

**ĀYATANA:  
A STUDY OF THE TWELVE ĀYATANAS  
AND THEIR PARALLELS IN HUMAN ANATOMY  
AS UNDERSTOOD BY MODERN SCIENCE**

by  
Apiramon Damrongsiri

A Thesis Submitted in Partial Fulfillment of  
The Requirement for the Degree of  
Master of Arts  
(Buddhist Studies)

International Master Degree Programme  
Graduate School  
Mahachulalongkornrajavidyalaya University  
Bangkok, Thailand  
2007/B.E. 2550

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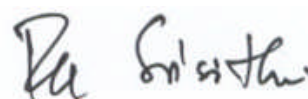
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The Graduate School, Mahachulalongkornrajavidyalaya University, has approved this thesis as a part of education according to its curriculum of the Master of Arts in Buddhist Studies.



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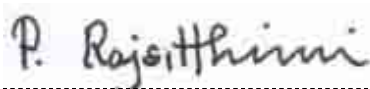
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### Abstract

This thesis is a study of the twelve *āyatanas* and their parallels in science. With an attempt to answer a hypotheses that many parallels exist between statements in the Buddhist scriptures and findings from scientific research. The information of the twelve *āyatanas* in the Buddhist scriptures are brought to compare with the information of the sensory receptors and the sense stimuli in human anatomy.

In this thesis, the various meanings of the term *āyatana* is analyzed in both the *Vedic-Sanskrit* and the *Pāli* traditions. Then the specific meaning of the twelve *āyatanas* in the *Tipiṭaka* and *Aṭṭhakathās* is clarified. The sense receptors and the sense stimuli in human anatomy are studied and then compared and contrasted with the description of the twelve *āyatanas*.

The result of the study shows that the meaning of the term *āyatana* in the *Pāli* tradition had been developed from the *Vedic-Sanskrit* tradition. The concept of the twelve *āyatanas* was invented by the Buddha and developed by the commentators. The study also answers the hypotheses that there are some resemblances in the material aspect between the description of the twelve *āyatanas* in the Buddhist scriptures and their parallels in science. However, the role of the mental aspect, the mind, is different. The role of the mental aspect is still ambiguous in science. Therefore, it could not be brought to compare with the information in the Buddhist scriptures. This is where science lags behind Buddhism.

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## LIST OF ABBREVIATIONS

### I. Texts (Original Sources)

|       |  |
|-------|--|
| A     | Aṅguttara- nikāya                      |
| As    | Aṭṭhasālinī (Dhammasaṅgaṇī-aṭṭhakathā) |
| D     | Dīgha-nikāya                           |
| Dhp   | Dhammapada                             |
| Dhs   | Dhammasaṅgaṇī                          |
| ItiA  | Itivuttaka-aṭṭhakathā                  |
| M     | Majjhima- nikāya                       |
| Paṭṭh | Paṭṭhāna                               |
| Ps    | Papañcasūdanī                          |
| S     | Saṃyutta- nikāya                       |
| Sn    | Sutanipāta                             |
| Ud    | Udāna                                  |
| Vbh   | Vibhaṅga                               |
| VbhA  | Vibhaṅga-aṭṭhakathā                    |
| Vin   | Vinaya-piṭaka                          |
| Vism  | Visuddhimagga                          |
| Yam   | Yamaka-pakaraṇa                        |

### II. Abbreviated Books Mentioned in the Footnotes

|     |                            |
|-----|----------------------------|
| BD  | Buddhist Dictionary        |
| CPD | A Critical Pāli Dictionary |
| DB  | Dictionary of Buddhism     |

|      |   |
|------|---|
| DP   | Dictionary of Psychology                  |
| DPa  | A Dictionary of Pāli                      |
| DPL  | Dictionary of the Pali Language           |
| PAW  | Pali-Anthologie und Wörterbuch            |
| PED  | Pali-English Dictionary                   |
| PSD  | The Practical Sanskrit-English Dictionary |
| VINS | Vedic Index of Names and Subjects         |

### III. Other Abbreviations

|          |  |
|----------|--|
| BPS      | Buddhist Publication Society   |
| comp.    | compiler   |
| e.g.     | <i>exempli gratia</i> , for example  |
| ed.      | edition, editor, edited by   |
| eds.     | editors  |
| enl.     | enlarged   |
| et al.   | <i>et alii</i> , and others  |
| etc.     | <i>et cetera</i> , and so forth  |
| f(f).    | and the following page(s)  |
| ibid.    | <i>ibidem</i> , in the same book   |
| i.e.     | <i>id est</i> ; that is to say   |
| loc cit. | <i>loco citato</i> , in the place cited                                      |
| n.d.     | no date, date is not indicated   |
| n.p.     | no publisher, publisher is not identified                                    |
| op. cit. | <i>opera citato</i> , in the work cited                                      |
| p(p).    | page(s)  |
| PTS      | Pali Text Society  |
| q.v.     | <i>quid vide</i> , which see (= look in another place to find something out) |

|         |  |
|---------|--|
| rev.    | revised  |
| s.v(v). | <i>sub verbo, sub voce</i> , under the word(s) |
| trans.  | translated by                                  |
| vol(s). | volume(s)                                      |
| vs.     | versus   |

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#### Note on the Usage of the Abbreviations

In referencing *Pāli* sources, the references are given according to the name of the book, the volume (if indicated by a Roman number), and the page number of the PTS edition. Except for the *Dhammapada*, where the verse number is given instead of the page number, e.g.

A III 43: the *Anguttara Nikāya* Volume III, page 43.

Dhp 1: the *Dhammapada* verse 1.

## CHAPTER I

### INTRODUCTION

#### 1.1 Background and Significance of the Problem

This thesis intends to study and analyze the concept of the *āyatana* with an emphasis on the twelve *āyatanas* in the context of science. The theoretical framework behind the study is that there are some resemblances between the statements in the Buddhist scriptures and the discovery in modern science. This idea is supported by many Buddhist scholars, such as Kurt F. Leidecker who mentions that “the remarkable fact is that if reduced to general principles, many statements in the Buddhist scriptures can be brought in line with modern scientific theories and hypotheses.”<sup>1</sup>

With the advent of scientific revolution, spirituality has gradually declined.<sup>2</sup> Some scientists refer to religions as “a mystic experience, a psychic thrill.”<sup>3</sup> There exists an increasing gap between the world of religion and the world of science. Many religions are based on blind faith. However, Buddhism rejects blind faith by allowing each individual to observe and experiment the Buddha’s teaching by oneself. This can be seen from the

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<sup>1</sup> Kurt F. Leidecker, introduction to **Buddhism and Science**, ed. Buddhadasa P. Kirthisinghe (Delhi: Motilal Banarsidass Publishers, 1993), p. IX.

<sup>2</sup> See details in William Macquitty, **Buddha** (New York: The Viking Press, 1969), pp. 123-125.

<sup>3</sup> Robert F. Spencer, “The Relation of Buddhism to Modern Science,” in **Buddhism and Science**, ed. Buddhadasa P. Kirthisinghe (Motilal Banarsidass Publishers, 1993), p. 17.

teaching of the Buddha in the *Kalama Sutta*.<sup>4</sup> The method in Buddhism is quite similar to the method in science. So many people believe that Buddhism can survive the threat of the scientific advancement.<sup>5</sup> This idea is supported by a well-known scientist, Albert Einstein, who says that “If there is any religion that would cope with modern scientific needs, it would be Buddhism.”<sup>6</sup> Moreover, many scholars believe that some teachings of the Buddha are now supported by scientific methods.<sup>7</sup>

In order to bridge the gap existing between the two worlds of spirituality and science, research is needed. Therefore, I select to study the twelve *āyatanas* and their parallel information in modern science, because of their importance as channels that allows human beings to gain information from the world.<sup>8</sup>

In the field of science, the twelve *āyatanas* may be identified as sensory receptors and sense stimuli. They are extensively studied in many fields, such as in the areas of psychology, philosophy and physiology.<sup>9</sup> These studies are based on repeated observations and experiments under the control of five physical organs and scientific instruments.<sup>10</sup> The role of the mind is still ambiguous in science. This is where science may lag behind Buddhism.

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<sup>4</sup> A I 188ff.

<sup>5</sup> See details in P.A. Payutto, **Thai Buddhism in the Buddhist World**, 10<sup>th</sup> ed. (Bangkok: Mahachulalongkornrajavidyalaya University, 2005), pp. 189-193.

<sup>6</sup> **Ibid.**, p. 194.

<sup>7</sup> Garry Thomson, **The Sceptical Buddhist** (Thailand: Amarin Printing, 2000), p. 32

<sup>8</sup> See details in P.A. Payutto, **Buddhadhamma** (Thai Edition), 11<sup>th</sup> rev. and enl. ed. (Bangkok: Mahachulalongkornrajavidyalaya University, B.E. 2546), pp. 34-39.

<sup>9</sup> Andrew M. Colman, ed., **Companion Encyclopedia of Psychology**, vol. 1, 1<sup>st</sup> ed. (London and New York: Routledge, 1994), p. 153.

<sup>10</sup> See details in Phra Thepsophon, **A Buddhist Worldview** (Bangkok: Mahachulalongkornrajavidyalaya University, 2003), pp. 12-20.

In Buddhism, the twelve *āyatanas* play an important role in the wheel of rebirth. They are one of the twelve elements in the *Paṭiccasanuppāda*, a teaching of the Buddha that reveals a conditional phenomena leading to the cycle of rebirth.<sup>11</sup> In addition, the twelve *āyatanas* play an important role in the practice of *satipaṭṭhāna*. This practice is believed by proponents of *Theravāda* Buddhism to be a way of purifying the mind which in turn leads to the realization of *nibbāna*.<sup>12</sup>

The present thesis proposes an exploration of the twelve *āyatanas* in the Buddhist literature together with scientific explanation. In order to provide a concrete background for the research, I will first examine the term *āyatana* and its various meanings thoroughly. Second, the information of the twelve *āyatanas* in the *Tipiṭaka* and its Commentaries will be analyzed. Last, the comparison of information related to the twelve *āyatanas* in the Buddhist scriptures and human anatomy in science will be explored.

## 1.2 Objectives

1.2.1 To study the concept of the term *āyatana* in *Sanskrit* and *Pāli* languages.

1.2.2 To study the twelve *āyatanas* in the Buddhist scriptures and the sensory receptors and the sense stimuli in modern science.

1.2.3 To identify the correlation between the twelve *āyatanas* of the Buddhist scriptures and sensory receptors and sense stimuli of science.

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<sup>11</sup> M III 63f.

<sup>12</sup> D II 290ff.

### 1.3 Statements of Problems

In order to meet the objectives of the research, the following statements of the problems are needed to be answered:

1.3.1 What is the definition of the term *āyatana* in general and in particular? What is the meaning of this term in *Sanskrit* and *Pāli*?

1.3.2 What is the exposition of the twelve *āyatanas* in the Buddhist scriptures? What are the sensory receptors and the sense stimuli in modern science?

1.3.3 Are there any similarities or differences between the information of the twelve *āyatanas* in the Buddhist literature and the information of the sensory receptors and the sense stimuli in science?

### 1.4 Hypotheses of the Research

Many parallels exist between statements on the twelve *āyatanas* in the Buddhist scriptures and findings from scientific research on the sensory receptors and the sense stimuli in the area of human anatomy and physiology.

### 1.5 Definition of the Terms Used in the Research

#### Modern Science:

This term refers to a system of acquiring knowledge based on setting up hypotheses and doing experiments. Modern science consists of many fields. However, the scope of this study centers on the explanation of the senses, including sensory receptors, sense stimuli, and human sense anatomy.

### Parallels:

This term refers to the state of being comparable between two things. In this case, they are the statements in the Buddhist scriptures and in science. Similarity is indicated, but identity is not implied.

### Sense Receptors / Sensory Receptors:

The sensory receptors are also known as sense organs.<sup>13</sup> In biology, a sense receptor refers to “a specialized cell or group of cells that translates a certain type of stimulus, received from the environment or from within the organism, into nerve impulses ...”<sup>14</sup> More simply, a sensory receptor is a structure that recognizes a stimulus. Therefore, the sensory receptors in this thesis cover the human eye, ear, nose, tongue, and body. The status of the mind is unclear.

### Sense Stimuli:

A sense stimulus is that which activates a sensory receptor,<sup>15</sup> for example electromagnetic wave activates sense receptors in the retina. Each sense receptor corresponds to a specific type of the sense stimuli.

## 1.6 Literature Review

1.6.1 C.L.A. De Silva, *A Treatise on Buddhist Philosophy of Abhidhamma*, 1997.

This book, first published in 1937, is based on the *Abhidhammattha Saigaha* written by Anuruddha. The intention of the writer in writing this

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<sup>13</sup> DP, s.v. “sense organ.”

<sup>14</sup> The New Encyclopædia Britannica, 15<sup>th</sup> ed., Micropædia, s.v. “receptor.”

<sup>15</sup> DP, s.v. “stimulus.”

book is to correct the misinterpretation in the publications of the Pali Text Society (PTS) edited by Mrs. Rhys Davids, who criticizes Buddhism from Christianity point of view. Silva extensively explores the information of *cittas* and *cetasikas* in depth. In addition, he focuses his interest on the doorways of the organs, objects, and six bases. At the end of the book, he also criticizes the controversy regarding the heart-base as whether it is located in the heart or in the brain with the conclusion that the heart-base is a material quality derived from the four great essentials (*mahābhūtarūpa*) and originated from *kanma*.

1.6.2 Jan Gonda, “*Āyatana*,” *Sanskrit Word Studies*, Vol. II of Selected Studies, 1969.

“*Āyatana*” by Jan Gonda is an analytical study of the term *āyatana* and its related terms in *Sanskrit* language. The writer investigates the term in many aspects, including its etymology. Gonda’s shows some development of the term *āyatana* in the pre-Buddhist tradition as well as in the Buddhist tradition. The study also shows the usage of this term in the Buddhist literature both in technical and metaphorical senses. Jan Gonda concludes the study with a very interesting point that the usage of the term *āyatana* in Buddhism is influenced by *Vedic* tradition; however, the Buddha also develops a new concept of this term.

1.6.3 Johnjoe McFadden, “Synchronous Firing and Its Influence on the Brain’s Electromagnetic Field,” *Journal of Consciousness Studies* 9, no. 4., 2002.

According to human anatomy, the human brain consists of central nervous system, with the ability to generate an electromagnetic (*em*) field. This *em* field has an effect on the process of awareness and perception of each human being. The writer of this article proposes that the *em* field generated

by the brain is the physical foundation of conscious awareness. This theory seems to regard the brain as a seat of consciousness, instead of the heart. However, the idea of this theory is still under controversy.

1.6.4 Padmasiri de Silva, *An Introduction to Buddhist Psychology*, 1991.

*An Introduction to Buddhist Psychology* by Padmasiri de Silva is a book about diverse aspects of the psychology of Buddhism. The writer denotes that his book is “concerned with the systematization and interpretation of the psychological questions raised within the discourses of the Buddha [p. xi].” With extensive background in psychology, Silva directs his interest on the result that arises from the six sense organs, especially the mind. He compares between Buddhist perspective of mind and Western therapeutic system. In addition, Silva discusses about body-mind integration, which is one of the highlighted topics in the West during the last few decades. At last, Silva illustrates that Buddhism offers an important pace to resolve interpersonal emotional conflict. He also outlines one method suggested by the Buddha as an effective way to resolve this problem by restraining and controlling one’s senses.

1.6.5 Philip Whitfield, *Human Body Explained*, 1995.

The book explains how the five physical sense organs (the eye, the ear, the nose, the tongue, and the body) work with simple anatomical explanation. It also explains the importance of the brain in processing and controlling these sense organs. This book reveals that the way a human being perceives the outside world is influenced by the effect created by the power of the brain.

1.6.6 Rex M. Heyworth, *Explore Your World with Science Discovery 2*, 2003.

This book introduces the basic idea of science. The topics that are of interest in this book cover information related to some sensory receptors and some sense stimuli. In addition, it explains the particulate models of matter in simple language. This particulate model of matter has a very interesting characteristic which is similar to the information of *mahābhūtarūpa* in Buddhism.

1.6.7 Rollin McCraty, Ph.D., *The Energetic Heart: Bioelectromagnetic Interactions*, 2003.

This paper, first published in *Clinical Applications of Bioelectromagnetic Medicine*, explains the importance of the heart as one of the sense organs of human beings. The writer shows that the heart can produce an *em* field, which is much stronger than the *em* field that is produced by the brain. This *em* field is radiated outside the body. It is strong enough to have an effect on the brain of other people. Since this *em* field bounds to the heart, this information may give a new scope to the delimitation of the *hadayavatthu* mentioned in the Buddhist scriptures. It must be noted here that the result of the study by McCraty is not widely accepted and is not verified by other scientists.

1.6.8 Suwands H. J. Sugunasiri, "The Whole Body, Not Heart, As 'Seat of Consciousness': The Buddha's View," *Philosophy East and West* 45, no. 3, July 1995.

