244,

189 *Ibid*, Vol. IV, p. 269.

190 *Ibid*, Vol. V, p. 192.

191 *Ibid*, Vol. I, p. 81.

192 *Ibid*, Vol. I, p. 42.

193 *Ibid*, Vol. II, p. 157.

194 *Ibid*, Vol. I, p. 51.



6.	<i>Rijimin</i>	The plants <i>kaḡuki</i> (Picrorhiza), <i>ativiÀa</i> (Atis root), <i>kuÀtha</i> (Costus, <i>Saussurea lappa</i> . C.B. Clarke <sup>195</sup> ) <i>gḡhadh£ma</i> and <i>hare,uka</i> mixed with <i>kÀaudra</i> (Poison berry), <i>vyoÀa</i> and <i>tagara</i> (Indian Valerian, <i>Valeriana jatamansi Jones</i> <sup>196</sup> )
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195 *Ibid*, Vol. V, p. 80.

196 *Ibid*, Vol. V, p. 345.

7.	<i>Vyantara</i>	The shoot of the plant <i>citri</i> should be cut to small pieces and buried under ground for two quarters of night. Remove, grind and mix with oil, and make powder. Cover the wound with this paste. Old Ghee mixed with the powder of <i>vari</i> has to be given to drink when the digested food is eliminated from the body, food consisting barley ( <i>Hordeum Vulgare</i> Linn.) processed in <i>s£pa</i> has to be give.
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Plants like *çirçÀa*, *surasa*, *siti*, *mirica* (white pepper) etc., are very suitable for the patients. These can be given both internally and externally. Two *palas* of *nata* (Indian valerian, *Valeriana jatamansi* Jones<sup>197</sup>) and *kuÀ¶ha*, four *palas* of ghee, and *kÀaudra* when given as a drink will give some relief to the victims bitten by *TakÀaka*.

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197 *IMP*, Vol. V, p. 345.



## 4.2.10 Preparation of Agadas

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Caraka prescribes four special recipes of *agadas* viz, *mṛtasamjivani*, *gandhahasti*, *mahigandhahasti* and *kĀira*. The former one i.e., *mṛtasamjivaniagada* alleviates all poisons, gives victory, revives the sinking man and destroys fever. By using it as a snuff, paste and amulet a householder can get rid of evil spirits, poisons, harmful organisms, inauspiciousness, evil incantation, charms, fire, thunderbolt, enemies, bad dreams, evil caused by women, fear of untimely death, floods and thieves. This recipe is revealed by Brahma before the appearance of nectar hence gives success, wealth, agricultural progress and promotes prosperity and life span.<sup>199</sup>

<sup>199</sup> CS, *Cikitsisthina*, 23, 54-60.  
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*Agada* with the name *gandhahasti* is administered to a patient in whom *kapha* is vitiated. If applied on head, after incising the scalp it provides quick relief. It alleviates all sorts of fever, supernatural powers, *viñciki*, indigestion and fainting, when applied as collyrium, it alleviates insanity, epilepsy, cataract, *pañala*, *nçlika*, head diseases, *ñuñkikñipika*, *pilla*, *arbuda*, *arma*, aching, blindness, debility, alcoholism and confusion. If applied as paste it fights with poison injected by poisoned arrow, licking, biting or ingestion. In the cases of piles or hardness of bowels, it is applied in anus, and in abnormal pregnancy it is applied in vagina. Scrotal enlargement, *kiñibha*, *kuñtha* leucoderma, eczema etc are treated with this. The *agada's* antipoisonous action is compared

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to the vigour of a mad elephant.<sup>200</sup>

The *agada* with the name *mahigandhahasti* was revealed by Tryambaka to Kubera. It has 60 drugs as the ingredients. By constant use and controlled diet it destroys eye diseases, irregular fever, indigestion, skin diseases; poisons of rats, serpents, spiders and plants. When speared on the body it helps one to hold the snakes and ingest poison. In the disorders of bowel it is applied on the anus and in the disorders of pregnancy it is applied on vagina. This *agada* is believed to fight with super natural elements and bring auspiciousness. While the application a *mantra* is advised to be chanted.<sup>201</sup>

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200 *Ibid*, 65-76.

201 *CS, Cikitsisthina*, 23, 92-94.

*Agada* with the name *kÀira* destroys poisons, swelling, *gulma*, skin problems, piles, fistula in ano, oedema, epilepsy, worms, evil spirits, hoarseness of voice, anaemia, less appetite, cough and insanity.<sup>202</sup> *Suṣruta* gives the recipe of ten *agadas* used especially for the treatment of snake bite and four *agadas* of multiple purpose. *Mahigada* stops the passage of poison and destroys it. The medicine is very strong and is said to have unbeatable potency.<sup>203</sup>

<sup>202</sup> *Ibid*, 95-104.

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<sup>203</sup> *SS, Kalpasthina*, V, p. 459.

The *agada* with the name *ajita* is capable of destroying poison of both vegetable and animal origin. *TirkÀyigada* destroys even the poison of celestial snake TakÀaka. A special recipe of an *agada* with the name *ᵂÀabha* is given in SS. It is used as an insecticide and rodenticide to fight against snakes, lizard, peacock, porcupine, cat, leopard and mongoose.<sup>204</sup>

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204 *Ibid.*  
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 ÊnùMvÉÉ {ÉiÉÉÉèÉ¶SÉ ÊxÉ®úÒiᵂᵂÉ ᵂÉtÉä Ê  
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*Samjçaniagada* applied as collyrium, snuff or internal medicine can restore the life of even the dead.<sup>205</sup> The *agada* with the name *ileÀmitaki* is used for the treatment of *Darvçkara* and *Rijila* snakes.<sup>206</sup> Poison of *Ma, ali* snakes are destroyed by the *agada* with the name *drikÀidi*.<sup>207</sup> *Vamçatvagidi agada* is capable of destroying any sort of poison of zoological origin. It also has the capacity to cure eye diseases and stomach problem.<sup>208</sup> Two *agadas* for destroying the poison of insects and rats are also described.<sup>209</sup> The application of *ekasiraga, a* is also very useful in the treatment of poisons.<sup>210</sup>

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205 *Ibid.*

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206 *Ibid*  
 207 *Ibid*  
 208 *Ibid*  
 209 *Ibid*  
 210 *Ibid.*

*Agadas* of multiple purpose enumerated by Suçruta are four in number and they are.

1). *KÀirigada* - This deviates from that of Caraka in preparation. It is useful in the treatment of urinary calculus, piles, abdominal tumor, cough, pain and enlargement of abdomen, indigestion, aversion to food, dropsy, ulceration of the mouth and severe dyspnoea and poison of even the celestial snakes.<sup>211</sup>

2). *Kalyi, akaghçta* - This destroys poison, cures the efforts of evil spirits, epilepsy, anaemia, homicidal poison, dyspnoea, indigestion, fever, cough, and sterility problems.<sup>212</sup>

3). *Amçtaghçta* - It is useful in the destruction of poison and restoration of life even in a dead man.<sup>213</sup>

4) *Mahisugandhi agada* - This has been described as the best one. Prepared of 50 drugs, it is capable of destroying the

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211 *SS, Kalpasthina, VI, p. 464.*

212 *Ibid, p. 465.*

213 *Ibid, p. 466.*

venom of even the celestial snakes.<sup>214</sup> If worn on the hands, the *agada* makes its bearer loveable, bestows brilliance and radiance even in the midst of enemies.

A special method described in these treatises for the administration of *agadas* is *dundubhisvançya*. Here *agadas* are smeared on drums and these are beaten to purify the atmosphere.<sup>215</sup>

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214 *Ibid.*

215 *Ibid.*

The treatment of the wound caused by poisoned weapon is also dealt with in the works.<sup>216</sup> A poisoned man is forbidden from taking heavy food, molasses and fermented gruels. Indigestion, over eating, day sleep, copulation, physical exercises, exhaustion, anger, alcoholic intake etc.<sup>217</sup> are also to be avoided.

216 *Ibid*, p. 458-459.

217 *Ibid*, p. 467.

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A person who is devoid of poison can be identified by the harmonious states of *doÅas* and *dhitus*, good appetite, normal, state of urine, tongue and skin and balanced working of mind and body.<sup>218</sup>

To avoid the situation of snake bite, Vigbha¶a advises to take an umbrella and a stick while walking. The shade and sound of these will distract the snakes, he says.<sup>219</sup>

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<sup>218</sup> *Ibid.*  
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 ´ÉMÉSUAödnùÊ´É¹ÉÆ¨ÉxÉÖ¹ªÉ¨ÉÂ\*\*

<sup>219</sup> *AH, Uttarasthina, 36, p. 822.*  
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 |ÉÖVÉRÂóMÉ¨ÉÉ&\*\*



Thus goes the details of treatment described for snake bite in Ayurvedic texts. The wide spectrum of treatments takes one aback and provides much food for thought. In contrast modern medicine proposes a single solution for the problem i.e., administration of antivenin or polyvenin, made by a complex process. When a particular venom is injected in a horse, its serum will produce antibodies to destroy the venom. These antibodies are extracted and used as medicine. This is called antivenin. Antivenin is capable of stopping the overall effects of poison, but cannot affect the symptoms caused by the venom.<sup>220</sup>

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220 *Sarpadamānam*, p. 70-81.

Antivenin cannot be applied directly to the site of bite as that would lead to hypersensitive reactions. It is applied only when serious manifestations of evenomations are visible. Coma, neurotoxicity, hypotension, shock, acute renal failure etc. are accepted as the manifestations of acute poisoning. During this stage dialysis and antibiotic therapy are accepted as supportive treatment.<sup>221</sup>

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221 *Forensic Medicine*, p. 422.

With this small range of treatment, modern medicine can not neglect the alternative solutions provided by the other, systems. *Ēyurveda* with a long history of treating and curing the cases of snake-bite has much to contribute to this field of medicine. To determine the real potential of *agadas*, scientific studies and experiments have to be carried out. By a type of assimilation a new solution for snake envenomation can be evolved in which the ideas of ancient physicians and techniques of modern science blend together.<sup>222</sup>

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<sup>222</sup> Joseph, L. Mathew, "Ophitoxaemia (Venomous Snake bite)", Infonet, [www.srmsbru.orgis.avail](http://www.srmsbru.orgis.avail). at [www.priory.com](http://www.priory.com), p. 1-19.

## CHAPTER 5

# **POISONING CAUSED BY THE BITE OF RAT, DOG ETC**

Being a social animal, man has to mingle with a number of fellow creatures, among which some create serious health problems to him. Some higher and lower animals become a menace when they are vectors of disease germs. This chapter tries to probe the accounts given in iyurvedic treatises on animal poisons.

## **5.1 Rats**

Rats and mice are included under the group 'rodents'. They have highly developed sense organs with which they can lead a very successful life. They can climb, jump, burrow and gnaw.<sup>1</sup> Pointed head, large eyes, round ears, long legs and long sharp claws characterize them.<sup>2</sup> (Fig. 5.1) The chiesell like front teeth help them to gnaw and burrow. With its aid they can pierce even metals.<sup>3</sup> They destroy food grains stored in warehouses. They are omnivorous and nocturnal in habits and have become the most serious animal threats to man-kind. Their increasing population has adversely affected the agricultural development. In spite of all the measures taken by modern world to control the population, rodents are increasing day by day and consequently rodents are identified to be the most widely spread groups of mammals.<sup>4</sup>

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1 *EB*, Vol. 18, p. 1177.

2 Guy Musser, "Rats", [www.search.eb.com/eb/article](http://www.search.eb.com/eb/article). *EB Online*, 2 Nov. 2006.

3 *The World Book Encyclopaedia*, Vol. 16, p. 141-143.

4 *Ibid.*



### 5.1.1 Classification

Based on habitat rats are classified as follows.<sup>5</sup>

- a. Mole rats (*Bandicota bengalensis*) seen in the holes of cultivational field. These are grey in colour.
- b. *Millardia meltada* is a species with brown or grey colour living in rocky areas near farms.
- c. *Golunda ellioti* is a species of rats with round neck and ears. Hairy tail is their another peculiarity. They have yellowish brown body with black patches on it. They are abundantly seen in bushes and fields. They make nests of grass and fibres.
- d. *Rattus blunfordi* is a variety of rats frequently seen in the holes on the trees. Long white hairs on the tip of the tail is their characteristic feature.

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<sup>5</sup> *Vižvavijμinakožam*, Vol. III, p.39.



e. *Rattus rattus* This is the house rat with blurred brown colour. It eats everything that is digestible.

f. *Vandellurina Oleracea* - This variety of rats is characterized by tender hairs seen all over the body. These are very small in size. They are brown in colour. They have a highly specialized tail to provide grip over the branches of trees.

Apart from eating and contaminating stored grains, rats are dreaded for the diseases they are spreading. About 40 diseases are said to be carried by them. Among which plague, food poisoning, typhus etc., are the most dreaded ones.<sup>6</sup>

### **5.1.2 Diseases caused by rat**

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<sup>6</sup> *EB Online*, 2<sup>nd</sup> Nov. 2006.

**a. Plague-** This is a contagious disease caused by the bacterium *Yersinia pestis*. Rodents, especially rats carry this causative organism and spread the disease to man.<sup>7</sup> Based on the mode of transfer, plague is classified<sup>8</sup> as (a) Bubonic plague-acquired by the bite of infested fleas with the name *Xaenopsiella* carrying the disease from dying rats. (b) Domestic plague-spread directly by the rodents living with man and (c) Pneumonic plague-Acquired from a plague-patient. Here the bacterium is spread to the atmosphere through droplets. This intensifies the severity of the menace. Hence plague is always treated as a pandemic.<sup>9</sup>

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7 *New Medical Dictionary*, Second Edition, p. 630.

8 *New Medical Dictionary*, p. 630.

9 [www.search.eb.com/eb/article](http://www.search.eb.com/eb/article). *EB Online*. Infonet, 2 Nov. 2006.

In the history of man kind, no other disease has so vigorously challenged the existence of human beings than plague. In 14<sup>th</sup> century it struck Europe to wipe out one third of its population and hence got the name *black death*. In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, it announced its presence in Asia. Bubonic plague is said to have the following symptoms- fever, chill, headache, swelling at the site of the affected lymph node (bubo) and abdominal discomfort.<sup>10</sup>

**b. Rat bite fever-** This too is caused by a bacterium with the name *Spirillum minus*.<sup>11</sup> The transmission of the disease occurs when an infested rat bites humans. Inflammation of regional lymph nodes, relapsing fever, chills and skin rash characterize the disease. Even though the disease could be cured by treatments, after 5 to 28 days the symptoms may have a sudden flare up. So, instead of suppression, systemic and long-term treatment is needed. This disease has been reported first from Japan where it is called by the name Sodoku.

### **5.1.3 Rats in Indian-Culture**

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11 *Ibid.*

In India, rats/ mice are also viewed in a religious light. They are considered as the vehicle of Gaṇeśa, the God of auspicious beginning.<sup>12</sup> Rat's ability to gnaw away the obstacles in its way is symbolically connected with the potential of the God to ward off difficulties in life. Rats are also compared with *itman* living in the hole of intellect. The mount of Gaṇeśa is called *mĀiki* or *ikhu* (Fig. 5.2). Reference to this is frequently seen in purāṇic literature like

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<sup>12</sup> [www.webonantios.commythology/](http://www.webonantios.commythology/) "Gaṇeśa". Internet, 8 Nov. 2006.

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The association with Gaṇapati has benefitted the rats much, as men are forbidden from killing them. In the Nokha province of Rijasthan, there is white-marble temple sacred to Karṣṇamīta. In this temple, rats are worshipped, hence the temple is called as temple of rats (Fig. 5.3). In Calcutta there is a park, with the name Carzan, which is meant for rats.

#### 5.1.4 Āyurvedic accounts of rats

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<sup>13</sup> *The student's Sanskrit English Dictionary*, p. 75.  
*Paṇcatantra*, l. 159.

In spite of this spiritual importance, the diseases caused by rats always threaten the Indians. Ayurvedic treatises deal with rat poison in detail. Suśruta mentions eighteen varieties of rats viz. *lilana*, *putraka*, *krāṇa*, *cikkira*, *chuchundara*, *alasa*, *kaṇṭiyadarṣana*, *kuliṅga*, *ajita*, *capala*, *kapila*, *kokila*, *aruṇa*, *mahikrāṇa*, *undura*, *mahizveta*, *ardhakupila* and *kapotibha*.<sup>14</sup> This classification seems to be based mainly on their external appearance.

#### **5.1.4.1 General treatment**

The symptoms produced by each rat species and their treatment are mentioned in detail. These can be described in a table.

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<sup>14</sup> SS, Kalpasthina, VII, p. 469

<sup>15</sup> *Ibid*, 170.

**Table 9: Symptoms produced by the  
poison of different rat species and the  
treatment**



	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
1	<i>lilana</i>	Excessive salivation, hiccup and vomiting	A paste of <i>ta, ulçyaka</i> (Prickly amaranth, <i>Amaranthus spinosus</i> Linn. <sup>16</sup> ) added with honey should be got licked.
2	<i>putraka</i>	Debility of the body, yellowish white colouration, and tumors on the body	A paste of <i>çirçÀa</i> (Siris tree <i>Albizia lebbeck</i> Linn. <sup>17</sup> ) and <i>ingudi</i> (climbing staff plant. <i>Celastus paniculatus</i> Willd. <sup>18</sup> ) added with honey
3	<i>kçÀ, a</i>	Swelling and vomiting of blood on cloudy days	A decoction of the fruit of <i>çirçÀa kuÀtha</i> <sup>19</sup> ( <i>Costus, Saussurea lappa</i> C.B. Clarke) and ash of <i>kimçuka</i>
4	<i>Hamsira</i>	Loss of appetite, more of yawning and horripilations	Induce vomiting and give a decoction made of the drugs belonging to the <i>iragvadhidiga, a</i>

<sup>16</sup> *IMP*, Vol. I, p. 121 and also, Vol. II, p. 39 (Fox grape, *Gayratia carnosu Gagnes*).

<sup>17</sup> *Ibid*, Vol. I, p. 81.

<sup>18</sup> *Ibid*, Vol. II, p. 51.

<sup>19</sup> *Ibid*, Vol. V, p. 80.

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
5	<i>Cikkira</i>	Headache, swelling, hiccup and vomiting	The drugs like <i>jilinç</i> (Horwort, <i>Ceratophyllum demersum</i> Linn. <sup>20</sup> ) <i>madana</i> (Emetic nut tree, <i>Catanaregum spinosa tirvengadum</i> <sup>21</sup> ) and <i>a´ko᳚a</i> (saze leaned alangium, <i>Alangium salvifolium</i> Wang. <sup>22</sup> ) should be applied to induce vomiting which has to be followed by the application of milk boiled with <i>yavanila</i> (Barley, <i>Hordenum vulgare</i> Linn. <sup>23</sup> ) <i>᳚Àabhaka</i> (RÀabak, <i>Malaxis muscifera kantze</i> . <sup>24</sup> ) and two species of <i>b᳚hati</i> (Poison berry, <i>Solanum anguivi</i> Linn.)

20 *Ibid*, Vol. II, p. 56.

21 *Ibid*, Vol. II, p. 33.

22 *Ibid*, Vol. I, p. 77.

23 *Ibid*, Vol. III, p. 175.

24 *Ibid*, Vol. III, p. 371.

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
6	<i>Chuchundara</i>	Thirst, vomiting, fever, debility, stiffness of the neck, swelling of the back, loss of sense of smell and gastro-enteritis ( <i>viÀfcika</i> )	A decoction of <i>cavya</i> (Wild pepper, <i>Piper brachystachyum</i> , Wall. <sup>25</sup> ) <i>harçtakç</i> (Chebulic myrobalan, <i>Terminalia chebula</i> Retz. <sup>26</sup> ) <i>çu,ñhç</i> (Dry ginger, <i>Zingiber officinale</i> Rosc. <sup>27</sup> ) <i>vi·a´ga</i> ( <i>Embelia ribes</i> Burm. <sup>28</sup> ) <i>pippali</i> (Indian long pepper, <i>Piper longum</i> Linn. <sup>29</sup> ) and the seed of <i>a´koñha</i> (Sage leaved alangium, <i>Alangium salvifolium</i> Wang. <sup>30</sup> ) added with honey should be given internally.
7	<i>Alasa</i>	Loss of movement of the neck, upward movement of gas, pain at the site of bite and fever	<i>Mahigada</i> along with ghee and honey should be applied internally.

25 *Ibid*, Vol. IV, p. 284.

26 *Ibid*, Vol. V, p. 263.

27 *Ibid*, Vol. V, p. 435.

28 *Ibid*, Vol. II, p. 268.

29 *Ibid*, Vol. IV, p. 290.

30 *Ibid*, Vol. I, p. 77.

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
8	<i>KaÀiyad anta</i>	More sleep, dryness of the heart and leanness (emaciation)	The decoction of the bark, fruits and milk of <i>çirçÀa</i> ( <i>Albizia lebeck</i> Linn. <sup>31</sup> ) along with <i>kÀaudra</i> (Poison berry, <i>Solanum anguivi</i> Linn. <sup>32</sup> ) should be given to drink.
9	<i>Kuli´ga</i>	Pain, swelling and patches at the site of bite	A decoction of the two varieties of <i>sahi</i> (?) <i>mudgapar,i</i> ( <i>Vigna pilosobaker</i> <sup>33</sup> ), <i>misapar,i</i> (Wild black gram, <i>Vigna radiata</i> <sup>34</sup> ) and <i>sinduvira</i> (Three leaved chaste tree, <i>Vitex biofolia</i> Linn. <sup>35</sup> ) mixed in honey should be applied internally.
10	<i>Ajita</i>	Black colouration of the body, vomiting, fainting, and catching pain in the heart	A paste of <i>pilindç</i> (?) and <i>majiÀ¶hi</i> (Indian madder, <i>Rubia cordifolia</i> Linn. <sup>36</sup> ) macerated in the milky sap of <i>snuhi</i> added with honey should be given.

31 *Ibid*, Vol. I, . 81.

32 *Ibid*, Vol. V, p. 154.

33 *Ibid*, Vol. V, p. 370

34 *Ibid*, Vol. V, p. 378.

35 *Ibid*, Vol. V, p. 392.

36 *Ibid*, Vol. V, p. 17.

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
1 1	<i>Capala</i>	Vomiting, fainting and thirst	<i>Triphala</i> , <i>bhadraki</i> Àtha ( <i>Aerva lanata</i> Linn. <sup>37</sup> ) and <i>jañla</i> (Indian nard, Musk root, <i>Nardo stachus grandiflora</i> DC. <sup>38</sup> ) powdered and mixed with honey to be licked.
1 2	<i>Kapila</i>	Ulcers with suppuration, fever, development of tumours accompanied with thirst	<i>áveta</i> (sissoo, <i>Dalbergia sisso</i> Roxb. <sup>39</sup> ) and <i>iveipunarnavi</i> ( <i>Boerhaavia verticillata</i> <sup>40</sup> ) mixed with honey are to be applied internally.
1 3	<i>Kokila</i>	Tumour, intense fever and profound thirst	Drink ghee prepared with decoction and paste of <i>var</i> Àibhu(?) and <i>nalin</i> ç(?)

37 *Ibid*, Vol. I, p. 67.

38 *Ibid*, Vol. IV, p. 107.

39 *Ibid*, Vol. II, p. 303.

40 *Ibid*, Vol. I, p. 285.

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
1 4	<i>Ēru, a</i>	Aggravation of <i>vita</i> (air) and related diseases. Development of tumours, discoloured patches with small eruptions and oedema	Medicated ghee prepared with one <i>prastha</i> (640ml) of curd, milk and ghee along with <i>karajja</i> (Indian beech, <i>Pongamia pinnata</i> Linn. <sup>41</sup> ), <i>iragvadha</i> (Indian laburnum, <i>Cassia fistula</i> Linn. <sup>42</sup> ) <i>vyoÀa</i> (?) <i>bæhat</i> ¢ (Poison berry, <i>Solanum anguivi</i> Linn. <sup>43</sup> ), <i>am¿umati</i> (?) and <i>sthiri</i> (?) are boiled in water and decoction is reduced to one fourth. <i>trivæt</i> (Indian jalap. <i>Operculina turpethum</i> Linn. <sup>44</sup> ) <i>goji</i> (prickly leaved elephant's foot, <i>Elephantopas scaber</i> Linn. <sup>45</sup> ) <i>amæta</i> ( <i>Gulanchia tinospora</i> , <i>Tinospora cordifolia</i> <sup>46</sup> ), <i>vakra</i> (?), <i>sarpagandhi</i> ( <i>Rauvolfia</i> root, <i>Rauvolfia serpentina</i> Linn. <sup>47</sup> ) <i>mættiki</i> (?) barks of <i>kapittha</i> (Elephant apple; <i>Limonia acidissima</i> Linn. <sup>48</sup> ) and <i>di·ima</i> (castor, <i>Ricinus communis</i> Linn. <sup>49</sup> ) are made to a nice paste and taken in one fourth

	<b>Rat species</b>	<b>Symptoms Produced</b>	<b>Prescribed Treatment</b>
1 5	<i>Mahikāśa</i>	Aggravation of <i>pitta</i> Development of tumours, discoloured patches with small eruptions and oedema	
1 6	<i>Mahikapila</i>	Aggravation of blood Development of tumours, discoloured patches with small eruptions and oedema	
1 7	<i>śveta</i>	Aggravation of <i>kapha</i> Development of tumours, discoloured patches with small eruptions and oedema	
1 8	<i>Kapota</i>	Aggravation of bile, phlegm air and blood. Development of tumours, discoloured patches with small eruptions and swelling	

41 *Ibid*, Vol. IV, p. 339.

42 *Ibid*, Vol. II, p. 11.

43 *Ibid*, Vol. V, p. 151.

44 *Ibid*, Vol. IV, p. 172.

45 *Ibid*, Vol. IV, p. 172.

46 *Ibid*, Vol. V, p. 283.

47 *Ibid*, Vol. IV, p. 409.

48 *Ibid*, Vol. III, p. 327.

49 *Ibid*, Vol. IV, p. 396.

## **5.1.4.2 Systematic Treatment**



Treatment of rat bite also follows the steps accepted in snake bite treatment. Venipuncture and purifying therapies should be done. The site of bite has to be burnt or incised to free the impure blood. After this, the spot has to be smeared with paste of *çirçÀa* (Siris tree, *Albizia lebeck* Linn.<sup>50</sup>) *rajanç* (?) *kuÀ¶ha* (Castus, *Saussurea lappa* C. B. Clarke<sup>51</sup>) *kumkuma* (Saffron, *Crocus safirus* Linn.<sup>52</sup>) and *amæta* (Gulanha *tinospora*, *Tinospora cordifolia*<sup>53</sup>). The plants used as emetics are *jilini* (?) and *a´ko¶ha* (sage leaved alangium, *Alangium salvifolium* Wang.<sup>54</sup>) Another recipe prescribed for inducing vomiting is accepted in the case of all kinds of rat poisons. It is prepared by macerating the roots of *çuka* (?) and *koçavati* (?), fruit of *madana* (Emetic nut

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50 *Ibid*, Vol. 1, p. 81.

51 *Ibid*, Vol. V, p. 80.

52 *Ibid*, Vol. II, p. 212.

53 *Ibid*, Vol. V, p. 283.