In this paper, the writer tries to locate the seat of consciousness. He believes that the theory of the *hadayavatthu* as the seat of consciousness was created during the post-Buddhian period. He argues that the seat of

consciousness covers the whole body. In order to support his theory, he mentions two Buddhist scholars, Roy E. John and Deepak Chopra, who also views the whole body as the seat of consciousness. John proposes that the seat of consciousness spreads throughout the whole body via its neuroskeletal system. However, Chopra has the idea that the seat of consciousness resides in every DNA starting from the very first DNA molecule before the embryo begins to divide.

#### 1.6.9 Thongkam Sunthornthepvarakul, *Pasādarūpa* 5 (CD), n.d.

Thongkam Sunthornthepvarakul is a Buddhist scholar whose background is in medical science. He explains the *pasādarūpa* through a comparison of information on the *pasādarūpa* appeared in the Commentaries with the human anatomy. Sunthornthepvarakul's comparison reveals some parallels between the *pasādarūpa* in the Buddhist scriptures and human anatomy in science. He uses his findings to explain and to encourage other people to practice insight meditation by following the guideline of the *satipaṭṭhāna*.

## 1.7 Expected Advantages

After completing this thesis, the following advantages should be obtained:

1.7.1 A deeper understanding of the term *āyatana* both in its general and in its particular aspects.

1.7.2 A clearer understanding of the twelve *āyatanas* in the Buddhist scriptures and the sensory receptors and the sense stimuli in science.

1.7.3 An awareness of the correlation between Buddhism and science.

## 1.8 Method of Study

The purpose of this research is to compare and correlate the twelve *āyatanas* in the Buddhist scriptures with the sensory receptors and the sense stimuli in science. The statements of the problems are investigated mainly through documentary research, especially in the *Tipiṭaka*, *Aṭṭhakathās* and scientific books. The research methodologies are divided into three main stages as follows:

### 1.8.1 Data Collection Stage

- 1.8.1.1 Collecting data about the term *āyatana* from *Vedic-Sanskrit* traditions, and texts. Due to the scope of the study, the Jan Gonda research and various *Sanskrit* and *Pāli* dictionaries are to be used during this stage.
- 1.8.1.2 Collecting data about the twelve *āyatanas* from the primary and secondary sources. A reliable translation of these texts is chosen, including the translation from the Pali Text Society, the Buddhist Publication Society, and the Wisdom Publications. The scope of the study about the description of the twelve *āyatanas* is based on *A Buddhist Manual of Psychological Ethics* (*Dhammasaṅgaṇī*), *The Book of Analysis* (*Vibhaṅga*), *The Dispeller of Delusion* (*Sammohavinodanī*), and *The Expositor* (*Aṭṭhasālinī*).
- 1.8.1.3 Collecting data related to human anatomy, the sensory receptors and the sense stimuli from textbooks, journals and other sources.

### 1.8.2 Data Analysis Stage

1.8.2.1 Analyzing the etymology of terms related to the twelve *āyatana*s. This process clarifies and provides a deeper understanding for each related term.

1.8.2.2 Systemizing data into three main sections. The first section is related to the various meanings of the term *āyatana*. The second one is contributed to the information of the twelve *āyatana*s. The last section is the comparison between the statements in the Buddhist literature and in science.

1.8.3 Data Conclusion Stage: Conclusion and suggestions for further research are made.

## 1.9 The Limitations of the Research

This research intends to study the parallels between the twelve *āyatana*s in the Buddhist scriptures and the sensory receptors and the sense stimuli findings in science. The findings of the research are tentative, since the study is related to discoveries in science that are subject to change all the time. Therefore, this study cannot be the final word, since there will always be new scientific discoveries and new interpretations of Buddhist philosophy as well as interpretations of scriptures that may also be subject to change. In addition, this research limits the study only sensory receptors and sense stimuli, and does not cover sense perception, i.e. not how the receptors and stimuli interaction comes to be perceived.

## CHAPTER II

### ĀYATANA

The term *āyatana* existed before the Buddha's time, in *Sanskrit* language. In order to understand the role and the importance of the twelve *āyatanas*, a clear definition of this term must be pursued. In the present chapter, I will clarify the meaning of the term *āyatana* in the pre-Buddhist and the Buddhist traditions, as well as its general and specific meanings.

In order to achieve this, I will explore the meaning of the term *āyatana* in the *Sanskrit* language to find the meaning and its influence in the pre-Buddhist tradition. Afterwards, the *Pāli* meaning of this term will be explored in order to identify the meaning of this term in the Buddhist tradition. Next, the specific meaning of the term *āyatana*, its classification, and its significance in the *Tiṭṭaka* will be discussed with a special emphasis on the description of the twelve *āyatanas*. The result of the study is expected to be the development and a working definition for the concept of *āyatana* as it was used by the Buddha and latter commentators.

#### 2.1 The Concept of the Term *Āyatana* in *Sanskrit*

The term *āyatana* exists in both *Sanskrit* and *Pāli* languages. The general meaning of this term in both languages as found in *Sanskrit* and *Pāli* dictionaries are nearly identical. Figure 1 shows an example of the meaning of this term from a *Sanskrit* and a *Pāli* dictionaries.

**Figure 1. The Term *Āyatana* as Appeared in Sanskrit and Pāli Dictionaries.** The figure shows the meaning of the term *āyatana* as appeared in a *Sanskrit* and a *Pāli* dictionaries. The general definition of this term in both languages is in the sense of place and sacred altar. The meaning of the term *āyatana* that is related to the sense organs and the sense objects seems to be appeared only in the Buddhist tradition.

| The Practical Sanskrit-English Dictionary  | आयतनम्   |
|--|----------|
| <ol style="list-style-type: none"> <li>1 Place, abode, house, resting-place; ...</li> <li>2 The place of sacred fire, altar, shed for sacrifices.</li> <li>3 A sanctuary, sacred place; ...</li> <li>4 The site of a house, ground-plot.</li> <li>5 A barn; ...</li> <li>6 An inner seat (with Buddhists who consider the five senses with <i>manas</i> as the six <i>Āyatanas</i>).</li> <li>7 The cause of disease.</li> </ol> |          |
| Dictionary of the Pali Language  | ĀYATANAM |
| Place, dwelling-place, abode, home, seat, rendezvous, haunt, receptacle, mine; altar, shrine; place of origin, source, fount, cause, origin [आयतन]. ... In Buddhist metaphysical system the twelve <i>Āyatanas</i> are the six Organs of Sense and the six Objects of Sense. ...   |          |

**Source Adaptive:**

1. PSED, rev. and enl., 1<sup>st</sup> compact ed., s.v. “आयतनम्.”
2. DPL, s.v. “ĀYATANAM.”

Before entering upon the *Pāli* definition of this term, I will first turn to the meaning of the term *āyatana* in the *Sanskrit* language to see whether it has an influence on the equivalent *Pāli* term or not. The *Sanskrit* concept of the term *āyatana* reflects the usage of this term in the pre-Buddhist tradition. The survey of the term *āyatana* in *Sanskrit* by Jan Gonda is the center of the study in this section.

The term *āyatana* generally means ‘abode’ or ‘home.’ In the *Vedic*, this term appears in a passage of the *Chāndogya Upaniṣad* in a sense of ‘holy

place,’ or ‘sanctuary.’<sup>16</sup> Etymologically, the term *āyatana* is derived from the root  $\sqrt{yat}$  combined with the suffix *-ana*. L. Renou and K.F. Gelner consider the term *yat-* to have a military sense for “aufmar[s]chieren, sich in Schlachtordnung aufstellen”<sup>17</sup> meaning ‘to deploy, to form up a battle order.’ In addition, the suffix of the term indicates *āyatana* in a sense of a container.<sup>18</sup> Followings are the compilation of the concept of this term based on Jan Gonda’s survey.

### 2.1.1 Spatial Concept

Spatial means ‘concerning space.’ Therefore, the meaning of *āyatana* in this sense relates to the concept of place, such as an abode, a house, a resting-place, or a dwelling-place.<sup>19</sup> The term *āyatana* in this sense consists of both architectural value and non-ornate description. It could be a temple, a home, a place where one returns after a journey, or a destination. An explanation by Gonda describes the term *āyatanāni* of hermitages and impromptu settlements as “appear as hastily erected huts or mounds of earth sacred to a god.”<sup>20</sup> In addition, the term *āyatana* denotes a natural habitat for rest and safety, or a refuge.<sup>21</sup> It also refers to a destination where safety, life eternal, and the final goal are attained.<sup>22</sup>

<sup>16</sup> VINS, s.v. “Ā-yatana.”

<sup>17</sup> Referred to Jan Gonda, “*Āyatana*,” in *Sanskrit Word Studies, Selected Studies*, vol. II (Netherlands: E. J. Brill, 1975), p. 179.

<sup>18</sup> Jan Gonda, 1975, *op. cit.*, p. 203.

<sup>19</sup> PSED, s.v. “आयतनम्.”

<sup>20</sup> See details in Jan Gonda, 1975, *op. cit.*, pp. 196-197.

<sup>21</sup> Jan Gonda, 1975, *op. cit.*, p. 186.

<sup>22</sup> Jan Gonda, 1975, *op. cit.*, p. 187.

### 2.1.2 Possessive Concept

The term *āyatana* can also be used in a sense of possession to express ownership of something, e.g. “*bhūmer mahad āyatanam*” is translated as “sovereignty over vast domains of earth.”<sup>23</sup>

### 2.1.3 Religious Concept

The term *āyatana* also refers to rules and systems of ritual techniques, such as in sacrificial ceremony. *The Practical Sanskrit-English Dictionary* indicates that “The place of the sacred fire, altar, shed for sacrifices ... A sanctuary, sacred places ...” are called *āyatana*.<sup>24</sup> The ritual sense of the term *āyatana* can be translated to either a place to exist in, such as an altar, or an entity being offered for the accomplishment of sacrifice including food.<sup>25</sup>

### 2.1.4 Anatomical Concept

The term *āyatana* may refer to physical organs when it is complemented by other terms, such as *yoni*- meaning womb. It is also identified with the mind (*mana*) of a person.<sup>26</sup> Indian physicians use the term *prāṇāyatana* to refer to ten principal ‘seats’ of vitality, which include physical organs such as the head, the heart, and the navel.<sup>27</sup>

### 2.1.5 Causality Concept

Originally, *āyatana* meant neither ‘cause’ nor ‘reason.’ However, the term was adopted by medical schools in latter periods, and was used as a

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<sup>23</sup> Jan Gonda, 1975, **op. cit.**, p. 183.

<sup>24</sup> **PSED**, s.v. “आयतनम्.”

<sup>25</sup> Jan Gonda, 1975, **op. cit.**, pp. 190-191.

<sup>26</sup> Jan Gonda, 1975, **op. cit.**, p. 185.

<sup>27</sup> Jan Gonda, 1975, **op. cit.**, p. 188.

synonym for *hetu* meaning ‘cause’ or ‘reason.’<sup>28</sup> This was an attempt to explain the causes of a disease in relation to human anatomy. This concept still exists with the equivalent *Pāli* term.

#### 2.1.6 Others

The term *āyatana* also appears in metaphorical senses in the *Vedic* tradition, such as in the sense of functional position and position in correlative system.

In the sense of functional position, Gonda gives an example of *Indra*, the lord of thunder and war, who has his *āyatana* in the midday pressing in the *Soma* sacrifice.<sup>29</sup> *Soma* is a ritual drink which is believed to be nectar prepared by pressing juice from the stalk of some mountain plants. The offering of *Soma* is performed by pressing *Soma* three times at certain interval during the day, altered with other types of offerings. *Indra* is the chief god who delights in drinking *Soma*. He is always invited in the *Soma* sacrifice during the midday pressing. That is why his *āyatana* is in the midday pressing. The hymn about *Indra* and the *Soma* sacrifice can be found in the *Yajurveda* (*Vajasaneyi-Samhita*), which is one of the four Hindu *Vedas*.

In the sense of correlative system, it is based on the belief that there is a correlation between the two systems, the elements of the universe and the human faculties. An example in this case is that the fingers of the human hand are being *āyatane* of the *Vedic* meters.<sup>30</sup> The *Vedic* meters are the verse of *Vedas* having different length in each type of meters, as follows:

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<sup>28</sup> Jan Gonda, 1975, **op. cit.**, p. 242.

<sup>29</sup> Jan Gonda, 1975, **op. cit.**, p. 216.

<sup>30</sup> Jan Gonda, 1975, **op. cit.**, pp. 219f.

1. *Jāgati*: a *Vedic* meter consists of four lines with twelve syllables in each line,
2. *Triṣṭubh*: a *Vedic* meter consists of four lines with eleven syllables in each line,
3. *Virāj*: a *Vedic* meter consists of four lines with ten syllables in each line,
4. *Anuṣṭubh*: a *Vedic* meter consists of four lines with eight syllables in each line,
5. *Gāyatrī*: a *Vedic* meter consists of three lines with eight syllables in each line.

In the correlative system, the little finger is said to be an *āyatane* of the *Gāyatrī*, since the little finger is the shortest finger and the *Gāyatrī* is the smallest *Vedic* meter.

There are a large number of diverse meanings derived from the root  $\sqrt{\text{yat}}$ , which keep the term *āyatana* full of mystery for a person who does not have a background in the *Vedic-Sanskrit* tradition. However, the varieties of the meanings have a central theme or thread of thought. Gonda expresses the opinion so:

Once we have succeeded in establishing, that is, at least, in defining or paraphrasing that central meaning [of the term *āyatana*] and in getting away from the idea that the series of different ‘meanings’ enumerated in our dictionaries necessarily represent a historical chain of well-defined and independent uses of the word which must have developed one from the other, it becomes clear that there is much less diversity in sense between the contextual uses of such a word than our usual translations would suggest.<sup>31</sup>

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<sup>31</sup> Jan Gonda, 1975, *op. cit.*, p. 255.

In the next section, I will discuss a general definition of *āyatana* in the *Pāli* texts and tradition, which we can find the trace of the *Vedic* sense in its usage.<sup>32</sup>

## 2.2 The Concept of the Term *Āyatana* in *Pāli*

*Āyatana* as used in *Pāli* is derived from a prefix *ā* (to, towards, and from) combined with the root  $\sqrt{yam}$  (hold, restraint).<sup>33</sup> There are two derivative forms of the term *āyatana* that should be recognized: *āyatanani* (singular), and *āyatanāni* (plural). According to *A Dictionary of the Pali Language*, *āyatanani* carries the meaning “Place, dwelling-place, abode, home, seat, rendezvous, haunt, receptacle, mine ; altar, shrine ; place of origin, source, fount, cause, origin [आयत्तन].”<sup>34</sup> In Buddhism, the meaning of the term *āyatana* is similar to the *Sanskrit* meaning. However, metaphorical and technical senses of this term were developed. Table 1 shows the different usages of the term *āyatana* as mentioned by Buddhaghosa.<sup>35</sup>

## 2.3 Definitions of the Different Enumerations of *Āyatana*

The term *āyatana* is widely used in the *Tipiṭaka*. The meaning of the term is varied from *sutta* to *sutta*. In addition, *āyatana* has been enumerated in many different ways. Each kind of enumerations may have different meaning depending on its context and interpretation. In the followings, specific definitions of *āyatana* from selected enumerations are presented.

<sup>32</sup> Jan Gonda, 1975, *op. cit.*, p. 245.

<sup>33</sup> PAW, s.v. “Ā-YATANA”; and PED, 1<sup>st</sup> Indian ed., s.v. “Āyatana.”

<sup>34</sup> DPL, s.v. “ĀYATANAM.”

<sup>35</sup> See details in Buddhaghosa, *The Path of Purification (Visuddhimagga)*, trans. Ñānamoli (Taiwan: The Corporate Body of the Buddha Educational Foundation, 1956), pp. 548-549.

**Table 1. The Different Usages of the Term *Āyatana*.** Buddhaghosa mentions the different usages of the term *āyatana* in five different senses in *The Path of Purification*.

|                          | Example  | Meaning  |
|--------------------------|--|--|
| <b>Place of abode</b>    | <i>Vāsudevāyatanani</i> <sup>36</sup>  | The abode of God <i>Vāsudeva</i>   |
| <b>Store (mine)</b>      | <i>Suvanṇāyatanani</i> <sup>37</sup>   | Gold mine  |
| <b>Meeting place</b>     | <i>Manoranime āyatane sevanti nani vihaṅgamā</i> <sup>38</sup>                     | And birds come home to that fair haunt ( <i>āyatana</i> )  |
| <b>Locality of birth</b> | <i>Dakkhiṇāpatho gunnani āyatanani</i> <sup>39</sup>                               | The southern land is the birthplace of cattle  |
| <b>Cause</b>             | <i>Tatra tatr' eva sakkiḥlabbatani pāpuṇissasi sati sati āyatane</i> <sup>40</sup> | You will attain the ability to witness any aspect therein, there being a suitable basis ( <i>āyatana</i> ) |

### 2.3.1 A Group of Two

A Group of two or the two kinds of *āyatana* (*dve āyatanāni*, *dvāyatanāni*) is mentioned in the *Suttanta Piṭaka* and the *Abhidhamma Piṭaka* in many different senses. In the *Mahānidāna Sutta*, this term is used in the sense of abodes as seen in the following passage:

Ānanda, there are seven stations of consciousness [*satta viññāṇaṭṭhiti*] and two realms [*dve āyatanāni*]. ... [The two realms are:] The Realm of

<sup>36</sup> Vism 482: Buddhaghosa, 1956, *op. cit.*, p.549.