54 *Ibid*, Vol. I, p. 77.

tree, *Catanaregum spinosa tirvengadum*<sup>55</sup>) and *devadili* (*Luffa echinata* Roxb.<sup>56</sup>) all mixed with curd. *Madana, vaci* (Sviect flag *Acorus calamus* Linn.<sup>57</sup>), *devatili* and *kuÀŕha* macerated in the urine of cow and prepared with curd is capable of destroying all types of poison. Paste of *trivæt* (Indian Jalap, *Operculina turpetham* Linn.<sup>58</sup>) *danti* (*Baliospermum montanum*, Muell-Arg.<sup>59</sup>) and *triphala* is the purgative adviced in rat poisoning. To purgate head, gum and resin of *çirçÀa* is prescribed. As collyrium, nicely powdered *trikaŕu* mixed in cowdung is used. For internal application, juice of *kapitha* and cowdung mixed with honey is prescribed. Otherwise a powder of *rasiµjana* (?) *haridri* (Turmeric, *Curecuma longa* Linn.<sup>60</sup>) *Indrayava* (kurchi seed<sup>61</sup>) and

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55 *Ibid*, Vol. II, p. 33.  
56 *Ibid*, Vol. III, p. 353.  
57 *Ibid*, Vol. I, p. 51.  
58 *Ibid*, Vol. IV, p. 172.  
59 *Ibid*, Vol. I, p. 240.  
60 *Ibid*, Vol. II, p. 259.  
61 *Ibid*, Vol. 3, p. 159.

*katvi* (Bitter bottle goard, *Lagenaria siceraria* (Mol.<sup>62</sup>) standley). or a paste of *ativiAa* (Atis root, *Acontium heterophyllum* Wall. ex Royle.<sup>63</sup>) along with honey is advised to be taken in the morning. Along with this, ghee mixed and boiled with roots of *ta, ulçyaka* (prickly amaranth, *Amaranthus spinosus* Linn.<sup>64</sup>) or with root of *ispho᳚a* (?) or root, bark, flower leaves and fruit of *kapittha* (Elephant apple, *Limonia acidissima* Linn.<sup>65</sup>) are also prescribed to be consumed.<sup>66</sup>

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62 *Ibid*, Vol. III, p. 292.

63 *Ibid*, Vol. I, p. 42.

64 *Ibid*, Vol. I, p. 121.

65 *Ibid*, Vol. III, p. 327.

66 *SS*, Kaipasthina, VII, p. 473-474.

Vigbhaṅga describes the symptoms produced by rat-poison in general. They are swelling, foul smell, white patches, intoxication, loss of appetite, cold, fever, tiredness, exhaustion, tremor, breaking of joints, horripilation, weariness of muscles, inflammation for a long period.<sup>67</sup> He also enumerates the symptoms of incurable state.<sup>68</sup> They are fainting, swelling of the body, discolouration, dampness, deafness, fever, heaviness of head, excessive salivation and vomiting blood.

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<sup>67</sup> AH, Uttarasthina, 38, p. 832.833.  
 OÉxIÉªÉ& ·ÉªÉIÉÖ& EòÉälÉÉä ¨Éhb÷÷±ÉÉÊxÉ  
 §É¨ÉÉä~ûÊSÉ  
 ¶ÉÒiÉV´É®úÉä□ÊiÉ~ûEÂð °ÉÉnùÉä ´Éä{ÉIÉÖ& {É  
 ´ÉÇ¡ÉänùxÉ¨ÉÂ\*\*  
 ®úÉä¨É½p¹ÉÇ& °xÉÖÊiÉ¨ÉÚÇSUôÉÇô  
 nùÒPÉÇEðÉ±ÉÉxÉÖªÉxvÉxÉ¨ÉÂ

<sup>68</sup> Ibid.  
 ¨ÉÚSUôÉÇRÂóMÉ¶ÉÉäið´Éè´ÉhªÉÇ-  
 C±Éänù¶ÉªnùÉ ÉÖÊiÉV´É®úÉ&  
 Ê¶É®úÉäMÉÖ~ûi´ÉÆ  
 ±ÉÉ±ÉÉ°ÉPCUôInù¶SÉÉ°ÉÉvªÉ±ÉIÉ¨ÉÂ\*

Suśruta scientifically investigates into the body constituent which is poisonous in rats and states that it is the śukra<sup>69</sup> which makes them poisonous (शुक्रं गच्छति रतेषु रतेषु च = ह्येते रतेषु रतेषु च<sup>70</sup>). If we take śukra as semen it is not right, as the diseases are produced both by the male and female rates. But if we take śukra as the reproductive element present in both the male and female rats then the sentence is right. However it is surprising to know that Suśruta was aware of the fact that rats are not poisonous by nature but are made poisonous by the bacterium residing in their internal constitution. Suśruta also describes the mode of spreading- if the body part comes in contact with the semen in any way, blood will be vitiated.<sup>71</sup>

<sup>69</sup> *New Medicinal Dictionary*, p. 743. Semen - Material of Male ejaculation containing secretions from seminal vesicle and prostate.

<sup>70</sup> *SS, Kalpasthina*, p. 469.

<sup>71</sup> *Ibid.*

शुक्रं गच्छति रतेषु रतेषु च = ह्येते रतेषु रतेषु च  
 शुक्रं गच्छति रतेषु रतेषु च = ह्येते रतेषु रतेषु च  
 शुक्रं गच्छति रतेषु रतेषु च = ह्येते रतेषु रतेषु च

The symptoms produced by vitiated blood are described as glandular swellings, round elevated patches having small eruptions, discoloured patches, multiple eruptions, erysipelas, minor leprosy severe joint pain, debility on the body parts, fever, weakness, loss of taste, dyspnoea, vomiting and horripilations.<sup>72</sup> If the poison is not expelled out, it will get aggravated during rainy season. Then the treatment for *dĀçviĀa* has to be applied.<sup>73</sup> The

ÉnÖù<sup>1a</sup>ÉÊiÉ\*

<sup>72</sup> *Ibid.*

VÉÉ<sup>a</sup>ÉxiÉä OÉxiÉ<sup>a</sup>É& ¶ÉÉäiòÉ& EòìhÉÉèÉ  
 “Éhb÷±ÉÉÊxÉ SÉ  
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 ÊÈðÊ]ö|ÉÉÊxÉ SÉ\*  
 {É´ÉÇ|ÉänùÉä °üVÉ<sup>o</sup>iÉÒµÉÉ “ÉÚSUôÉÇRĀóMÉ<sup>o</sup>ÉnùxÉÆ  
 V´É®ú&\*  
 nùÉèαÉÇ±<sup>a</sup>É“É˘ûÊSÉ& ¶ÉĀ´ÉÉ<sup>o</sup>ÉÉä  
 ´É“ÉiÉÖ±ÉÉæ“É½pp<sup>1</sup>ÉÇhÉ“ÉĀ\*\*  
 nù]ö°ü{ÉÆ °É“ÉÉ<sup>o</sup>ÉÉäHò“ÉĀ\*

<sup>73</sup> SS, Kalpasthina, P. 474.

“ÉÚÊ<sup>1</sup>ÉEòÉhÉÉÆ Ê´É<sup>1</sup>ÉÆ |ÉÉ<sup>a</sup>É& EÖò{<sup>a</sup>Éi<sup>a</sup>É§Éä<sup>1</sup>  
 ´ÉÊxÉ¾piÉ“ÉĀĀ  
 iÉjÉÉ{<sup>a</sup>Éä<sup>1</sup>É Ê´ÉÊvÉ& EòÉ<sup>a</sup>ÉÉæ <sup>a</sup>É¶SÉ nÚù<sup>1</sup>ÉÒÊ  
 ´É<sup>1</sup>ÉÉ{É½p&\*\*  
 Î<sup>o</sup>iÉ®úÉhÉÉÆ °üVÉiÉÉÆ ´ÉÉÊ{É µÉhÉÉxÉÉÆ  
 EòÉìhÉÉèÉÆ Ê|É<sup>1</sup>ÉÉĀò  
 {ÉÉ]öÊ<sup>a</sup>Éi´ÉÉ <sup>a</sup>ÉiÉÉnùÉä<sup>1</sup>ÉÆ µÉhÉ´ÉSSÉÉÊ{É  
 ¶ÉÉävÉ<sup>a</sup>ÉäiÉĀ\*\*

symptoms described and the account of timely aggravation resembles the case of rat bite fever. We may assume that epidermic plague was unknown to Suśruta, but other minor diseases produced by rats are well studied and cured by him. *MuĀikaviĀiri agada* is a special recipe prescribed for the treatment of poisoning by rats.<sup>74</sup>

## 5.2 Dog, Fox etc.

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<sup>74</sup> *Ibid*, VI, p. 462.  
 EPò¹`Æö ÊjÉEè]ÖðEÆè nùÉ´ÉÔ ¨ÉvÉÖEÆè ±É  
 ´ÉhÉuùªÉ¨É  
 ¨ÉÉ±ÉiÉÒ xÉÉMÉ{ÉÖ¹{ÉÆ SÉ °É´ÉÉÇÊhÉ  
 ¨ÉvÉÖ®úÉÊhÉ SÉ\*  
 EòÊ{ÉiÉ®ú°ÉÊ{É¹]ðÉäªÉÆ  
 ¶ÉÉÇò®úÉiÉÉèpùù°ÉÆªÉÖiÉ&  
 Ê´É¹ÉÆ ½pxiªÉMÉnù& °É´ÉÈ ¨ÉÚÊ¹ÉEðÉhÉÉÆ Ê  
 ´É¶Éä¹ÉiÉ&\*\*

Dogs belong to the group canidal and are known for their loyalty, highly developed sense organs and friendship (Fig. 5.4).<sup>75</sup> But unlike the Western World, Indian tradition never admired the companionship of a dog, with single exception cited in the *Mahiprasthinika parva* where a dog accompanies YuthiÀ¶hira unto the end of his life.<sup>76</sup> Lord Kilabhairava (the ferocious state of lord áiva) has dog as this vehicle.<sup>77</sup> Yama; the God of death owes somekind of control over the dogs. From these accounts, it may be assumed that dogs are not connected with auspicious side of life. In later works too they are pictured as ferocious animals. *Mattavilisa prahasana* is an example for this.<sup>78</sup>

75 [www.search.eb.com/eb/article](http://www.search.eb.com/eb/article). EB Online, 2 Nov. 2006.

76 *Mahibhirata*, Mahiprasthanika parva, Chapter-III, p. 12.

+ªÉÆ ·ÉÉÆ ¡ÉÚiÉ¡É¹É¶É ¡ÉHðÉå ¨ÉÉÆ ÊxÉiªÉ¨Éä¹É ½p  
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 ¨ÉÊiÉ&\*\*

77 [www.webonutics.com/mythology/ga\\_eia](http://www.webonutics.com/mythology/ga_eia)

78 *Mattavilisa prahasana*, p. 55  
 B¹É B¹É nÖù¹]õEÖðCEð®ú&



The reason for such a consideration seems to be the fear of the disease which is transferred through dogs. Modern science names the disease Rabies or hydrophobia.

### **5.2.1 Hydrophobia**

This is a viral disease affecting the central nervous system, and is spread among domestic dogs and wild carnivorous animals. The virus responsible for the disease is rhabdovirus. It resides in the salivary glands of rabid animal, and when the animal bites some one, through its saliva the virus is transferred (Fig. 5.5).<sup>79</sup> After infection the virus may undergo 10 days to 8 months of incubation period. After inflammation, the disease vigorously spreads through the body of a victim. During the first stage, the rabid animal will be restless and friendly, but it will bite at the slightest provocation. Rabies in humans resembles that in animals. As the disease enters salivary glands, there would be frequent foaming at the mouth. Depression, headache, nausea, seizures and muscle stiffness are the other symptoms of the disease. As the muscles

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<sup>79</sup> [www.search.eb.com/eb/article](http://www.search.eb.com/eb/article). *EB Online*, Infonet, 2 Nov. 2006.

of throat are paralysed, the person can not swallow or drink and this leads to Hydrophobia (i.e. the dread of water) when paralysis spreads to other parts of the body the patient may fall into a coma and receive a slow death due to cardiac and respiratory failure. Mental state of an infected is very deplorable which is indicated by the name of the disease. Rabies = Madness.<sup>80</sup>

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80 *Op.cit.*

There is no remedy for rabies. But if remedial measures are taken before the manifestation of symptoms i.e., the incubation period it can be cured. The vaccine developed by Louis Pasteur and Emile Roux against Rabies in the year 1885 was the first attempt to treat Rabies. The vaccines adopted by Modern medicine are Human Diploid Cell Vaccine (HDCV) Chick Embryo Cell Culture and Rabies Vaccine Absorbed (RVA)<sup>81</sup>

### **5.2.2 Āyurvedic accounts**

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81 *New Medical Dictionary*, p. 695.

Āyurvedic system was aware of almost all details of rabies. The animals capable of spreading rabies are also enumerated.<sup>82</sup> They are *iva* (dog) *ivaḡgila* (Jackal), *tarakÀu* (hyena) *ḡkÀa* (bear), *vyighra* (tiger) etc (Fig. 5.6). The air (*vita*) in their body gets aggravated and combines with vitiated

<sup>82</sup> SS, Kalpasthina, VII, p. 474.

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 ¶±Éäª¹´É|ÉnÖù¹]õÉä´´ÉÖ¹hÉÉÊiÉªÉÆYÉÉÆªÉÆYÉÉ  
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 ªÉÖkÉiÉÉ VÉÉªÉiÉä nÆù¶Éä Eþò¹hÉÉÆ iÉÉÊiÉ»É  
 ´ÉiªÉªÉPEÂð\*\*  
 ÊnùMvÉÉ´ÉrùªªÉ Ê±ÉRÂóMÉäxÉ |  
 ÉÉªÉ¶É¶SÉÉä{É±ÉÊiÉiÉ&\*  
 ªÉäxÉ SÉÉÊ{É |É´Éäqù¹]õªªÉ SÉä¹]õÉÆ´ùiÉÆ  
 xÉ®ú&\*  
 ªÉ½Öþ¶É& |ÉÊiÉEÖð´ÉÉÇhÉ& ÊGðªÉÉ½pÒxÉÉä Ê  
 ´ÉxÉ¶ªÉÊiÉ\*\*  
 nÆù¹]ÅõhÉÉªÉäxÉ nù¹]õ¶SÉ iÉpÚù{ÉÆªÉªiÉÖ  
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 ´ÉÊxÉlnù¶ÉäiÉÂ\*\*  
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 ´ÉÉ VÉ±É´ÉÂ\*  
 VÉ±ÉjÉÉªÉÆ iÉÖ Ê´ÉtÉkÉÆ Ê®ú¹]Æõ iÉnùÊ{É  
 EòÒliÉiÉ´ÉÂ\*\*

phlegm (*kapha*) and affects the nervous system. Such a rabid dog can be identified by restlessness, weakness of tail, jaw and shoulder, excessive salivation, deafness, blindness and provocativeness. When bitten by such a dog, humans develop loss of sensation, black colouration and heavy bleeding at the site of bite and the mannerism of the bitten animal. The victim dies of the cessation of all his bodily activities. If the victim sees the image of the animal reflected either in water or in mirror, it has to be considered as indicative of his death. Fear of water is also a fatal sign.<sup>83</sup>

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83 *Ibid.*

These symptoms correspond with that identified by Modern Medicine. The viral infection is considered as the vitiation of *vita* and phlegm. Hallucinations experienced by the patient along with the mental outbursts are clearly recorded in Ayurvedic parameters. The cases which cannot be cured are also stated. If the patient experiences fear of water, without being bitten, after awakening from sleep or remaining in healthy condition the disease is said to be an incurable one.<sup>84</sup>

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84 SS, Kalpasthina, VII, p. 475.

The treatment includes venipuncture and burning the site with hot ghee and this will be followed by medication. The procedure is given as follows. After giving old ghee to drink purgatives mixed with *dhattāra* (?) sap of *arka* (Gigantic swallow wort, *Calotropus gigantea* R. Br.)<sup>85</sup>, *śveta* (Sissoo, *Dalbergia sissoo* Roxb.)<sup>86</sup> and *punarnava* (Hogweed, *Boerhaavia diffusa* Linn.)<sup>87</sup>. The *pilala* (oil cake) gingili oil, the milk of Gigantic swallow work (*rāpika* or *arka*) along with jaggery destroy the poison of dog just like wind sways away the cluster of clouds.<sup>88</sup>

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85 *IMP*, Vol. I, p. 341.

86 *Ibid.*, Vol. II, p. 304.

87 *Ibid.*, Vol. II, p. 281.

88 *SS*, Kalpasthina, VII, p. 475.



A special meal is said to be prepared for the patient. It is a cake made of 10gms of the root of *īrapu'gha* (wild Indigo. *Tephrosia purpurea* Linn. pers)<sup>89</sup> and 5gms of the root of *dhattura* (?) macerated along with rice (*ta, ·ula*) using rice wash. This ball of paste, when enveloped in the leaves of *dhattura* (?) and made into a cake, it becomes a medicated one suitable for the victim.<sup>90</sup>

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89 *IMP*, Vol. V, p. 249.

90 *SS*, Kalpasthina, VII, p. 476.

Even after the intake of this cake, if the patient still experiences the symptoms of poisoning he has to be confined in a cold room, where water is not be available. When the symptoms vanish, he should be given a bath followed by warm meals containing either *ίili* rice or *ÀaÀtçka* rice.<sup>91</sup> This has to be repeated for three to five days. If the symptoms persist the treatment has to be retained for some more days but in lesser intensity.

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<sup>91</sup> *IMP*, Vol. IV, p. 198.

*ίili* and *ναçhi* are the varieties of paddy (*Oryza sativa* Linn.) The classification is a based mainly on yield and duration and reflecting the difference they are called *haimanta* and *ÀiÀηika* respectively.

The person, in whom poison finds a quick pace, will not survive. In such cases, before the outburst of symptoms, the disease has to be aggravated. For this, the patient has to be taken to the banks of a river or to a square and given bath with cold water from pots containing precious gems and medicinal plants. All the process should be accompanied with the chanting of hymns. The God Sirameya has to be offered, with the food containing *pinyika* (Oil cake)<sup>92</sup>, meat, cured, cooked and raw meat. A prayer to the God for freeing him from the hold of poison is also to be made which runs as

+ ±ÉÉÈÉÊvÉ{ÉiÉä ¢ÉiÉ-  
 °ÉÉ®ú"Éä¢ÉMÉhÉÉÊvÉ{É  
 +É±ÉÉÈVÉÖ<sup>1</sup>]ö"ÉäiÉx"Éä ÊxÉì´É<sup>1</sup>ÉÆ EÖð-û  
 "ÉÉÊSÉ®úÉiÉÂ\*

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92 *Ibid.*, Vol. 5, p. 113.

Even though the poison is removed, emetics and purgatives have to be applied, otherwise it leads to timely aggravation of the healed wound.

The wounds made by the nails or teeth of these animals should be squeezed and poured with warm oil. Aggravation of *vita* (air) is the expected result of these rashes.

In the case of *ilarkavi* too, the treatment prescribed by the system of *Āyurveda* includes both the therapeutical and psychological aspects. Eventhough pasturisation has provided a permanent and satisfactory solution for the problem, the revival of a patient suffering from the last stage of rabies still perplexes modern medicine. Hence the drugs prescribed by iyurvedic system have to be studied to determine their potentials.

**Fig. 5.1: Rat**



**Fig. 5.2:**



**Fig. 5.3: Temple**





**Fig. 5.4: Dog**



**Fig. 5.5: Rabid dog**





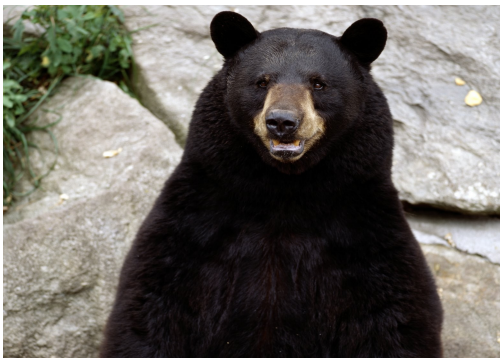
**Fig. 5.6: Animals spreading Rabies**



**1. Jackal**



**2. Hyena**



### **3. Bear**

### **4. Tiger**

## CHAPTER 6

# **DELIBERATE OR CRIMINAL POISONING**

Since ancient times, poison has been considered as the best means of ending life stealthily. In such a case, detection of the cause of death was very difficult. It was abundantly used for both suicidal and homicidal purposes. Hence, John Fletcher, the Jacobean dramatist described poison as ‘coward's weapon’.<sup>1</sup> No other form of death has been celebrated by the literacy world as death by poison. Shakespeare in his *Hamlet, The Prince of Denmark* describes the death caused by poisoning.<sup>2</sup> 'Poisoned cup' and 'envenomed weapon' play a decisive role in the play.

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1 *A Brief History of Poisoning*, Avail at [www.bbc.co.uk](http://www.bbc.co.uk).  
*Internet*, 2<sup>nd</sup> October, 2007.

2 Shakespeare, *Complete works of Shakespeare*, 1980, p. 1037.

Act I Scene - 5

Ghost: Upon my secure hour thy uncle stole,  
Within Juice of cursed hebona in a vial  
And in the porches of my ears did pour  
The leprous distilment, whose effect  
Holds such an enmity with blood of man  
That swift as quick silver it courses through  
The natural gates and alleys of the body,  
And with a sudden vigour it doth posset  
And curd, like eager droppings into milk  
The thin and wholesome blood, so did it mine...  
And a most instant tatter barked about crust  
Most lazar like, with vile and loathsome  
All my smooth body, ...  
Thus I sleeping...



Sanskrit literature also provides ample instances of poisoning. In the Ēdiparva of the *Mahibhirata*, there is an episode, describing Duryodhana, poisoning Bhçmasena with *Kilakᅇᅇa* poison and throwing the latter to the deep waters of river Ganges; where the bites of serpents work like antidotes and revive him.<sup>3</sup>

<sup>3</sup> *Mahibhirata*, Ēdiparva, Vol. 1, Chapter 138, p. 243.  
 iÉiÉÉä nÖùªÉÉævÉxÉ& {ÉÉ{ÉºiÉnÂù|ÉiªÉä  
 EòÉ±ÉÉÚò]õEò"ÉÂ  
 Ê´É¹ÉÆ |ÉiÉä{ÉªÉÉ"ÉÉºÉ |ÉÒ"ÉºÉäxÉÊVÉPÉÉÆºÉªÉÉ\*

.....  
 iÉiÉ& ºÉ"ÉäiªÉ ºÉ½ÖpÊ|ÉºiÉnùÉ xÉÉMÉè"ÉÇ½pÉÊ  
 ´É¹Éè&  
 +nùᅇªÉiÉ |ÉᅇᅇÉÆ |ÉÒ"ÉÉä "É½pÉnÆù¹]Àèõöì´É¹ÉÉä±  
 ºÉhÉè&\*  
 iÉiÉÉäºªÉ nùᅇªÉ"ÉÉxÉºªÉ iÉÊuù¹ÉÆ EòÉ±ÉÉÚò]õEò"ÉÂ  
 ½piÉÆ ºÉ{ÉÇÊ´É¹ÉähÉè´É ºiÉÉ´É®Æú  
 VÉRÂóMÉ"ÉäxÉ iÉÖ\*\*

In the first act of the play *MudririkÅasa*, there is a reference to king Parvateçvara being killed by a *viÅakanyi*<sup>4</sup> (poison damsel). According to tradition, these are trained ladies whose bodies are saturated with gradual doses of poison and they can impart poison by a simple bite. But there is no scientific basis for the concept.<sup>5</sup> It has been scientifically proven by the Haffkin Institute, Bombay, that gradual intake of small quantities of poison, may enhance the production of antibodies within the body and make the person resistant to poison. Being a foreign and hostile substance, poison always remains harmful to human body. Under no circumstances can it become or act like a body fluid or enzyme. Hence a poisoned person cannot poison some one else. The only thing

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<sup>4</sup> *MudririkÅasa* Act-I, p. 28.

Ê´É¹ÉÉòxªÉªÉÉ ®úÉÍÉºÉäxÉ  
 +º´´ÉÉÉð´´ÉªÉxiÉÉä{ÉÉðÉ®úÖ PÉÉÊiÉiÉ& iÉ{Éº´ÉÒ {É  
 ´ÉÇiÉä·É®ú&\*

<sup>5</sup> P.J. Deoras, *Sl*, p.

possible is that we may extract the antibodies from his body and revive someone. This theory is ironically proved by the story of Mithradates, the king of Pontos (Now Turkey).<sup>6</sup> He used to dose himself with various poisons, so as to immunise himself against poisoning. But during the Roman invasion, this practice ironically backfired him. Then his attempts to commit suicide failed and at last he was forced to order his soldier to stab him to death.

In a *Brief History of Poisoning*, the idea of poison damsel is explained thus.<sup>7</sup> "They are used to assassinate monarchs, cleverly exploiting the human weakness for sex. They flirted their way into the trust of their victim only to mix poison in his food or drink."

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<sup>6</sup> *Poisoning in History*, avail.at.www.portfolio.mvm.ed.ac.uk/student webs/session 2 group. internet. avail at www.bbc.co.uk/dna/h2g2. internet.

<sup>7</sup> *Ibid.*



Poison has always been a sinister weapon in the hands of state-craft. History presents a number of instances where feud, racial conflicts and over ambitions end in poisoning. Poison has also been used for implementing capital punishment. Greeks called it as "State poison" and used it to execute political enemies.<sup>8</sup> Socrates, the great philosopher was a victim of this practice.<sup>9</sup>

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8        *Ibid.*

9        *Ibid.*

In India, administration of poison has been treated as a part of jurisprudence.<sup>10</sup> To determine the innocence of an accused, poison was administered. It has been applied more as a ritual than an ordeal. Poison obtained from *vatsanibha*, growing in the cold hilly regions is to be mixed with ghee and administered in the morning.<sup>11</sup> The quantity of ghee should be 30 times that of poison.<sup>12</sup> Prajipati has quoted the method of administration thus the person who is going to be poisoned, has to be kept on a fast. The giver should worship lord áiva and face the northern or eastern

<sup>10</sup> *Yijñavalkyaśmṛti*, Vyavahiridhyiṃyā, Divyaprakaraṃa.  
 iÉÖ±ÉMxªÉÉ{ÉÉä Ê´É¹ÉÆ EòÉä¶ÉÉä Ênù´ªÉÉxÉÖ½þ Ê´É¶ÉÖrùªÉä\*

´É½þÉÊ|ÉªÉÉäMÉÉä¹´ÉäiÉÉÊxÉ  
 ¶ÉÖ¹ÉÇEòªiÉäÊ|ÉªÉÉäHòÊ®ú\*\*

<sup>11</sup> *Srçsarasvativilisa*, Vyavahirakiṃa, p. 204.  
 |ÉVÉÉ{ÉÊiÉ&´ÉÊRÂóMÉhÉÉä´ÉiªÉxÉÉ|ÉªªÉ½èþ´ÉªªÉ  
 SÉÊ´É¹ÉªªÉ SÉ\*

½þÉ®úÒiÉ&{ÉÚ´ÉÉÇ½ÂþpxÉä ¶ÉÖiÉ±Éä näù¶Éä Ê´É¹ÉÆ näùªÉÆ PÉþiÉ{±ÉÖiÉ´ÉÄ\*

<sup>12</sup> *Ibid.*  
 {ÉÚ´ÉÉÇ½ÂþpxÉä ¶ÉÖiÉ±Éä näù¶Éä Ê´É¹ÉÆ näùªÉÆ  
 Ê½þ näùÊ½þpxÉÉ´ÉÄ\*

PÉþiÉäxÉªÉÉäÊVÉiÉÆ ¶±ÉiÉÂhÉÆ PÉþiÉÆ  
 ÊjÉ¶ÉnÂùMÉÖhÉÉÍx´ÉiÉ´ÉÄ\*

direction. And in the presence of Brihmims and other Gods, the accused facing the southern direction has to be provided with the poison.<sup>13</sup> During the process particular *mantras* have to be chanted, both by the accused and by the administrator.<sup>14</sup> When the former pleads to exonerate him, latter prays to discriminate the right and wrong.