<sup>37</sup> Vism 482: Buddhaghosa, 1956, *op. cit.*, p.549

<sup>38</sup> A III 43: E. M. Hare, trans., *The Book of the Gradual Sayings*, vol. III (Oxford: PTS, 1995), p. 35.

<sup>39</sup> Vism 482: Buddhaghosa, 1956, *op. cit.*, p.549

<sup>40</sup> M I 495: Nanamoli and Bodhi, trans., *The Middle Length Discourses of the Buddha*, vol. 1 (Kandy: BPS, 1995a), p. 600.

Unconscious Beings [*Asaññīsattāyatana*] and, secondly, the Realm of Neither-Perception-Nor-Non-Perception [*Nevasaññānāsaññāyatana*].<sup>41</sup>

Maurice Walshe translates the term *dve āyatanāni* as ‘two realms.’ It is mentioned in the *Mahānidāna Sutta* along with *satta viññāṇaṭṭhiti* in order to explain different places where different types of beings live in the cosmos. The term *dve āyatanāni* refers to the two realms of sentient beings where we could not justify the function of perception, while *satta viññāṇaṭṭhiti* refers to the seven realms of sentient beings with different types of body and perception.

In the *Jhāna Sutta* in the *Aṅguttara Nikāya*, the term *dve āyatanāni* is used in the sense of transcendental states of mind as seen in the following passage:

Thus, monks, as far as perception prevails there is gnosis-penetration. Moreover, monks, those spheres [in PTS version ‘those spheres’ = *imāni āyatanāni*, in Budsir *dve āyatanāni* is used instead]—both the attainment of the sphere of neither perception nor non-perception [*Nevasaññānāsaññāyatana* *samāpatti*] and the ending of perception and feeling [*Saññāvedayitaṇirodho*]<sup>42</sup>—are one ...

In addition, the *Abhidhamma Piṭaka* refers to the two kinds of *āyatana* in the sense of sense-fields or bases, as can be seen from the following examples.

Example 1 from *The Book of Analysis*, under the section dealing with arising and non-arising in the plane of the formless element mentions that: “Therein what are **the two bases** [*dve āyatanāni*] **in the formless element**?

<sup>41</sup> D II 68f: Maurice Walshe, trans., *The Long Discourse of the Buddha* (Kandy: BPS, 1996), pp. 228-229. See also CPD, s.v. “āyatana.”

<sup>42</sup> A IV 426: E. M. Hare, trans., *The Book of the Gradual Sayings*, vol. IV (Oxford: PTS, 1995), p. 285. See also DPa, s.v. “āyatana.”

The mind base [*manāyatana*], ideational base [*dhammāyatana*]. These are called the two bases in the formless element.”<sup>43</sup>

Example 2 from *The Book of Analysis*, under the section dealing with arising and non-arising in states not include in the mundane mentions that: “Therein in ‘(states) not included’ what are the two bases [*dve āyatanāni*]? Mind base [*manāyatana*], ideational base [*dhammāyatana*]. These in ‘(states) not included’ are called the two bases.”<sup>44</sup>

Example 3 from *The Book of Analysis*, under the section showing the states at the moment of conception of beings without perception mentions that:

At the moment of conception of deva beings without perception ... Two bases [*dve āyatanāni*] are apparent, (viz.,) visible base [*rūpāyatana*], ideational base [*dhammāyatana*]. ... Deva beings without perception are apparent (as being) without roots, without nutrients, without contact, without feeling, without perception, without volition, without consciousness.<sup>45</sup>

Example 4 from *The Book of Analysis*, under the section showing the states at the moment of conception in the plane of the formless element mentions that:

At the moment of conception in the formless element, which two bases are apparent? Mind base [*manāyatana*], ideational base [*dhammāyatana*]. At the moment of conception in the formless element these two bases are apparent<sup>46</sup>

All examples from the *Abhidhamma Piṭaka* show that the meanings of the two kinds of *āyatana* are all related to the sense bases.

<sup>43</sup> Vbh 407: Paṭhamakyaw Ashin Thiṭṭila (Setṭhila), trans., *The Book of Analysis* (London: PTS, 1969), pp. 520-521.

<sup>44</sup> Vbh 408: *Ibid.*, p. 522.

<sup>45</sup> Vbh 419: *Ibid.*, pp. 536-537.

<sup>46</sup> Vbh 420: *Ibid.*, p. 537.

In sum, the two kinds of *āyatana* in the *Tipiṭaka* represent more than one meaning. The different meanings of the two kinds of *āyatana* are shown in table 2.

### 2.3.2 A Group of Five

A group of five or the five kinds of *āyatana* (*pañcāyatanaṇi*) is mentioned in both the *Suttanta Piṭaka* and the *Abhidhamma Piṭaka*. An example from the *Suttanta Piṭaka* can be seen from the *Pañcattaya Sutta*, as follows:

Bhikkhus, any recluses or Brahmins who speculate about the future and hold views about the future, who assert various doctrinal propositions concerning the future, all assert these five bases [*pañc' āyatanāni*] or a certain one among them.<sup>47</sup>

**Table 2. The Two Kinds of *Āyatana*.** The table shows some selected examples of the different divisions of the two kinds of *āyatana* as found in the *Tipiṭaka*.

| Different Divisions of the Two Kinds of <i>Āyatana</i>   |                                     |
|--|-------------------------------------|
| The two kinds of <i>āyatana</i> in the sense of 'abode' in the <i>Mahānidāna Sutta</i> :   |                                     |
| 1. <i>Asaññīsattāyatana</i>  | 2. <i>Nevasaññīnānāsaññīāyatana</i> |
| The two kinds of <i>āyatana</i> in the sense of 'transcendental states of mind' in the <i>Jhāna Sutta</i> in the <i>Aṅguttara Nikāya</i> : |                                     |
| 1. <i>Nevasaññīnānāsaññīāyatanasamāpatti</i>   | 2. <i>Saññīnāvedayitanirodha</i>    |
| The two kinds of <i>āyatana</i> in the sense of 'bases' in the <i>Vibhaṅga</i> , such as in Vbh 406f, Vbh 408f, and Vbh 420:               |                                     |
| 1. <i>Manāyatana</i>   | 2. <i>Dhammāyatana</i>              |
| Another version of the two kinds of <i>āyatana</i> in the sense of 'bases' in the <i>Vibhaṅga</i> , such as in Vbh 419:                    |                                     |
| 1. <i>Rūpāyatana</i>   | 2. <i>Dhammāyatana</i>              |

<sup>47</sup> M II 233: Nanamoli and Bodhi, trans., **The Middle Length Discourses of the Buddha**, vol. 2 (Kandy: BPS, 1995b), p. 842.

In this *sutta*, the term *pañcāyatanaṇi* is used in the sense of cause and reason that recluses or Brahmins hold about the future.

In *The Book of Analysis*, under the section showing the states at the moment of conception in the element of the plane of form, *pañcāyatanaṇi* is used to denote sense fields or bases, as can be seen from the following example:

At the moment of conception in the element of form, which five bases [*pañcāyatanaṇi*] are apparent? Eye base [*cakkhāyatana*], visible base [*rūpāyatana*], ear base [*sotāyatana*], mind base [*manāyatana*], ideational base [*dhanimāyatana*]. At the moment of conception in the element of form these five bases are apparent.<sup>48</sup>

In sum, the five kinds of *āyatana* in the *Tipiṭaka* represent more than one meaning. The different meanings of the five kinds of *āyatana* are shown in table 3.

### 2.3.3 A Group of Six

There are many different divisions for a group of six or the six kinds of *āyatana*. The two main divisions of this group are *ajjhāttikāṇi āyatanaṇi* and *bāhirāṇi āyatanaṇi*. Both of these divisions of the six kinds of *āyatana* play very important roles in many teachings of the Buddha.

The *ajjhāttikāṇi āyatanaṇi*, also known as *saḷāyatana*, are the internal sense bases, which are:

1. *cakkhāyatana* or the eye,
2. *sotāyatana* or the ear,
3. *ghāṇāyatana* or the nose,
4. *jivhāyatana* or the tongue,

<sup>48</sup> Vbh 418: Paṭhamakyaaw Ashin Thitṭila (Seṭṭhila), 1969, *op. cit.*, p. 535.

**Table 3. The Five Kinds of *Āyatana*.** The table shows some selected examples of the different divisions of the five kinds of *āyatana* as found in the *Tipiṭaka*.

| Different Divisions of the Five Kinds of <i>Āyatana</i>   |
|---|
| <p>The five kinds of <i>āyatana</i> in the sense of ‘cause and reason’ that recluses or Brahmins hold about the future in the <i>Pañcattaya Sutta</i>:</p> <ol style="list-style-type: none"> <li>1. The self is percipient and unimpaired after death</li> <li>2. The self is non-percipient and unimpaired after death</li> <li>3. The self is neither percipient nor non-percipient and unimpaired after death</li> <li>4. The annihilation, destruction, and extermination of an existing being [at death]</li> <li>5. <i>Nibbāna</i> here and now</li> </ol> |
| <p>The five kinds of <i>āyatana</i> in the sense of ‘bases’ in Vbh 418:</p> <ol style="list-style-type: none"> <li>1. <i>Cakkhāyatana</i></li> <li>2. <i>Rūpāyatana</i></li> <li>3. <i>Sotāyatana</i></li> <li>4. <i>Manāyatana</i></li> <li>5. <i>Dhammāyatana</i></li> </ol>  |

5. *kāyāyatana* or the body, and

6. *manāyatana* or the mind.

This division of the six kinds of *āyatana* can be found in many places in the *Tipiṭaka* such as in the *Saṅgīti Sutta* and in the *Nindāna-Saṇṇyutta*. The internal sense bases play a very important role as a condition in the *Paṭiccasamuppāda*, which is a teaching about a conditional phenomena leading to the cycle of rebirth.

The *bāhirāni āyatanāni* are the external bases, which are:

1. *rūpāyatana* or visible objects,

2. *saddāyatana* or sound,

3. *gandhāyatana* or odor,

4. *rasāyatana* or taste,
5. *phoṭṭhabbāyatana* or tangible objects, and
6. *dhammāyatana* or mind objects.

The term *bāhirāni āyatanāni* also can be found in many places in the *Tipiṭaka*. This division of the six kinds of *āyatana* plays a very important role as objects or external foundations for sense-perceptions.

There is another division of the six kinds of *āyatana* which is *cha āyatanāni*. It is found in *The Book of Analysis*, as follows: “Therein, what are **the six bases** [*cha āyatanāni*] **in the element of form**? Eye base, visible base, ear base, audible base, mind base, ideational base. These are called the six bases in the element of form.”<sup>49</sup>

In sum, the six kinds of *āyatana* in the *Tipiṭaka* represent more than one meaning. The only two main divisions are the *ajjhāttikāni āyatanāni* and the *bāhirāni āyatanāni*. The last division, the *cha āyatanāni* in the *Vibhaṅga*, is rarely used in the *Tipiṭaka*. The different meanings of the six kinds of *āyatana* are shown in table 4.

#### 2.3.4 A Group of Seven

A group of seven *āyatanas*, *sattāyatanāni*, is the combination of selected bases between the *ajjhāttikāni āyatanāni* and the *bāhirāni āyatanāni*. An example can be seen from the following quotation and in table 5:

At the moment of conception in the element of desire, in whom are seven bases [*sattāyatanāni*] are apparent? In womb gestated beings, at the moment of conception seven bases are apparent, (viz.,) visible base, odorous base, sapid base, body base, tangible base, mind base, ideational

<sup>49</sup> Vbh 405: Paṭhamakyaaw Ashin Thitṭila (Seṭṭhila), 1969, *op. cit.*, p. 519.

base. At the moment of conception in the element of desire these seven bases are apparent in these (beings).<sup>50</sup>

**Table 4. The Six Kinds of Āyatana.** The table shows some selected examples of the different divisions of the six kinds of *āyatana* as found in the *Tipiṭaka*.

| Different Divisions of the Six Kinds of Āyatana  |                            |
|--|----------------------------|
| The six kinds of <i>āyatana</i> in the sense of ‘internal sense bases’ in the <i>Saṅgīti Sutta</i> : |                            |
| 1. <i>Cakkhāyatana</i>   | 4. <i>Jivhāyatana</i>      |
| 2. <i>Sotāyatana</i>   | 5. <i>Kāyāyatana</i>       |
| 3. <i>Ghānāyatana</i>  | 6. <i>Manāyatana</i>       |
| The six kinds of <i>āyatana</i> in the sense of ‘external sense bases’ in the <i>Saṅgīti Sutta</i> : |                            |
| 1. <i>Rūpāyatana</i>   | 4. <i>Rasāyatana</i>       |
| 2. <i>Saddāyatana</i>  | 5. <i>Phoṭṭhabbāyatana</i> |
| 3. <i>Gandhāyatana</i>   | 6. <i>Dhammāyatana</i>     |
| Another version of the six kinds of <i>āyatana</i> in Vbh 405:                                       |                            |
| 1. <i>Cakkhāyatana</i>   | 4. <i>Saddāyatana</i>      |
| 2. <i>Rūpāyatana</i>   | 5. <i>Manāyatana</i>       |
| 3. <i>Sotāyatana</i>   | 6. <i>Dhammāyatana</i>     |

**Table 5. The Seven Kinds of Āyatana.** The table shows an example of the division of the seven kinds of *āyatana* as found in the *Tipiṭaka*.

| Division of the Seven Kinds of Āyatana                                |                            |
|---|----------------------------|
| The seven kinds of <i>āyatana</i> in the sense of ‘bases’ in Vbh 413: |                            |
| 1. <i>Rūpāyatana</i>  | 5. <i>Phoṭṭhabbāyatana</i> |
| 2. <i>Gandhāyatana</i>  | 6. <i>Manāyatana</i>       |
| 3. <i>Rasāyatana</i>  | 7. <i>Dhammāyatana</i>     |
| 4. <i>Kāyāyatana</i>  |                            |

<sup>50</sup> Vbh 413: Paṭhamakyaw Ashin Thitṭila (Setṭhila), 1969, *op. cit.*, p. 529.

### 2.3.5 A Group of Nine

A group of nine *āyatana*s, *navāyatanāni*, is a combination of selected internal and external sense bases. An example of *navāyatanāni* is as follows:

At the moment of conception in the element of desire, in whom are nine bases [*navāyatanāni*] are apparent? In spontaneously born ghosts; in spontaneously born asuras; in spontaneously born animals; in these who are in hell; in the congenitally blind and deaf at the moment of conception nine bases are apparent, (viz.) visible base, nose base, odorous base, tongue base, sapid base, body base, tangible base, mind base, ideational base. At the moment of conception in the element of desire these nine bases are apparent in these (beings).<sup>51</sup>

This division of the nine kinds of *āyatana* is the set of *āyatana*s that appear at the moment of conception in the element of desire (*kāmadhātu*) of beings spontaneously born (*opapātika*) in the four states of loss and woe (*apāya*). They are blind and deaf since they were born. These beings include spontaneously born creatures in hell (*niraya*), animal realm (*tiracchānayoṇi*), realm of hungry ghosts (*pittivisaya*), and demons (*asurakāya*). See table 6 for the divisions of the nine kinds of *āyatana*.

**Table 6. The Nine Kinds of *Āyatana*.** The table shows an example of the division of the nine kinds of *āyatana* as found in the *Tipiṭaka*.

| Division of the Nine Kinds of <i>Āyatana</i>                         |                            |
|--|----------------------------|
| The nine kinds of <i>āyatana</i> in the sense of ‘bases’ in Vbh 413: |                            |
| 1. <i>Rūpāyatana</i>   | 6. <i>Kāyāyatana</i>       |
| 2. <i>Ghāṇāyatana</i>  | 7. <i>Phoṭṭhabbāyatana</i> |
| 3. <i>Gandhāyatana</i>   | 8. <i>Manāyatana</i>       |
| 4. <i>Jivhāyatana</i>  | 9. <i>Dhammāyatana</i>     |
| 5. <i>Rasāyatana</i>   |                            |

<sup>51</sup> Vbh 413: Paṭhamakyaw Ashin Thitṭila (Seṭṭhila), 1969, *op. cit.*, p. 529.