15

- 
- 13 *Ibid.*  
 |ÉVÉÉ{ÉÊiÉ-°ÉÉä{É´ÉÉ°ÉÉ°É nâù°ÉÆ °°ÉÉÊuù¹ÉÆ  
 ¥ÉÉÀhÉ°ÉÊzÉvÉÉè\*  
 °ÉÚ{ÉÉä{É½pÉ®ú´ÉxjÈè¶SÉ {ÉÚVÉÊ°Éi´ÉÉ  
 ´É½äp·É®ú´ÉÂ\*\*  
 nâù´ÉÉxÉÉÆ °ÉÊzÉvÉÉè SÉè´É nùÉÊiÉhÉÉÊ|É´ÉÖJÉä  
 ÎiÉiÉä  
 =nùRÂó´ÉÖJÉ& |ÉÉRÂó´ÉÖJÉÉä ´ÉÉ nùtÉÊuù|  
 É°°É´ÉÉÊ½piÉ&\*\*
- 14 *Yijuvalkyasmṛti, Vyavahiridhyiya, p. 256.*  
 i´ÉÆ Ê´É¹É ¥ÉÀhÉ& {ÉÖJÉ& °Éi°ÉvÉ´Éæ ´°É´ÉÎiÉiÉ&  
 jÉÉ°É°´ÉÉ°´ÉÉnù|ÉÖ¶ÉÉ{ÉÉi°Éi°ÉäxÉ |É´É  
 ´Éä´ÉpiÉ´ÉÂ\*\*
- 15 *Vyavahiranir, aya, Divyaprami, anir, ayaki, a, p. 175.*  
 i´ÉÆ Ê´É¹É ¥ÉÀhÉÉ °Ép¹]ö& {É®úÒiÉiÉiÉÉ  
 nÖù®úÉi´ÉxÉÉ´ÉÂ  
 {ÉÉ{ÉÉxÉÉÆ nù¶ÉÆ°ÉÉi´ÉÉxÉÆ ¶ÉÖqùÉxÉÉ´É´ÉpiÉÆ  
 |É´É\*  
 ´Épi°ÉÖ´ÉÚiÉæ Ê´É¹É i´ÉÆ Ê½p ¥ÉÀhÉÉ  
 {ÉÉ®úÊxÉÉ´ÉiÉ´ÉÂ\* jÉÉ°É°´ÉäxÉÆ  
 xÉ®Æú {ÉÉ{ÉÉiÉÂ °Éi°ÉÆ SÉänù´ÉÉ´ÉpiÉÆ |É´É\*

About the quantity of poison, accurate measures are provided. *Yava* is the unit of measure accepted by the authorities. This unit has also been defined accurately.<sup>16</sup> According to different seasons, the quantity of poison varies. In rainy season four *yavas* are applied while in summer, winter and autumn the quantity becomes five, seven and six *yavas* respectively.<sup>17</sup>

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16 *Sr̥sasvat̥vilisa*, Vyavahiraki, a, p. 205.  
 VÉÉ±ÉÉxiÉ®úMÉiÉä |ÉÉxÉÉè ºÉiºÉÚI´ÉÆ ou¶ºÉiÉä  
 ®úVÉ&  
 |ÉiÉ´ÉÆ iÉi|É´ÉÉhÉÉxÉÉÆ jÉºÉ®äúhÉÖÆ |ÉSÉiÉiÉä\*  
 jÉºÉ®äúhÉ´ÉÉä¹]ö Ê´ÉYÉäºÉÉ Ê±ÉiÉèEòÉ  
 {ÉÊ®ú´ÉÉhÉiÉ&  
 iÉÉ& ®úÉVÉºÉ¹ÉÇ{ÉÉîºiÉ»É& iÉä jÉºÉÉä  
 MÉÉè®úºÉ¹ÉÇ{É&\*  
 ºÉ¹ÉÇ{ÉÉä ¹Éb÷¬´ÉÉä...

17 *Ibid*  
 ´É¹Éæ SÉiÉÖºÉÉÇ´É´ÉÉjÉÉ OÉè¹´Éä {É\SÉ ºÉ  
 ´ÉÉºº´ÉpiÉÉ&  
 ½èp´ÉxiÉÉäò ºÉ{iÉºÉ´ÉÉ& ¶É®út±{ÉÉ& iÉiÉÉä□Ê{É  
 SÉ\*

After the administration, the body of the accused has to be observed closely. If he remains calm and does not exhibit any sign of poisoning like loss of consciousness, vomiting etc., he has to be exonerated.<sup>18</sup> Otherwise he has to be punished. The period of observation is from morning to evening. If a high dose of poison is given, the period is the time taken to complete five hundred *tilas* (claps).<sup>19</sup>

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<sup>18</sup> *Ibid*  
 ;ÉÊÍÉiÉä iÉÖ ¢ÉnùÉ ¢´É¸iÉÉä ¨ÉÚUðÉÇUðìnùÊ´É  
 ´ÉìVÉiÉ&

ÊxÉì´ÉÉðÉ®úÉä ÊnùxÉ¸ÉÉxiÉä ¶ÉÖrÆù  
 iÉ¨ÉÊ;ÉÊxÉìnù¶ÉäiÉÂ\*\*

<sup>19</sup> *Ibid*  
 {É\SÉiÉÉ±É¶ÉiÉÆ EðÉ±ÉÆ ÊxÉì´ÉÉðÉ®úÉä ¢ÉnùÉ ;É  
 ´ÉäiÉÂ

iÉnùÉ ;É´ÉÊiÉ ¸ÉÆ¶ÉÖrù& iÉnùÉ  
 EÖð¸ÉÉÇÍSSÉÊEðì¸ÉÉð¨ÉÂ\*\*

The interesting thing to be noted here is that, even if the accused proves to be guilty or not after the completion of the time of observation, he has to be treated with suitable medication, incantation and jewels. Prior to the application of poison, antidotes are collected and the body of the accused is well examined to understand the body constitution. Only curable poisons are applied. Incurable ones like *kilakṣṇa* or *alimbu* are forbidden. From these accounts, it may be inferred that, in ancient India, the judiciary never advocated the accused to be poisoned to death. But it cleverly utilised the psychophysical imbalance occurring in a guilty man to prove the crime. A poisoner is treated with high contempt and poisoning is considered as a criminal offense. Such a man or woman is condemned to be drowned to death. If the convicted is a pregnant woman, the verdict

has to be delayed for a month after delivery.<sup>20</sup>

## 6.1 Protection of kings

As the centre of power and wealth, the crown is much prone to poisoning. Hence all administrative treatises call for high vigilance on the part of the king. The *Arthaśāstra* enumerates the name of kings, who were killed by poisoning.<sup>21</sup> These details are also furnished in *Bṛhatsamhiti*.<sup>22</sup> This being the case,

<sup>20</sup> *Arthaśāstra*, Kaṣṭhakaśāstradhana, p. 158  
 Ê´É¹ÉñùÉªÉÉÆð {ÉÖ`û¹ÉÆ ÎºjÉªÉÆ SÉ  
 {ÉÖ`û¹ÉPxÉÖ`É {É& |É´Éä¶ÉªÉänù-  
 MÉI;ÉhÉÖ`´ÉÉºÉÉ´É®ú|ÉVÉÉiÉÉÆ {ÉÊiÉMÉÖ`û|  
 ÉVÉÉPÉÉÊiÉÉÈÉ-  
 ´ÉÎMxÉÊ´É¹ÉñùÉÆ ºÉÆÊVÉSUäðÊñùÈðÉÆ´ÉÉ  
 MÉÉÊ;É& {ÉÉ]ð¬äiÉ\*- 28

<sup>21</sup> *Ibid*, Vinayidhikara, a, p. 82.  
 ±ÉÉVÉÉx´ÉñVÉÖxÉäÊiÉ Ê´É¹ÉähÉ {ÉªÉÇªªÉ nàù´ÉÒ  
 ÈðÉÊ¶É®úÉVÉ´ÉÂ\*  
 Ê´É¹ÉÊñùMvÉäxÉ xÉÚ{ÉÖ®äúhÉ´Éè®úxiªÉÆ  
 ´ÉäJÉ±ÉÉ´ÉÊhÉxÉÉ ºÉÉè´ÉÒ®ú´ÉÂ\*  
 VÉÉ±ÉÚiÉ´ÉÉñù¶ÉæxÉ....

<sup>22</sup> *Bṛhatsamhiti*, Vol. II, Strçpumsamiyogidhyiya, p. 851.  
 ±ÉÉVÉÉxÉÂ Ê´É¹ÉähÉ ºÉÆªÉÉäVªÉ´ÉñVÉÖxÉäÊiÉ Ê  
 ´É±ÉÉäÊ;ÉiÉ´ÉÂ  
 nàù´ÉÒ iÉÖ ÈðÉÊ¶É®úÉVÉäxpÆùù ÊxÉVÉñVÉÉxÉ  
 ®ú½pÉäMÉiÉ´ÉÂ\*  
 Ê´É¹ÉÉHäðxÉ SÉ ºÉÉè´ÉÒ®Æú´ÉäJÉ±ÉÉ´ÉÊhÉxÉÉ  
 xÉP{É´ÉÂ\*  
 xÉÚ{ÉÖ®äúhÉ SÉ´Éè´ÉiªÉÈ iÉpÚù{ÉÆ nù{ÉÇhÉäxÉ

Kauṣilya dedicates a full chapter in *Vinayidhikara*, a for the self protection of the king. This corresponds much with the iyurvedic treatises.

Suśruta speaks in detail of the need of the king to be protected. He says that human mind is unsteady like a horse; hence the king should not trust anybody.<sup>23</sup> He should always anticipate an attack from an enemy or a house maid. Poisoning occurs mainly through kitchen, hence Suśruta recommends to post a physician is posed in the kitchen.<sup>24</sup> According to him, the

SÉ\*\*

<sup>23</sup> SS, Kalpasthina, I. p-407.

âÉ°“ÉÉSSÉ SÉäiÉÉäÊxÉiâÉi´É“É·É´ÉiÉÂ |ÉÉÊiÉiÉÆ  
 xÉPhÉÉ“ÉÂ  
 xÉ Ê´É·É°âÉÉkÉiÉÉä ®úÉVÉÉ EòñùÉÊSÉñùÊ{É  
 Eò°âÉÊSÉiÉÂ\*\*

<sup>24</sup> *Ibid.*

Ê®ú{É´ÉÉä Ê´ÉGò“ÉÉGòÉxiÉÉ âÉä SÉ °´Éä EÞðiaÉiÉÉÆ  
 MéiÉÉ&  
 Ê°É°ÉPIÉ´É& GòÉävÉÊ´É¹ÉÆ Ê´É´É®Æú |ÉÉ{âÉ  
 iÉÉòù¶É“ÉÂ\*  
 Ê´É¹ÉèìxÉ½ÞxâÉÖìxÉ{ÉÖhÉÆ xÉÞ{ÉËiÉ  
 nÖù¹]öSÉäiÉ°É&\*  
 Î°jÉâÉÉä ´ÉÉ Ê´ÉÊ´ÉvÉÉxÉÂ âÉÉäMÉÉxÉÂ  
 EòñùÉÊSÉi°ÉÖ;ÉMÉäSUôâÉÉ  
 Ê´É¹ÉÉèòxâÉÉä{ÉâÉÉäMÉÉúùÉ  
 iÉhÉÉVVÉ½ÂÞÞâÉÉñù°ÉÚzÉ®ú&  
 iÉ°“ÉÉúèùtàxÉ °ÉiÉiÉÆ Ê´É¹ÉÉÞùlâÉÉä



latter should hail from a good family and be righteous, friendly, cultured, vigilant, devoted, grateful, pleasing,<sup>25</sup> devoid of greed, stubbornness, anger, crudity, jealousy and laziness, having control over senses and able to forgive, clean, virtuous, kind, intelligent, highly energetic, committed, well-wisher, skilled in conversations, bold, experienced, efficient, having readily available antidotes and well honoured.<sup>26</sup>

xÉ®úÉÊvÉ{É&\*\*

<sup>25</sup> CS, Cikitsisthina, 23.p.

Ê®ú{ÉÖªÉÖHäðìªÉÉä xÉP{ÉäìªÉ& °´ÉäìªÉÉä  
 °jÉÖìªÉÉäìÉ´ÉÉ ìªÉÉÆ xÉP{ÉìÉä\*  
 +É½pÉ®úÉ´É½pÉ®úMÉìÉÆ iÉº´ÉÉìÉÂ |Éä¹ªÉÉxÉÂ

{É®úÒìÉäìÉ\*

<sup>26</sup> Ibid., p. 408.

EÖð±ÉÖxÉÆ vÉÉì´ÉÉÆð îºxÉMvÉÆ °ÉÖìÉPìÉÆ  
 °ÉÆìÉìÉÉäìììÉÉ´ÉÂ  
 +±ÉÖxvÉ´É¶É`Æö |ÉHÆð EPðìÉYÉÆ Ê|  
 ÉªÉnù¶ÉÇxÉ´ÉÂ\*  
 GòÉävÉ{ÉÉ`û¹ªÉ´ÉÉìªÉªÉÇ´ÉÉªÉÉ±ÉªªÉÊ´É´ÉìVÉìÉ´ÉÂ\*  
 ÊVÉìÉäìxpùªÉ´ÉÂ iÉ´ÉÉ´ÉxiÉÆ ¶ÉÖúËSÉ ¶ÉÖ±ÉnùªÉÉìx  
 ´ÉìÉ´ÉÂ\*\*  
 ´ÉävÉÉÊ´ÉxÉ´ÉªÉÆ,ÉÉxiÉ´ÉxÉÖ®úHÆð  
 Ê½piÉèÊ¹ÉhÉ´ÉÂ  
 {É}ÖÆðð |ÉMÉ±ìÉÆ ÊxÉ{ÉÖhÉÆ nìÉ´ÉÉ±ÉªªÉ  
 ´ÉìVÉìÉ´ÉÂ  
 {ÉÚ´ÉÉæHèð¶SÉ MÉÖhÉèªÉÖÇHÆð ÊxÉìªÉÆ  
 °ÉÊzÉÊ½piÉÉMÉnù´ÉÂ\*  
 ´É½pÉxÉªÉä |ÉªÉÖ\VÉÖ ´ÉètÆ iÉÊuùt{ÉÚÊVÉìÉ´ÉÂ\*\*

The royal kitchen should have some qualities; it should be located in an auspicious place and direction; should be clean, equipped with big clean utensils, should have good ventilation and windows to enhance air circulation, should be devoid of stocks of hay should have a roof, and always be sanctified by the worship of fire.<sup>27</sup> Attendants appointed in the kitchen have to be well tested of their merits and loyalty. They are supposed to have the following qualities.<sup>28</sup> They should be clean, hailing from good family backgrounds,

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<sup>27</sup> *Ibid*  
 |É¶É°iÉÊñMnâù¶ÉÉPðìÉÆ ¶ÉÖÊSÉ|ÉÉhbÆ÷  
 °É½pSUÖôÊSÉ  
 °ÉVÉÉ±ÉÉÆð MÉ´ÉÍÍÉÉf∅¬°ÉÉ{iÉ´ÉMÉÇÊxÉ¹ÉäÊ  
 ´ÉiÉ°ÉÂ\*  
 Ê´ÉÉÆðìÉ°ÉP¹]ö°ÉÆ°ÉP¹]Æö °ÉÊ´ÉiÉÉxÉÆ  
 EPðìÉÉSÉÇxÉ°ÉÂ\*  
 {É®úÒÊiÉiÉ°jÉÒ{ÉÖ`û¹ÉÆ |É´ÉäSSÉÉÊ{É  
 °É½pÉxÉ°É°ÉÂ\*\*

<sup>28</sup> *Ibid*  
 ¶ÉÖSÉ°ÉÉä nùÊiÉhÉÉ nùlÉÉ Ê´ÉxÉÒiÉÉ& Ê|  
 É°Éñù¶ÉÇxÉÉ&\*  
 °ÉÆÊ´É|ÉHðÉ& °ÉÖ°ÉxÉ°ÉÉä xÉÒSÉÉäð¶ÉxÉjÉÉ&  
 Ê®úlÉ®úÉ&  
 °xÉÉiÉÉ qùfÆ∅ °ÉÆ°ÉÉÊ°ÉxÉ& EPðìÉÉä¹hÉÒ¹ÉÉ&  
 °ÉÖ°ÉÆ°ÉiÉÉ&  
 iÉ°É SÉÉYÉÉÊ´ÉvÉä°ÉÉ& °ÉÖi´ÉÊ´ÉvÉÉ&  
 {ÉÊ®úÉdì°ÉhÉ&

efficient, obedient, good looking, skilled in doing different works, kind hearted, devoid of undesirable hairs, nails and mustaches, steady, having the habit of taking bath daily, strong, disciplined, wearing a headwear, alert, self controlled and having the habit of performing duties obediently and skillfully. The physician in charge of the kitchen has to control all the attendants and give utmost care in the preparation of food.

Almost all the medical and political treatises enumerate the physiological and behavioural traits of a man who is going to poison someone. According to Caraka a man of suspicious nature, showing deviant behaviour by becoming talkative or silent, and pale enough to lose the normal luster can be identified as a poisoner.<sup>29</sup> Kauṣilya goes deeper into the characteristics of a poisoner like the

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<sup>29</sup> CS, Cikitsisthina, 23  
 +iªÉIÉÇ¶ÉÎRÁóEðiÉ& °ªÉÉnÂù¼Öp´ÉÉMÉIÉ´ÉÉ±{É  
 ´ÉÉÎM´ÉMÉiÉ±ÉI´ÉÒ&\*  
 |ÉÉ{iÉ& |ÉÉPðÊiÉÊ´ÉÉèÉ®Æú Ê´É¹É|ÉnùÉiÉÉ  
 xÉ®úÉä YÉäªÉ&\*\*

dryness and discoloration of face, stuttering, excessive perspiration, and yawning, trembling, stumbling, casting a fierce look while talking, showing agitation in work and not remaining steady in his own place.<sup>30</sup> Suḥruta moves further and presents the minute details of the personality traits of a poisoner. One who does not answer when questioned, gets disillusioned while talking, speaks like an idiot, utters irrelevant or meaningless words, makes sound with his fingers, scratches the ground without any cause, laughs, trembles with fear, looks at one another, tears something with his nails, pulls his hair occasionally, tries to go out through the wrong door, looks around again and again, exhibits contradictory traits, thin, discoloured, timid and unconscious man has to be identified as a poisoner.<sup>31</sup> Suḥruti also

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<sup>30</sup> *Arthaśāstra*, Vinayadhikara, a, p. 87  
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<sup>31</sup> SS, Kalpasthina, i. p.409

asserts that the above mentioned characteristics are exhibited also by a virtuous but confused man. Hence the king has to be very careful in observing servants.

Before taking food, king has to offer it first to fire and then to birds. If it is poisoned, the flame of the fire will turn bluish in colour and produce crackling sound. Fumes produced will not subside soon.<sup>32</sup> Poisoned food will kill

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<sup>32</sup> *Ibid.*  
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birds.<sup>33</sup> Different birds produce different signs of poisoning.<sup>34</sup> At the sight of poisonous food, the eyes of *cakora* (Greek partridge) get discoloured, *jçvajçvaka* bird dies, cuckoo produces peculiar, sound, *kraumca* gets intoxicated, peacocks hoot, parrot and mynah cry aloud with fear, swan makes loud sound and *bᳵ'garija* hoots.<sup>35</sup> Apart from these birds animals also undergo peculiar behavioural

<sup>33</sup> CS, Cikitsisthina, 23.  
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<sup>34</sup> *Arthazīstra*, Vinayidhikara, a, p. 85  
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<sup>35</sup> SS, Kalpasthina, I. p. 410.  
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changes, when they get exposed to poisoned food. Spotted deer sheds tear, while monkeys discharge excreta. Suśruta says that these birds and animals have to be kept close to the king. Thus they could easily detect the presence of poison. Kauṣilya explains the peculiarities of poisoned food stuffs.<sup>36</sup> They can be represented in a table.

**Table 10: Identification of poisoned food stuffs**

	<b>Name of food stuff or Substance being poisoned</b>	<b>Identification</b>
1	Boiled rice	Steam having the colour of peacock's neck, coldness, sudden change of colour as when stale, being full of water, partially boiled nature.
2	Broths	Quick drying up, having a soiled

<sup>36</sup> *Arthaśāstra*, Vinayadhikara, a, p. 80  
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		appearance, presence of foam, becoming curdled, destruction of normal smell, and flavour
3	Liquids	Appearance of a shade fainter or deeper and the appearance of upward lines at the edges of the mass of foam
4	Juice	Blue line in the middle portions
5	Milk	Reddish line in the middle portion
6	Wine and water	Black line on the middle portion
7	Curd	Dark line
8	Honey	White line
9	Wet substances	Becoming quickly faded and over cooked and attaining a dark blue colour on boiling



10	Dry substances	Quickly falling to pieces and losing colour
11	Hard substances	Softness
12	Soft substances	Hardness

In the case of poisonous liquids (*pin çyaviÀa*) Suçruta also enumerates the characteristics like the formation of coloured lines, opaqueness of the surface and the presence of froth and bubbles.<sup>37</sup> In the case of vegetables and soups Suçruta's ideas correspond with that of Kauñilya. According to Suçruta they are devoid of taste and smell and have a wet nature. On poisoning, snacks and fruits will lose their natural smell, colour and taste. Unripe ones ripen quickly and even putrify.<sup>38</sup> According to Kauñilya, on poisoning

<sup>37</sup> SS, Kalpasthina, I. p. 412.  
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<sup>38</sup> *Ibid*  
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edible substances, on poisoning cause the death of small creatures like flies.<sup>39</sup>

When poisoned, bed sheets and blankets form dark patches on their surface. Metals and precious stones get discoloured.<sup>40</sup> Suśruta furnishes the details of changes in commodities on being poisoned.<sup>41</sup> When poisoned, tooth stick will lose its bristles, anointing oil will be slimy, thick or discoloured, riding materials will agitate the animals, garland will lose its natural fragrance and colour, and ornaments will lose their natural glow. These details help in distinguishing a poisoned substance.

Caraka also provides the symptoms produced by poisoned materials.<sup>42</sup> Suśruta

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39 Arthaśiṣṭra, Vinayidhikara, a, p. 86.

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40 Ibid

41 SS, Kalpasthina, I. pp. 410-414.

42 CS, Cikitsisthina, 23 p.

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goes further to prescribe symptomatic treatment for each case. Hence it is more convenient to analyse the views of Sužruta which can be represented in a table.

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**Table 11: Different modes of poisoning along with the symptoms and treatment**

<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
1	<i>AnnaviÀa</i> (poison in food)	When put on fire, the fumes rising from it produce burning sensation, unsteady movement of eyes and headache	Snuffs and collyrium prepared of <i>kuÀ¶ha</i> (costus [ <i>Saussurea lappa</i> . C.B. Clarke] <sup>43</sup> <i>limajja</i> ( <i>Vetiveria zizanioides</i> (Linn.) Nash. Vetiver, <sup>44</sup> <i>nalada</i> (?) and honey should be administered. A paste of <i>çirçÀa</i> (siris tree, <i>Albizia lebbeck</i> (Linn.) <sup>45</sup> <i>rajani</i>

43 *IMP*, Vol. V, p. 80.

44 *Ibid*, Vol. V, p. 361.

Sl. No.	Mode of poisoning	Symptoms produced	Prescribed treatment
			(tree turmeric, <i>Coscinium fenestratum</i> <sup>46</sup> (Gaertn.) Colebr and <i>candana</i> (Sandal tree, <i>Santalum album</i> Linn.) <sup>47</sup> has to be anointed on the body. Application of sandal wood paste on heart may soothen the pain of heart.
2	a) <i>HastaviĀa</i> (poison in hands)	Burning sensation of the palm and falling of the nails	Smear the hand with the paste of <i>īyimi</i> (Indian Jalap.) [Operculina

45 *Ibid*, Vol. 1, p. 81.

46 *Ibid*, Vol. II, p. 191.

47 *Ibid*, Vol. 5, p. 57.

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
			turpethum (Linn.) Silva Manso. <sup>48</sup> <i>indra</i> (Bitter gourd [Cucumis trigonus Roxb.] <sup>49</sup> <i>gopi</i> (Indian sarsaparilla) <i>sima</i> <sup>50</sup> (Moon plant, <i>Sarcostemma acidum</i> (Voigt) Voigt. <sup>51</sup> and

48 *Ibid*, Vol. IV, p. 178.

49 *Ibid*, Vol. II, p. 235.

50 *Ibid*, Vol. III, p. 141.

<b>Sl. No .</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
			<i>utpala</i> (Ichnocarpus frutescens (Linn.) R.Br. <sup>52</sup> )

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51 *IMP*, Vol. V, p.73.

52 *Ibid*, Vol. III, p. 203.

Sl. No	Mode of poisoning	Symptoms produced	Prescribed treatment
3.	b) <i>ĒsyaviĀa</i> (poison in mouth)	Hardening of the tongue, pricking pain, loss of the power to detect taste, burning sensation and excessive salivation	Incise the swelling mildly to apply the paste of the flower of <i>dhitakç</i> (Fire flame brush, <i>Woodfordia fruticosa</i> (Linn.) Kurz.) <sup>53</sup> <i>pañhyi</i> (Chebulic myrobalan. <i>Terminalia chebula</i> Retz.) <sup>54</sup> and seed of <i>jambĕphala</i> (Black plum, <i>Syzygium cumini</i> (Linn.) <sup>55</sup> added with honey or paste of the root of <i>a'koñla</i> (sage leaved alangium, <i>Alangium salvifolium</i> (Linn.f) <sup>56</sup> Wall.) or of the bark of <i>saptaccada</i> ( <i>Alstonia venenata</i> R.



<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
4.	<i>Dantaki</i> (poison in tooth stick/ brush)	Swelling of the tongue, teeth, gums and lips	
5.	<i>Jihvinirlekhavi</i> (Poison in tongue /scraper)		
6.	<i>Kavalavi</i> (Poison in mouth gargles)		
7.	<i>Ēmi</i> (Poison in the stomach)	Fainting, vomiting, diarrhoea, flatulence, burning sensation, shiverings and disorder of the senses.	Induce vomiting by applying a paste powder of <i>madana</i> (Emetic nut. <i>Catuna regum spinosa</i> (Thunb.) <sup>59</sup> Tarengadum.)

53 *Ibid*, Vol. V, p. 412.

54 *Ibid*, Vol. ....

55 *Ibid*, Vol. V, p. 225.

56 *Ibid*, Vol. I, p. 77.

57 *Ibid*, Vol. I, p. 117.

58 *Ibid*, Vol. I, p. 81.

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
			<i>alib£</i> (Bitter bottle gourd. <i>Lagenaria siceraria</i> (Mol.) <sup>60</sup> standley.) <i>bimbç</i> (Ivy gourd, <i>Coccinia grandis</i> (Linn.) <sup>61</sup> Voigt. or <i>Kožitakç</i> (sponge gourd. <i>Luffa cylindrica</i> (Linn.) M. Roem.) <sup>62</sup> mixed either with curd diluted buttermilk or rice wash.
8.	<i>pakviçayaviÀa</i> (Poison in large intestine)	Burning sensation, fainting, diarrhoea, thirst, disorders of the senses, gurgling noise	Purgation should be induced by using <i>nçlin</i>

59 *IMP*, Vol. II, p. 33.

60 *Ibid*, Vol. III, p. 295.

61 *Ibid*, Vol. II, p. 133.

62 *Ibid*, Vol. III, p. 350, AV, p. 364-339.

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
		in the abdomen, anaemia and leanness	<i>çphala</i> (Indian indigo. <i>Indigofera tinctoria</i> Linn.) <sup>63</sup> with ghee or <i>duÀ çviÀiri agada</i> with curd and honey.