### 2.3.6 A Group of Ten

A group of ten or the ten kinds of *āyatana*, *dasāyatanaṇi*, is mentioned in both the *Suttanta Piṭaka* and the *Abhidhamma Piṭaka*. The meaning of the ten kinds of *āyatana* is varied dependent on surrounding contexts. Generally in the *Suttanta Piṭaka*, the term *dasāyatanaṇi* refers to *cakkhāyatana*, *rūpāyatana*, *sotāyatana*, *saddāyatana*, *ghāṇāyatana*, *gandhāyatana*, *jivhāyatana*, *rasāyatana*, *kāyāyatana*, and *phoṭṭhabbāyatana*.<sup>52</sup>

However, the classification of the ten kinds of *āyatana* is different in the *Abhidhamma Piṭaka*. In the plane of desire, there are two classifications for the ten kinds of *āyatana*, as follows:

At the moment of conception in the element of desire, in whom are ten bases [*dasāyatanaṇi*] are apparent? In spontaneously born ghosts; in spontaneously born asuras; in spontaneously born animals; in these who are in hell; in the congenitally blind at the moment of conception ten bases are apparent, (viz.,) visible base, ear base, nose base, odorous base, tongue base, sapid base, body base, tangible base, mind base, ideational base. At the moment of conception in the element of desire these ten bases are apparent in these (beings).<sup>53</sup>

At the moment of conception in the element of desire, in whom are another ten bases [*dasāyatanaṇi*] are apparent? In spontaneously born ghosts; in spontaneously born asuras; in spontaneously born animals; in these who are in hell; in the congenitally deaf at the moment of conception ten bases are apparent, (viz.,) eye base, visible base, nose base, odorous base, tongue base, sapid base, body base, tangible base, mind base, ideational base. At the moment of conception in the element of desire these ten bases are apparent in these (beings).<sup>54</sup>

These two classifications are different that the first one is the classification for blind beings in the element of desire; therefore, the eye base

<sup>52</sup> DPL, s.v. "ĀYATANAM."

<sup>53</sup> Vbh 412f: Paṭhamakyaw Ashin Thittila (Setṭhila), 1969, **op. cit.**, p. 528.

<sup>54</sup> Vbh 413: Paṭhamakyaw Ashin Thittila (Setṭhila), 1969, **op. cit.**, p. 529.

does not exist. The second classification is the classification for deaf beings in the element of desire; therefore, the ear base does not exist.

In sum, the ten kinds of *āyatana* in the *Suttanta Piṭaka* and in the *Abhidhamma Piṭaka* may represent different meanings dependent on their context. The different divisions of the ten kinds of *āyatana* are shown in table 7.

### 2.3.7 A Group of Eleven

A group of eleven or the eleven kinds of *āyatana* is mentioned in the *Abhidhamma Piṭaka*. An example of this division of *āyatana* is as follows:

**Table 7. The Ten Kinds of *Āyatana*.** The table shows some selected examples of the different divisions of the ten kinds of *āyatana* as found in the *Tipiṭaka*.

| Different Divisions of the Ten Kinds of <i>Āyatana</i>  |                             |
|---|-----------------------------|
| The general meaning of the ten kinds of <i>āyatana</i> in the <i>Suttanta Piṭaka</i> in the sense of 'bases,' such as in the <i>Dasuttara Sutta</i> : |                             |
| 1. <i>Cakkhāyatana</i>  | 6. <i>Gandhāyatana</i>      |
| 2. <i>Rūpāyatana</i>  | 7. <i>Jivhāyatana</i>       |
| 3. <i>Sotāyatana</i>  | 8. <i>Rasāyatana</i>        |
| 4. <i>Saddāyatana</i>   | 9. <i>Kāyāyatana</i>        |
| 5. <i>Ghānāyatana</i>   | 10. <i>Phoṭṭhabbāyatana</i> |
| The ten kinds of <i>āyatana</i> in the <i>Vibhaṅga</i> in Vbh 412f:   |                             |
| 1. <i>Cakkhāyatana</i> (deaf born) or<br><i>Sotāyatana</i> (blind born)   | 6. <i>Rasāyatana</i>        |
| 2. <i>Rūpāyatana</i>  | 7. <i>Kāyāyatana</i>        |
| 3. <i>Ghānāyatana</i>   | 8. <i>Phoṭṭhabbāyatana</i>  |
| 4. <i>Gandhāyatana</i>  | 9. <i>Manāyatana</i>        |
| 5. <i>Jivhāyatana</i>   | 10. <i>Dhammāyatana</i>     |

At the moment of conception in the element of desire, in whom are eleven bases [*ekādasāyatanaṇi*] are apparent? In deva of the plane of desire; in the human beings who are first in a world cycle; in spontaneously born ghosts; in spontaneously born asuras; in spontaneously born animals; in those who are in hell; in those having all bases at the moment of conception eleven bases are apparent, (viz.,) eye base, visible base, ear base, nose base, odorous base, tongue base, sapid base, body base, tangible base, mind base, ideational base. ...<sup>55</sup>

This eleven kinds of *āyatana* is the combination between the *ajjhāttikāṇi āyatanaṇi* and the *bāhirāṇi āyatanaṇi*, excluding *saddāyatana*. See table 8 for the division of the eleven kinds of *āyatana*.

### 2.3.8 A Group of Twelve

A group of twelve kinds of *āyatana*, *dvādasāyatanaṇi*, is the combination between the *ajjhāttikāṇi* and the *bāhirāṇi āyatanaṇi*. It is the topic that I am interested to pursue in this thesis, since it plays a very important role in Buddhism as a factor that leads human life to the cycle of rebirth. From now on, I will use the word twelve *āyatanas* to refer to *dvādasāyatanaṇi*.

**Table 8. The Eleven Kinds of *Āyatana*.** The table shows an example of the division of the eleven kinds of *āyatana* as found in the *Tipiṭaka*.

| Different Divisions of the Eleven Kinds of <i>Āyatana</i>  |                            |
|--|----------------------------|
| The eleven kinds of <i>āyatana</i> in the <i>Abhidhamma Piṭaka</i> in the sense of ‘bases’ in Vbh 412: |                            |
| 1. <i>Cakkhāyatana</i>   | 7. <i>Rasāyatana</i>       |
| 2. <i>Rūpāyatana</i>   | 8. <i>Kāyāyatana</i>       |
| 3. <i>Sotāyatana</i>   | 9. <i>Phoṭṭhabbāyatana</i> |
| 4. <i>Ghāṇāyatana</i>  | 10. <i>Manāyatana</i>      |
| 5. <i>Gandhāyatana</i>   | 11. <i>Dhammāyatana</i>    |
| 6. <i>Jivhāyatana</i>  |                            |

<sup>55</sup> Vbh 412: Paṭhamakyaw Ashin Thittila (Seṭṭhila), 1969, *op. cit.*, p. 528.

In this section, we can see that the concept of the term *āyatana* is far more developed by the Buddha. We still can see the traces of *Vedic* usages, such as *āyatana* in the sense of ‘cause and reason,’ in the *Tipiṭaka*. However, some concepts, such as the concept of the internal and the external sense bases, were created by the Buddha. The concept of the twelve *āyatanas*, which is the combination between the internal and the external sense bases, is very important in the Buddhist teachings. Therefore, I will discuss the meaning of the twelve *āyatanas* in more detail in the next section.

## 2.4 The Twelve *Āyatanas* and Their Meaning

The twelve *āyatanas*, sense bases, generally refer to *cakkhāyatana* (the eye), *sotāyatana* (the ear), *ghānāyatana* (the nose), *jivhāyatana* (the tongue), *kāyāyatana* (the body), *manāyatana* (the mind) and their corresponding objects which are *rūpāyatana* (visible objects), *saddāyatana* (sound), *gandhāyatana* (smell), *rasāyatana* (taste), *phoṭṭhabbāyatana* (tangible objects), and *dhammāyatana* (mind objects). The commentators explain the reason why these sense bases are called *āyatanas* in two ways. The first one can be seen from the following passage and in table 9:

*Āyatanānantī ettha āyatanato, āyānāni tananato, āyatassa ca nayanato āyatanānīti.*

[Direct translation⇒] Bases (*āyatanānī*): in this connection, they are bases (*āyatanāni*), on account of their being active (*āyatanato*), on account of its being the sources (*āyānāni*) that they extend (*tananato*), and on account of its being to that which is protracted (*āyatassa*) that they lead (*nayanato*).<sup>56</sup>

<sup>56</sup> ItiA II 168f: trans. Peter Masefield. See Buddhaghosa, 1956, *op. cit.*, p. 548.

**Table 9. The Phenomena of the Twelve *Āyatanas* and Their Meanings.** The table shows the phenomena that are the characteristic of the sense bases which are the reason why they are called '*āyatana*.'

| Characteristic           | Meaning                     | Explanation   |
|--------------------------|-----------------------------|---|
| <i>āyatanato</i>         | Being active                | The various states of <i>citta</i> <sup>57</sup> and <i>cetasikas</i> <sup>58</sup> belonging to each pair of internal sense bases and external sense bases are active by means of its functions, such as experiencing. |
| <i>āyānānī tananato</i>  | Extending from its origin   | The various states of <i>citta</i> and <i>cetasikas</i> when they are acting as a source make the sense bases expand by providing them scope.   |
| <i>āyatassa nayanato</i> | Leading on what is actuated | As long as each pair of internal sense bases and external sense bases still perform their functions, therefore, they cause to occur that which increases the time in the round of rebirths leading to suffering.        |

The second way to explain the reason why the sense bases are called *āyatanas* can be seen in table 10. The table shows explanation why the internal and the external sense bases are called *āyatana* in reference to the different meanings of the term *āyatana*, which are in the sense of 'place of abode,' 'store,' 'meeting place,' 'locality of birth,' and 'cause' (see table 1).

<sup>57</sup> "CITTA: 'Mind', 'Consciousness', 'State of Consciousness', is a synonym of *mano* (q.v.) and *viññāṇa* ..." from **BD**, 3<sup>rd</sup> rev. and enl. ed., s.v. "CITTA."

<sup>58</sup> "CETASIKA: 'Mental Things, Mental Factors', are those mental concomitants which are bound up with the simultaneously arising consciousness (*citta* = *viññāṇa*) and conditioned by its presence" from **BD**, s.v. "CETASIKA."

**Table 10. The Sense Bases and Various Meanings of the Term *Āyatana*.** The table shows the sense bases and their relationship to various meanings of the term '*āyatana*.'

| Sense Bases                     | Referred to the Term <i>Āyatana</i> in the Sense of | Explanation  |
|---------------------------------|---|--|
| Internal Sense Bases            | 1. <i>Sañjātidesaṭṭha</i> (locality of birth)       | The internal sense bases are the 'birthplace' of <i>vīthiccittas</i> .   |
|                                 | 2. <i>Nivāsaṭṭha</i> (place of abode)               | The internal sense bases are the '(indirect) abode' of <i>vīthiccittas</i> . It is indirect because <i>vīthiccittas</i> exist in the internal sense bases for only temporary. If only when there are proper causes and conditions, then a <i>vīthiccitta</i> will arise. |
|                                 | 3. <i>Ākaraṭṭha</i> (store, mine)                   | The internal sense bases are like a 'mine,' where information or knowledge can be obtained.  |
| External Sense Bases            | 4. <i>Samosaṇaṭṭha</i> (meeting place)              | The external sense bases are the 'meeting place' of <i>vīthiccittas</i> . By experiencing an external sense base, <i>vīthiccittas</i> arise.   |
| Internal & External Sense Bases | 5. <i>Kāraṇaṭṭha</i> (cause)                        | Both the internal and the external sense bases are 'causes,' since they have an effect on the arising of <i>vīthiccittas</i> .   |

Source Adaptive:

1. Khumue Kan Sueksa Laksut Chula-Aphithammika Tho, p. 75.

## 2.5 The Twelve *Āyatanas* in Their Metaphorical Senses

As I discuss earlier, the term *āyatana* had evolved in the Buddhist tradition. The twelve *āyatanas* were used in a form of metaphors by the Buddha as a tool to clarify his teaching. The following are some selected metaphors of the twelve *āyatanas* from the Buddhist scriptures.

### 2.5.1 The Twelve *Āyatanas* in the Similitude of Burning

In the *Ādittapariyāya Sutta*,<sup>59</sup> the Buddha explains that everything, including the twelve *āyatanas*, is burning. Burning is compared to the fire that arises from lust, hatred, and delusion. Burning is also compared to suffering that arises as a result of birth, aging, death, sorrow, lamentation, pain, grief, displeasure, and despair. This burning arises because a person has passion towards conditional things. The burning will stop whenever a person becomes dispassionate and liberated from desire by non-clinging.

### 2.5.2 The Twelve *Āyatanas* in the Similitude of a Deserted Village and Village-Raiding Robbers

In the *Āsīvisa Sutta*,<sup>60</sup> the *ajjhāttikāyatanāni* are compared to a deserted village (*suññagāma*), because they appear to be without reality (*rittakāni*), hollow (*tucchakāni*) and empty (*suññākāni*). In contrary, the *bāhirāyatanāni* are compared to village-raiding robbers (*corā gāmaghātā*), since they harass the internal sense bases by agreeable and disagreeable forms.

### 2.5.3 The Twelve *Āyatanas* in the Similitude of the Near Shore and the Far Shore

In the *Dārūkhanda Sutta*,<sup>61</sup> the Buddha compares the internal sense bases to the near shore and the external sense bases to the far shore as follows:

If, bhikkhus, that log does not veer towards the near shore [= *ajjhāttikāni āyatanāni*], does not veer towards the far shore [= *bāhirāni āyatanāni*], does not sink in mid-stream [= *nandirāga*], does not get cast up on high ground [= *asmimāna*], does not get caught up by human beings [= involving oneself in laypeople's affairs and duties], does not get caught up by

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<sup>59</sup> S IV 19f.

<sup>60</sup> S IV 172ff.

<sup>61</sup> S IV 179ff.

nonhuman beings [= the aspiration to be reborn in *deva*'s world], does not get caught up in a whirlpool [= *kāmaguṇa*], and does not become inwardly rotten [by immoral], it will slant, slope, and incline towards the ocean [= *nibbāna*]. For what reason? Because the current of the river Ganges [right view] slants, slopes, and inclines towards the ocean.<sup>62</sup>

The Buddha uses this parable to advise *bhikkhus* to act as the log and to see the danger of the twelve *āyatanas* and other threats mentioned above in order to attain enlightenment.

#### 2.5.4 The Twelve *Āyatanas* in the Similitude of Six Types of Creatures and Their Resorts

In the *Chappāṇa Sutta*,<sup>63</sup> the Buddha compares the internal sense bases to six kinds of creatures and the external sense bases as their resorts. Table 11 shows the simile of the six animals and their explanations in the Commentaries.

In this *sutta*, the Buddha teaches a parable of a hunter who caught six kinds of animals having different habitats and tied them together. The animals naturally pulled the rope in six different directions. Finally, the five animals would have to follow the direction that was pulled by the strongest animal. In this case, the Buddha compares the strongest animal to an untrained mind.

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<sup>62</sup> Bodhi, trans., *The Connected Discourses of the Buddha*, vol. II (USA: Wisdom Publications, 2000b), p. 1242.

<sup>63</sup> S IV 198f.

**Table 11. The Six Internal *Āyatanas* in the Similitude of the Six Animals.** This table shows the simile of the six animals in the *Chappāṇa Sutta* and their explanations.

| <i>Ajjhatikāni<br/>Āyatanani</i> | Creatures | Meaning  |
|----------------------------------|-----------|--|
| <i>Cakkhu</i>                    | Snake     | As a snake takes no delights outside its place, it only secures mental quietude at the resting time when it enters a place of refuse, a lair of grass and leaves, or an ant-hill. This is like the eye which likewise does not delight in burnished, gilded walls, but instead delights in surfaces variegated with pictures and beautified with creeping flowers.   |
| <i>Sota</i>                      | Crocodile | A crocodile, having gone out and found no prey to catch, dives into water and enters its den. It lays itself down. At that time, its mind becomes tranquil and sleeps at ease. So, too, hearing desires a 'den,' it entertains a wish for the cavity of the ear which is dependent on space. The space in the ear-cavity is the cause of hearing a sound.  |
| <i>Ghāṇa</i>                     | Bird      | A bird delights neither in a tree nor the ground. However, when it flies into the sky, it gets the feeling of security. Likewise, the nose desires for space and yet is dependent upon the wind ( <i>vāta</i> ).   |
| <i>Jivhā</i>                     | Dog       | A dog when wandering finds no safe place. Only when it comes back to its home, scratching up ash at an oven-door and lying down, does it find ease. In the same way the tongue desires for a home and is dependent on water element ( <i>āpodhātu</i> ).   |
| <i>Kāya</i>                      | Jackal    | A jackal wanders outside never be satisfied, until it eats human flesh at the cemetery for non-cremation and lying down it gets ease. So is the tactile sense which desires matter grasped at, and takes a tangible object dependent on the extension element. Thus, persons getting no other matter 'grasped at,' will then lying down put the head on the palm of the hands. Internal and external extension is the cause of the tactile sense seizing the object. |

*Continued*

**Table 11, continued. The Six Internal *Āyatanas* in the Similitude of the Six Animals.** This table shows the simile of the six animals in the *Chappāṇa Sutta* and their explanations.

| <i>Ajjhatikāni<br/>Āyatanani</i> | Creatures | Meaning  |
|----------------------------------|-----------|--|
| <i>Mana</i>                      | Monkey    | A monkey does not like to walk on the ground. Only when it climbs up on a tree and sits there, watching various directions, is the time when it finds happiness. The mind is like the monkey such that it delights in various objects. |

Source Adaptive:

1. The Expositor Vol. II, pp. 411-413.

Therefore, the Buddha reminds his followers to train their mind and set up mindfulness of the body. He suggests that by training one's mind the unwholesome states would be reduced and then cease at last. Like tying the six animals to a strong post, when the six animals are tied, they could not move freely. They may struggle until exhausted. As a result, they would lie down near the post, like our unwholesome states of mind would be reduced and cease.

## 2.6 The Significance of the Twelve *Āyatanas* in the *Tipiṭaka*

The significance of the twelve *āyatanas* can be seen from a passage that the Buddha replied to a deity<sup>64</sup> and *Hemavata Yakkha*,<sup>65</sup> as follows:

In six has the world arisen;  
In six it forms intimacy;  
By clinging to six the world  
Is harassed in regard to six.<sup>66</sup>

<sup>64</sup> S I 92.

<sup>65</sup> Sn 30.

The difference between the answer to a deity and *Himavata Yakkha*, according to the explanation from the Commentaries, is that the first answer refers to only the six internal *āyatanas*, while the second answer refers to both the internal and the external *āyatanas*. From the above paragraph, the statement “Is harassed in regard to six” refers to *dukkha*, suffering, that may arise due to the twelve *āyatanas*, which is a very important topic in the study of Buddhism. The following is the compilation of the significance of the twelve *āyatanas* I found in the *Tipiṭaka*.

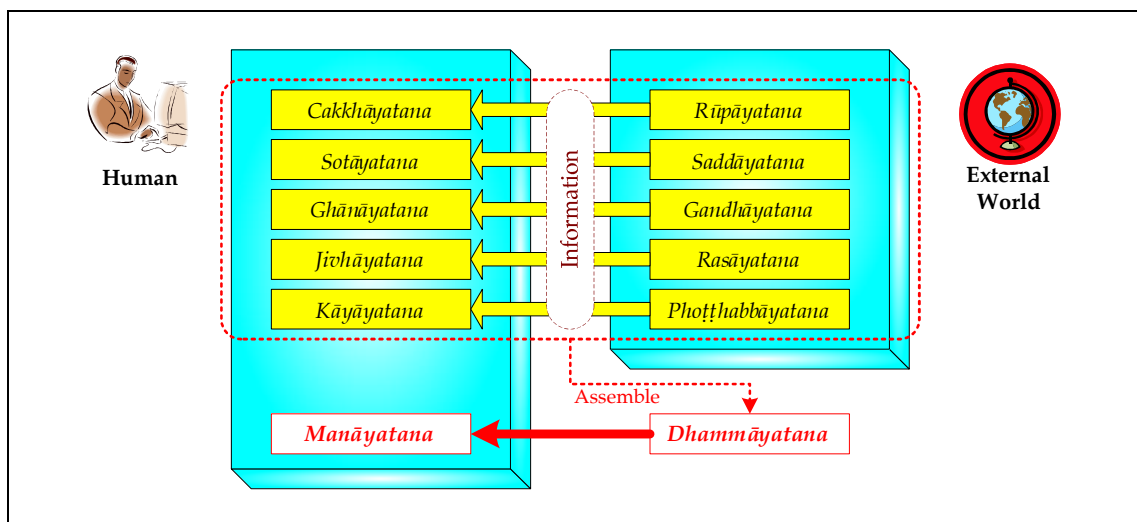
### 2.6.1 The Twelve *Āyatanas* Link between Human and the World

The twelve *āyatanas* connect human beings and the external world together. Normally, human beings communicate with the external world through the five physical sense organs, which are the eye, the ear, the nose, the tongue, and the body. These are where the *cakkhāyatana*, *sotāyatana*, *ghānāyatana*, *jivhāyatana*, and *kāyāyatana* play an important role on the human side and the *rūpāyatana*, *saddāyatana*, *gandhāyatana*, *rasāyatana*, and *phoṭṭhabbāyatana* on the external world side. *Manāyatana* also plays a very significance role as a collector and director of other *āyatanas* as can be seen in the following passage: “External objects, visible, audible, olfactory, gustatory and tangible assemble there [*manāyatana*] as objects in mind [*dhammāyatana* or *dhammārammaṇa*].”<sup>67</sup> From the quotation, we can see that the first five *āyatanas* receive their corresponding objects from the world outside in a form of information. The information then is sent to the *manāyatana* where information will be further processed, as can be seen in figure 2.

<sup>66</sup> Bodhi, *The Connected Discourses of the Buddha*, vol. I (Boston: Wisdom Publication, 2000a), p. 133.

<sup>67</sup> Pe Maung Tin, *The Expositor*, vol. I, 2<sup>nd</sup> ed. (London: PTS, 1958a), p. 186.

**Figure 2. The Twelve *Āyatana*s Connect Human Beings and the External World Together.** After the first five internal *āyatana*s receive information of their corresponding external *āyatana*s, the information will be assembled in a form of object of mind (*dhammāyatana*) and then is sent to the *manāyatana*. The *manāyatana* will further process the incoming message.



From the figure, it shows that each internal sense base has its own corresponding external sense base. The pairs between them are *cakkhāyatana-rūpāyatana*, *sotāyatana-saddāyatana*, *ghāṇāyatana-gandhāyatana*, *jivhāyatana-rasāyatana*, *kāyāyatana-phoṭṭhabbāyatana*, and *manāyatana-dhammāyatana*. The commentators elaborate the possibilities how human beings contact the external world through each internal sense base, excluding the *manāyatana*, into fifty-two methods. The way of exposition of each *āyatana* is the same. Figure 3 shows where the fifty-two methods come from with the example from the expounding of the *cakkhāyatana*. The same techniques also can be applied for other *āyatana*s, except for the *manāyatana* and the *dhammāyatana*. I will discuss these fifty-two methods in more detail in this section.

**Figure 3. Fifty-Two Methods of Expounding the *Cakkhāyatana*.** The fifty-two methods shown here explain how each *āyatana* contact the external world. The example below is from the *cakkhāyatana*. The same method also can be applied for the remaining *āyatanas* (except the *manāyatana* and the *dhammāyatana*).

### A Buddhist Manual of Psychological Ethics

(pp. 159-162)

[597] What is that [material] form which is the sphere of vision (*cakkhāyatana*)?

**4 ways how the eye reacts on material:**  
 The eye, that is to say the sentient organ, derived from the Great Phenomena, included in the self-state, nature of the self, invisible and reacting - by which eye, invisible and reacting, one has seen, sees, will, or may see material shape that is visible and reacting - ...

**4 ways of involuntary visual sensation how material impinges on the eye:**  
 The eye, ..., invisible and reacting, and against which eye, invisible and reacting, [material] shape that is visible and reacting, has impinged, impinges, will, or may impinge - ...

**4 ways of voluntary visual sensation how the eye impinges on material:**  
 The eye, ..., invisible and reacting, which eye, invisible and reacting, has impinged, impinges, will, or may impinge on [material] shape that is visible and impinging - ...

**4 ways how each *phassapañcaka* arises, therefore, 20 methods are mentioned here:**  
 The eye, ..., invisible and reacting, depending on which eye, in consequence of some [visible] shape, there has arisen, arises, will, or may arise  
 [i] visual contact; ...  
 and depending on which eye, in consequence of some [visible] shape, there has arisen, arises, will, or may arise - born of that visual contact -  
 [ii] a feeling ...  
 [or iii] a perception ...  
 [or iv] volition ...  
 [or v] a visual cognition ...

Three types of relations related to the twelve *āyatanas* are also mentioned here, namely, *purejāta-paccaya*, *ārammaṇādhipati-paccaya*, and *ārammaṇūpanissaya-paccaya*.

**4 ways how each *phassapañcaka* arises in connection with objects (= 20 methods):**  
 [further] depending on which eye, and having a [visible] shape as its object, there has arisen, arises, will, or may arise  
 [vi] visual contact,  
 and depending on which eye, and having a [visible] form as its object, there has arisen, arises, will, or may arise, born of that visual contact  
 [vii] a feeling ...  
 [or viii] a perception ...  
 [or ix] volition ...  
 [or x] a visual cognition -

One type of relation related to the twelve *āyatanas* is mentioned here, which is the relationship between the external *āyatanas* and mind by way of *ārammaṇa-paccaya*.

this that is sight, the sphere of sight, the element of vision, ...

**Total methods mentioned here are 52 methods.**  
 (4 + 4 + 4 + 20 + 20 = 52)

**Notes:**  
 1. 'has arisen' indicates the event in the past.      2. 'arises' indicates the event in the present.  
 3. 'will arise' indicates the event in the future.      4. 'may arise' indicates the conditional event.

**Source Adaptive:**  
 1. A Buddhist Manual of Psychological Ethics, pp. 159-162.  
 2. The Expositor Vol.II, pp. 403-407.

### 2.6.1.1 Fifty-Two Methods How the Twelve *Āyatanas* Link between Human and the World

As shown in figure 3, the Commentaries explain fifty-two methods how human beings contact the external world through the five physical sense bases. The fifty-two methods are as follows:

1. Four methods how the internal sense bases interact with the external sense bases

There are four possibilities how the internal sense bases interact with the external sense bases, namely, in the past, in the present, in the future, and conditional. Figure 3 shows that by the eye, there are four ways the eye reacts on material:

- a. a person has seen a past visible object in the past with a past eye;
- b. a person sees a present visible object in the present with a present eye;
- c. a person will see a future visible object in the future with a future eye; and
- d. if the eye is intact, a person may see a visible object if the object comes into the focus of the eye.

These are the four methods that the eye can see.

2. Four methods of involuntary communication

The involuntary communication is the communication that arises when there is no desire to communicate, such as when there is a lightening; the eye can see the light and the ear can hear the sound without any intention to see or hear. In case

of the eye, the four methods of involuntary visual sensation also can arise in the past, in the present, in the future, and conditional:

- a. a past visible object has impinged on the past eye in the past;
- b. a present visible object impinges on the present eye in the present;
- c. a future visible object will impinge on the future eye in the future; and
- d. a visible object may impinge on the eye if the object reaches the avenue of the eye.

### 3. Four methods of voluntary communication

The voluntary communication is the communication that arises when there is a desire to communicate, such as when a person would like to see an object, therefore, his eye impinges on the object. In case of the eye, the four methods of voluntary visual sensation can arise in the past, in the present, in the future, and conditional, as follows:

- a. the past eye has impinged on the past visible object in the past;
- b. the present eye impinges on the present visible object in the present;
- c. the future eye will impinge on the future visible object in the future; and
- d. the eye may impinge on the visible object if the object reaches the avenue of the eye.

4. Four and twenty methods of how *phassapañcaka* arises

*Phassapañcaka* is the fivefold group of “basic non-rational elements in a state of consciousness”<sup>68</sup> consisting of *samphassa* (contact), *vedanā* (feeling), *saññā* (perception), *cetanā* (volition), and *viññāṇa* (cognition). In consequence of the first five external bases, namely, *rūpāyatana*, *saddāyatana*, *gandhāyatana*, *rasāyatana*, and *phoṭṭhabbāyatana*, there are four possible ways that each *phassapañcaka* can arise. In case of the eye, the four methods are as follows:

- a. dependent on the eye, in consequence of some visible objects, there has arisen *phassapañcaka* in the past;
- b. dependent on the eye, in consequence of some visible objects, there arises *phassapañcaka* in the present;
- c. dependent on the eye, in consequence of some visible objects, there will arise *phassapañcaka* in the future;
- d. dependent on the eye, in consequence of some visible objects, there may arise *phassapañcaka*.

*Phassapañcaka* consists of five factors of sense-impression which are *phassa*, *vedanā*, *saññā*, *cetanā*, and *viññāṇa*. To whom *phassa* becomes evident, not only *phassa* arises, but also the remaining pentad of sense-impression arises. Therefore, the five factors of *phassapañcaka* arise together, as can be seen from the following quotation:

<sup>68</sup> See details in Nyanaponika, *Abhidhamma Studies*, 4<sup>th</sup> ed. (Kandy: BPS, 1985), pp. 47ff.

Not only impression [*phassa*] itself arises, but also together with it there arises feeling [*vedanā*] which experiences that same object, also perception [*saññā*] which perceives it, also volition [*cetanā*] which forms plans about it and also there arises consciousness [*viññāṇa*] which cognises it.<sup>69</sup>

Since the *phassapañcaka* consists of five components, then there are twenty ( $4 \times 5$ ) methods mentioned here.

In addition, these twenty methods concern the external bases, which become objects of their corresponding internal bases. Therefore, three types of relations related to the twelve *āyatana*s are also mentioned here, namely, *purejāta-paccaya*, *āraṇmaṇādhīpati-paccaya*, and *āraṇmaṇūpanissaya-paccaya*. I will discuss about these relations in the next section.

5. Four and twenty methods of how *phassapañcaka* arises in connection with objects

Having one of the first five external bases as an object and depending on their corresponding internal bases there are four possible ways that each *phassapañcaka* can arise. In case of the eye, the four methods are as follows:

- a. dependent on the eye, having a visible shape as an object, there has arisen *phassapañcaka* in the past;
- b. dependent on the eye, having a visible shape as an object, there arises *phassapañcaka* in the present;
- c. dependent on the eye, having a visible shape as an object, there will arise *phassapañcaka* in the future;

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<sup>69</sup> VbhA 265: Ñānamoli, trans., **The Dispeller of Delusion**, part I (London: PTS, 1987), p. 326.

- d. dependent on the eye, having a visible shape as an object, there may arise *phassapañcaka*.

These are the four methods how each *phassapañcaka* arises. Since the *phassapañcaka* consists of five components, then there are twenty ( $4 \times 5$ ) methods mentioned here.

In addition, these twenty methods concern the external bases as objects of mind. Therefore, a relation related to the twelve *āyatanas* is mentioned here, which is the relationship between the external *āyatanas* and the mind by way of *ārammaṇa-paccaya*, which I will discuss about it in the next section.

#### 2.6.1.2 Four Types of Relations How the Twelve *Āyatanas* Link between Human and the World

There are four types of relations mentioned in the fifty-two methods in the above section. These four relations show that the twelve *āyatanas* do not exist as isolated entities, but they constitute in a well-ordered system. The four relations are *ārammaṇa-paccaya*, *ārammaṇādhīpati-paccaya*, *purejāta-paccaya*, and *ārammaṇūpanissaya-paccaya*. Followings are the brief information about each of them.

##### 1. *Ārammaṇa-Paccaya*

*Ārammaṇa* means “That on which anything rests or dwells, a support, stay, basis, ground, cause, material, object.”<sup>70</sup> It is derived from  $\bar{a} + \sqrt{\text{ram}}$  which means “to attach, to adhere,

<sup>70</sup> DPL, s.v. “ĀRAMMAṆAM.”

to delight.”<sup>71</sup> In Buddhism, this word refers to an object of senses on which the mind rests, which is very important to the arising of *citta* (mind) and *cetasikas* (mental factors).

Therefore, the *ārammaṇa-paccaya* refers to an object of senses acting as a causal relation to *citta*. The object, in this case, is the conditioning factor, while *citta* and *cetasikas* are the conditioned factor. This is how *citta* experiences an object. Figure 4 portrays the *ārammaṇa-paccaya* in brief.

## 2. *Ārammaṇādhīpati-Paccaya*

*Ārammaṇādhīpati-paccaya* is a sub-category of *adhīpati-paccaya*. *Adhīpati* means “mastery or lordship over one’s own.”<sup>72</sup> Therefore, the *ārammaṇādhīpati-paccaya* (object-predominance condition) refers to an object that is predominant, which means it needs special attention by pondering it seriously.<sup>73</sup> Figure 5 portrays the *ārammaṇādhīpati-paccaya* in brief.

The *ārammaṇādhīpati-paccaya* operates under the process of apperception.<sup>74</sup> An object which is highly regarded by *citta* must be desirable; therefore, some objects could not be conditioned by way of the object-predominance. From the description shown in figure 5, we can see that if a person thinks about an object too much, then it may become an

<sup>71</sup> Anuruddhācariya, **A Manual of Abhidhamma**, 5<sup>th</sup> rev. ed., trans. Nārada (Malaysia: The Buddhist Missionary Society, 1987), p. 184.

<sup>72</sup> **Ibid.**, p. 373.

<sup>73</sup> Bunmi Methangkun and Butsakon Methangkun, **Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 8** (Nakhon Pathom: Abhidhamma Foundation, B.E. 2545), p. 129.

<sup>74</sup> Pe Maung Tin, **The Expositor**, vol. II, 2<sup>nd</sup> ed. (London: PTS, 1958b), p. 406.

obsession which may cause the arising of lust (*rāga*) and wrong views (*ditṭhi*).

### 3. *Ārammaṇūpanissaya-Paccaya*

*Ārammaṇūpanissaya-paccaya* is a sub-category of *upanissaya-paccaya*, which is derived from *upa* + *ni* +  $\sqrt{si}$  (to lie). The prefix *upa* indicates that this condition is the causal relation of “strong” dependence.