Sl. No	Mode of poisoning	Symptoms produced	Prescribed treatment
9.	<i>Abhya'gaviÀa</i> (poison in the oil used for anointing)	Eruptions in the body, pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and tearing of muscles.	Pour cold water on the body and apply cooling pastes like that of <i>candana</i> ( <i>Santalum album</i> Linn., Sandal tree) <sup>64</sup> <i>tagara</i> (Fenugreek, <i>Trigonella foenum graecum</i> Linn.) <sup>65</sup> <i>kuÀ¶ha</i> (Costus, <i>Saussurea lappa</i> (C.B. Clarke) <sup>66</sup> , <i>uzçra</i> (Vetiver, <i>Vetiver zizanioides</i> (Linn.) Nash,) <sup>67</sup> <i>venupatra</i> (Thorny bamboo, <i>Bambusa arundinacc</i> (Retz) Wild.) <sup>68</sup> <i>somavalli</i> (Moon plant, <i>Sarcostemma acidum</i> <sup>69</sup>

<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
10.	<i>Utsidanavi</i> (poison massaging materials)	in Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and tearing of muscles.	

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- 64 *IMP*, Vol. V, p. 57.
  - 65 *Ibid*, Vol. V, p. 345.
  - 66 *Ibid*, Vol. V, p. 80.
  - 67 *Ibid*, Vol. V, p. 361.
  - 68 *Ibid*, Vol. I, p. 244.
  - 69 *Ibid*, Vol. 5, p. 73.
  - 70 *Ibid*, Vol. V, p. 283.
  - 71 *Ibid*, Vol. I, p. 380.
  - 72 *Ibid*, Vol. IV, p. 110.
  - 73 *AV*, p. 293, 218, 121.
  - 74 *IMP*, Vol. II, p. 305.
  - 75 *Ibid*, Vol. II, p. 87.
  - 76 *Ibid*, Vol. III, p. 327.

<b>Sl. No .</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
11.	<i>PariĀekavisa</i> (poison in the materials used for bathing)	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and fearing of muscles.	
11.	<i>KaĀiyaviĀa</i> (poison in the decoctions for bath)	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and fearing of muscles.	

<b>Sl. No .</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
12.	<i>AnulepanaviÀa</i> (Poison unguents) in	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and fearing of muscles.	
13.	<i>áyuyiviÀa</i> (poison in bed)	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and tearing of muscles.	

<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
14.	<i>VastraviĀa</i> (poison in clothes)	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and tearing of muscles.	
15.	<i>TanġtraviĀa</i> (poison in armour)	Eruptions in the body pain, exudation, ulcer, necrosis of the skin, excess of sweating, fever and tearing of muscles.	



Sl. No	Mode of poisoning	Symptoms produced	Prescribed treatment
16.	<i>Avalekhanavi</i> (poison in comb)	Shedding of hairs, headache, bleeding from minute pores, and development of tumours in the head	Frequent application of the paste of black mud mixed with the bile of <i>ṛṣya</i> (big deer), <i>ghee</i> , <i>syimi</i> ( <i>Callicarpa macrophylla vahl.</i> ) <sup>77</sup> <i>pilindi</i> (Indian jalap, <i>Operculina turpethum</i> Linn. <sup>78</sup> and <i>taḍulḥyaka</i> (Prickly amaranth, <i>Amaranthus spinosus</i> Linn. <sup>79</sup> or juice of fresh cowdung or juice of <i>milat ḥ</i> (Spanish, jasmine <i>Jasminum grandiflorum</i> Linn. <sup>80</sup> or <i>musakapar, ḥ</i> (?) is advised the smoke coming out of charcoal is

<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
17.	<i>áirobhya ´gaviÀa</i> (poison in the materials applied on head)	Shedding of hairs, headache, bleeding from minute pores and development of tumours in the head	
18.	<i>áirastri, aviÀa</i> (poison in helmet)	Shedding of hairs, headache, bleeding from minute pores and development of tumours in the head	

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- 77 *Ibid*, Vol. I, p. 334.  
78 *Ibid*, Vol. IV, p. 172.  
79 *Ibid*, Vol. I, p.121.  
80 *Ibid*, Vol. III, p. 249.

Sl. No	Mode of poisoning	Symptoms produced	Prescribed treatment
19.	<i>UÀ, çÀaviÀa</i> (poison in headwear)	Shedding of hairs, headache, bleeding from minute pores and development of tumours in the head	
20.	<i>SrakviÀa</i> (Poisoned garlands)	Shedding of hairs, headache, bleeding from minute pores and development of tumours in the head	
21.	<i>MukhilepaviÀa</i> (Poison in the cosmetics applied on face)	Darkening of the face, eruptions in the body, pain, exudation, necrosis, excess of sweating, fever and tearing of muscles.	A solution of honey and ghee should be given to drink. A paste of <i>candana</i> (Sandal wood, <i>Santalum album</i> Linn.) <sup>81</sup> <i>payasya</i> (Common dandelion;

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
		Thorny pimples resembling the columns of lotus flower will appear on the face	<i>Taraxacum officinale</i> <i>Weber)</i> <sup>82</sup> <i>madhuka</i> <i>(Glycyrrhiza glabra</i> Linn.). <sup>83</sup> <i>phamjç</i> (clerodendrum, <i>Serratum</i> (Linn.) Moon). <sup>84</sup> <i>bandhuj</i> çva (Medagascar periwinkle, <i>Catharanthus</i> <i>roseus</i> (Linn.) G. Don.) <sup>85</sup> and <i>punarnavi</i> (Hogweed, <i>Boerhaavia diffusa</i> Linn.) <sup>86</sup> added with ghee

82 *Ibid*, Vol. V, p. 243.

83 *Ibid*, Vol. III, p. 84.

84 *Ibid*, Vol. II, p. 121, AV, p. 693.

85 *Ibid*, 698, IMP, Vol. II, p. 31.

86 *Ibid*, Vol. I, p. 281.

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
			should also be applied on the face.
22.	<i>Vihanavi</i> Àa (Poisoned riding materials)	Eruptions on buttocks, anus, penis and scrotum	Treatment is similar to that of <i>abhya 'gavi</i> Àa
23.	<i>Nasyadh£mavi</i> Àa (poisoned snuff and smoke)	Bleeding from the orifices, headache, excessive flow of phlegm and disorder of sense organs.	The milk and ghee of cow etc. boiled with <i>atçvi</i> Àa (Atçs root, <i>A conitum neterophyllum</i> Wall. ex. Roy) <sup>87</sup> <i>çveti</i> ( <i>Careya arborea</i> Roxb. Kumbi) <sup>88</sup> and <i>madayantiki</i> (Henna, <i>Lawsonia inermis</i> Linn.) <sup>89</sup> should be used for drinking and nasal application.

<b>Sl. No</b>	<b>Mode of poisoning</b>	<b>Symptoms produced</b>	<b>Prescribed treatment</b>
24.	<i>PuÀpamiliviÀa</i> (poisoned garland)	On inhalation the smell will produce headache, and emission of tears	
25.	<i>Kar, atailaviÀa</i> (poisoned oil for ears)	Hearing disorders, swelling, pain and exudation of the ears	Fill the ears with the fresh juice of <i>bahupatra</i> (peacock's tail, <i>Actiniopteris dichotoma</i> Bedd.) <sup>90</sup> added with ghee and honey or juice of <i>somavalka</i> (white cotech tree. <i>Acacia polyantha</i> willd.) <sup>91</sup> filled cold is also advised.
26.	<i>AµjanaviÀa</i> (poisoned	Accumulation of waste in the eyes, burning	The person should be

88 *Ibid*, Vol. I, p. 380.

89 *Ibid*, Vol. III, p. 303.

90 *Ibid*, Vol. I, p.55.

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
	collyrium)	sensation, pain, disorders of vision and blindness.	made to drink ghee and groats added with <i>migadha</i> (Pippali, long pepper, <i>Piper longum</i> Linn.) <sup>92</sup> The resin of <i>meÀaàr´gi</i> (Periploca of the woods, <i>Gymnema sylvestre</i> (Retz.) R.Br.) <sup>93</sup> and <i>varu, a</i> (Three leaved

Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
			caper, <i>Crataeva magna</i> (Lour.) DC) <sup>94</sup> should be applied to the eyes as collyrium or <i>muÀkaka</i> (weaver's beam tree <i>Schrebera swietenioides</i> Roxb.) <i>ajakar, a</i> (Indian

91 *Ibid*, Vol. I, p. 30.

92 *Ibid*, Vol. IV, p. 290.

93 *Ibid*, Vol. III, p. 107.

94 *Ibid*, Vol. II, p. 202.



Sl. No .	Mode of poisoning	Symptoms produced	Prescribed treatment
			copal tree, <i>Vateria indica</i> Linn. and <i>samudraphena</i>
			(Barringtonia acutangula (Linn.) Gaerin.) mixed with <i>gopitta</i> (gall stone) or of <i>kapitha</i> (Elephant apple, <i>Limonia acidissima</i> Linn.) and <i>meÀas᳚, g᳚</i> (periploca of the woods, <i>Gymnema sylvestre</i> (Retz.) R.Br. or of flowers of <i>bhallitaka</i> (marking nut tree, <i>Semecarpus anacardium</i> Linn.f.) or of <i>bandh᳚ka</i> (Noon plant, <i>Pentapetes</i>

Sl. No.	Mode of poisoning	Symptoms produced	Prescribed treatment
			<i>phoenicea</i> Linn. and <i>utkala</i> (Mast tree, <i>polyalthia longifolia</i> (sonn.) Thwaites) each one separately may be used as counter collyrium.
29.	<i>Pidukavi</i> (Poisoned footwear)	Swelling, exudation, loss of sensation, eruptions etc. in foot.	

In this context, Vigbhaṅga mentions *gara* (artificial poison).<sup>95</sup> According to him, this artificial preparation is specifically made by women to envenomate kings or husbands so as to fulfill their secret desires. The preparation is a combination of body wastes of different creatures, harmful drugs and slightly poisonous substances. By this, the victim becomes pale, lean, weak, inert and reserved.<sup>96</sup> Digestion becomes slow. Cough, painful inhalation, fever, stomach problems, oedema, etc are the other symptoms of the intake of *gara*. Such a victim will not get a sound sleep and he may see jackal, cat, tiger and monkeys in dreams.<sup>97</sup>

<sup>95</sup> AH, Uttarasthina, 35, p. 808.  
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<sup>96</sup> *Ibid.*  
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<sup>97</sup> *Ibid.*  
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hunger, thirst, spiritual imbalance, anger, fear, sorrow, weariness, indigestion, diarrhoea, increase of bile and air, smell of sessamum-flower or fruit, the odour of earth, lightning, sound of elephant, mouse or any musical instrument, forewind, smell of flowers and sex. This emphasizes the need for the patient to take rest.<sup>99</sup> He should not get involved in quick action inducing the release of enzymes stimulating blood circulation and heartbeat.<sup>100</sup> This surely paves the way for the easy spreading of poison. Besides these, if a man of *pitta* constitution gets poisoned by poisonous

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<sup>99</sup> *Ibid.*, p. 810.

<sup>100</sup> *Ibid.*

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vegetables like *sarÀapa* in rainy season and if his humour as well as blood is vitiated, there is little chance of survival. In such cases, one out of hundred may survive.

A poison having the properties of phlegm, has to be expelled by inducing vomiting, and applying ointments of hot, harsh and rough qualities and food of astringent, hot and bitter tastes. A poison with the properties of bile has to be neutralized by applying methods of oozing out with sprinkling or pasting of cold substances. Food with astringent, bitter and sweet tastes mixed with ghee is the diet prescribed during the treatment. Poison with an airy constitution is treated with edible substances with sweet, tender, sour and salt tastes mixed with ghee. Intake of cooked flesh is also desirable.<sup>101</sup> Among these the poison of airy constitution is very difficult or sometimes impossible to cure while that of bile needs some sort of effort and phlegm needs little

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101 *AH, Uttarasathina*, p. 890-891.

effort.<sup>102</sup> *AH* and *AS* agree in all these respects.<sup>103</sup>

In a sophisticated society, criminal or deliberate poisoning gets little room. But the criminal urges of man remain a serious threat before the administration.<sup>104</sup> Hence even in this age, food stuffs of national leaders are prepared and served with much care. Frequently occurring wars have presented another opportunity for poisoning.<sup>105</sup> Besides, engaging in plunder, the attacking nations

<sup>102</sup> *Ibid.*

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<sup>103</sup> *AS, Uttamasthina*, 40, p. 340-341.

<sup>104</sup> *Arthashastra*, p. 292.

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<sup>105</sup> *Ibid. Ka, ¶akazodhana, ÊzumxtakaparikÀi*, p. 136.

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from the body and the examination of the same was done. All these point to the scientific nature of investigation prevalent in ancient India.

In this age, poison is treated as a political weapon. Even Napoleon is suspected to be a victim of arsenic poisoning. Both the developed and undeveloped countries contaminate other's properties. Introduction of biological weapons has made the situation worse. Epidemics and pandemics like plague and anthrax are suspected to have such an origin. Sudden rise in living standards and increased stress has made man susceptible to suicidal tendencies. It is a real challenge before the medical world to neutralize the biological and chemical substances used for suicidal purposes. In this context, ayurvedic solutions for the problem may work complementary to the existing system, but much research is required in the field.



**CHAPTER 7**

**POISONOUS INSECTS AND  
SPIDERS**

Āyurvedic texts, after describing poisonous plants, reptiles and animals mention *kṣṛā*-s. The word *kṣṛā*, is translated as insects. It is interesting to analyse the life of an insect.

## **7.1 The natural history of insects-modern accounts**

Insects are small animals, belonging to group Arthropoda.<sup>1</sup> They have six legs, three body segments, two antennae, compound eyes, one or two pairs of wings and an exoskelton.<sup>2</sup> These are one of the most ancient inhabitants of earth. About 8,00,000 species of insects such as bees, ants, wasps, butterflies, cockroaches, ladybugs, fireflies, termites, moths, houseflies, dragonflies, mosquitoes, silverfish, grasshoppers, bee, crickets, walking sticks, flies etc. are identified.<sup>3</sup> (Fig. 7.1) Due to the abundance of insects in habitations, human beings are constantly at war with insects. Insects bite and inflict them with deadly diseases. Some of the insects help in pollination and some others provide honey.<sup>4</sup> So the class of insects comprise of both harmful and useful insects.<sup>5</sup>

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1 *Illustrated Oxford Dictionary*, Oxford University Press, London, p.419.

2 *The World Book Encyclopaedia*, Vol.10, p.216.

3 *Ibid*

4 *Ibid*

5 *Ibid*

Insects show adaptability to adverse conditions. Their small size, increased rate of reproduction, exoskeleton and wings, help them to meet with the challenges of the surroundings. They have unique and excellent social life. They exhibit a model of division of labor. They smell with their antennae, taste with feet and hear with hairs. They possess enormous strength. They are the most beautiful of all animals. Insects do not have any vessel to carry blood. Hence it fills the whole body cavity and washes all organs and muscles. Insect blood is seen in greenish or yellowish colours. Sometimes it may be colourless. They reproduce in the natural way. During the process of mating, females receive sperms and protect them in their abdomen. Under desirable conditions, eggs are fertilized to produce offspring.

In the abdominal region of insects, there is a special organ called ovipositor. This naturally helps the insect to insert their eggs into soil,

wood etc. In some insects like ants, bees and wasps this ovipositor has been modified into the poisonous sting. 1% of insect population is harmful to humans. Various biting bugs and flies inject deadly poison. Some produce soreness, tissue damage and rarely death. They are always feared as the carriers of dreadful diseases like malaria, dengue, typhoid fever, cholera etc.

### **7.1.1 Āyurvedic accounts of insect poisoning**

Āyurvedic treatises use the word *kṣā* in a wider sense. All lower animals other than those producing Rabies are included under this section. Thus frogs, fishes and spiders are included in this class.

#### **7.1.1.1 Genesis and classification of insects**

Āyurvedic treatises unanimously opine that insects are born from the semen, excreta, urine, eggs and decomposed body wastes of

snakes.<sup>6</sup> Based on their nature, these are further classified into insects having airy qualities, fiery qualities, watery qualities and combined qualities. A list of insects coming under each group is given in SS.<sup>7</sup>

**a) Insects having airy qualities:-** These are eighteen in number and include *Kumbhçnasa*, *tu, ·ikezi*, *ìx´gç*, *ìatakulçraka*, *ucci¶i´ga*, *agninima*, *cicciti´ga*, *may£riki*, *ivartaka*, *aurabhra*, *sirikimukha*, *vaidala*, *ìarivakurda*, *abhiriji*, *puruÀa*, *citraìçrÀaka*, *ìatabihu* and *raktariji*. Their bite will vitiate *vita* (air) and thus diseases caused by the aggravation of *vita* will arise.

**b) Insects having fiery qualities:-** These are twenty four in number and are *kau, ·inyaka*,

6 SS, kalpasthina, VIII, p.458.  
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7 Ibid.



*ka, abhaka, varaṅga, patravṛcika, vinisiki, brihma, iki, bindula, bhramara, bihyakṣ, picchiṅga, kumbhṣ, varcakṣṅga, arimedaka, padmakṣṅga, dundubhika, makara, śatapidaka, paṃcilaka, pikamatsya, kṣā, atu, da, gardabhṣ, klṣta, kṣmisarirṣ and utkleśaka. By their bite pitta will get aggravated.*

**c) Insects having watery qualities:-**

Thirteen insects are identified to have watery qualities- They are *viśvambhara, paṃcaśukla, paṃcakṣā, kokila, saireyaka, pracilaka, valabha, kiṅgibha, śṣcṣmukha, kṣā, agodhi, kaśiyavisiki, gardabhaka and troṅga. Their bite vitiates kapha (phlegm).*

**d) Insects of Combined qualities:-**

*Tu'g ṣnasa, vicilaka, tilaka, vihaka, koṅghigiri, kṣmikara, ma, alapucchaka, tu, anibha, sarāpika, valguli, śambuka and agnikṣṅga are called as the destroyers of life. These twelve aggravate the whole three dośas and create disease sannipita. The site of bite will look like*

as that burnt by caustic alkali or fire. Its colour will be red, yellow, white or light red.

### **7.1.1.2 Common symptoms of insect bite**

Insect-bites are further divided into acute poisoning and mild poisoning. Symptoms of acute poisoning are fever, body ache, horripilation, discomforts, vomiting, diarrhoea, thirst, burning sensation, fainting, yawning, rigors, dyspnoea, hiccup, severe chills, development of eruptions, oedema, glandular enlargement, appearance of coloured round patches, *dadru*, *karika*, *visarpa*, *kiñibha* or such other skin diseases. These symptoms are common to the aggravation of weak poison (*dĒÀçviÀa*) or the effects of poisoned weapon. Symptoms of mild poisoning are salivation, loss of taste, vomiting, feeling of heaviness of the head, cold shivers, appearance of eruptions, rashes and itching. These are connected with the *doÀa* getting aggravated.

### **7.1.1.3 General treatment**

Insect bite has to be treated like snake

bites. Fomentation, external application of medicine, and washing with medicated substances are to be performed to bring warmth. If the patient is unconscious and the wound exhibits the signs of ulceration and putrefication, fomentation is forbidden. Then it has to be treated, with antipoisonous and purificatory treatments.<sup>8</sup> For fomentation, pan cake made of *çirçÀa*, *ka¶uka*<sup>9</sup> (*Picrorhiza*, *Picrorhiza scrophularit* flora Penell), *kuÀ¶ha*, *vaci*.<sup>10</sup> (Sweet flag, *Acorus calamus* Linn.); *rajani*, *saindhava*, milk, marrow, fat and ghee, *çun¶hi*, (Dry ginger) *pippali*, *devadiru* and

8 SS, Kalpasthṛna, VIII. p.485.  
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9 IMP, Vol. IV, p.269.

10 Ibid. Vol.I, p.51.

*sthira*<sup>11</sup>(Deodar, *Cedrus deodara* Roxb. ex. Don) is used. In the case of scorpion bites instead of fomentation, fumigation is prescribed. Suśruta then gives the description of all the varieties of *kiṇṇas* poisonous to the humans, symptoms produced by each and the treatment. These can be represented in a table.

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<sup>11</sup> AV, p.978. IMP. Vol.I, p.163. Axle Wood (*Anogeissus lotifolia* (Roxb. ex Dc.) Wall. ex Guill & Derr.).

**Table 12: Poisonous insects-the details**

Sl. No.	Name of the creature	Varieties if any	Symptoms Produced	Treatment
1.	<i>ka, abha</i> (wasp)	a) <i>trika, ¶ha</i> , b) <i>kari, ç</i> c) <i>hastikakÀa</i> and d) <i>aparijita</i>	Severe pain, swelling, body ache, feeling of heaviness of the body and darkening of the site of bite	Application of <i>kuÀ¶ha</i> , <i>vakra</i> , <i>vaci</i> , <i>pi¶hi</i> <sup>12</sup> (Data roof, <i>Cyclea pellata</i> (Lam.) Hook. f & Thoms.), root of <i>bilva</i> <sup>13</sup> (Bael

				tree, <i>Aegle marmelos</i> (Linn.) Corr.), <i>suvarika</i> <sup>14</sup> , smoke of kitchen and two types of <i>haridri</i> (turmeric, <i>Carcuma longa</i> Linn.).
2.	<i>godheraka</i> (garden lizard)	a) <i>pratisfryaka</i>	Swelling, burning sensation and pain	

13 *Ibid.* Vol.1, p.62.

14 AV, p.964.

		b) <i>pi´gibhasa</i> c) <i>bahuvar, a</i> d) <i>nir£pama</i> & e) <i>godhereka</i>	at the site of bite. Glandular enlargements and fever.	
3.	<i>galagoliki</i> (?)	a) <i>¿veti</i> b) <i>krÀ, a</i> c) <i>raktarijç</i> d) <i>raktama, ·ali</i> e) <i>sarva¿veti</i> &	Burning sensation, swelling and exudation	<i>Rajanç,</i> <i>igiradh£ma,</i> <i>vakra, kuÀ¶ha</i> and seeds of <i>pali¿a</i> have to be applied together.
		f) <i>sarÀapiki</i>	Pain in the area of heart, diarrhoea leading to death.	
4.	<i>¿atapadi</i> (centepede)	a) <i>paruÀi</i> b) <i>kxÀ, i</i> c) <i>citri</i> d) <i>kapila</i> e) <i>pçtika</i> f) <i>rakti</i>	Swelling and Pain	<i>Ku´kuma</i> <sup>15</sup> (Saffron. Crocus sativus Linn.) <i>tagara,</i> <i>¿igru</i> <sup>16</sup> (Horse radish tree,

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IMP. Vol.II, p.212,

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Ibid. Vol.IV, p.59.

		g) <i>īveti</i>		<i>Moringo oleifera</i> Linn.), Padmaka, the two <i>rajanç</i> all are macerated in water and applied.
		h) <i>agniprabhi</i>	Burning sensation, fainting and development of white coloured eruptions.	
5.	<i>ma, .£ka</i> (Frog)	a) <i>kṛā, a sira</i> b) <i>sira</i> c) <i>kuhaka</i> d) <i>harita</i> e) <i>rakta</i> f) <i>yavavar, ibha</i> g) <i>bhṛkuṇi</i>	Itching at the site of bite, exudation of yellow froth from mouth	<i>meÀaīṅgi</i> <sup>17</sup> (Periploca of the woods, <i>Gymnema sylvestre</i> (Retz.) R. Br.), <i>vaci, piṇhi, nicula</i> <sup>18</sup>

17 Ibid. Vol.III, p.107

18 Ibid. Vol.III. p.172. AV, p.814.



				( <i>Homonium riparium</i> Lour.) <i>rohini</i> and <i>jala</i> <sup>19</sup> ( <i>Plectranthus Vettiveroides</i> (Jacob) Singh & Sharma)
		h) <i>koṣṭhika</i>	Burning sensation, vomiting and fainting.	
6.	<i>viśvambhara</i> (big scorpion)		Multiple, painful eruptions resembling mustard seeds. Fever with rigors	Dhava <sup>20</sup> (Axle wood, <i>Anogeissus</i> <i>latifolia</i> (Roxb. ex. DC. Wall. ex Guill & Perr., <i>aśvagandhi</i> <sup>21</sup> ( Winter cherry,

19 loc.cit. Vol.IV, p.318.

20 Ibid. Vol.I, p.163.

21 Ibid., Vol.V, p.409.

				<p><i>Withania somnifera</i> (Linn.) Duna ),  <i>atibali</i><sup>22</sup> (<i>Sida rhombifolia</i> Linn.)  <i>bali</i> (<i>sida rhombifolia</i> Linn. sp. retusa (Linn.) Borssum.)  <i>atiguhi</i> and <i>guhi</i><sup>23</sup> (<i>Pseudarthria viscida</i> (Linn.) Wight &amp; Arn.).</p>
7.	ahi, uka	a) <i>ahi, uka</i>	Pricking pain, burning sensation, itching, oedema and delusion.	Application of <i>irçÀa</i> , <i>tagara</i> , <i>kuÀha</i> , <i>ilipar, i</i> <sup>24</sup>

22

Ibid., Vol.V, p.132.

23

Ibid., Vol.IV, p.366.

24

ndian Medicinal Plants, Vol.IV, p.366.

				( <i>Pseudarthria viscida</i> (Linn.) Wight & Arn.) <i>saha</i> and two <i>niṣa</i> (turmeric).
		b) <i>ka, ḥmaka</i>	Body becomes yellow in colour, fainting diarrhoea and fever.	Cold treatments at night.
		c) <i>īḥkavṛanta</i>	Itching and appearance of rashes and thorn like structures.	<i>Vakra, kuṅḥha</i> and <i>apimirga</i> applied together or a paste of ant hill mixed with

				the juice of <i>bhṛṅgarīja</i>  (Prailing  eclipta, <i>Eclipta</i>  <i>prostrata</i> Linn.)
8.	<i>pipṭliki</i> (ants)	a) <i>sthēlaḥṭrāa</i> b) <i>samvihiki</i> c) <i>brahmaḥika</i> d) <i>aḥguliki</i> e) <i>kapiliki</i> & f) <i>citavarḥi</i>	Swelling, burning as if touched by fire and oedema at the site of bite.	Apply a paste of black mud of termite mound mixed with cow's urine on the wound.
9.	<i>makāiki</i> (honeybee)	a) <i>kinthiriki</i> b) <i>kṛāḥi</i> c) <i>piḥgali</i> d) <i>madhēliki</i> e) <i>kisiyṭ</i>	Itching, swelling, burning sensation, and pain	
		f) <i>sthiliki</i>	Blue eruption and	

			complications like fever leading to death.	
10.	<i>maḥaka</i> (mosquito)	a) <i>simudri</i> b) <i>parima, āla</i> c) <i>hastimaḥaka</i> d) <i>kṣā, a</i> e) <i>pirvatḥya</i>	Severe itching and swelling at the site of bite.	
11.	<i>leech</i> (Jalauka)	a) <i>kṣā, a</i> b) <i>karbura</i> c) <i>alagarda</i> d) <i>Indriyudha</i> e) <i>simudrika</i> & f) <i>gocandana</i>	Itching, Swelling, fever and fainting.	Measures alleviating <i>vita</i> and <i>pitta</i> are prescribed along with the treatment for insect poisoning.
12.	<i>ucciti'ga</i>		horripilation, stiffness of penis, intense pain and chills.	
13.	<i>matsya</i> (fishes)		Burning, swelling	Roots of <i>iveta</i> ,

			and pain	bha <sub>2</sub> .i <sup>25</sup> (siris tree, <i>Albizia lebeck</i> (Linn.) Benth. ) <i>trikaṅṅu</i> and ghee are used.
14.	<i>gṛhagodhiki</i> (house lizards)		Burning sensation, piercing pain, sweating and swelling	<i>Kapittha</i> , <i>akāipçda</i> , ark seeds, <i>trikaṅṅu</i> , <i>kariṃja</i> , <i>haridri</i> , and <i>diruharidri</i> are applied.

CS and AH classify insects as those having *vita*, *pitta* and *kapha* natures. Symptoms as well as treatments are prescribed so as to suit the constitution.

**Table 13: Treatment based on the doÀas**

	<b>DoÀa</b>	<b>Symptom</b>	<b>Treatment</b>
1.	<i>vita</i>	Cardiac pain, upward movement of <i>viyu</i> , stiffness, dilation of blood vessels, pain in bone joints, giddiness, twisting and black colouration of the body.	Local application of brown sugar, ( <i>kha, da</i> ), oil massage, fomentation with tubular method or

			<i>pulika</i>  (inferior cereals)  and  bulkpromoting regimens.
2.	<i>pitta</i>	loss of consciousness, hot expiration, heart-burning, pungent taste in mouth, tearing down of flesh, red or yellow coloured swelling.	Cold sprinklings and anointments.
3.	<i>kapha</i>	vomiting anorexia, nausea, salivation, excitement, heaviness, chills and sweetness of mouth	Scraping excision, fomentation and vomiting.

In all cases except that of scorpions and *ucciti'ga* cold substances are applied. In the



case of insect poisoning, fruits, root, bark, flower and leaf of the plant *çirçÀa* are used. This preparation is called *paµcaçirçÀigada*.

When we analyse, the iyurvedic accounts on insect classification, we are confused with the definition of the term *kç¶a*. When we go through the details provided in *SS*, the word *kç¶a* can be sensed as arthropods, while the description given by *Caraka* and *Vigbha¶a* suggests that it is used in the sense of all lower animals.

Ëyurvedic account of the genesis of insects from dead matter is incorrect, since all animals are biogenic i.e. born from living matter. Among them, some are born by hatching the eggs and some others are born alive from mother's womb. Scorpions belong to the second class. But when we analyse the egg laying habits of insects, we understand the justification for iyurvedic conception. Almost all egg laying insects

bury their eggs in mud or decomposed wood. Eggs commonly invisible to the bare eyes might have led to the inference that insects are born out of dead matter. As most of them are producing allergic problems and signs of poisoning, they were easily assumed to be born out of the body wastes of poisonous snakes.<sup>26</sup>

When we evaluate the insects mentioned in these texts, the following details are also to be noted.

(a) Wasps, belonging to the order Hymenoptera are both social and solitary in habits. They have biting mouth part antennae with 12 or 13 segments. Females are provided with a modified ovipositor and venom producing glands.<sup>27</sup> Their venom contains acetyl chloride, neurotoxin, hemolysin, histamine etc.<sup>28</sup> Though not

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26 Prof. K.R. Srikantha Murthy, *SS*, p.480.

27 "Wasp", *EB*, 2007, *EB Online*, 18 April, 2007.

28 Brace W. Halstead, "Poison", *EB*, 2007. *EB Online*, 18 April, 2007.

aggressive as hornets, the sting less painful in nature may sometimes prove to be fatal (Fig. 7.2).

(b) Centipedes belonging to the class chilopoda are the many segmented arthropods. Their body segments, except the hindmost, bear one pair of legs. They have many jointed antennae, a pair of jaw like venomous claws just behind the head (Fig. 7.3). The order Scolopendria, contain longest centipedes inflicting severe bites.<sup>29</sup>

(c) Frogs are amphibians lacking venomous apparatus. But they have poison glands spreading poison to all the body secretions. These body secretions of species dendrobates, physalemus and rana produce burning sensation (Fig. 7.4). They contain histamine, bufotenine, physalaemin, serotonin and some other substances characteristic of the species. Tree frogs also have body secretions of venomous nature.

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<sup>29</sup> “Centipede”, *EB*, 2007. *EB* Online, 19 April, 2007.

On handling, frogs produce burning sensation and skin rashes, if they come into contact with the eyes there would be inflammation of eyes. On ingestion, they produce vomiting and abdominal pains. These body secretions of frogs were abundantly used as arrow poisons.<sup>30</sup>

(d) Ants belonging to the family formicidae are the social insects with a powerful sting at the top of the abdomen. Solitary stings are not poisonous. But if attacked by a group of ants the situation may be crucial.<sup>31</sup> They inject formic acid (Fig. 7.5).

(e) Honey bee belongs to the apis species and is a social insect. The venom contains toxic elements like neurotoxin, hemolytic, melittin, hyaluronidases, phospholipase a histamine and others. Solitary sting is not capable of injecting

30 Bruce W. Halstead (Ed). "Poison". *EB* 2007. *EB Online*. 18 April 2007.

31 "Ants". *EB*, 2007. *EB Online*, 18 April 2007.

lethal dose to a human, but 500 stings, delivered in a short period of time may prove to be fatal. Local pain, burning sensation and blanching at the site of sting surrounded by a zone of redness are the symptoms.<sup>32</sup> (Fig. 7.6)

(f) Mosquitoes belong to the order Diptera and create serious health problems to the living world. Female mosquitoes require the proteins obtained from a blood meal to nourish their eggs. This enhances the transmission of diseases like yellow fever, malaria, fulariaris, and dengue(Fig. 7.7). Anophele mosquitoes are the carriers of Malaria. Culex mosquitoes carry the viruses of encephalitis and filariosis. Aedes mosquitoes carry yellow fever, dengue and encephalitis. Malaria is identified by chills, fever, anaemia, splenomegaly and fatal complications while dengue is characterized

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<sup>32</sup> Bruce W. Halstead, "Poison". *EB*, 2007, *EB Online*, 18 April 2007.

by fever, extreme pain and stiffness of the joints.<sup>33</sup> These serious diseases are not mentioned in the iurvedic treatises. They are only concerned about the allergic problems created by mosquitoes.

(g) Leeches are annelids with 39 segments in their body. They reproduce naturally and respire through their skin.<sup>34</sup> They are sanguivorous in habits. i.e. feed on blood. The anesthetic agents present in the saliva of leeches make the blood letting process painless. Hence a variety of leeches (*Hirudo medicinalis*) is used to remove unwanted blood (Fig. 7.8). *SS* mentions six varieties of poisonous and six varieties of non poisonous leeches.<sup>35</sup> Eventhough all varieties of leeches are not used for medicinal purpose, none of them are

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33 "Mosquito", *EB*, 2007 - *EB* Online, 18 April 2007.

34 K. Silverstein, "Hirudomedicinalis". Animal Diversity web, 3 January 2007 avail at, <http://Animaldiversity.Ummz.html>. Eamundo sandigo. R.N., "Leechtherapy", avail at [www.am.jmh.org/body](http://www.am.jmh.org/body), cfm.

35 *SS*, *sġtrasthina*, 13, p.55.

mentioned to be poisonous. But their *bite* may induce infection.<sup>36</sup>

(h) Some fishes like cartor oil fish, cause mild poisoning, and some others exhibit signs of severe poisoning. Deadly death puffer containing tetrotoxin, thread herring containing cloupeotoxin and morag cel containing ciguatoxin are included under the latter group.<sup>37</sup> (Fig. 7.9) But this type of poisoning is not so common in India.

(i) Body secretions of lizards are poisonous but no poison apparatus is present in lizards (Fig. 7.10). Identification of *ihi, uka* and *ucciti'ga* is not done. But these names are assumed to be denoting some hornet like creature imparting painful bites in humans. Many epidemics are suspected to be carried by insects. These are not mentioned in iyurvedic treatises. But

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36 Julie Briggs, avail at [www.amazon.com](http://www.amazon.com). Tatiano Ighostina, [www.leeches.biz](http://www.leeches.biz).

37 Bruce W. Halstead (Ed.) "Poison", *EB*, 2007, *EB Online*, 19 April 2007.

one thing we have to note is that many of these contaminative diseases have a short history. Ęyurvedic texts concentrate mainly on the skin problems created by insects. These might have had the credit of serious health problems created by insects in those ages. They prescribed successful treatment for each case. Body fluids of all insects are proved to be poisonous. This has been clearly mentioned by Sir. Vincent Brain Wigglesworth<sup>38</sup> who says, "Dermal glands of many insects discharge repellent or poisonous secretions over the cuticle, whereas others are protected by poisons that are present continuously in the blood and tissues. In many hemenopterans accessory glands in the female reproductive system has been modified to produce toxic proteins. These poisons injected into the nervous system of the prey, paralyse it. In this state, the prey serves as food for the

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38 "Insect". *EB*, 2007, *EB Online*, 18 April 2007.



wasp larva. Stings are also used by ants, wasps and bees for self defense."

Ancient Indian knowledge of poisonous insects is really amazing and the treatment prescribed for each case has to be subjected to careful study and analysis.

## **7.2 Scorpion sting- scientific accounts**

Scorpions belong to the order scorpionida of arachnid group. Segmented curved tail tipped with a venomous stinger at the rear side of the body and a pair of grasping pincers characterise the species.<sup>39</sup> (Fig. 7.11) They are nocturnal in habits, viviparous in reproduction and predators in feeding habit. After mating, females often kill the males. Many of the scorpion species are powerful enough to kill a human. Scorpion venom contains a number of toxic elements like neurotoxin, cardiotoxin, hemolytic, lecithinase, hyaluronidase and

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<sup>39</sup> Willis John Gertsch, Gary A. Pollis & Joseph Culin. 'Scorpion', *EB*, 2007, *EB Online*. 18 April, 2007.

others.<sup>40</sup> Common symptoms produced are burning sensation, swelling, sweating, restlessness, salivation, confusion, vomiting and convulsions leading to death.<sup>41</sup> Mortality rate is very high. Antivenin has been successfully applied in the cases of scorpion stings.

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40       Brace W. Halstead (Ed). "Poison", *EB*, 2007, *EB Online*, 189 April 2007.

41       Even Moeschlin, *Poisoning, Diagnosis and Treatment*, Grave Stratton New York, 1964, p.636.

### 7.2.1 Ēyurvedic accounts of scorpion sting

Based on the origin, Suŕruta classifies scorpions into three groups.<sup>42</sup> i.e. *mandavi*, *madhyavi* and *mahivi*. Scorpions born from decomposed cowdung are *mandavi* i.e having mild poison. Those born of decomposed wood or mud are *madhyavi* (moderately poisonous), and those born of decomposed dead body of snakes and other poisonous animals are *ŕkavi* (highly poisonous). Each are further explained with their characteristic features and symptoms produced.

**a) Scorpions of mild poison:-** scorpions having black, blue, brown, white, bluish black, yellow or red colour or resemble cow's urine, looks dull or smoky or having hairs in their belly are identified to have mild poison. When bitten by these scorpions, pain, shivering, stiffness of the body and flow of

42 *SS, Kalpasthina, VIII, p.487.*

black coloured blood from the site of bite are seen. These are the primary symptoms. In acute cases there would be burning sensation, sweating, oedema and fever.

**b) Scorpions of moderate poison: -**

These may have red, yellow, or brown coloured body, grey belly, and three joints in their tail.<sup>43</sup> If stung, there would be swelling of the tongue, obstruction in swallowing food and fainting.

**c) Scorpions of strong poison:-** Their body will be whitish, brownish or reddish in colour. Belly will have red, white, reddish blue, yellowish red, bluish yellow, red, bluish white, red or grey colour. Tail will have two segments in it. When stung by these, manifestation of the symptoms produced by snake bite, development of blebs, dizziness, burning sensation, fever, and flow of black

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43 In the former part, these class of scorpions are described to be born of decomposed wood or mud but while describing the characteristics of the class, they are said to be arising from the body wastes of three types of snakes.

blood from the orifices will occur and the patient suddenly dies.

### 7.2.2 Treatment

Scorpion venom is considered as of *paittika* constitution.<sup>44</sup> Hence treatment suitable for the constitution is prescribed. Treatment resembles that of snake bite. The site of bite has to be fomented, incised and smeared with powder of *rajani*, *saindhava*, *vyoÀa*<sup>45</sup> (This is a combination of dried ginger, red chilly and long pepper and is used to cure a number of diseases) and fruits and flower of *çiriÀa*.

External application of the paste of sour *mitula´ga* (Pomegranate, *Punica granatum* Linn)<sup>46</sup> and young leaves of *surasa* (Holy basil, *Ocimum tenuiflorum* Linn.)<sup>47</sup> macerated in cow's urine is advised. Sweet

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44 AH, Uttarasthaina, 27. p.824.

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45 AV.

46 IMP, Vol. IV, p. 396.

47 Ibid, Vol. IV, p. 168.

milk added with honey is given as a drink. In the case of mild poison, the site of bite should be washed either with fresh oil or water boiled with drugs of *vidiryidiga*, a.<sup>48</sup> Fomentation by cakes and poultices of antipoisonous drugs are also applied on the site. Then jaggery water mixed with the powder of *caturjitaka* or milk added with jaggery has to be given as a cool drink. Fumigation of feathers of peacock, cock, *saindhava*, oil and ghee, given to the area of bite quickly destroys scorpion poison. If the smoke produced by burning flowers of *kusumbha*, *rajani*, *niḥa*<sup>49</sup> (Turmeric) *kodrava* (Kodo millet, *Paspalum scorbiculatum* Linn.)<sup>50</sup> or grass mixed with ghee is applied on the region of anus, scorpion poison and

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48 This is a combination of plants used to evoke special effects. Its results are given as

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Vaidya Bhagavan Dash, *Materia Medica of Āyurveda*.

49 AV, p. 628.

50 IMP, Vol. IV, p. 226.

insect poison will be neutralized.

According to Caraka, scorpion sting has to be treated with pigeon excrements, *mitula'ga*, juice of *zirçÄa* flower, *çankhinç* latex of *arka*, *çu, ¶hi*, *karajja* and honey. Fomentation, massage with ghee and salt, hot sprinklings, and intake of ghee are the methods of treatment.<sup>51</sup>

Vigbha¶a elaborates the treatment further. Washing the site of bite with fresh oil, application of cool drinks etc. are also mentioned.

The genesis of scorpions mentioned in iyurvedic texts are not correct. But the other aspects of the accounts like the effects of poison and treatment seem to be reliable. Hence the study of the effects of *agadas* and

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51 CS, Citiksisthina, 25.

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other medicaments will certainly enlighten the medical world.



### 7.3 Spider poison

Spiders are the web-spinning animals abundantly seen in human habitats (Fig. 7.12). They are admired for their skill, wisdom and cunning nature; feared for their sinister appearance, venomous qualities and unpredictable habits and are protected for their medicinal value and spiritual importance.<sup>52</sup> Spiders have secured a place in a number of myths and superstitions. According to Greek mythology, form of a spider is the curse of heavens on pride. The story is connected with Arachnae, the skillful weaver. Her talent had made her so proud that she challenged Pallas Athena and invited her for an open competition. Defeat alighted as a curse and made her a spider.<sup>53</sup>

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52 *EB. William Benton Publishers, Vol. 21, pp. 17-21.*

53 *Bulfinch's Mythology, Nelson Double day, Inc. USA, 1968, p. 111-115.*

*cf. The Encyclopaedia of myths and Legends of All nations. Edmund Ward, London, 1962.*

*Thomas Bulfinch, The Age of Fable, Everyman's library, New York, 1969, p. 12.*

It is a world wide belief that killing a spider is indicative of the forthcoming unluck. This seems to be a product of protective mythology. However, spiders' eating habits have some sort of importance. They feed mainly on flies harmful to the humans. This has been reflected in a number of proverbs like.

"Kill a spider, bad luck yours will be  
Until of flies you've swatted fifty  
three.

If you wish to live and thrive  
Let a spider run alive".<sup>54</sup>

About the venomous nature also, there exist proverbs like.

"Where the bee gathereth honey.  
Even there the spider gathereth  
venom".<sup>55</sup>

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54 W.S. Bristowe, *The world of spiders*, Collins. St. Jame's  
Palace. London, 1971.

55 *Ibid.*

Spider web is believed to have the capacity to staunch the flow of blood. Spiders are also attributed with the power to ward off fever and predict the weather.<sup>56</sup> These have no scientific background. Liked or disliked by the people, spiders always made their presence felt in the day to day life of human beings. Contrary to the world wide acceptance, spiders exert little influence on Sanskrit literature. May be due to their negative aspects; even in the selection of imagery famous Sanskrit poets omit spiders.

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56 *Ibid.*

### **7.3.1 Natural history of spiders – Scientific accounts**

Spiders belong to kingdom Animalia, phylum Arthropoda (Group of animals with segmented foot), sub phylum Arachnida and Order Araneae.<sup>57</sup> They lack bones, and have blue blood. Spiders have an exoskeleton formed of chitin.<sup>58</sup> Their body is divided into two parts i.e., cephalothorax and abdomen.<sup>59</sup> Mouth is capable of sucking the juices of the prey. The solid body parts of the prey are predigested to form the liquefied form. In this process, the sickle shaped fang plays an important role. The fang has an opening of poison gland.<sup>60</sup> With a pair of appendages viz. chelicerae, the spider seizes and kills the prey and pierces its body with the fang. Thus poisonous glands secrete poison, with which the solid structure of the prey is

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57        *The World Book Encyclopedia*, Vol. 8. Field Enterprises Educational Corporation, Chicago, p. 612.

58        *EB*, Vol. 21, p. 17-21.

59        *Ibid.*

60        *Ibid.*

liquefied (Fig. 7.13). This is squeezed by the spider. Usually spiders are confused with insects. But both have distinct features. The difference between them can be represented in a table.

**Table 14: Difference between spiders  
and insects**

	<b>Spiders</b>	<b>Insects</b>
1.	The body has two parts i.e., cephalothorax and abdomen	The body has three parts ie., head, thorax and abdomen
2.	Absence of wings and antennae	Presence of wings and antennae
3.	Presence of fangs and poison glands	Absence of fangs and poison glands. Some ants have stings
4.	Presence of spinnerets to produce silk	Absence of spinnerets
5.	Simple eyes	Compound eyes
6.	Four pairs of legs	Three pairs of legs
7.	Leads a solitary life	Well organized social life
8.	Practise ballooning	Winged insects fly



The most interesting aspect of spider life is its capacity to spin webs. These webs help them in procuring the prey, protecting eggs, attracting mates and defending themselves from the enemies.<sup>61</sup> Webs are formed of silk produced by the spinnerets situated in the abdomen. Silk is a scleroprotein produced as a liquid. Mechanical stretching hardens it and wherever a spider goes it spins a silk line behind it. It is called dragline or lifeline.<sup>62</sup> With its help the spider can escape from any dangerous situation. The sticky secretions coming out of the spinnerets adhere the prey to the web. However a spider always manages not to get adhered to its own web. For that some safe areas are formed in the web. Spider always clutches the web with the tip of its claw. This claw is covered with abundance of hair and pasted with an

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61 *The World Book Encyclopaedia*, Vol. 18, p. 612.  
62 *EB*, Vol. 21, p. 17-21.

oily secretion.

### **7.3.1.1 Classification of spiders**

Though a number of classifications are prevalent,<sup>63</sup> the classification done based on feeding habits is more convenient and simple.<sup>64</sup> There in spiders are classified broadly into two classes viz. a) hunting spiders and b) web-spinning spiders. The former class pursues the prey while the latter spins webs and waits for the prey to get entangled in it.

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63 Herbert W. Levi, Lorna R. Levi & Joseph Culin. "Spider", *EB*, 2007, *EB Online*, 12 April 2007.

64 *The World Book Encyclopaedia*, Vol. 18, p. 614.

a) Hunting spiders are further divided into jumping spiders, water spiders, tarantulas, fisher spiders, crab spiders, funnel web spiders and wolf spiders. Jumping spiders are the most colourful of the spider species (Fig. 7.14). Water spiders dwell under water in air tight webs shaped as a bell (Fig. 7.15). The whole structure is filled with air bubbles. Tarantulas are the largest spiders of the world (Fig. 7.16). Trap door spiders are included in this group (Fig. 7.17). This group is indulged in digging barrows as nests. Fisher spiders dwell near water resources and feed mainly on small fishes and aquatic insects (Fig. 7.18). With the light body and long legs they can walk through water surface. Crab spiders are capable of changing their colour so as to suit the surroundings (Fig. 7.19). Funnel web spiders are characterized by the funnel shaped web (Fig. 7.20). Wolf spiders are excellent hunters (Fig. 7.21).

Web spinning spiders lack clear vision. Hence they can't pursue the prey. They spin webs characteristic of their species and wait for the apt time to act. These are further divided into three groups; first among them are the tangled web-weavers (Fig. 7.21). They spin the simplest webs. They can be divided into cellar spiders; spinning webs in the dark empty places of buildings and comb-footed spiders spinning tangled web with a tightly woven sheet of silk in the middle. The notorious black widow spider belongs to this group (Fig. 7.22). Second group of web spinning spiders is sheet web spiders (Fig. 7.23). They weave flat sheets of silk between the nearby vegetation. Dwarf spiders belong to this group (Fig. 7.24). Third group is orb weavers (Fig. 7.25). They build the most beautiful but complicated webs.<sup>65</sup>

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65 *Ibid*

Spiders reproduce naturally. Male, smaller in size and attractive in form approaches the female in caution as it could be conceived as a prey. After mating, female stores the sperm in her body and fertilizes her eggs as and when needed. Male spiders have a short life span, compared with that of a female.

### **7.3.2 Nature of Spider Venom**

Venom glands are present in most spiders; except in the case of the family uloboridae.<sup>66</sup> Spider venom has a complex structure containing both neurotoxins and hemotoxins.<sup>67</sup> In most cases, spider poison owes a mild action and its effects on humans are transitory. But some specific species like Black Widow (genus *Lacrodectus*) and tarantula are dangerous to humans.<sup>68</sup> Venom of black widow is neurotoxic in nature and poisoning can be identified by two tiny red dots at the site, localized swelling, intense pain of abdomen, rigidity of muscles, nausea, sweating, respiratory distress, chills fever and numbness. Tarantula venom has a localized effect. The bite of genus *Loxosceles* causes localized tissue death.<sup>69</sup> All these poisons are well treated by antitoxic serum (Merck, Sharp and Dohme, vials of 2.5ml or

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66 Herbert W. Levi, Lorna R. Levi and Joseph Culin, "Spider", *EB*, 2007, *EB Online*, 12 April 2007.

67 *EB*, Vol. 21, p. 17-27.

68 *Ibid.*

69 Bruce W. Halstead (Ed.) "Poison", *EB*, 2007, *EB Online*, 18 April 2007.

reconvalescent serum).<sup>70</sup>

### 7.3.3 Poisonous spiders - Äyurvedic accounts

Äyurvedic treatises include spiders among the insects harmful for human existence. Poison of a spider is very harsh in action, and difficult in detection and treatment.<sup>71</sup> Hence the treatment of spider-poison is not an easy task for a physician. Because of this peculiarity, Äyurvedic treatises provide with both speculative and factual statements about spiders.

#### 7.3.3.1 Genesis of spider-species

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70 Owen Moeschlin, *Poisoning Diagnosis and treatment*, Grune & Stratton, New York, 1964, p. 635-636.

71 SS, Kalpasthina, VIII, p. 490.

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According to Suśruta, sixteen varieties of spiders are there; and all of them are poisonous. Based on the result of treatment, these spiders are classified into two categories.<sup>74</sup> i.e.(a) difficult to be cured and (b) incurable. Both the varieties have eight kinds of spiders included in their boundary.

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74      *SS, Kalpasthina, VII, p. 493.*

### **a) Kṛcchrasidhya (Difficult to be cared)**

The spider species coming under this category are named as (a) *Trimāḥala* (b) *śveta* (c) *kapila* (d) *pṛṭhivī*, (e) *ilamṅtra viḥā* (f) *rakta* and (g) *kasana*. This classification seems to be based mainly on the appearance. The fifth one i.e., *ilamṅtraviḥā* deviates from this, as the name indicates that the spider has poison in its urine and saliva. Symptoms caused by the bite of this class of spiders include headache, itching and pain at the site of bite and the appearance of diseases caused by the vitiation of air and bile.

### **b) Asidhya (Incurable)**

This class includes (a) *sauvar,ika* (b) *lijavar,a*, (c) *jilinç* (d) *e,çpadç* (e) *krÀ,a* (f) *agnivar,a* (g) *kiki,·a* and (h) *miligu,a*. Necrosis, bleeding, fever, burning sensation and diarrhoea are the symptoms caused by their bite. Besides these the diseases caused by the vitiation of three *doÀas* also find room in the victim.

### 7.3.3.3 Symptoms of spider poisoning

Caraka sums up the symptoms of spider poisoning as fever, swelling; white, black, red or yellow coloured growths, dyspnoea, burning sensation, hiccup and stiffness in head.<sup>75</sup>

75 CS, Cikitsisthina, 25.  
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 Ê{Éb÷EòÉ V´É®ú&\*  
 |ÉÉhÉÉxiÉÉèÉä ¡É´ÉäSUÂô´ÉÉ°ÉÉä  
 nùÉ½pÉ½pCEòÉÊ¶É®úÉäOÉ½pÉ&\*\*

According to Suśruta, spiders are capable of imparting highly powerful, moderately powerful and slightly powerful poison through their saliva, nails, urine, teeth, menstrual blood, excreta and semen. If poisoning occurs through saliva, there would be itching rashes on the body. These rashes would not spread. These shallow rashes will exert mild pain. Poisoning through nails and teeth produces oedema, itching, horripilation and feeling of hot fumes coming out of the wound. The wound caused by poisonous urine will have red coloured edges and black centre. Edges will not be elevated but torn. Poisoning by teeth produces painful, hard, discoloured, immovable and round patches. Poisoning caused by excreta, blood and semen produce blebs resembling an *imalaka* fruit. These would be pale yellow in colour.

According to Vigbhaṇa, treatment of spider poison is more complex than that of insects.<sup>76</sup> The bite may vitiate bile, phlegm or air. If bile is vitiated, there would be burning sensation, thirst, eruptions, fever, dyspnoea, increase in temperature, and formation of red or yellow coloured bubbles resembling a *drikāi* fruit. If phlegm is vitiated, the wound will be hard with a deplorable form. Excess of sleep, chills, fever, cough and itching are the symptoms. If *vita* is vitiated the wound will be hard, black in colour and causing fever at intervals.

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76 AH, Uttarasthina.  
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### 7.3.3.4 Spreading of spider poison

A fatal bite has an action of seven days which has been mentioned both by Suśruta<sup>77</sup> and Vigbhāṅga.<sup>78</sup> This can be represented in a table.

**Table 15: The action of spider poison**

<b>Sl. No.</b>	<b>Day of Action</b>	<b>Symptoms</b>
1.	First day	Formation of a movable rash, with mildly itching nature and of unmanifest colour
2.	Second day	The rash gets clearly manifested with swollen edges and depressed middle
3.	Third day	Red coloured circle will be formed. Fever and horripilation
4.	Fourth day	All the symptoms will get aggravated
5.	Fifth day	Aggravated symptoms produce abnormalities
6.	Sixth day	Spreads to the whole body affecting the vital parts

77 SS, Kalpasthina, VIII, p. 491.

78 AH, Uttarasthina, 27, p. 829.

7.	Seventh day	Gets severely increased to dominate the whole body functions and finally to kill the victim
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A bite of moderate potency has a longer span of action, while that of low potency extends the time further. If kept unnoticed and incurred low potency venom kills the victim in a fortnight. Naturally, spider poison can be cured after treating for twenty-one nights.<sup>79</sup>

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79 *Ibid.*

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**Table 16: Different varieties of spiders along with symptoms and treatment**



ult f tm t	Name of spider species	Symptoms produced by the poisoning	Prescribed Treatment
ch id a fic to ed)	1. <i>Trima, ali</i>	Flowing out of black blood from the site of bite, tearing of the site, deafness, blurred vision and burning sensation in the eyes	A paste of root of ar (gigantic swallow w <i>Calotropus gigantea</i> R. <i>nikuli</i> <sup>81</sup> Greater galan <i>Alpinia galanga</i> (Li <i>rajani</i> <sup>82</sup> (Tree turme <i>Coscinium fenestrat (Gaertn.) Colebr. or Inc Indigo, Indigofera tinct Linn) and <i>prainapar (Desmodium gangetic (Linn.) DC) should be gi for drinking, na medication, exte application and collyrium.</i></i>

80 *IMP*, Vol. I, p. 341.