**Figure 4. The Relationship between Objects and *Citta* by Way of *Ārammaṇa-Paccaya*.** *Citta* experiences an object by an object acting as the conditioning factor and *citta* and *cetasikas* are the conditioned factor.

| OBJECT-CONDITION<br>[ <i>ārammaṇa-paccaya</i> ]   |                 |                            |  |
|---|-----------------|----------------------------|--|
| <p><i>Ārammaṇa</i> - or <i>Ālambana</i> - the former is derived from <math>\bar{a}</math> + <math>\sqrt{ram}</math>, to delight in; the latter from <math>\bar{a}</math> + <math>\sqrt{lanib}</math>, to hang upon. Things on which the subject delights in or hangs upon are 'objects.' There are six classes of objects. A form, for instance, acts as a causal relation to visual-consciousness by way of an 'object.' It should be stated that there is nothing mundane or supramundane that does not become an object to the mind.</p> |                 |                            |  |
| (i) <i>Rūpāyatana</i>   | is related to   | <i>cakkhuvīññāṇa-dhātu</i> | } and its associated states by <i>ārammaṇa-paccaya</i> . |
| (ii) <i>Saddāyatana</i>   | is related to   | <i>sotaviññāṇa-dhātu</i>   |  |
| (iii) <i>Gandhāyatana</i>   | is related to   | <i>ghāṇaviññāṇa-dhātu</i>  |  |
| (iv) <i>Rasāyatana</i>  | is related to   | <i>jīhāvīññāṇa-dhātu</i>   |  |
| (v) <i>Phoṭṭhabbāyatana</i>   | is related to   | <i>kāyaviññāṇa-dhātu</i>   |  |
| (vi) <i>Rūpāyatana</i><br><i>Saddāyatana</i><br><i>Gandhāyatana</i><br><i>Rasāyatana</i><br><i>Phoṭṭhabbāyatana</i>   | } is related to | <i>mano-dhātu</i>          | and its associated states by <i>ārammaṇa-paccaya</i> .   |
| (vii) All states  |                 | <i>mano-viññāṇa-dhātu</i>  | and its associated states by <i>ārammaṇa-paccaya</i> .   |
| (viii) Taking any states as object, these states, <i>citta</i> and <i>cetasikas</i> , arise; those (former) states are related to those (latter) states by <i>ārammaṇa-paccaya</i> .  |                 |                            |  |

**Source Adaptive:**

1. A Manual of Abhidhamma, p. 373.
2. Paṭṭh 1f: Conditional Relations (Paṭṭhāna), p. 2.

**Figure 5. Ārammaṇādhīpati-Paccaya and Its Example.** The figure shows a brief explanation about *adhīpati-paccaya* and an example of *ārammaṇādhīpati-paccaya*.

**OBJECT-PREDOMINANCE**  
[ *ārammaṇādhīpati-paccaya* ]

Predominance condition is of two kinds, namely:

- 1) Object-predominance [*ārammaṇādhīpati-paccaya*]: It refers to any objects [*ārammaṇa*] on which a person heavily ponders.
- 2) Conscience-predominance [*sahajātādhīpati-paccaya*]: It includes predominant desire [*chanda*], predominant effort [*virīya*], predominant consciousness [*citta*], and predominant investigating wisdom [*vimāṇsā*].

The followings are the examples of *ārammaṇādhīpati-paccaya*.

Indeterminate state [*avyākata dhamma*] is related to faulty state [*akusala dhamma*] by predominance condition.

**Object-predominance :** (One) esteems, enjoys and delights in the eye. Taking it as estimable object, arises lust [*rāga*], arises wrong views [*diṭṭhi*]. One esteems, enjoys and delights in the ear ... nose ... tongue ... body ... visible object ... sound ... smell ... taste ... tangible object ... (heart-) base. Taking it as estimable object, arises lust, arises wrong views. (One) esteems, enjoys and delights in the resultant indeterminate [*vipāka-avyākata khandha*] or functional indeterminate aggregates [*kiriya-avyākata khandha*]. Taking it as estimable objects, arises lust, arises wrong views.

**Source Adaptive:**

1. Paṭṭh 158f: Conditional Relations (Paṭṭhāna), p. 148.

The information of the *ārammaṇūpanissaya-paccaya* is the same as the *ārammaṇādhīpati-paccaya* as shown in figure 6. The only difference between them is that the object in the *ārammaṇādhīpati-paccaya* is highly esteemed by *citta* and *cetasikas*, so that they ponder on it. However, the object in the *ārammaṇūpanissaya-paccaya* has a powerful influence on a subsequent phenomenon such that the subsequent phenomenon is strongly dependent on the preceding object.<sup>75</sup>

<sup>75</sup> Nina Van Gorkom, "Ch. 8: Decisive Support-Condition Part II," **Conditions**, Dhamma Study e-Books, retrieved 20 October 2005, <<http://www.dhammastudy.com>>.

**Figure 6. *Ārammaṇūpanissaya-Paccaya* and Its Example.** The figure shows a brief example of *ārammaṇūpanissaya-paccaya*.

**OBJECT-STRONG-DEPENDENCE**  
**[ *ārammaṇūpanissaya-paccaya* ]**

*Upa* is derived from *upa* + *ni* + *√si*, to lie. *Upa* is an intensive prefix. ... S. Z. Aung renders *upanissaya* by 'sufficing condition.' For instance, one of the five heinous crimes such as matricide, parricide and so on will serve as an *upanissaya* to effect a birth in a woeful state.

There are three kinds of *upanissaya*. *Ārammaṇūpanissaya-paccaya* is one of them. The example is as follows:

Indeterminate state [*abyākata dhamma*] is related to faulty state [*akusala dhamma*] by strong-dependence condition.

It is of three kinds. Object-strong-dependence is one of them. Following is its example:

*Object-strong-dependence* : (One) esteems, enjoys and delights in the eye. Taking it as estimable object, arises lust, arises wrong views. (One) esteems, enjoys and delights in the ear ... nose ... tongue ... body ... visible object ... sound ... smell ... taste ... tangible object ... (heart-)base. Taking it as estimable object, arises lust, arises wrong views. (One) esteems, enjoys and delights in the resultant indeterminate or functional indeterminate aggregates. Taking it as estimable objects, arises lust, arises wrong views.

**Source Adaptive:**

1. A Manual of Abhidhamma, p. 375.
2. Paṭṭh 170: Conditional Relations (Paṭṭhāna), p.165.

#### 4. *Purejāta-Paccaya*

*Purejāta* literally means "born before."<sup>76</sup> Therefore, *purejāta-paccaya* is a condition that exists before another conditioned thing. The example of the *purejāta-paccaya* can be seen in figure 7.

<sup>76</sup> Anuruddhācariya, 1987, **op. cit.**, p. 375.

**Figure 7. The Twelve Āyatanas Are Related to Viññāṇadhātu and Its Associated States by Purejāta-Paccaya.** The twelve āyatanas exist before and in the presence of viññāṇa-dhātu and its associated states in order to support them.

| PRENASCENE CONDITION<br>[ <i>purejāta-paccaya</i> ]  |  |                 |                            |   |
|--|--|-----------------|----------------------------|---|
| <i>Purejāta</i> - lit., born before or that which pre-exists. The six physical bases [internal <i>āyatana</i> ] and six sensual objects [external <i>āyatana</i> ] are regarded as pre-existent. The pre-existent things are regarded as causal relations only when they continue to exist in the present and not by mere antecedence [from <i>uppādakhaṇa</i> until <i>ṭhitikhaṇa</i> ].  |  |                 |                            |   |
| (i)  | <i>Cakkhāyatana</i>  | is related to   | <i>cakkhuvinnāṇa-dhātu</i> | } and its associated states<br>by <i>vattlupurejāta-paccaya</i> .   |
| (ii)   | <i>Sotāyatana</i>  | is related to   | <i>sotavinnāṇa-dhātu</i>   |   |
| (iii)  | <i>Ghāṇāyatana</i>   | is related to   | <i>ghānavinnāṇa-dhātu</i>  |   |
| (iv)   | <i>Jivhāyatana</i>   | is related to   | <i>jivhāvinnāṇa-dhātu</i>  |   |
| (v)  | <i>Kāyāyatana</i>  | is related to   | <i>kāyavinnāṇa-dhātu</i>   |   |
| (vi)   | <i>Rūpāyatana</i>  | is related to   | <i>cakkhuvinnāṇa-dhātu</i> | } and its associated states<br>by <i>ārammaṇapurejāta-paccaya</i> . |
| (vii)  | <i>Saddāyatana</i>   | is related to   | <i>sotavinnāṇa-dhātu</i>   |   |
| (viii)   | <i>Gandhāyatana</i>  | is related to   | <i>ghānavinnāṇa-dhātu</i>  |   |
| (ix)   | <i>Rasāyatana</i>  | is related to   | <i>jivhāvinnāṇa-dhātu</i>  |   |
| (x)  | <i>Phoṭṭhabbāyatana</i>  | is related to   | <i>kāyavinnāṇa-dhātu</i>   |   |
| (xi)   | <i>Rūpāyatana</i><br><i>Saddāyatana</i><br><i>Gandhāyatana</i><br><i>Rasāyatana</i><br><i>Phoṭṭhabbāyatana</i> | } is related to | <i>mano-dhātu</i>          | and its associated states<br>by <i>purejāta-paccaya</i> .           |
| (xii) Depending on this matter [ <i>Rūpaṇi</i> = <i>nipphanarūpaṇi</i> ], <i>mano-dhātu</i> and <i>manovinnāṇa-dhātu</i> arise; that matter is related to <i>mano-dhātu</i> and its associated states by pre-nascene condition; is sometimes related to <i>manovinnāṇa-dhātu</i> and its associated states by pre-nascene condition [ <i>pavatti kāla</i> ], and is sometimes not related by pre-nascene condition [ <i>paṭisandhi kāla</i> ].   |  |                 |                            |   |
| <b>Notes:</b> <ul style="list-style-type: none"><li>There are two types of <i>purejāta-paccaya</i>:<br/>1. <i>vattlupurejāta-paccaya</i>    2. <i>ārammaṇapurejāta-paccaya</i>.</li><li>The condition of the arising of <i>vattlupurejāta-paccaya</i> is <i>vattu</i> 6, which are <i>cakkhuvattu</i>, <i>sotavattu</i>, <i>ghānavattu</i>, <i>jivhāvattu</i>, <i>kāyavattu</i>, and <i>hadayavattu</i> that arise before <i>paccayuppana</i> (arisen from a cause).</li><li>The condition of the arising of <i>ārammaṇapurejāta-paccaya</i> is <i>ārammaṇa</i> 6, which are <i>nipphanarūpa</i>.</li><li><i>Nipphanarūpa</i> is the <i>rūpa</i> that is directly produced by conditions which are <i>kamma</i>, <i>citta</i>, <i>utu</i>, and <i>āhāra</i>.</li></ul> |  |                 |                            |   |
| <b>Source Adaptive:</b> <ul style="list-style-type: none"><li>1. A Manual of Abhidhamma, p. 375.</li><li>2. Paṭṭh 4f: Conditional Relations (Paṭṭhāna), pp. 7-8.</li><li>3. Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 8, pp. 159-160.</li></ul>   |  |                 |                            |   |

The figure shows that the twelve *āyatanas* exist before *viññāṇa-dhātu* and its associated states arise. In addition, the twelve *āyatanas* continue to exist to support *viññāṇa-dhātu* and its associated states during their presence. Figure 8 shows an example of the relationship between *rūpāyatana* and *cakkhuvīññāṇa* by way of *purejāta-paccaya*.

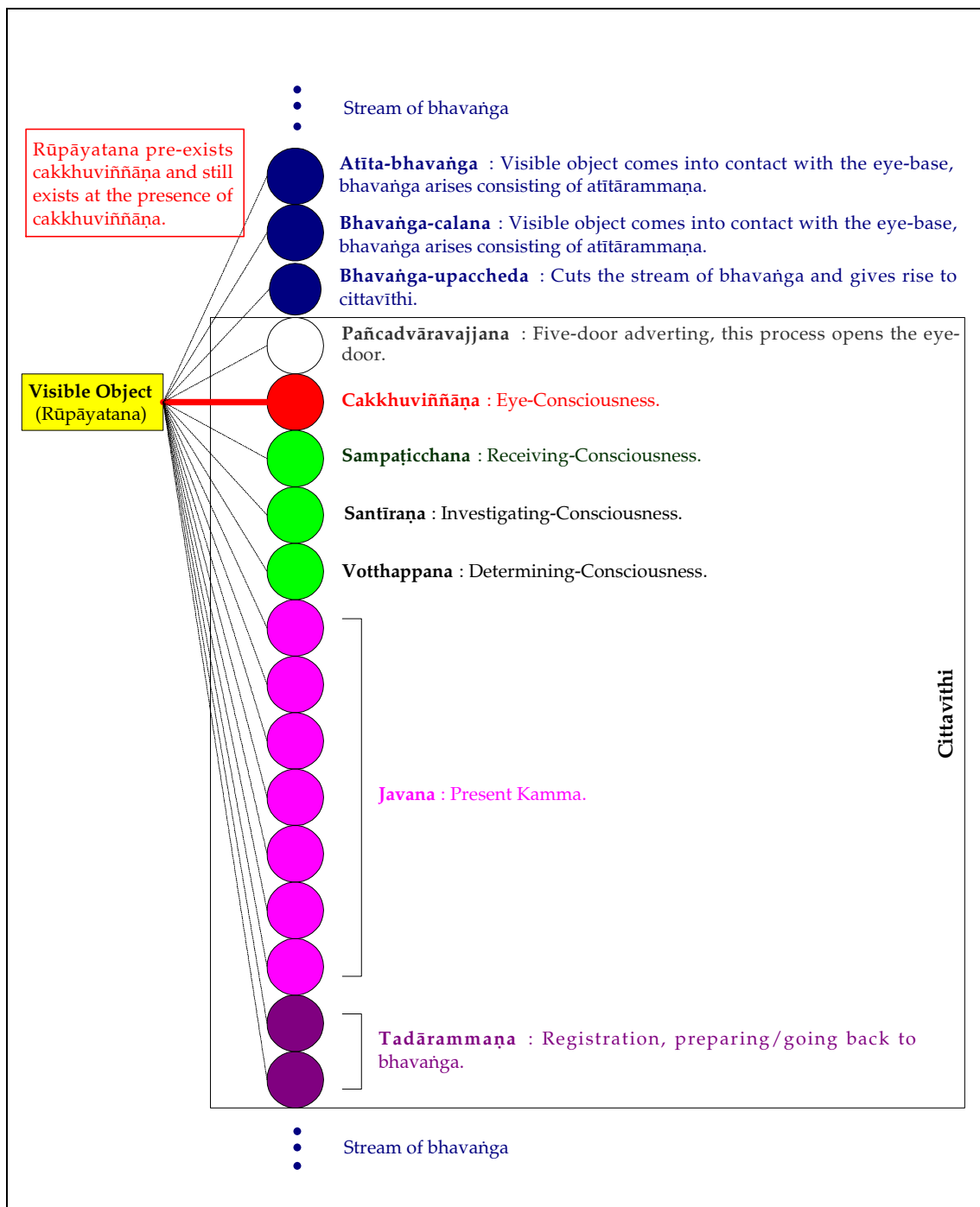
It should be noted here that there are differences between six *vatthus* and *ajjhātikāyatanaṇi*. Table 12 shows that the six *vatthus* and the internal *āyatanas* are similar, except that the *hadayavattu* and the *manāyatana* have different constituent factor, which are *hadayarūpa* and *citta*, respectively. There are also differences between the six *ārammaṇas* and *bāhirāyatanaṇi*. Table 13 shows that the *dhammāyranmaṇa* consists of *citta*, *cetasika*, *pasādarūpa*, *nibbāna*, and *paññatti*. However, the *dhammāyatana* consists only *cetasika*, *sukhumarūpa*, and *nibbāna*.

## 2.6.2 The Twelve *Āyatanas* Allow Human to experience the World

In order to experience the world, the *ajjhātikāyatanas* must interact with the corresponding *bāhirāyatanas*. The interaction between them generates a process of perception which allows human beings to experience the external world. The word ‘experience’ here has a specific meaning, which should not be confused with the term *vedanā* (feeling). In psychology, this term refers to “knowledge derived from proof furnished by one’s own senses.”<sup>77</sup> Figure 9 is the theory of perception which provides an explanation of how human beings experience the external world.

<sup>77</sup> DP, s.v. “experience<sup>n</sup>.”

**Figure 8. The Example of the Relationship between *Rūpāyatana* and *Cakkhuvīññāṇa* by Way of *Purejāta-Paccaya* in the Process of Seeing.** The figure shows that the *rūpāyatana* exists before and during the presence of the *cakkhuvīññāṇa*.



**Table 12. The Comparison between *Vatthu* and *Ajjhattikāyatanāni*.** The differences between the six *vatthus* and the internal sense bases can be seen in the constituent factor between the *hadayavattu* and the *manāyatana*.

|                                     | <i>Vatthu 6</i>      | <i>Ajjhattikāyatanāni</i> |
|-------------------------------------|----------------------|---------------------------|
| <i>Cakkhuvattu vs. Cakkhāyatana</i> | <i>Cakkhuppasāda</i> | <i>Cakkhuppasāda</i>      |
| <i>Sotavattu vs. Sotāyatana</i>     | <i>Sotappasāda</i>   | <i>Sotappasāda</i>        |
| <i>Ghānavattu vs. Ghānāyatana</i>   | <i>Ghānappasāda</i>  | <i>Ghānappasāda</i>       |
| <i>Jivhāvattu vs. Jivhāyatana</i>   | <i>Jivhāppasāda</i>  | <i>Jivhāppasāda</i>       |
| <i>Kāyavattu vs. Kāyāyatana</i>     | <i>Kāyappasāda</i>   | <i>Kāyappasāda</i>        |
| <i>Hadayavattu vs. Manāyatana</i>   | <i>Hadayarūpa</i>    | <i>Cittas</i> (89)        |

Source Adaptive:

1. Paramatthachotika: Paritchet 3 and Paritchet 7 Laksut Chula-Aphithammika Tho
2. Khumue Kan Sueksa Laksut Chula-Aphithammika Tho, p. 75.