81 *Ibid.*, Vol. I, . 110.

82 *Ibid.*, Vol. III, p. 210, Vol. II, p. 191.

83 *Ibid.*, Vol. II, p. 319.

2. áveti	white coloured eruptions, spreading the whole body producing itching, burning sensation, fainting, fever, exudation and severe pain.	Antidote made of <i>canda</i> (Sandal tree, <i>Santalum album</i> Linn.) risni <sup>85</sup> (Great galangal, <i>Alpinia galanga</i> Linn. Willd.) eli <sup>86</sup> (Cardamom, <i>Elettaria cardamomum</i> Maton) hare_u, <sup>87</sup> na (Sacred lotus, <i>Nelumbo nucifera</i> Gaertn.) vaju (Ashoka, <i>Saraca asotica</i> (Roxb.) de Wilde) KuÀ (Costus, <i>Saussurea lapidaea</i> C.B. Clarke), limajja (vetiver, <i>Vetiveria zizanioides</i> (Linn.) Nosh.) Vakra <sup>92</sup> (Indian valerian, <i>Valeriana jatamansi</i> Jones) and nilada (?)
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- 84 *Ibid.*, Vol. V, p. 57.  
85 *Ibid.*, Vol. I, p. 106.  
86 *Ibid.*, Vol. II, p. 360.  
87 AV, p. 995.  
88 IMP, Vol. IV, p. 110, AV, p. 620.  
89 IMP, Vol. IV, p. 332, AV, p. 830.  
90 IMP, Vol. V, p. 80.  
91 *Ibid.*, Vol. V, p. 361.  
92 AV, p. 827. IMP, Vol. V, p. 345.

<p>3. <i>Kapila</i></p>	<p>Brown colour of the wound, heavyness of head, burning sensation, partial blindness and dizziness.</p>	<p>Usage of <i>padma</i> (Himalayan Wild Che <i>Prunus cerasoides</i>), <i>Ku</i> (Costus, <i>Saussurea lappa</i> Clarke. <i>ela</i><sup>95</sup> (Cardam <i>Elettaria cardamom</i> Maton) bark of <i>karap</i> (Indian beech, <i>Ponga pinnata</i> Linn.) and <i>kakub</i> (Arjuna, <i>Terminalia arj</i> (Roxb. ex DC) Wight &amp; <i>sthiri</i><sup>98</sup> <i>arkapar</i> (Gingandic swallow w <i>Calotropis gigantea</i> (Li R.Br.) <i>apimirga</i><sup>100</sup> (Pri chaff-flower pl <i>Achyranthes aspera</i> Li <i>dErva</i><sup>101</sup> (Dhub gr Cynodon dactylon (Li Pers.) and <i>Brihn</i> (Thymeleaved grati</p>
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4. <i>pçtaka</i>	Yellow coloured eruptions, vomiting, fever, headache, and redness of eyes.	Antidote made of <i>kuñja</i> (Kurchi, <i>Holarrhena pubescens</i> (Buch. Ha Willich ex. Don) <i>uçñ</i> (Vetiver, <i>Vetiveria zizanioides</i> (Linn.) Nash. <i>tu'ga</i> <sup>105</sup> (T leaved cargota) <i>padma</i> <i>vajula</i> , <i>çirçÅa</i> , <i>ki,i</i> (Prickly chaff-flower pl. <i>Achyranthes aspera</i> Linn. <i>çelu</i> <sup>107</sup> (Sebesten pl. <i>Cordia dichotoma</i> Forst <i>kadamba</i> and bark <i>kakubha</i> <sup>108</sup> (Arju <i>Terminalia arjuna</i> (Roxb. DC) Wight & Arn.)
5. <i>mçtraviÅa</i>	Spreading wound, expulsion of dark blood from the wound, cough, dyspnoea, vomiting, fainting, fever and burning sensation	Antidote made of <i>manaçç</i> <i>ila</i> <sup>110</sup> (orpiment), <i>madhu</i> <i>kuÅtha</i> , <i>candana</i> , <i>padma</i> and <i>limajja</i> added w honey.

- 93 *Ibid.*, Vol. IV, p. 353.  
94 *Ibid.*  
95 *Ibid.*  
96 *Ibid.*, Vol. IV, p. 339.  
97 *Ibid.*, Vol. V, p. 253.  
98 AV, p. 978.  
99 IMP, Vol. I, p. 341.  
100 *Ibid.*, Vol. I, p. 39.  
101 *Ibid.*, Vol. II, p. 289.  
102 *Ibid.*, Vol. I, p. 235.  
104 *Ibid.*  
105 *Ibid.*, Vol. II, p. 1, AV, p. 555.  
103 *Ibid.*, Vol. III, p. 156.  
109 AV, p. 747.  
110 *Ibid.*  
106 *Ibid.*, p. 306. IMP, Vol. I, p. 39.  
107 *Ibid.*, Vol. II, p. 180, AV, p. 913.  
108 IMP, Vol. V, p. 223.

	6. <i>rakta spider</i>	Pale yellow eruption at the site of wound, burning sensation and exudation red at its edges and containing blood.	Antidote prepared of <i>vilak</i> (?) <i>toya</i> ( <i>calycopt floribunda</i> Lam.) <i>canda uçra</i> , <i>padmaka</i> , barks <i>arjuna</i> , <i>çela</i> , and <i>imritaka</i>
	7. <i>KaÅa,a</i>	Bleeding of slimy and cold blood cough dyspnoea	
dh a cur e)	1. <i>Sauvar,ika</i>	Bluish black colour of wound. Emission of froath and smell of fish, dyspnoea, cough, fever, thirst and fainting.	
	2. <i>Lijavar,a</i>	Bluish black colouration, expulsion of foul smelling blood, burning sensation, fainting, diarrhoea, and headache.	
	3. <i>Jilinç</i>	The site of bite cracking through lines rigidity of the body, dyspnoea, frequent loss of eyesight, and dryness of the palate.	
	4. <i>E,ipadi</i>	Bite resembling a black sesame, thirst, fainting, fever, vomiting, cough and dyspnoea	

5. <i>KrĀ, a</i>	Slight haemorrhage, elimination of blood with the smell of faeces, fever, fainting, vomiting, burning sensation cough and dyspnoea.	Application <i>eli</i> <sup>112</sup> (cardamom, <i>Elettaria cardamomum</i> Maton) <i>vakra</i> (Indian valerian, <i>Valeriana jatamansi</i> Jones) <i>sarpikā</i> (Mangoose plant, <i>Ophiorrhiza mungos</i> Linn. <i>gandhanika</i> (Greater galangal, <i>Alpinia galanga</i> (Linn.) Willd. <i>Candana</i> together with <i>Mahisugandhi</i> <i>aga</i> Application of <i>siriva</i> <sup>116</sup> (Indo-sarasaparilla, <i>Hemidesmus indicus</i> (Linn.) R. Br. <i>uīṣṇa</i> (Vetiver, <i>Vetiveria zizanioides</i> (Linn.) Nash <i>yaĀtyihva</i> ( <i>Liquorice, candana, utpala</i> ( <i>Ichnocarpus frutescens</i> L. R. Br. .... and <i>padmak</i> (Himalayam Wild Cherry) <i>Prunus cerasoides</i> Treatment for the <i>kr</i> spider is also desirable.
6. <i>Agnivaktra</i> ( <i>Agnivar, a</i> )	Burning sensation, excess of exudation, and pricking pain at the site of bite, itching, horripilation, burning sensation and information of ulcers.	

- 112 *Ibid.*, Vol. II, p. 360.  
113 *Ibid.*, Vol. V, p. 345. AV, p. 827.  
114 *Ibid.*, Vol. IV, p. 180.  
115 *Ibid.*, Vol. I, p. 110.  
116 *Ibid.*, Vol. III, p. 141.  
117 *Ibid.*, Vol. V, p. 361.  
118 *Ibid.*  
119 *Ibid.*, Vol. III, p. 203.  
120 *Ibid.*, Vol. IV, p. 453.

	7. <i>Kika, aka</i>	Whitish red colour of the site of bite. severe pain, thirst, fainting, dyspnoea heart failure, hiccup and cough	
	8. <i>Miligu, a</i>	Red coloured site emitting the smell of smoke, severe pain, necrosis, leading to the falling of muscles, burning sensation, fainting and fever.	

### **7.3.3.5 General Treatment**



In the case of curable spider bites, physician should apply the bark of *ileAmitaka*<sup>121</sup> (sebasten plum *Cordia dichotoma* Forst) *akAçva*<sup>122</sup> and *pippala*<sup>123</sup> (Peepal tree, *Ficus religiosa* (Linn.) in the methods like *pina*, *lepa*, *nasya* and *amjana*. (drink, paste, snuff and collyrium respectively). In the case of curable bite, the physician is directed to cut the bite using a surgical instrument named *væddhipatra*.<sup>124</sup>

121 *IMP*, Vol. II, p. 180.

122 *AV*, p. 1023.

123 *Loc.cit.*, Vol. III, p. 38.

124 *SS*, Kalpasthina, VIII, p. 497.

G. Mukhopadhyaya, *Ancient Hindu Surgery*, p. 232.

*Væddhipatra* is a sharp instrument used for incision. *ÉPÊrù{ÉjÉÆ IÉÖ®úÉEòÉ®Æú Uäônù ¡ÉänùxÉ {ÉÉ]öxÉä- AH I. XXVI. According to Vigbha¶a two kinds of *væddhipatras* are known one having a straight structure to operate superficial abscesses. While the other with a curved shape to pierce the deep seated abscesses. Suçruta recommends its usage for removing hair before a surgery.*

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*IÉÖ®úEòkÉÇ®úOºÉxnÆù¶Éè ºiÉºÉ®úÉä¨ÉÉÊhÉ ÊxÉ½Çp®äúiÉÂ – SS, IV. i.*

Other cases in which the instrument is used are the removal of scrotal tumour and excision of the wound caused by spider bites. This instrument is also used by veterinary surgeons. This has been at tested by *pilakipyä*.

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*ÉPÊuù{ÉjÉähÉ xÉÉMÉÉxÉÉÆ EÖòºÉÉÇSUäônùxÉ*

The incision is done only when the patient is not having fever or the bite is not in any of the vital parts. On mild oedema, the site of bite has to be incised and applied with anti-poisonous drugs mixed with honey and *saindhava* salt. Patient has to be given a decoction made of *priya'gu*, *rajanç*, *kuÀ¶ha*, *sama'ga* (sensitive plant, *Mimosa pudica* Linn.)<sup>125</sup> *madhuka*, *siriva*, *drikÀi*<sup>126</sup> (common grape-vine, *Vitisvinifera* Linn.), *payasyi*<sup>127</sup> (common dandelion, *Taraxacum officinale* Weber.) *KÀçramorata*<sup>128</sup> or of *vidiri*<sup>129</sup> (Indian Kudzu, *Pueraria tuberosa* DC) *gokÀura*<sup>130</sup> (Land caltrops, *Tribulus terrestris* Linn.) and *KÀaudra*<sup>131</sup> (honey or *champaka*, *Michelia champaca*). The site of bite has to be washed with cool decoction of barks of *kÀçravrkÀas*. Major process involved in the

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¶ÉänùxÉä - *Ibid*, III. i.

125 *IMP*, Vol. IV, p. 36,

126 *Ibid.*, Vol. V, p. 396.

127 *Ibid.*, Vol. V, p. 243.

128 *AV*, p. 385.

129 *IMP*, Vol. IV, p. 391.

130 *Ibid*, Vol. V, p. 311.

131 *Ibid.*, Vol. IV, p. 33. *AV*, p. 219.



should be prescribed after carefully observing the nature of poison. Food may not aggravate the poison.

If the wound is painless, thorns are to be removed by a surgical process and it should be immediately followed by the application of purifying drugs mixed with honey.

Caraka prescribes easy medicament for curing spider poison. *Candana*, *padmaka*, *uḷḷa*, *ḷirḷā*, *sindhuviriki*, *kāḷraḷukla(?)* *tagara*, *kuḷḷa*, *piḷala*, *udḷcya* (*plectranthus vettiveroides* (Jacob) Singh & Sharma)<sup>138</sup> and *siriva* when mixed with the juice of *ḷleḷmitaka*, and applied on wound made by a spider, it gets cured. The medicament prepared of *madhḷka* (South Indian Mahua, *Madhuca longifera* (Koenig) Macbride)<sup>139</sup>, *madhḷka*, *kuḷḷa*, *ḷirḷā*, *udḷcya*, *pitala*, *nimba*, *siriva* and honey are also useful for spider poisoning. Formation of

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138 *IMP*, Vol. IV, p. 318.

139 *Ibid.*, Vol. III, p. 362.

convulsions is controlled by applying *kusumbha* flowers, cowteeth, *svar, akÅçri* (Mexicon poppy, *Argemone mexicana* Linn.)<sup>140</sup> excreta of pigeon, *dantç, trivæt* and rock salt. Wounds are treated with decoction made of the barks of *ka¶abhi, arjuna, çirçÀa, çleÀmitaka* and bark of latex bearing trees.

Vigbha¶a gives an elaborate description of the treatment of spider poison.<sup>141</sup> First of all the wound has to be incised or burned. The incision has to be conducted with a surgical instrument and burned with an instrument viz. *jimbavauÀ¶ha*.<sup>142</sup> If the wound exhibits the signs of vitiation of bile, it may not be burned.<sup>143</sup> The wounds made in vital parts, joints and hair buds, which are very hard in appearance are forbidden from incising or burning. In the case of spreading wounds incision and burning are not advised. Burnt wounds have to be applied

140 *Ibid.*, Vol. I, p. 187.

141 *AH*, Uttarasthina, 27, p. 829-830.

142 VÉÉ" ¤É'ÉÉè¹` ö& IÉÉ® únùÉxÉªÉxjÉÊ'É¶Éä¹É&  
 °ÉÚjÉ°IÉÉxÉÆ, 25 +vªÉÉªÉ&\*

143 Ê{ÉKÉÉÊvÉÉò¹ÉÖ ®úÉäMÉÉä¹ÉÖ nùÉ½p&  
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with antidotes mixed in honey and rocksalt. After that, a cool decoction made of the latex-bearing trees has to be poured. Impure blood has to be oozed out with a horn like instrument. The *agadas* prescribed by Vigbhaṅga are *padmakigada*, *campakigada*, *mandarigada* and *gandhamidanigada*. Special medicaments for purification (*viśodhana*), purgation (*virecana*) removal of eruptions (*karṣikāpitana*) and fomentation (*bṛmhaṅga*) are also given. Vigbhaṅga sums up saying that the spiders exhibiting the vitiation of *pitta* (bile), *vāta* (air) and *kaphi* (phlegm) are controlled by these excellent antidotes used as drink, collyrium, snuff or paste. These *agadas* work like the wise controlling the wayward.<sup>144</sup>

When we evaluate these accounts on spider poison, we encounter a number of controversies. Modern medicine never considers spider poison as a serious threat.

144 AH, Uttarasthina, 27, p. 831.

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 ´ÉÉ®úÉxiÉäiÉä \*\* 85\*\*

Only spider species proved to be fatal to the humans is the black widow. All bites are provided with fruitful antiserum. But one thing kept unnoticed is the serious skin problems caused by spiders. When we go through the symptoms enlisted by iyurvedic treatises these skin problems can be noticed as projected to be the prominent ones. Treatment in iyurvedic system is always oriented towards the healing of wounds. This can be a valuable supplement to the modern system of treatment. In this regard the properties of *agadas* and other medicaments are to be subjected to serious study and experimentation. Ēyurvedic conception of spiders imparting poison through saliva, urine etc is wrong. Poison glands in a spider have a single way out i.e. through the fang. But body secretions of a spider may cause skin problems. The sticky material of the silk as well as the hemocyanin<sup>145</sup> in spider blood

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145 These are the respiratory pigments contained in the leucocytes (white corpuscles) of spiders. They contain more

may cause allergic complaints. Such outcomes might have been misinterpreted as cases of poisoning. Though different from modern trends of classification, Āyurvedic classification of spider species is also noteworthy. With bare eyes and keen observations what our ancestors have acquired, is indeed remarkable.

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copper than iron. In deoxygenated condition spider blood is colourless otherwise it is blue in colour. *EB*, Vol. 21, P. 21.



## **CONCLUSION**

The present study is based on one of the still debated issues of public interest, in Kerala; viz. the authenticity of *Agadatantra*. The beginning of the problem was in 1962; when *Mithrubh£mi*; one of the leading weeklies in Kerala published a series of articles by a well known zoologist Prof. K.G. Adiyodi. Illustrating his laboratory experiments with snakes, Prof. Adiyodi argued that the herpetological details given in *Agadatantra* are incorrect; and based on that he accused the system of *£yurveda* for promoting superstitions and misleading the people. Following this, there were serious debates on the topic. iyurvedic physicians also got involved in the discussions and it was Dr. V.M. Kuttikrishna Menon, who stood for the system and rationalized the theories. Both the sides were very strong and without any concrete result, the discussions dwindled away.

But whenever a slight remark is made, the issue used to get a sudden flare-up. This practice has been continuing till the present times.

When both the arguments are analysed, the following remarks are down. The supporters of modern science are analysing some minor portions in *Agadatantra* and based on the results they accuse the system of *Āyurveda* for being unscientific. The studies were conducted in laboratories. Hence the results are not applicable to real life situations.

On the other hand, iyurvedic physicians speaking for the system try their level best to justify the problematic portions. But their justifications are very much restricted. They are not able to substantiate their ideas with clinical studies or experimentations. Sometimes they themselves admit their helplessness in proving the mystic and extra sensory effects of iyurvedic treatment. Today,

some of the ayurvedic practitioners are ready to compromise with modern science and some others are involved in legitimizing all that is mentioned in basic texts. The latter usually quote the lines.

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 ÉiªÉiÉið±Énù¶ÉÇxÉÉiÉÂ\*  
 “ÉxjÉ´ÉiÉÂ ºÉÆ|ÉªÉÉäHò´ªÉÆ xÉ  
 “ÉÒ“ÉÉÆºªÉÆ EðIÉ\SÉxÉ\*\* (AH)

and forbid others from criticizing the system. This sharpens the criticism.

In this situation, the present study has made an impartial investigation to the problem. The major aim of the study is to conduct a thorough and scrupulous study of the *samhiti* works and compare the contents with modern science. The major findings of the study can be summarised thus.

*Agadatantra* has always been a part and parcel of typical Indian society. From ancient works, we can detect the gradual development

of Toxicology into a full fledged discipline. The science stands on the firm foundation of a number of principles which were formulated by the ancient people through their experience. Cases of poisoning and their treatment with medicines and *mantras* are abundantly mentioned in almost all ancient works.

Just like a modern branch of science, all the *iyurvedic* treatises begin with the definitions of technical terms with which they are dealing. They differentiate *viÀa*, *gara* and *duÀçviÀa*. The most important aspect of this portion is the properties of poison. This can be cited as an example for the critical acumen of ancient sages. Actually, they are investigating the constituent element that makes poison harmful, to a normal body. As a result, ten properties are discovered. The texts also give a detailed picture of the impact of poison in an affected body. The classification of poison, given in *Agadatantra* portions seems to resemble that of modern science. The

classification of poison into toxins and venoms is represented in the *sthivara* and *ja'gama* divisions; and the classification into natural poisons and artificial poisons is reflected in the *viÅa* and *gara* divisions. The tips to recognize a case of poisoning are given in the preliminary portion. It is really amazing to find that the iyurvedic treatment of poisoning involves twenty four steps. The treatment incorporates both the first aid measures and symptomatic treatments.

Poisonous plants are being classified into seven groups, i.e. those having poison in their roots, leaves, fruits, flowers, bark, sap and tubers. Eight plants are mentioned to have poisonous roots; among which *a'vamira*, *guµji* and *sugandhi* are highly poisonous. Four plants are mentioned to have poisonous leaves, among which none is noticed to have poisonous leaves. Among the 12 plants, with poisonous fruits, *sarpaghiti* is highly poisonous and *ibhagandhi* is slightly poisonous. Five

plants with poisonous flowers are mentioned, among which none is proved to be poisonous. Seven plants are mentioned to have poisonous bark and none of them is identified to be poisonous. Among the three plants with poisonous milk *snuhi* is identified to be poisonous. Among the thirteen plants mentioned to have poisonous stem, *kilakṣṇa*, *pilaka* and *vatsanibha* are highly poisonous. 24 plants enlisted in the iyurvedic texts remain unidentified. Nine are identified to be highly poisonous and the rest are identified to be harmless. Some plants like *sarāpa* are identified to be harmless; but it is not the final word to reject the ideas of ancient sages. Because we are unaware of the properties of each and every plant. Some may produce adverse effects in natural conditions and some in artificial conditions like exposure to heat etc. Some may create problems when taken in excess. As there is no reference to the condition, which makes the plant poisonous,

we cannot accept or reject the toxicity of the plant. The duration of time may also be considered seriously. The concept of *vegantaras* and the preparation of *duÀ çviÀiriagada* against plant poisons are the important portions of this episode.

The portion on poisonous snakes is one of the most controversial episodes. In this portion, both divergences and convergences with modern science can be cited. The classification of snakes into *darvçkara*, *ma,·ali*, *rijçla* and *nirviÀa* corresponds much with modern classification. *Darvikaras* are cobras, *rijilas* are kraits, *ma,·alis* are vipers and *nirviÀas* are non poisonous snakes. Ęyurvedic texts do not mention sea snakes. The existence of hybrid snakes is one of the most debated statements of *Agadatantra*. This can be explained in a favorable light i.e., Ancient physicians want to identify snakes for fixing the treatment. For that they depended mainly on the symptoms produced in a victim. Common symptoms

produced in patients are classified as those produced by cobras, kraits and vipers. When symptoms are complex the system attributes them to hybrid snakes. Snake venom with a complex structure puzzles even a herpetologist and to a system adopting a reverse mode of identification, it is really possible to accept the existence of a different variety of species exhibiting complex symptoms. As the system is not dealing with Zoology of Herpetology in detail, it is not its responsibility to give accurate description of the natural history of a snake. As a snake and an alligator cannot mate with each other, the quadruped snake *gaudheyaka* mentioned by Caraka, cannot be included in the group of snakes. According to Caraka, four fangs of varying colours are there in a poisonous snake. But this is not true. As the number of poisonous fangs present in a snake is only two, Caraka's assumption is incorrect. Sometimes the reserve fangs may be treated as the additional fangs. Otherwise, the



marks of non-poisonous teeth on a victim might have confused Caraka and made him assume the presence of more than two fangs. The colour of teeth can only be seen as the result of imagination. Actually all the teeth including the fangs are identically white in colour. In iyurvedic texts, snakes are considered as creatures with high memory and the power of extrasensory perception. But this idea is rejected by modern science; which have proved the deplorable condition of snake brain. The portion on different types of bites hints that iyurvedic system never considered, all the bites done by a poisonous snake as lethal. This is really scientific.

According to iyurvedic works, cobra poison vitiates *vita*. Modern medicine considers it as resulting in nervous breakdown and paralysis. According to iyurvedic works viper poison vitiates *pitta* and modern medicine characterizes viper poisoning by blister formation and necrosis. Both the systems

identify excessive bleeding as the symptom of poisoning. Modern science explains the reason behind such bleeding. Thromboplastin present in viper poison converts the coagulating agent present in blood to crystals and as the coagulating capacity is lost, blood flows out even through a small wound. From this, it can be assumed that though unable to reach the minute detail of the symptom, iyurvedic system has sincerely observed and recorded the symptoms and tried its best to prescribe suitable treatment for the observed symptoms. According to *Ēyurveda* in the case of krait poisoning vitiation of *kapha* and the rigidity of the body are the observed results and modern science says that the neurotoxic effect of the venom causes broken neck syndrome. When the results are analysed it is obvious that both the systems are oriented towards the same truth, but the parameters differ.

While describing the first aid and systematic treatments, iyurvedic system

exhibits its scientific outlook. Though venipuncture is advised in all the cases of snake bite, it is forbidden in viper poisoning. It has been scientifically accepted that the anti-coagulating agents present in the venom will cause continuous bleeding resulting in collapse. In the case of viper poisoning; washing the wound with cold water is also forbidden. It has been substantiated that washing with cold water will decompose the tissues, which are affected by necrosis. Even though *mantras* are mentioned as a part of the treatment, it is not followed by Suçruta. He prefers medicine to *mantra* and explains his stand. Expressing his feeling of reverence to the sages who can cure poison by *mantras* he mentions the great effort prerequisite for acquiring that power. Considering the impracticability of the tradition, he advises to follow the treatment with medicines. But in *AH mantras* have been advised twice. Even then the *samhiti* texts seem to follow the treatment

with medicines. While binding tourniquet above the site of bite, the system adopts scientific approaches. It realizes the purpose of the practice and insists that the binding may neither be too light to make irreversible injuries to the veins nor be too loose to let the poison spread. Before sucking the poison out from the wound, the person ready for the task is advised to make sure that there are no wounds or lesions in his mouth. In this way the system takes precautionary measures to manage all the emergency situations arising before a physician. Coming to the systematic treatment, we can see a wide spectrum of treatments. a number of *agadas* viz. *gandhahasti*, *mahigandhahasti*, *ajita*, *kÀira*, *mtasamjçvani*, *samjçvani*, *kalyanaghta*, *mahisugandhi*, *hita*, *himavin*, *amtaghata* etc. are mentioned in this episode. Modern medicine prescribes antivenin as the only solution for snake bites. If applied directly to the wound, antivenin would elicit hyposensitive

reactions. Hence it is applied only when serious manifestations of poisoning appear. Even if dialysis and antibiotic therapy are supplementing the treatment, the chance of bringing back a patient from the final stages of poisoning is almost impossible. On the other hand *Āyurveda* having a long history of treating and curing snake bites has much to contribute to this field of medicine.

The chapter on the diseases caused by rats and other animals show how useful *Āyurveda* is to a society, which is very conversant with animal pets. Even though the epidemics like plague were not familiar to the sages, some of the diseases like rat bite fever seem to be treated in those days. Suśruta was aware of the fact that rats are not poisonous by nature but are made poisonous by the change coming in their internal constitution. In this context, apart from symptomatic treatment, special treatments are also given. The *agada*, viz. *mĀikaviĀiri* is very important. All the details

of Rabies and its treatment are given in iyurvedic texts. The treatment involves special regimen and medicinal preparations. The treatment is, of course a long process and in each and every step the physician should take care of the patient. As modern medicine cannot bring back a patient from the final stages of Rabies, iyurvedic solutions for Rabies become significant.

The portion on criminal poisoning helps in identifying a poisoned foodstuff. The iyurvedic solutions for poisoning of 29 essential commodities of life are given in this portion. They include food, tooth brush, mouth gargles, anointing oil, massaging materials, bathing materials, clothes, comb etc. The details of artificial poison viz. *gara* given in the texts are relevant even today. In this age of increased atmospheric pollution and administration of biological weapon by the hostile armies, iyurvedic solutions for poisoning become important.

By the term insect, iurvedic books refer all lower creatures except spiders and the poisoning or irritating effect produced by them, are included under the head insect poisoning or *kṣṇaviĀa*. Here the poisoning caused by wasps, garden lizard, *galagolika*, centipede, frog, big scorpion, *ahinduka*, ants, honey bee, mosquito, leech, *ucciti'ga*, fishes and house lizards is treated in detail. Solutions for all the problems created by these creatures are provided in the treatises. The internal divisions of each species given in the texts require special attention. Treatment of scorpion sting and spider poisoning are considered as very important. Spider poison is considered as more dreadful than snake venom. Here a number of special recipes are also given. They are *padmakigada*, *campakigada*, *mandarigada* and *gandhamidanigada*. According to the system, insects are either born out of the body wastes of poisonous snakes or decaying matter. This is incorrect. It has been

scrupulously proved that all insects are biogenic. Among them some are oviparous and some others viviparous. Scorpions belong to the latter group. Then how the system of *Ēyurveda* acquired such a wrong notion! This question leads us to the egg laying habits of insects. Almost all egg-laying insects bury their eggs in mud or decomposed wood. Eggs commonly invisible to bare eyes might have made the system believe that insects are originating from dead or decaying matter.

From this study, it has been revealed that *Ēyurveda* provides all the necessary solutions for the needs of the society. Of course, some of the portions given in the texts are wrong. But we cannot blame the sages for those portions because all these portions were prepared in a less sophisticated age and society. For their conclusions, they depended mainly on observations. And to understand the real anatomy and physiology, observation is not enough. So for the wrong conclusions, they



may be excused. But we cannot consider that everything told in iyurvedic treatises are wrong. Many details given in those texts are highly scientific and authentic. In iyurvedic treatises, nothing is mentioned of the efficiency of the medicine. And to a society less concerned of the scientific clarifications, the experiences shared by great sages themselves became the final word. But in this age, that is not sufficient. As the authenticity of basic texts itself is being questioned, no longer those texts can appear before the student in their previous form. An iyurvedic student should be confident about the discipline, which he is mastering. He should not follow his ancestors blindly. He is not obliged to obey or preach all that is mentioned in the *samhiti* works. He should be very critical in approach and should be bold enough to neglect the wrong and accept the right. As the texts are embedded with knowledge mixed with religious beliefs, texts should be rearranged to contain the original

text, the scientific basis if any and the conclusions reached by thorough study and analysis. For example the *samhiti* works advises a victim to bite the same snake. If a bitten person is trying to catch the same snake the possibility of poisoning increases. Even though this is cited as an example for the mental assurance, this is not a good advice. The treatises are also ready to classify the snakes into different castes based on their glance and postures. These things are to be neglected. So in a textbook, when these textual portions are appearing, they should be followed by the expert opinion about the practicability of the concept. Even amidst these paraphernalia, the most important knowledge preserved in these texts is of course, the medicinal preparations. One should be very careful, while criticizing the traditional knowledge bases. The criticism should always be a constructive one; otherwise one careless leap may destroy the whole system. So critics

should define their goal. That may not be the clarification of a proposed theory. Accepting new ideas of modern science is very good but it won't permit someone to eradicate the existing knowledge bases. The criticism should always be oriented towards the welfare of humanity. Whatever proves to be beneficial should be accepted, whether it owes a traditional or modern source. If the herpetological details or some minor portions provided in the texts are not correct we cannot blame the system. We should concentrate on what they really try to convey. That is really the treasure house of all the acquired knowledge that our ancestors have preserved for the coming generations. To exonerate the system from the suspicion of treating the nonpoisonous bites the potentials of each and every *agada* are to be determined. It is the responsibility of the Government and institutions like *Central Council for Ēyurveda and Sidha* to prove the potentials of the

medicinal preparations mentioned in the works. So to determine the real potential modern measures of pharmacology has to be applied. In modern medicine, before coming to the market each and every drug has to be undergone a number of tests and trials. These tests viz. clinical studies (clinical trials) are conducted to ensure that a new medicine can be used safely and effectively to treat patients. New drugs are first tested in the laboratory, then on animals. Only if laboratory and animal testing demonstrate that a drug product is reasonably safe can it be tested on human volunteers in clinical studies. These studies are designed and conducted on the strict rules and guidelines of *Food and Drug Administration* (FDA). This procedure should be adopted in determining the potentials of *agadas*. This can otherwise be possible by conducting studies in *Ethno-pharmacology* (a multidisciplinary area of research concerned with observation, description and experimental investigation of

indigenous drugs and their biological activities or the interdisciplinary scientific exploration of biologically active agents traditionally employed or observed by man). By conducting such studies we can determine the potentials of the *agadas* and investigate whether they can help us in curing the diseases of the present times.

### **Recommendations of the study**

The outcome of the study suggests for the following changes to be introduced to the present system of iyurvedic teaching and research.

1. All the basic texts when appear before an iyurvedic student, they should be reorganized to contain the basic text, critical study and the conclusion. This will enable a student to have the real knowledge of the system. He may not be forced to glorify the system blindly but

should be provided with the real pictures of all the details given in the original works.

2. As a branch, having so severely been criticized by modern scientists, *Agadatantra* should be given a special place in the researches.
3. *Agadas* are to be subjected to laboratory and clinical testing.
4. Measures to record and study the knowledge bases of traditional practitioners and traditional remedies for poisoning should be taken.

### **Scope for further research**

1. Many of the important works of *Agadatantra* remain unpublished. Measures for collecting and editing the manuscripts can be done.
2. Sanskrit literature reflects the toxicological awareness of the age in which it was created. These references can be compiled

together and compared with the ayurvedic accounts of Toxicology.

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## **APPENDIX I**

### **TOXICOLOGICAL INSIGHTS OF KERALA**

In Kerala, we can see lush green vegetation full of variety and utility. The unique geographic pattern full of greenery makes the land a natural habitat of a wide variety of living species; among which include poisonous reptiles, insects etc. So development of Toxicology was the result of the struggle of primitive keralites for their existence. From the very beginning of the history, Toxicology seems to be a part and parcel of the society of Kerala.

#### **Kerala School of Toxicology**

In the Kerala tradition of Toxicology, we can see two main streams. First one is called *ViÀavidyi* and the other *ViÀavaidya*. The former owes a Tamil origin while the latter is derived from the knowledge bases of the *iryans*. *ViÀavidyi* is a system which uses only *mantras* to cure the cases of poisoning. *ViÀavaidyi* treats poison by giving medicines. These two streams amalgamated together to form a very unique style. So to analyse the peculiarities of Kerala school of Toxicology, both the streams have to be studied well.

***ViÀavidyi***: This has been derived from the daily practice of the aboriginal tribes of Kerala. This is strongly interlinked with the Tamil



for obtaining progeny, prosperity and good health. Milk, turmeric and water are offered to snakes.

However, the persons entrusted with the mission of protecting the poisoned took over the task with great determination. They depended mainly on the *samhiti* works and created their own books. In those words the influence of *viĀvidyā* is also visible. The works popular in that ages are

\mcm-b-Wo-b-ap-Īn-i-ap-Xv]-ew-l-c-ta-Jem  
 e£-Wm-arXajvSmw-K-lr-Zbw lme-h-©\w  
 hn]-kw-l-c-W-ñ\p hnti-jn-ñ-h-tb-gnepw  
 D]m-b-app sNmĀp¶p hnkvXt-cW hn]-ÝnXx<sup>4</sup>

By *Niriya,çya*, the first 10 *paññālas* of *Tantrasirasa'graha* are mentioned. The work gives importance to the mantric tradition. *Udv çā* gives importance to medical treatment. Nothing is available about the content of *Utpala* and *Haramekhala*. *LakĀa,imṛta* is a standard work on Toxicology. It has been written by Sundara. The work begins thus.

SÉÚb÷ÉSExpùÊ  
 ´ÉÊxÉ<sup>1a</sup>Éxnù<sup>o</sup>ÉÖvÉ<sup>a</sup>ÉÉ|ÉÚiÉĀ |  
 É<sup>o</sup>ÉÉvÉxÉ"ÉĀ  
 MÉ®ú& Eòh`äö {É®Æú <sup>a</sup>É<sup>o</sup>aÉ <sup>o</sup>É  
 {ÉÉ<sup>a</sup>ÉÉiÉĀ |ÉÖ´ÉxÉÆ |É´É&\*

and ends with the lines

<sup>4</sup> K.Sankaramenon, Intro. *Jyotsniki*, p. iv.

Ê´É¨ÉÉ {ÉÚ´ÉÇiÉxjÉÉvÉÓ  
MÉ®ú±ÉC±ÉäÊ¶ÉxÉÉÆ xÉPhÉÉ¨ÉÂ\*  
<nÆù |ÉÉhÉÉä{ÉEðÉ®úÉIÉÈ MÉPÁiÉä  
±ÉIÉhÉÉ¨ÉPiÉ¨ÉÂ\*

The portion given in *AÀ¶i´gahdaya* on Toxicology was very popular among the keralites and has been mentioned as a single work. *Kilavaµcana* describes treatment in the critical stage. Based on these works written in Sanskrit, a number of works are produced in which Sanskrit and Malayalam are used. The works like *Jyotsniki* and *Prayogasamuccaya* come in this tradition. Following these works quite a large number of works are produced. All of them cling mainly on the characteristics of Kerala school of Toxicology.

## **Characteristics of Kerala school of Toxicology**

1. **Equal importance to medicines and *mantras*:** Fruitfulness of *mantras* depends on the strict rules that the physician observe throughout his life. He has to accept the *mantras* from a preceptor, live an ideal life dedicated only for the treatment and make himself updated with the studies. Treatment of poisoned persons was actually considered as a social service. No remuneration was accepted. So the rich families of the land accepted this as a mission and a clever person from such families was entrusted

with the mission. He worshipped the deities and set aside his whole life for the same. Families like Kokkara, Pimbinmekki<sup>5</sup> and Kiri<sup>5</sup> are famous for their excellence in the treatment.<sup>5</sup>

2. **Diagnosis based on the mannerisms of the messenger:** Almost all works of keralite origin mention this as an inseparable part. The physician who could predict a case of poisoning could easily infer the present state of the patient by simply observing the mannerism of the messenger. But there is no scientific basis for the same.
3. **Close connection with astrological calculations:** For his inferences, the physician depends mainly on the astrological rules. Peculiarities of each date have to be noted. This deviates much from the common astrological notes given in classical texts.
4. **Usage of local plants as medicines:** Medicines are prepared with plants commonly seen in Kerala. Plants like neem, tamarind, sandal wood, milk hedge etc. are the main ingredients of *Agadas*.
5. **Special preparations in all the possible forms:** *Agadas* are prepared in forms like drinks (*pina*), *kalka*, *leha*, *ghṛta*, *taila*, *kvitha*, *cṛa* etc.

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<sup>5</sup> *Keralṭyasamskṛtasihiyacaritam*. III, p. 542.

6. **Treatment through the practice of *karuts*:** Different *karuts* viz., *kaṁṁi*, *garu·a*, etc. are prevalent among the tribal people. There are stories of people who had escaped from poison by taking any of the substance mentioned in the *karut*. Tribal people used to recite the story in a particular way. The matter full of Tamil usages and phrases are considered as the non-iryan counterpart of iryan *mantras*. Many popular tales speak of the hostility of established toxicologists towards the *tribal* people practicing *karuts*. The tribal people brutally killed by the upper-class and are converted into the form of *Teyyams*.

### **Important works from Kerala**

## ***Jyotsniki***

This is, one of the popular works, which presents all the toxicological insights of Kerala. Niriyaḥ, disciple of Visudeva is identified as the author of the work.<sup>6</sup> Visudeva of kiḥyapa race was a devotee of āiva at Va·akkunnithatemple, Thrissur.<sup>7</sup> From the language, the work can be assumed to have been influenced by the language and culture of Malabar. The work exhibits its indebtedness to an early work viz., *LakĀa, imḁta*. Even though the date of composition is not mentioned in the work, K. Mahidevaḥistri evaluates the internal evidences and fixes the date not later than 1790.<sup>8</sup>

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<sup>6</sup> *Jyotsniki*, 21, p. 125.

\mcm-b-tW\`mtjbw NnlnŌm tPymŌn-\n-lm-`n[m  
BNm-cy-l-cp-Wm-]qĀ@-kp-[m-`m-\p-h-sX-s,mgpw

<sup>7</sup> *Ibid.*

X{X lmiy-]-tKm-{X-`nĀ kw`-hn`p KpcpĀ½a  
{io]p-co-i-Kn-co-iky ]qPmbmw XĀ-`cĒ ssh  
bky hmK-ar-tX-ss\h hnjm-hn-jvS-ĒpJo `thXv  
XmZr-iky Kptcm-cm-ko-Zm-β-P-Ým-β-k-¶n`x  
Xmhp`u hmkp-tZ-hmJyu hmkp-tZ-h-in-h-[]nbu  
kzIĀ½Wm N X]km tZymX-am\u ZzntPm-`au

<sup>8</sup> K. Mahadevasasthri, Intro. *Jyotsniki*, p. xi.



The work has been divided into 21 *adhikiras*. First *adhikira* elaborates the characteristics of a physician treating poisons, the patients not to be treated, patients to be treated and varieties of poisons. A brief list of the content is also included in this portion. The work describes the greatness of treating a poisoned man and considers the work as superior to all religious deeds like *dina*, *yiga* etc.<sup>9</sup> The second *adhikira* exhibits all the specialties of Kerala school of Toxicology. The astrological codes influencing snake bite and treatment are explained here in detail. The dates, weeks and months having an inauspicious effect, other inauspicious conditions, possibilities of death, critical stages, auspicious and inauspicious messengers, interpretation of the message etc. are described. The third *adhikira* describes the signs of snake bite, different types of fangs and the signs of bite caused by each, spreading of poison, and signs of death. The fourth *adhikira* elaborates general treatment and the first aid treatments, while the fifth, sixth and seventh *adhikira* deal with the treatment of hooded snakes, vipers and kraits respectively.

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<sup>9</sup> *Ibid.*

The eighth *adhikira* narrates the methods of venipuncture, sweating, etc. The most important portion given in this chapter is on the diet. Desirable and undesirable cereals, condiments, vegetables, fruits, meat, other provisions for the patient etc. are enlisted in detail. This section concerns mainly with the food habits of Kerala. When other texts give general statements on dietary habits. *Jyotsniki* goes to the minute details. A poisoned man is advised to avoid the intake of oil, betel leaves with areca nut, flour cake, molasses, tamarind, Indian mustard, coconut, buttermilk, acidic substances, meat, ghee, liquor, vegetables, sugar cane, jackfruit etc. They are forbidden from day sleep, weariness, hard work, exposure to snowfall, walking, anger, grief, loud speech, fear, harsh words, and all the deeds exerting tiredness.<sup>10</sup> In this *adhikira*, treatment, preparation and application of medicaments etc. are also given.

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<sup>10</sup> *Ibid.* VIII, p. 44.

am\k-tZ-l-]o-UIÄ hcp-̄o-Sp¶ |Ä½-§-sfÄmw  
hÄÖy-a-sX¶p Xs¶ \nXcmw t{]màx `njKv`nx ]pcm.

The ninth *Adhikira* speaks of the preparation of different medicaments. The tenth *adhikira* describes the concept of *Amṛtakala* (The sites of elixir). These are said to be very important in the treatment of poison. They are fifteen in number, thumb, leg, joints, knee, genital organ, navel, heart, chest, throat, nose, ear & eyes, the middle of the brows, forehead, and head.<sup>11</sup> If rubbed on these points, poison will vanish. But if rubbed in the opposite direction it will prove to be fatal. In this *adhikira*, another section describing the genesis, importance, method of procurement, application etc. of medicaments are also included. Here *suprabhi* is identified as the deity of medicinal herbs. If taken without paying due respect, herbs will not exert their innate power to cure. Hence before obtaining a herb, it has to be worshipped with flowers and a particular *mantra*.<sup>12</sup> The application of medicaments also involves a number of rituals. This portion highlights the ritualistic attitude of Kerala society towards the treatment of poison.

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<sup>11</sup> *Ibid.*

AwKpjuTw ]mZhpw kÔn Pm\p Kplyw N \m`nbpw  
 lrZbw lpNhpw IWvTw \mknIm t\{X-IA@hpw  
 {\`qa<sup>2</sup>yw s\än aqÀ<sup>2</sup>mhpw Øm\-\$Ä ]Xn-\-©n-h.

<sup>12</sup> *Ibid.* X, p. 56.

Hmw \tam Huj-[o`yx DuÄÖ-ht´m `hn-jyY  
 XzZzossyx lrÖ\o-lp-cp<sup>2</sup>zw ]N ]N \ \ \ \  
 Zl Zl amcb amc-b- Xp`yw \ax

The eleventh *adhikira* describes the poison of rats. Deviating from the *samhiti* texts, *Jyotsniki* enlists sixteen types of rats. Viz., *kulacandra*, *karaghna*, *viÀaghiti*, *bhayinaka*, *kr£ra*, *ugra*, *kumuda*, *meghanida*, *bh£taka*, *tçkÀ,a*, *sudar¿¿a*, *simhisya*, *sudantha*, *sumukha*, *ekacirç* and *sugarbhi*.<sup>13</sup> The *adhikira* further provides with symptoms, first aid and treatment for rat-poison.

The twelfth *adhikira* elaborates the poison of scorpion, spider, mongoose, cat, dog, jackal, horse, monkey, frog, hornet, leech, fish, honey bee, green house lizard, chameleon, millipede, etc. An interesting portion is on the poison of human teeth.

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<sup>13</sup> *Ibid.* XI, p. 58.

The thirteenth *adhikira* is on poisonous plants. The chapter concentrates to prescribe the treatment for the poisonous plants seen in Kerala. Use of *Terminalia Ballerica* in the case of poisoning by a marking nut tree,<sup>14</sup> sour mango against the poisoning of butter milk, coconut milk against tobacco, saline water against oil and dried ginger against jackfruit etc. are enlisted here. These are the records of regional treatments hence bear great importance.

The 14<sup>th</sup> *adhikira* deals with the treatment of cows. The 15<sup>th</sup> *adhikira* elaborates on the preparation and application of medicaments. Preparation of *Bilvidi*, *hi'gvidi*, *rasidi*, *mṛtyuṃjaya* and *sinduridi capsules* and preparation of collyriums viz. *mṛtyuṃjaya*, *garu·a*, *daḷabḥja*, and *mirḥca* etc. are described here.

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<sup>14</sup> C. Madhavan Pillai, *Malayalam English Dictionary*, NBS, p. 407.  
Marking nut tree, *Semecarpus orientalis*.

The 16<sup>th</sup> *adhikira* further elaborates the preparatory details of some other medicaments that cure all types of poisons. Preparations viz. *cĕr,arija* and *bhuja ġacĕr,a* are described here. A particular treatment with the plant *vela* is also given. The plant *vela* is identified as Wild mustard (*Cleome viscosa* Linn.).<sup>15</sup> The cultivation of the plant involves a series of processes. If applied in different medicinal preparations. The plant is said to have the power to eradicate all types of poisons. The preparations which help to catch snakes, forbid them from opening their mouth, and make the snakes go away are also described.

The 17<sup>th</sup> and 18<sup>th</sup> *adhikiras* speak of the genesis and genealogy of snakes. Body features of eight type of snakes viz. *ananda, gulika, visuki, ĩa ġkhapilaka, takÀaka, mahipatma, patma* and *kirkotaka*, the origin of other snakes from these divisions, life, dentition, longevity, reasons for snake bite etc. are also described.

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<sup>15</sup> *IMP*, Vol. II, p. 116.

Next two *adhikiras* are meant to explain the major peculiarity of Kerala school of Toxicology i.e., the adherence to *mantras*. The 19<sup>th</sup> *adhikira* describes different types of *mantras*, qualities of a teacher and a student and the acceptance and failure of *mantras*. 20<sup>th</sup> *adhikira* goes further into the application of *mantras*. Nature of a *mantra*, method of muttering *mantras garu·amantra*, fine acts, concept of arresting the snake, *śudhihṛdayaprayoga* and *nṣlaka*, *ṣhatrakāra* are narrated in this *adhikira*. The 21<sup>st</sup> *adhikira* elaborates the history of *Ēyurvedic* tradition up to the times of the author. According to it, Brahma transmitted the medical science to Dakāaprajapati. From his Aśvanṣdevas obtained the science from them Puruhṣta received the science and he gave the same to the sons of sage Atri. They popularized the science which was later on accepted by the preceptors of the author. As an appendix the author prescribes special recipes for the treatment of different ailments affecting a poisoned person. They are 16 in number and if avoided, are capable of killing the patient. Special recipes of *kāirigada*, *sugandhikhyigada* and *mahisagandhigada* are described. These three prescriptions are similar to that of the *samhiti* texts.

### ***Viāaniriya´ṣya***

This has been considered as the most authentic work on Toxicology penned by a keralite author. Actually the work forms a part of *Tantrasirasa 'graha*; a hand book on *Tantra*. *Tantrasirasa 'graha* contains 32 chapters dealing exclusively with *ViÀavidyi*, *ViÀavaidya*, *Mantravida* and *Tantra*. Of these 32 chapters first ten chapters (*paññalas*) are of toxicological importance. The author Niriya, a belonged to áivapura on the banks of river Ni½a. Here the author presents a blending of *viÀavaidyi* and *viÀavidyi* which has been identified as the main characteristic of Kerala school of Toxicology.

When we analyse the contents of first 10 *paññalas* we come across, all the basic conceptions of Tantric tradition. In the first *paññala* the contents of the work, nature, divisions and the process of procurement of *mantras*, characteristics of a preceptor and disciple etc. are given. The contents of the work are summarised thus.

Ê´É¹ÉOÉ½pÉ¨ÉªÉv´ÉÆºÉÉ& IÉÖpÆù  
 ¨É¨ÉÇ SÉ EðÉÊ¨ÉEð¨ÉÂ  
 <ÊiÉ ¹É]ÂõEðì¨ÉEÆð  
 iÉxjÉ¨ÉäiÉîiºÉÊrùuùªÉÉº{Énù¨ÉÂ\*<sup>16</sup>

*Mantras* are divided as masculine, feminine and neuter among which masculine types are used to destroy poison. The work clearly defines the qualities of both the preceptor and

<sup>16</sup> *Tantrasirasa 'graha*, I, p. 13.



disciple.<sup>17</sup> Procurement of *mantra* is an important task. Muttering of *mantras* is described in detail. Single *mantra* obtained through tough rituals is capable of fulfilling all the needs. A man with a number of *mantras* is identified as *áiva*.<sup>18</sup>

Contents of second *pañjala* are summarised in a verse.

xÉÉMÉÉänùªÉÉäIÉ  
 iÉ®úÉÊnùNÆù¶ÉºIÉÉxÉÉÊxÉ ¨É¨ÉÇ SÉ  
 ºÉÚSÉEÆò nù¹]õSÉä¹]äõÊiÉ  
 ºÉ{iÉ±ÉIÉhÉ¨ÉÖSªÉiÉä\*

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<sup>17</sup> Ibid.  
 vÉÒ®úÉä nùIÉ& ¶ÉÖÊSÉ¡ÉÇHòÉä  
 VÉ{ÉvªÉÉxÉÉÊnùiÉi{É®ú&  
 ÊºÉrùºiÉ{Éº´ÉÒ EÖò¶É±ÉºiÉxjÉYÉ& ºÉiªÉ¡ÉÉ¹ÉhÉ&  
 ÊxÉOÉ½pÉxÉÖOÉ½äp ¶ÉHòÉä  
 MÉÖ´úÊ®úªÉÉÊ¡ÉvÉOªÉiÉä\*\*  
 ¶ÉÉxiÉÉä nùÉxiÉ& {É]Öõ¶SÉÒhÉÇ¥ÉÀSÉªÉÉæ ½pÊ  
 ´É¹ªÉ¡ÉÖEÂò  
 EÖò´ÉÇzÉÉSÉªÉÇ¶ÉÖ,ÉÚ¹ÉÉÆ ¨ÉxÉÉä  
 ´ÉÉCEòÉªÉEò¨ÉÇÊ¡É&  
 ¶ÉÖrù¡ÉÉ´ÉÉä ¨É½pÉäiºÉÉ½pÉä ¢ÉÉärùÉ Ê¶É¹ªÉ  
 <ÉiÉ º¨Ép¡É&\*

<sup>18</sup> Ibid, 17.  
 ºÉªÉÊCºÉrèùEò¨ÉxjÉºªÉ xÉÉºÉÉvªÉÊ¨É½p ÊEò\SÉxÉ  
 ¢É½Öp¨ÉxjÉ´ÉiÉ& {ÉÖÆºÉ& EòÉ EòIÉÉ Ê¶É´É B´É  
 ºÉ&\*

Third chapter describes the protection of life (*jçvarakÀi*) and the *mantras* like *garu·amantra*. Along with the *mantra* the method of muttering each *mantra* is also given.

Fourth chapter describes the *çaiva* mantras like *nçlaka´hçya*, *vidyidhipatirudra*, *viÀairirudra*, *titiru·ra*, *viÀagarbharudra*, *pakÀairudra*, *viÀotsidanarudra*, *kiritarudra*, *viÀabhakÀarudra*, *rudri´kaça*, *kirç¶irudra* and *pi´galarudra*.

Fifth chapter explains the measures to invoke a snake. For that the physician has to purify himself by performing a ritual viz. *śucividyā*. Then he has to invoke the bitten snake and carefully observe the snake so as to determine the class to which it belongs. A bitten snake is determined by its crooked posture, contraction of the skin, deep breath, half open eyes, hiding nature and laziness. Before muttering specific *mantras* to cure the poison the physician should identify the snake. *Kirkoṅka* variety of snakes has patched neck, spear-marked hood, wandering nature and half-moon marked body. *Mahipadma* variety can be identified by ever stretched eyes, three vertical lines on the neck and hood with the mark of *Indrvara* on hood. *Takāka* variety is identified by five dots on the hood, and quick movements. *śāka* variety has stern glance and dotted hood. The snake with the mark of a conch on hood is called *śākhapila*. *Visuki* has the mark of *svartika* in its hood and has the habit of looking through the left side of the eye. The snake with shivering tail and hood with a lotus mark is identified as *padma*.

Snakes are classified as *Brihma*, *a*, *kÀatriya*, *Vaiÿya* and *á£dra* types. *Brihma*, *a* snakes feed on air and live in treasure places, dense forest regions and mountains. *KÀatriya* type lives in ruined houses feed on mice and lives near lakes. They are active in the noon. The snakes live in holes, in the woods and pathways, feed on frogs, and wander in the afternoon are identified as included in the *Vaiÿya* variety. The snakes live in stables, sacrificial areas, old wells, squares, thorny trees, islands or marshy areas are the *á£dra* variety of snakes. They wander around at night. The favorite dish of each variety is also given. Their dwelling places are specifically mentioned. The *Brihma*, *a* variety of snakes dwells in sacred places like temples, courts, cultivation fields, empty houses, or trees like *paliÿa* and *aÿvatha*. If the snakes are dwelling on trees like *udumbara*, *va¶a*, *plakÀa*, *ÿimÿupi*, *arjuna* or polluted or dirty places they are *KÀatriyas*. *Vaiÿyas* live in marshy places and thorny trees and *á£dras* dwell everywhere. All snakes are found to be dwelling in termite mounds. The chapter also deals with the details of snake bite. To eradicate all type of poisoning, *mantras* are to be muttered.<sup>19</sup>

<sup>19</sup> *Tantrasirasa 'graha*, 5, p. 17.

{ÉÖ¹{ÉÉ¶ÉÖ ´ÉÉ ÊuùVÉ& IÉÒ®úÉtÉ½pÉ®ú&  
 ²ÉÉzÉp{ÉÉä®úMÉ&\*  
 ´Éè¶ÉÉä ±É´ÉhÉ´´ÉÉÆ²ÉÉ¶ÉÖ xÉ ¶ÉÚpù²ÉÉ¶ÉxÉä  
 î¶ÉÊiÉ&\*

The sixth chapter deals with antidotes. Before systematic treatment the chapter summarizes all the precautionary measures thus.

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Importance of *amṛtakalas* and their role in the treatment are also described. It describes cobra poison in detail.

The seventh *paṇāla* enumerates the 16 varieties of vipers along with the treatment for their bite. The eighth chapter deals with the treatment of krait poison. The ninth chapter describes the treatment of poisoning by rats. The tenth *paṇāla* deals with the poisoning caused by the bite of spiders, scorpion, fish, frog, centipede, lizard, donkey etc. The chapter also covers the poisoning caused by the bite of dogs and poisonous plants.