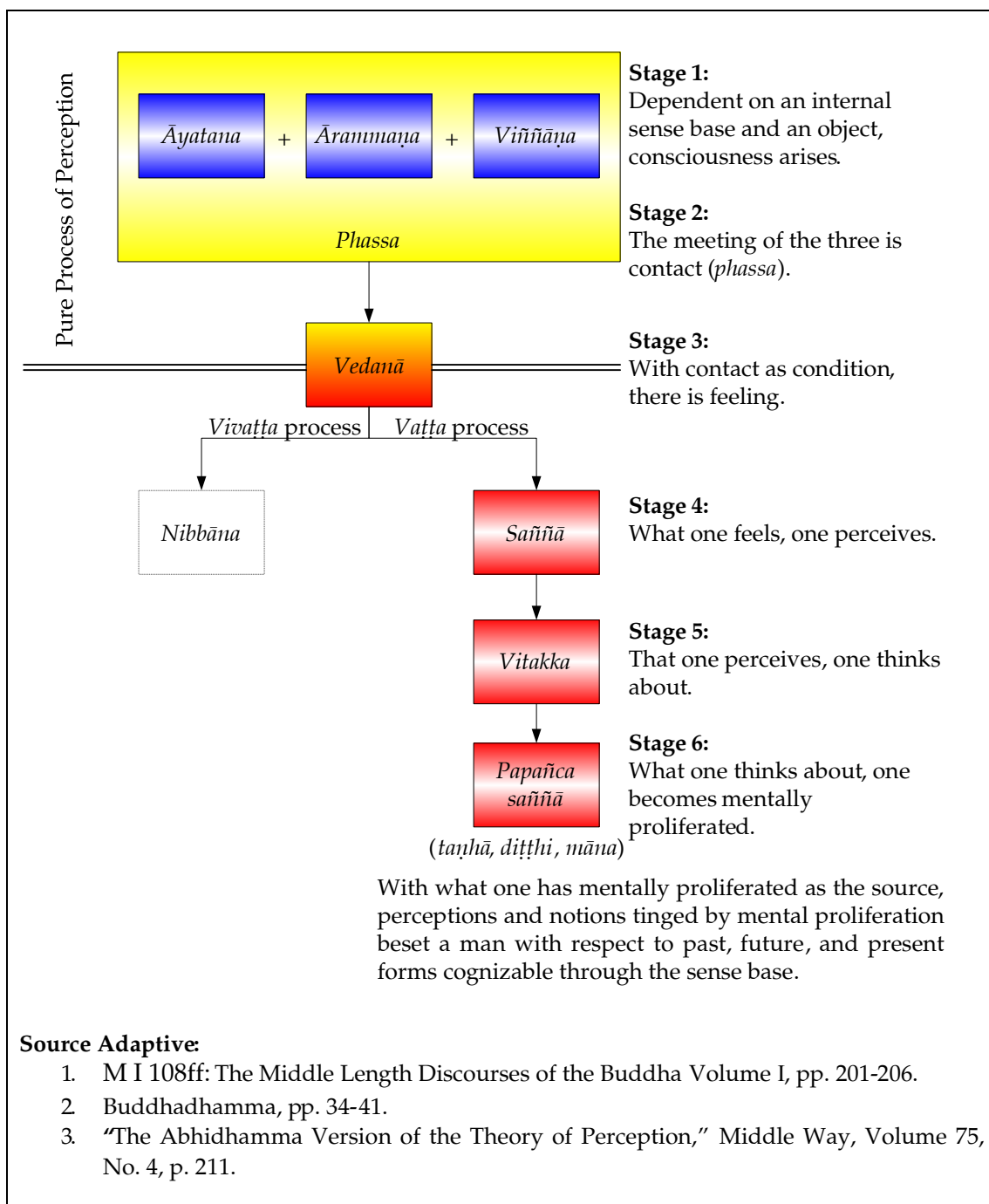
**Table 13. The Comparison between *Ārammaṇa* and *Bāhirāyatanāni*.** The differences between the six *ārammaṇas* and the external *āyatanas* can be seen in the constituent factors of the *dhammārammaṇa* and the *dhammāyatana*. However, these two terms are always used interchangeably in the *Suttanta Piṭaka*.

|   | <i>Ārammaṇa 6</i>  | <i>Bāhirāyatanāni</i>                      |
|---|--|--|
| <i>Rūpārammaṇa vs. Rūpāyatana</i>             | Colors   | Colors                                     |
| <i>Saddārammaṇa vs. Saddāyatana</i>           | Sounds   | Sounds                                     |
| <i>Gandhārammaṇa vs. Gandhāyatana</i>         | Odors  | Odors                                      |
| <i>Rasārammaṇa vs. Rasāyatana</i>             | Flavors  | Flavors                                    |
| <i>Phoṭṭhabbārammaṇa vs. Phoṭṭhabbāyatana</i> | Tangible objects   | Tangible objects                           |
| <i>Dhammārammaṇa vs. Dhammāyatana</i>         | <i>Cittas, Cetasikas, Pasādarūpas, Nibbāna, and Paññatti</i> | <i>Cetasikas, Sukkumarūpas and Nibbāna</i> |

Source Adaptive:

1. Khumue Kan Sueksa Laksut Chula-Aphithammika Tho, pp. 29, 75.

**Figure 9. The Series of Mental Phenomena of the Process of Perception.** The early Buddhist theory of perception is mentioned in the *Madhupiṇḍhika Sutta*. The process of perception consists of six stages of mental phenomena. There is a dispute about which should be considered as the last stage of the process of perception between *saññā* and *papañcasaññā*. Karunadasa explains that “What follows after *saññā* could not be understood as a process of sense-perception but as a purely ideational process set up by a process of perception (Middle Way, 75:4, 211).” Therefore, full cognition should take place at the end of the series of mental phenomena.



From the figure, we see that the process of experiencing in psychology starts from the arising of *phassa* (contact) to the arising of *papañcasaññā* (idea of obsession), which is the final stage in the process of sense-cognition.<sup>78</sup> The whole process provides information and knowledge derived from the sense bases. Only *vedanā* does not provide enough information for human beings to experience the world, since it is merely a hedonic tone from the psychological point of view.<sup>79</sup>

We now know that the bases condition consciousness by way of the *purejāta-paccaya*. When an object comes into the avenue of the corresponding internal sense base, *viññāṇa* arises. When the three meets (*ārammaṇa* + *ajjhatikāyatana* + *viññāṇa*), there is also *phassa*. Only the collision between an object and the avenue of the corresponding sense base is not classified as *phassa*.<sup>80</sup>

According to the *Paṭiccasamuppāda*, *phassa* conditions *vedanā*. It seems that *vedanā* arises after *phassa*, however, they arise together in one conscious moment along with other factors in *phassapañcaka*. When *vedanā* arises, we can experience pleasant feeling, painful feeling, and indifferent feeling, which lead to *taṇhā* (craving). However, if we do not submit to these feelings, there is a way out from the cycle of rebirth (*vivaṭṭa process*) as shown in figure 9.

<sup>78</sup> Padmasiri De Silva, *An Introduction to Buddhist Psychology*, 2<sup>nd</sup> ed. (London: Macmillan Academic and Professional Ltd, 1991), p. 24.

<sup>79</sup> *Ibid.*, p. 41; “hedonic tone = the pleasurable or unpleasurable accompaniment or characteristic of conscious experiences” from DP, s.v. “hedonic tone.”

<sup>80</sup> Anuruddhācariya, 1987, *op. cit.*, p. 82.

### 2.6.3 The Twelve *Āyatanas* Are the Place Where *Saṃyojana* Arises

*Saṃyojana*, fetters, has a very important role in Buddhism, since it binds human beings to the cycle of rebirth.<sup>81</sup> In the *Saṃyojaniya Sutta*, the Buddha mentions the causes of the arising of fetters and fetters as follows:

Bhikkhus, I shall expound on the causes of the arising of fetters, and on fetters. Listen to it, Bhikkhus, what are the causes of the arising of fetters and what is a fetter? Bhikkhus, the eye is the cause of the arising of fetters. The sensual attachment to the eye is a fetter ...<sup>82</sup>

The discourse continues by applying the same idea to other internal sense-bases. In addition, there is another similar discourse named the *Saṃyojaniya Dhamma Sutta* that explains the same thing by way of external sense bases.<sup>83</sup> From these two *suttas*, the *Saṃyojaniya Sutta* and *Saṃyojaniya Dhamma Sutta*, we see that the internal and the external *āyatanas* are the cause of the arising of fetters, while the desire and lust for them are fetters.

The *saṃyojana* has been enumerated in many different ways. Figure 10 shows the different classifications of the *saṃyojana*, which are varied from three to ten kinds. The *saṃyojana* that is widely mentioned in the *Suttanta Piṭaka* is the five kinds of *saṃyojana*. They are also known as *orambhāgiya* and *uddhambhāgiya-saṃyojana*.

The *orambhāgiya-saṃyojana*, the lower fetters, consists of five fetters as can be seen its detail in figure 11, which are:

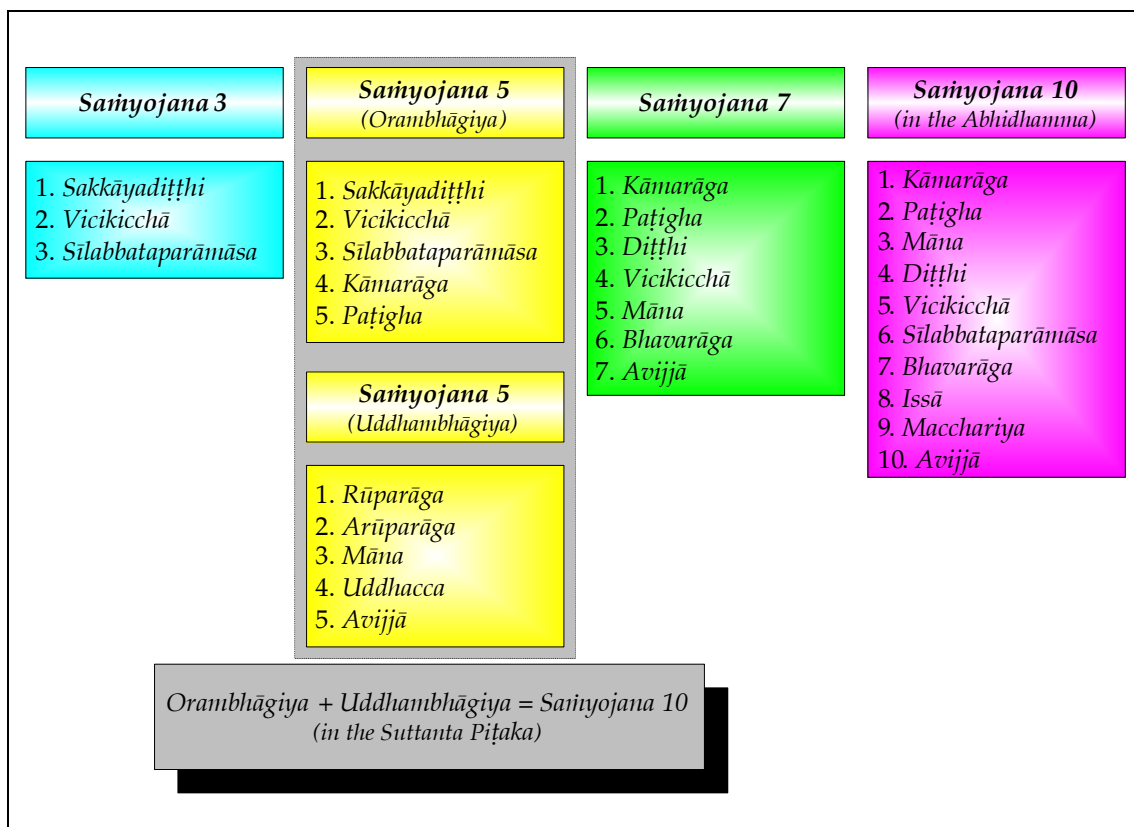
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<sup>81</sup> Nynatiloka, 1972, **op. cit.**, p. 161.

<sup>82</sup> S IV 89: U Hla Maung, **Salāyatana Samyutta** (Myanmar: The Department for the Promotion and Propagation of the Sāsana, 1998), p.136; and Bodhi, 2000b, **op. cit.**, p. 1186. I chose the translation from U Hla Maung's instead of Bodhi's because the translation is easier to understand.

<sup>83</sup> S IV 107f: U Hla Maung, 1998, **op. cit.**, p. 165; and Bodhi, 2000b, **op. cit.**, p. 1196.

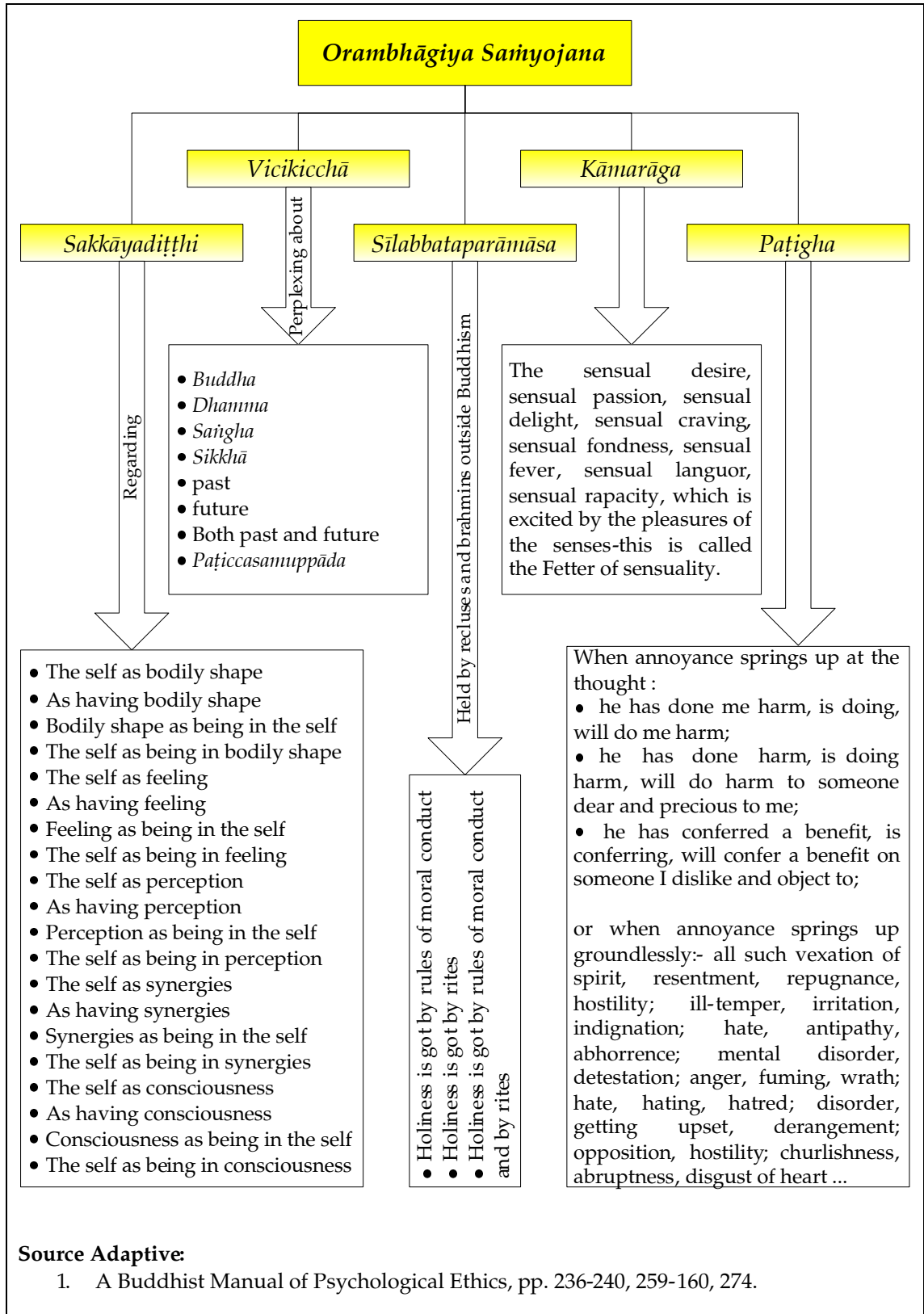
**Figure 10. The Different Classifications of *Saṃyojana*.** The figure shows the different enumerations of *saṃyojana*, which are three, five, seven and ten kinds of *saṃyojana*. The five kinds of *saṃyojana* are divided into two types, namely, lower fetters and higher fetters. In the *Suttanta Piṭaka*, when combining these two types of the lower and the higher fetters together, it is called the ten kinds of *saṃyojana*.