As the forerunner of Kerala school of Toxicology, *ViĀaniriya,çya* exhibits all the characteristic features of the class to which it belongs. Adherence to *mantras* and the acceptance of substances abundantly seen on the land like coconut etc. are the main features of the work. It concentrates mainly on the treatment of snakes. Spiders and other creatures have only a secondary importance. The work describes the origin of medicinal plants thus - After the creation of human beings Brahma created medicinal plants for the protection of his subjects, and for the protection of medicinal plants a goddess viz. *suprabhi* was entrusted. Whoever accepts the plant without due respect will not get the real effect. The vigour of the plant will be taken away by the goddess. So before receiving a plant part, everyone has to salute the plant and mutter a *mantra*.<sup>20</sup>

<sup>20</sup> Ibid, 10, p. 38.

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## ***Prayogasamuccaya***

This is a text; which is considered as one of the most authentic work on Toxicology. The work popular in Kerala is a translation of the original Sanskrit text. The translator is Kocchunni Thampuran of Kochi. Nothing is available to prove the date or authorship of the original text. The translation belongs to the early half of twentieth century and has been studied and practised throughout Kerala.

The work contains eleven chapters viz. *paricchedas*. The first chapter begins with the genealogy of divine serpents, and explains the nature of snakes commonly seen on earth. Here varieties of snakes, places notorious for fatal snake bites, nature of fangs, characteristics of a poisonous bite, incurable bites, and signs of death are described. Next chapter gives the first aid measures, and focuses on the poisoning by cobras. Third chapter is on the poisoning caused by the bite of vipers. As the poisoning by viper is very common in Kerala, this is the lengthiest chapter which covers almost all the minute solutions to tackle each and every situation of crisis arising during the treatment. The fourth chapter is on krait poisoning. The fifth chapter is another lengthiest portion giving the instructions to treat a patient bitten by an unidentified snake, the measure of treating an ailing patient, the recipe of some particular preparations, treatment with *vela*, and the

treatment of poisoning caused by the bite of hybrid type of snakes (*vyantiras*).

The sixth chapter deals with the poisoning caused by the bite of rats. The seventh and eighth chapters deal respectively with the scorpion stings and spider poisoning.

The ninth chapter deals with the poisoning caused by lower animals like that of mongoose, cat, frog, monkey, horse, dog, fox, garden lizard, lizard, hornet, leech, centipede, millipede, fish, etc. Along with that, the treatment for the irritation caused by the bite of human beings is also given. Treatment for poisoned animals, and the diet prescribed for the patient, the diet forbidden for the patient, the quantity of medicines, methods of preparation of medicine and the application etc are the other topics coming in the chapter. The tenth chapter is on the characteristics of the messenger. It explains how to infer the conditions of the patient by observing the mannerisms of the messenger. Even treatment is prescribed by observing him. The eleventh chapter deals with topics like artificial poisons, food poisons, poisonous plants, treatment for excess intake of food, counteracting food, etc. As the work describes all the major areas of poisoning it has been considered as the most authentic work on Toxicology.



## ***Kriyikaumudi***

This text has been treated as the most valuable contribution Kerala has ever made to the field of Toxicology. The author, V. M. Kuttikrishna Menon, was an erudite scholar. He acquired the lessons of Toxicology from a traditional physician T kkovil Krishnavarrier and accepted the mission of preserving the tradition for the coming generations. He has also commented on *AH* and has conducted research on Dramaturgy. The works *Keralathile na anakala*, *Na anakala pi cityavum paurastyavum* and *Keralathile gram ,arum grim ,ni aka  alum* are gone to his credit. The author not only mastered the lessons but also done his best to defend the tradition against the attacks of modern scholars.



*prakara*,a quotes the properties of poison enumerated by sages and describes the action of each quality. Route of poison in the body, symptoms produced at every stage, symptoms of death, general treatment and special recipes of *Bṛhatpañcānimbacṛ*,a and *mṛtasamjṣvanṣagada* are the other topics dealt with in the *prakara*,a (*ViṂasiminyaparakara*,a).

The Second *prakara*, *a* (*UragaviÀasiminyaparakara, a*) explains the *sth£la* (gross) and *s£kÀma* (minute) divisions of poison. The latter is further divided into four viz. *hilihala*, *intarçkÀa*, *bhauma* and *¿ibdika*. The former is caused by climatic changes. In due course, that becomes *gara* and during the time of eclipse kills the body. *EntarçkÀa* situates in the earth, water, air and rays and vitiates the three *doÀas*. Fear, bad dreams and madness are the symptoms. Gradually blood gets vitiated and death occurs within three years. *Bhauma* occurs in the caves or wells. When exposed to fire or lightning it gets stimulated and enters the body through eyes and ears and spreads the whole body to arrest semen. Impotency, decrepitude, and anemia are the symptoms produced. In this situation the patient has a gradual death. *¿ibdika* poison originates from the residuals of *hilihala* poison. Different types of noises enter the body through ears to degenerate the blood. This causes laziness and inertness. All these can be treated by *mantras*, sacrifice, penance, ablution, holy bath and medicaments.

*Sthēla* type of poison is divided into *sthivara* and *ju'gama* types. This division closely follows that given in the *samhiti* works. When we analyse the *sĕkĀma* variety, the causes of sound and atmospheric pollution are seen to be included. Now-a-days this also is a serious health problem. No where in the *samhiti* works reference to sound pollution is seen. This surely is an improvement of Kerala school of Toxicology.

The *prakara*,a gives the details of nonpoisonous snakes of the land. The *prakara*,a describes the substitution of a new tooth in the place of lost one. Different conditions like *śa'kivi*Àa<sup>24</sup> and *sarpi'gibhihata*<sup>25</sup> are also described. It differentiates between a poisonous snake bite and snake bite. The *prakara*,a describes the measures to identify a poisonous bite like by pressing of the wound with a turmeric piece. If the turmeric turns blue the bite is poisonous. Different types of bites are also mentioned. Following the *samhiti* works it gives the three fold division viz. *sarpita*, *radita* and *nirvi*Àa. Along with this, a much specialised division is also given i.e., into *Tu,·ihata*, *vyilç·ha*, *vyipta*, *da*À¶*aka* and *da*À¶*anipç·ta*. First two are non-poisonous. Next two are curable bites while the last one is incurable. Based on the number of teeth imprints, wounds are termed as *da*À¶*a*, *vidha*, *kha,·ita* and *avalupta*. The fangs viz. *karili*, *mikarç*, *kilaritri* and *yamad£tiki* are mentioned with their characteristics and treatments. First aid treatment, protection of heart and *dhitus* are also described in this *prakara*,a. The measures to protect oneself

<sup>24</sup> *Ibid.* p. 36.

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kÄ,·Zw-i-\sa-¶pÄ anYym-t\_m[w P\n-j-bmÄ  
hnj-]o-Ulfpmlpw i|m-hn-j-a-Xn-¶p-t]Ä.

<sup>25</sup> *Ibid.*

`ocp-jÄ ]m¼4n-s\·s·m«p t]Sn-·mÄ hmX-ta-dnSpw  
kv]rjvS-tZti \ocp-am-lnÄ kÄ,mw-Km-`n-l-Xm-Jy-amw.-

from snake bites are explained. These are based on a text called *Akṣtavara, ḥya*.

The third *prakara, a* viz. *mara, amṣtalakā, aprakara, a* explains the signs of death and describes how to identify an ailing or dead person.

The fourth *prakara, a* viz. *mṣrkhaviāaprakara, a* furnishes the symptoms, features of incurable bites, different varieties of the snake, symptoms produced by the bite of each, general treatment, special recipes of *nḥrvilataila, mayṣri, aguliki, vajraguliki, garalaghnaguliki* and *agastyakkuzhamba*, and the treatment for other ailments caused by cobra poison. Thus it provides with all the details of cobra bites.

The fifth *prakara*, viz., *ma·aliviÀaprakara*, gives all the details of viper bite along with the description of the symptoms and their treatment. A particular recipe viz., *sugandhidiyagada* is also given in the *prakara*. The sixth *prakara*, viz., *rijilaviÀaprakara*, describes krait bite in detail. The seventh *prakara*, viz., *vyantaridiviÀaprakara*, explains the details of hybrid type of snakes. Recipes of *mustidicr* and *aivagandhitiguliki* are also given. In this *prakara* there is a portion discussing the treatment of ailments caused by non-poisonous snakes. This *prakara* also discusses the symptoms of *odipimbuviÀa*. This has been identified as the part of black magic. When a man crosses a proposed area he experiences the symptoms similar to snake bite. This practice is said to be common in the Valluvanid regions of Malabar. Medicines and mantras are incorporated in the treatment.



Description of *rasakriyi* (mercury treatment) and poison stone are noteworthy. The former is applied only in a critical situation. It is made of different types of metals and minerals and is very difficult to prepare. Poison stone is a very important devise used in the treatment of poison. Its preparation is given as follows. Pierce the eggs of an eagle with a needle other than that made of iron and through the hole put few drops of mercury mashed in bitter leaf sap. Cover it with an identical substance and place it in the nest. After 41 days take and break the egg. Put in turmeric powder, cover with silk and keep in a box, other than that made of iron. If this is placed on the wound, if the bite is poisonous the stone will turn black. After the sucking poison, it will detach itself from the wound. Sometimes more than one poison stone will be required to remove of poison. To purify the stone, put it in milk.

Another method of the preparation is also given! Treatment suitable for the day of bite, usage of the plant *vela*. *Samhiti* works are silent on the situation when the physician has to treat himself for poisoning. In this *prakara*, the author describes the measures that have to be adopted by the physician in self treatment. He has to place a white stone in a hole made in the timber of Nux vomica tree. After six months the stone will become a powder. If the powder is taken with cow-milk all types of poisons will get vanished. Another method of self treatment is also provided.

The ninth *prakara*, viz *uragaviÀopadravaprakara*, lists the 16 ailments affecting a poisoned man and describes treatments for each. Fever, cough, vomiting, difficult breath, hiccup, thirst, swooning, roughness, constipation, belly pain, urinary infection, edema, pellagra, bleeding and poisoned breath are the enlisted ailment for which treatments are described.

The tenth *prakara*, a viz *kriyikramaparakara*, a emphasizes the importance of the treatment. It also describes the patients who are to be discarded, the diet prescribed for the patient, the measures to induce vomiting, description of the treatment in a sequential order etc. It mentions that the butter milk of goat milk, cured of buffalo and ghee of cow milk are very suitable for a patient. In the same time curd of goat milk, ghee prepared of buffalo milk and butter milk of cow milk are not harmful for the patient, but if goat milk, ghee prepared of goat milk and buffalo milk are given to the patient it will be fatal to the patient.

The eleventh *prakara*, a viz., *ĒkhuviÀaparakara*, a deals with the poison of rats. Symptoms of rat poisoning, divisions of rats, signs of incurable poisoning, first aid treatments, treatment of poisoning passing through different *dhitus*, general treatment, treatment of different ailments caused by rat poisoning etc. are dealt with in the *prakara*, a. Here the author identifies the fever caused by rat poisoning as rat bite fever.

The twelfth chapter viz., *catuÀpadidiviÀaprakasa, a* treats the poisoning caused by quadruped in detail. Symptoms, methods, and treatment of dog poisoning, treatment of poisoned cows or other animals, treatment of rabies, treatment for the bite of six types of dogs, treatment for the ailments caused by dog bite, treatment for the bite of jackal, cow, buffalo, tiger, bear, horse, ass, pig, camel, elephant etc. are also given.

The 13<sup>th</sup> *prakara, a* viz., *k¶idiviÀaprakara, a* is on insect sting. Treatment for scorpion sting, spider poisoning, poisoning by greenhouse lizard, chameleon, leech, honey bee, ant, hornet, wasp, bees, mosquito, dog mice, millipede and other lower creatures are mentioned here. The *prakara, a* deals with poisoning by betel leaf snake; ear snake and worms. Measures to destroy the poison in breast milk are also given. Skin rashes and other skin diseases are dealt within the *prakara, a*.

The 14<sup>th</sup> *prakara, a* viz *kÀudraviÀaprakara, a* deals with the poisoning caused by human teeth, monkeys, cats, mongoose, fish, frog, etc.

The 15<sup>th</sup> *prakara*, viz., *sthivaraviÀaprakasa*, deals with poisonous plants in detail. Treatment for arrow poisoning, thorn poisoning, stone poisoning, deliberate poisoning etc. Treatment for artificial poison *dÀiviÀa*, measures to clean polluted water, and the treatment for the poisoning caused by the seven plants, minerals, disagreeing food and excess of food etc. are the important portions dealt with in the *prakara*.

Analysis of the features of a messenger, omens, description of the methods to purify and culture poisonous substances and the comments on Kerala school of Toxicology are provided as appendices. In the last appendix the merits and demerits of iyurvedic treatment of Toxicology are enlisted. With a thorough knowledge of the system the author anticipates the preservation of the same.

In this work the author tries to list all the prevalent toxicological practices of the land. While describing the plant or animal species of poisonous nature, the author gives importance to those seen in this particular province. Hence the work contains the measures to tackle with the problems encountered by the Keralites. Treatment also makes use of plants seen in Kerala. This regional importance made the work the most authentic work on Toxicology. The author discriminately presents the scientific details provided in ancient treatises. He probes the matters under dispute and

provides his explanations for all. He never shows any inhibition in accepting the findings of modern science whenever it is relevant. For example in his final appendix the author opines that in the treatment of Rabies modern medicine has discovered the most convenient remedy, hence it is wise to drop the iyurvedic treatment for the illness. Even though difficult to substantiate, the author explains his experiences with ancient physicians who could cure poisoning by muttering the mantras.

These texts can be considered as the representatives of the Kerala school of Toxicology.

## **APPENDIX II GLOSSARY OF TECHNICAL TERMS**

<b>Medical terms</b>	<b>Description</b>
Abortifacient	An agent inducing abortion (The deliberate ending of a pregnancy at an early stage)
Aphrodisia	An agent that is alleged to increase libido or the duration of sexual activity.
Arthritis	Inflammation of a joint
Ascitis	Accumulation of free fluid in the peritoneal cavity.
Bronchitis	Inflammation of the air passage arising from the trachea
Calculus	A stone found within the body
Carminative	A pleasant tasting agent preventing gas formation in the gastrointestinal tract
Cataract	Opacity of the lens of the eye.
Catarrh	Inflammation of the mucous membrane of the nasopharyngeal mucosa.

Cisterna chili	A dilated part of the thoracic duct at its origin in lumbar origin into which the intestinal trunk and two lumbar lymphatic trunks open.
Collyrium	A lotion for the eye
Consumption	Tuberculosis
Demulcent	Soothing agent
Dermatitis	Inflammation of the skin characterized by itching redness and various skin lesions
Diarrhoea	Abnormal frequent passage of loose stools
Diuretic	Agent that increases amount of urine.
Dropsy	Generalized accumulation of fluid in the body
Dyspnoea	Difficult or labored breathing
Eczyema	A superficial inflammation affecting the epidermis.
Enema	An introduction of a liquid into the rectum, to stimulate bowel activity.
Epidemic	Affecting a large number of



	people in a community at the same time suddenly.
Epilepsy	A disorder of the brain caused by abnormal electrical activity.
Erysipelas	A contagious disease of skin and subcutaneous tissue with diffuse deepened inflammation due to infection.
Expectorant	Agent promoting the coughing up of the secretion
Fistula in ano	An abnormal passage from the anal canal to the body surface
Flatulence	The presence of an excessive amount of air or gas in the stomach and intestine.
Fomentation	A warm application
Insanity	Mental derangement with unreliability of behavior.
Insomnia	Inability in falling sleep of remaining asleep
Lassitude	Weariness
Lecithinase	A phospholipase that catalyses the decomposition

	of lecithin
Leucoderma	Local or total absence of pigmentation in the skin
Lymph	A transparent, slightly yellowish fluid circulating in the lymphatics. It plays an important part in the immune system and in the absorption of fats from the intestine.
Narcosis	Depression of neuronal excitability causing stupor or sleep
Necrosis	Death of cells, tissue or organ with in living body.
Neurotoxin	Endotoxin, which blocks conduction of the nerve impulse or block synaptic transmission.
Oedema	Accumulation of fluid in subcutaneous tissue due to extra cellular volume expansion.
Palpitation	A subjective feeling of an usually rapid or irregular heart beat
Placebo	A substance having no pharmacological effect but given merely to satisfy the

	patient who considers it to be a medicine.
Poultices	A soft, moist, hot mass of mustard, linseed or soap and oil applied to the skin to create moist local heat or counter irritation
Pruritis	Severe itching
Purgation	Evacuation of the bowel by a purgative
Pustules	A small circumscribed elevation of the skin containing purulent fluid.
Rheumatoid	Resembling rheumatism, stiffness of body etc.
Rhinitis	Inflammation of nasal mucosa
Scrotum	A musculocutaneous sac containing testes
Somniferous	Producing sleep
Syphilis	A sexually transmitted disease.
Systole	The phase of contraction of the heart muscle especially of the ventricles in the cardiac cycle.
Tourniquet	An appliance to compress a

	blood vessel to reduce blood flow
Urticarial rashes	A sudden eruption of transitory, itchy wheals of variable size and shape due to a particular food or food additive or a drug.
Venipuncture	Puncture of a vein with a needle to withdraw blood

Fig. 3.6: *Boswellia thurifera*



Fig. 3.7: *Cardiospermum helicacabum* Linn.



Fig. 3.8: *Jasminum auriculatum* Linn.



Fig. 3.9: *Hemidesmus indicus* Linn.



Fig. 3.10: *Rauwolfia serpentina*



Fig. 3.11: Zedoary



Fig. 3.12: *Anethum graveolins* Linn.



Fig. 3.13: Fenel



Fig. 3.14: Bitter luffa



Fig. 3.15: Long pepper



Fig. 3.16: Madder root



Fig. 3.17: *Withania somnifera* Linn.



Fig. 3.18: Sweet fennel



Fig. 3.19: *Vitex trifolia* Linn.



Fig. 3.20: *Kaempferia galangal* Linn.



Fig. 3.21: Small fennel

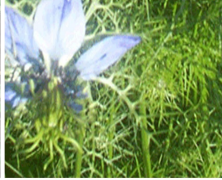


Fig. 3.22: Common basil



Fig. 3.23: Indian hemp



Fig. 3.24: Bitter bottle gourd



Fig. 3.25: *Tectona grandis* Linn.



Fig. 3.26: *Pergularia daemia*



Fig. 3.27: *Baliospermum montanum*



Fig. 3.28: Common rattan



Fig. 3.29: Pepper



Fig. 3.30: *Cyperus rotundus* Linn.



Fig. 3.31: Nuxvomica

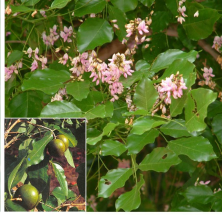


Fig. 3.32: Banyan



Fig. 3.33: Raddish



Fig. 3.1: *Glycyrrhiza glabra* Linn.



Fig. 3.2: *Nerium oleander* Linn.



Fig. 3.3: *Cascabela thevetia*

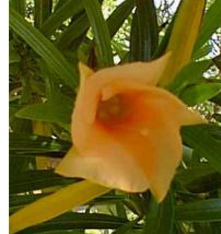


Fig. 3.4: Crab's eye



Fig. 3.5: *Alpinia calcarata* & *Alpinia galangal*



Fig. 4.2: Siva and Vishnu



Fig. 4.3: Buddha



Fig. 4.4: Kaliyamardanam



Fig. 4.5: Snake Anatomy

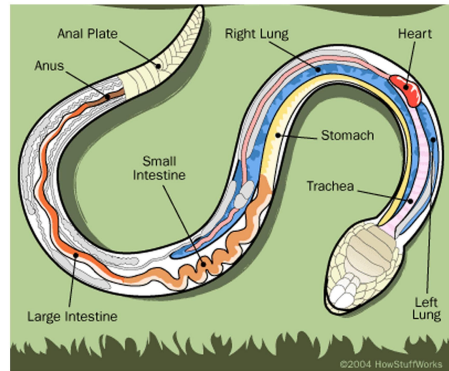
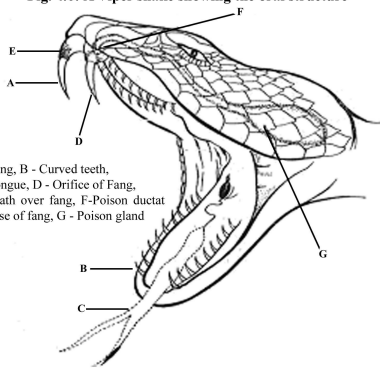


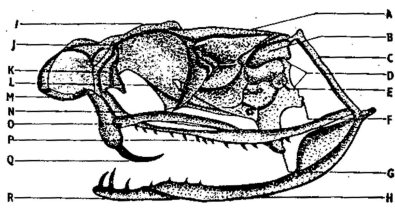


Fig. 4.6: A Viper snake showing the oral structure



A - Fang, B - Curved teeth,  
C - Tongue, D - Orifice of Fang,  
E - Sheath over fang, F - Poison duct at  
the base of fang, G - Poison gland

Fig. 4.7: Columella auris



A - Parietal bone	G - Basis-occipital spine	M - Premaxilla
B - Squamosal bone	H - Angular bone	N - Palatine bone
C - Quadrate bone	I - Frontal bone	O - Transpalatine bone
D - Foramen magnum	J - Nasal bone	P - Pterygoid bone
E - Columella auris	K - Lacrymal bone	Q - Fangs
F - Occipital condyle	L - Inter-orbital septum	R - Dentary bone with solid teeth

Fig. 4.8: Snake charmers

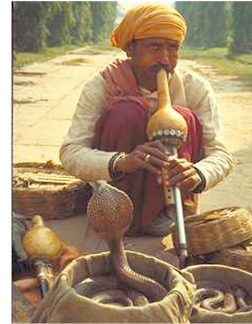


Fig. 4.9: Molting



Fig. 4.10: Oral structure

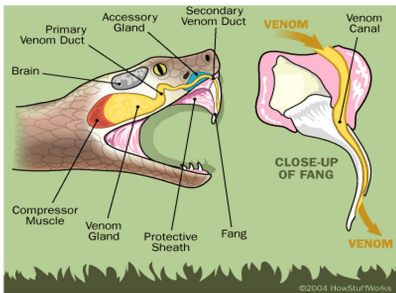


Fig. 4.11: Elapidae



1. Mamba

2. Coral snake



4. Death adder

3. Tiger snake

5. Taipan

**Fig. 4.12: Non-poisons snakes**



**1. Rat snake**



**2. Indian python**



**3. African boa**

**Fig. 4.13: Sea snakes**



**Fig. 4.14: Indian cobra**



Fig. 4.16: Viperidae



1. Russel's viper



2. Lavantine viper



3. Saw-scaled viper



4. Horned viper



5. Pit viper



6. Bamboo pit viper

Fig. 4.15: King cobra



Fig. 4.17: Krait



Fig. 4.18: Snake bites



1. The bite

1. The wound



3. The swelling



4. Necrosis

Fig. 7.1: Different types of insects



Fig. 7.2: Wasp



Fig. 7.3: Centipede



Fig. 7.4: Frog



Fig. 7.5: Ants

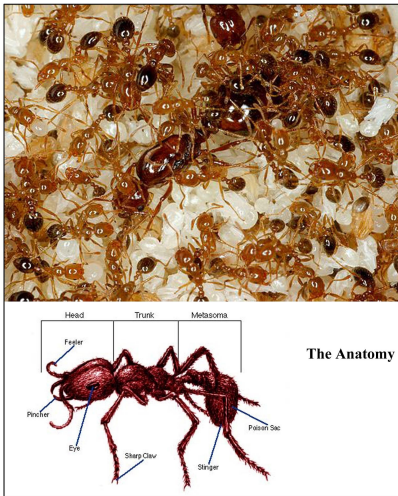
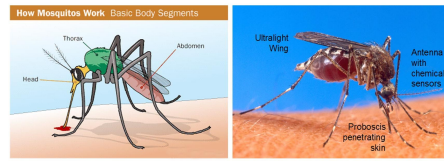


Fig. 7.6: Honey bee



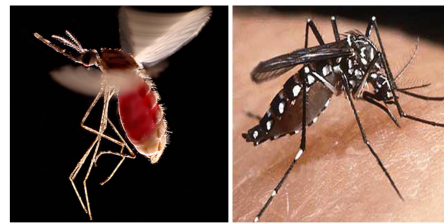
Fig. 7.7: Mosquitoes



The body parts



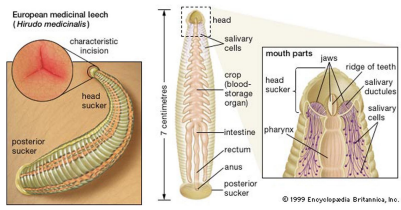
Culex



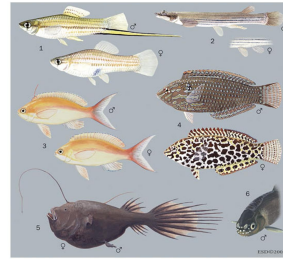
Anophele mosquito

Aedes

**Fig. 7.8: Leeches**



**Fig. 7.9: Fish**



**Fig. 7.10: Lizard**

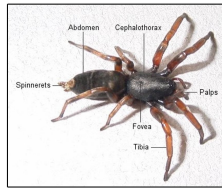


**Fig. 7.11: Scorpion**

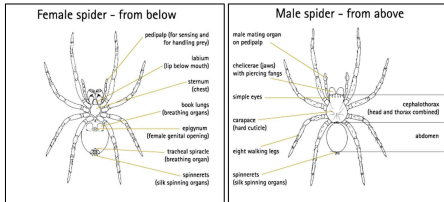




**Fig. 7.12: Spiders**



**Fig. 7.13: Body parts of male and female spiders**



**Fig. 7.14: Jumping spiders**



**Fig. 7.15: Water spiders**



**Fig. 7.16: Tarantula**



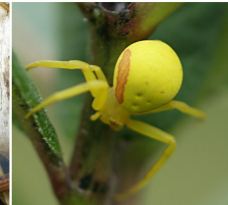
**Fig. 7.17: Trap door spider**



**Fig. 7.18: Fisher spider**



**Fig. 7.19: Crab spider**



**Fig. 7.20: Funnel web spider**



**Fig. 7.21: Wolf spider**



Fig. 7.22: Tangled web weavers

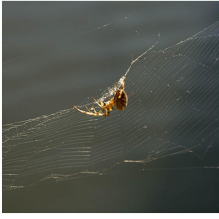


Fig. 7.23: Black widow spider



Fig. 7.22: Tangled web weavers

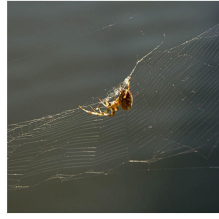


Fig. 7.23: Black widow spider



Fig. 7.24: Shee web spider



Fig. 7.25: Dwarf spider



Fig. 7.24: Shee web spider



Fig. 7.25: Dwarf spider



Fig. 7.26: Orb spider and the web



Fig. 7.26: Orb spider and the web



**Fig. 5.1: Rat**



**Fig. 5.2: Gaṇeśa**



**Fig. 5.3: Kar, çmita Temple**





**Fig. 5.4: Dog**



**Fig. 5.5: Rabid dog**



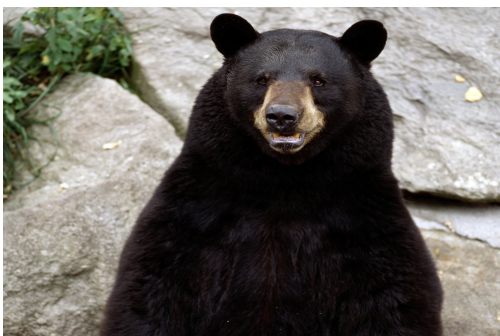
**Fig. 5.6: Animals spreading Rabies**



**1. Jackal**



**2. Hyena**





**3. Bear**

**4. Tiger**