1. *sakkāyadiṭṭhi* (false view of individuality)
2. *vicikicchā* (doubt)
3. *sīlabbataparāṇāsa* (adherence to rules and rituals)
4. *kāmarāga* (sensual lust)
5. *paṭigha* (repulsion, irritation)

A person who attains *sotāpattimagga* can eradicate the first three lower fetters. A person who attains *sakadāgāminimagga* further overcomes the remaining lower fetters in their gross form. A person who completely eradicates the five lower fetters attains *anāgāminimagga*.

**Figure 11. Orambhāgiya-Saṃyojana and Its Details.** The lower fetters consist of *sakkāyadiṭṭhi*, *vicikicchā*, *silabbataparāmāsa*, *kāmarāga*, and *paṭigha*.



The *uddhambhāgiya-saṇṇyojana*, the higher fetters, also consists of five fetters as shown in figure 12, which are:

1. *rūparāga* (attachment to realms of form)
2. *arūparāga* (attachment to formless realms)
3. *māna* (conceit, pride)
4. *uddhacca* (restlessness, distraction)
5. *avijjā* (ignorance)

Only a person who attains *arahattamagga* can eradicate both the *orambhāgiya* and the *uddhambhāgiya-saṇṇyojana*.

The ten fetters as enumerated in the *Abhidhamma Piṭaka* are different. They are:

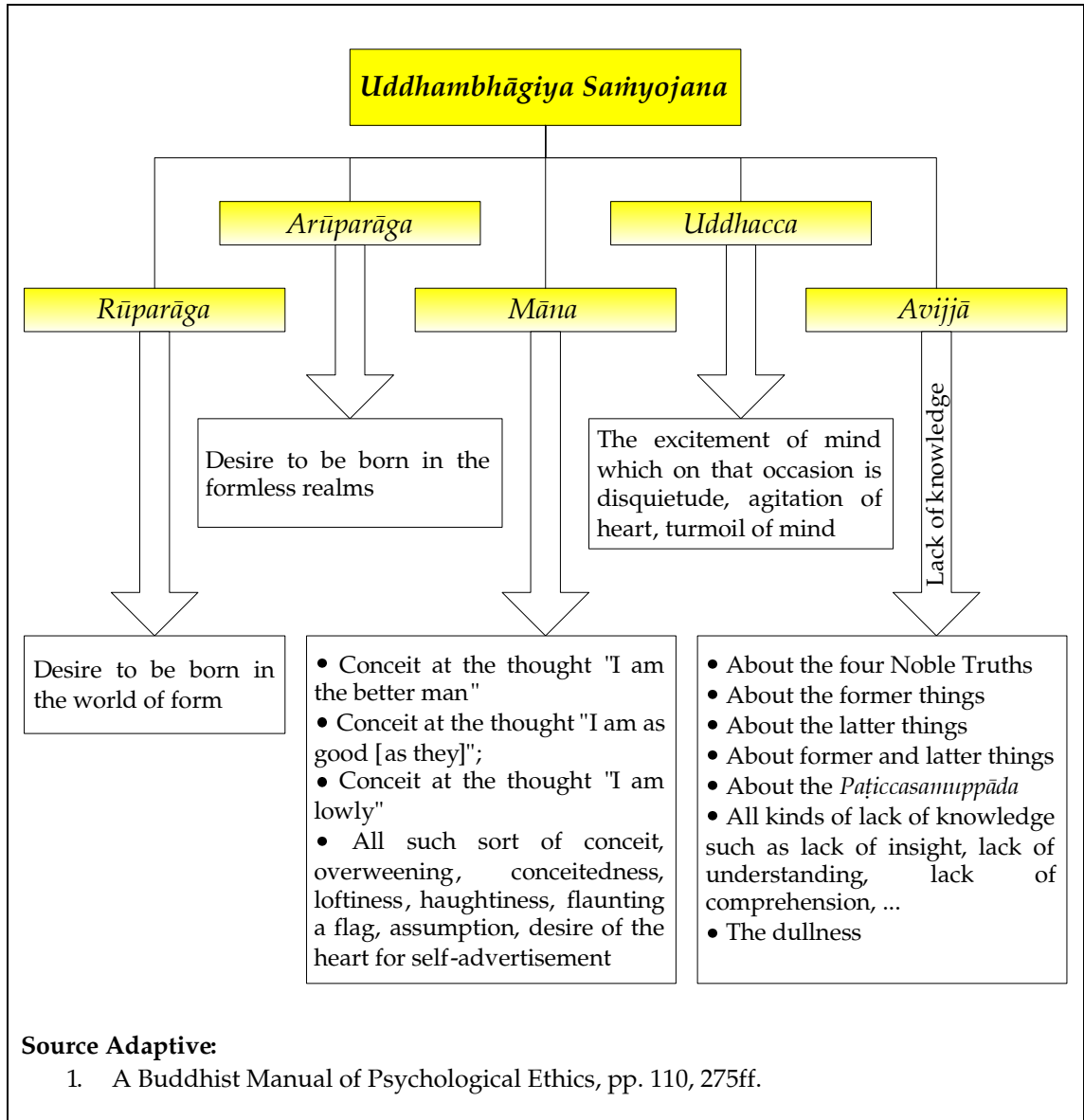
- |                                |   |
|--------------------------------|---|
| 1. <i>kāmarāga</i>             | 6. <i>śīlabbataparāmāsa</i>                 |
| 2. <i>paṭigha</i>              | 7. <i>bhavarāga</i> (craving for existence) |
| 3. <i>māna</i>                 | 8. <i>issā</i> (envy)                       |
| 4. <i>diṭṭhi</i> (wrong views) | 9. <i>macchariya</i> (stinginess)           |
| 5. <i>vicikicchā</i>           | 10. <i>avijjā</i>                           |

The ten fetters in the *Abhidhamma Piṭaka* have four different fetters from the ten fetters in the *Suttanta Piṭaka*.

#### 2.6.4 The Twelve Āyatana's Lead Human's Life to Dukkha

*Dukkha* is a very important teaching in Buddhism. It is the first factor of the Four Noble Truths (*Ariyasacca*) and the second factor of the Three Characteristics of existence (*Tilakkhaṇa*). The term *dukkha* in this section refers to general aspect of *dukkha* which is 'suffering' or 'unsatisfactoriness.'

**Figure 12. Uddhambhāgiya-Saṃyojana and Its Details.** The higher fetters consist of *rūparāga*, *arūparāga*, *māna*, *uddhacca*, and *avijjā*.



In the *Mahāsaṃyātanika Sutta*,<sup>84</sup> the Buddha explains that when a person does not know and see the twelve *āyatana*s and things conditioned by the twelve *āyatana*s as they really are, then that person is inflamed by lust for

<sup>84</sup> M III 287ff: Nanamoli and Bodhi, 1995b, *op. cit.*, pp. 1137ff.

the twelve *āyatanas* and things that are conditioned by them. This inflammation by lust is a cause of the clinging of the five aggregates which leads a human to *dukkha* both bodily and mentally. As shown in figure 13, the blind knowledge of the twelve *āyatanas* leads a human's life to *dukkha* and to lose his way in the wheel of existence.

### 2.6.5 The Twelve *Āyatanas* Are *Dukkha*

Even though, *dukkha* is generally translated as 'suffering.' However, in Buddhism there are three kinds of *dukkha* as shown in figure 14, namely,

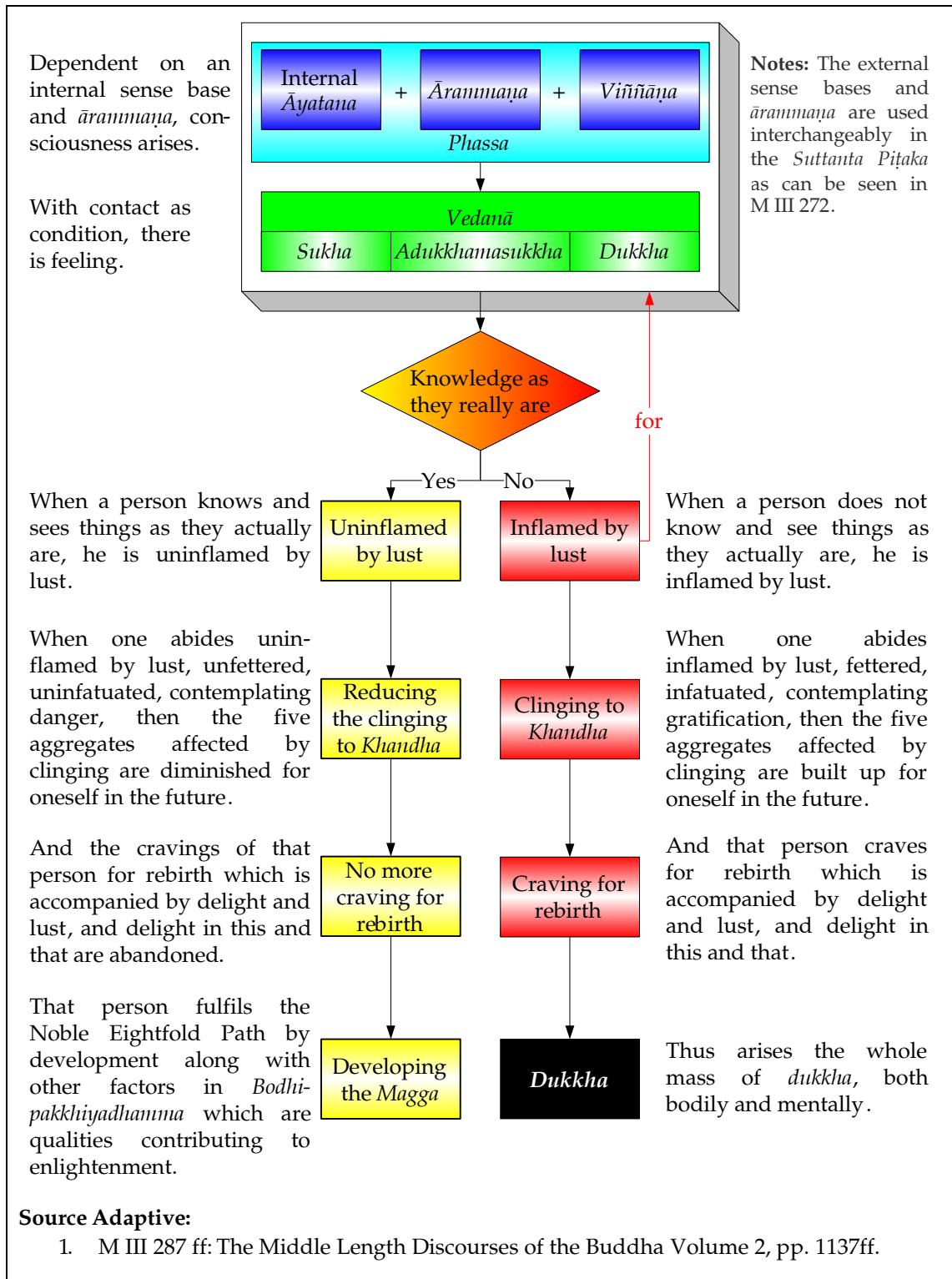
1. *dukkha-dukkhatā* (painfulness as *dukkha*);
2. *vipariṇāma-dukkhatā* (*dukkha* in change); and
3. *saṅkhāra-dukkhatā* (*dukkha* due to formation).<sup>85</sup>

The twelve *āyatanas* fall under these three types of *dukkha*, since they are subject to painfulness, to change, and to formation. An example of the twelve *āyatanas* as *dukkha-dukkhatā* can be seen in figure 13. *Dukkha-dukkhatā* is the state of *dukkha* that results from mental or bodily pain. When a person does not know the twelve *āyatanas* as they really are, *dukkha* arises as a result in body and mind. Therefore, the twelve *āyatanas* can be classified as a part of *dukkha-dukkhatā*.

*Vipariṇāma-dukkhatā* is the state of *dukkha* that arises due to changes. In the *Nandakovāda Sutta*, Venerable Nandaka gave advices to *bhikkhuniīs* as follows:

<sup>85</sup> DB, s.v. "[78] Dukkhatā 3"; and BD, s.v. "DUKKHATĀ."

**Figure 13. The Relationship between the Twelve *Āyatana*s and *Dukkha*.** The ignorance of the twelve *āyatana*s is a cause keeping human to be born in the wheel of existence leading his life to the whole mass of *dukkha*. To the contrary, true knowledge breaks the cycle and results in the end of *dukkha*.



‘Sisters, what do you think? Is the eye permanent or impermanent?’ – ‘Impermanent, venerable sir.’ – ‘Is what is impermanent suffering or happiness?’ – ‘Suffering, venerable sir.’ – ‘Is what is impermanent, suffering, and subject to change fit to be regarded thus: “This is mine, this I am, this is my self”?’ – ‘No, venerable sir.’

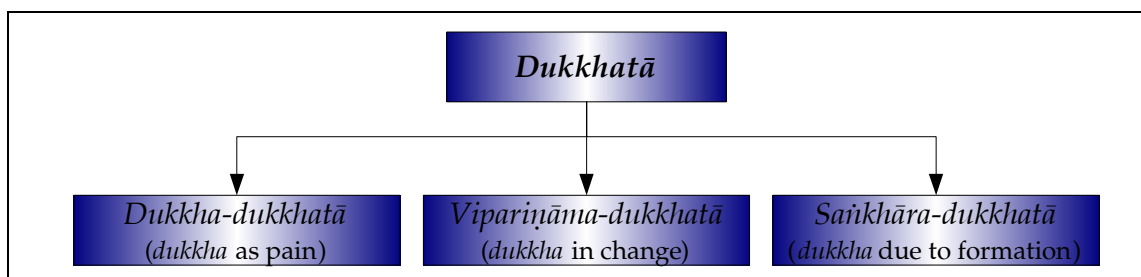
[The same is repeated for the remaining internal *āyatanas*] ... thus: ‘These six internal bases are impermanent.’

[The same is also repeated for the remaining external *āyatanas*] ... thus: ‘These six external sense bases are impermanent.’<sup>86</sup>

From the above quotation, we see that the six internal and the external sense bases are impermanent, thus subject to change. Therefore, the twelve *āyatanas* can be classified as *vipariṇāma-dukkhatā*.

*Saiṅkhāra-dukkhatā* is explained as “the oppressive nature of all formations of existence (i.e., all conditioned phenomena), due to their continual arising and passing away; this includes also experiences associated with neutral feeling.”<sup>87</sup> The twelve *āyatanas* are also conditioned phenomena because they take part in the *Paṭiccasamuppāda* and the *ārammaṇa-paccaya*, therefore, the twelve *āyatanas* can also be classified as *saiṅkhāra-dukkhatā*.

**Figure 14. Three Kinds of *Dukkha*.** There are three kinds of *dukkha*, namely, *dukkha-dukkhatā*, *vipariṇāma-dukkhatā*, and *saiṅkhāra-dukkhatā*. The twelve *āyatanas* fit all characteristics of the three kinds of *dukkha*.



<sup>86</sup> M III 271f: Nanamoli and Bodhi, 1995b, **op. cit.**, p. 1121.

<sup>87</sup> **BD**, s.v. “DUKKHATĀ.”

## 2.7 The Roles of the Twelve *Āyatana*s in Attaining *Nibbāna*

As I mentioned earlier, the twelve *āyatana*s have both advantages and disadvantages. The advantages of the twelve *āyatana*s are the pleasure and joy arising from dependence on them, while their disadvantages are the Three Characteristics of existence, which are *aniccāṇi*, *dukkhāṇi*, and *anattā*.<sup>88</sup> As a result, the pleasure that arises from the twelve *āyatana*s lasts only for a period of time. Therefore, the Buddha, before his enlightenment, tried to find a way to escape from the attachment to the twelve *āyatana*s by way of removing and abandoning desire and lust for them. This is where the twelve *āyatana*s play an important role in the process of enlightenment. In order to achieve this, the Buddha teaches us to see things as they really are.

Seeing thus [seeing the internal and external *āyatana*s as impermanent], the instructed noble disciple experiences revulsion towards the eye, revulsion towards the ear, revulsion towards the nose, revulsion towards the tongue, revulsion towards the body, revulsion towards the mind. Experiencing revulsion, he becomes dispassionate. Through dispassion [his mind] is liberated. When it is liberated there comes the knowledge: 'It's liberated.' He understands: 'Destroyed is birth, the holy life has been lived, what had to be done has been done, there is no more for this state of being.'<sup>89</sup>

From the above quotation, we see that one should train oneself to see the twelve *āyatana*s as they really are. The Buddha suggests his followers to comprehend the problems, not try to avoid them. This teaching can be seen in many *suttas*. In addition, the teaching related to the twelve *āyatana*s can be found in both the *Vinaya* and the *Abhidhamma Piṭaka*. Some of the practices in the *Tipiṭaka* related to the twelve *āyatana*s include restraining of the twelve *āyatana*s, developing *samādhi*, cultivating *satipaṭṭhāna*, as follows:

<sup>88</sup> S IV 7f.

<sup>89</sup> S IV 2f: Bodhi, 2000b, **op. cit.**, p. 1134.

### 2.7.1 Restraining of the Twelve *Āyatana*s

In the *Saṁyutta Nikāya*, the *Saṁgayaha Sutta* 1 explains that untamed, unguarded, unprotected, unrestrained internal *āyatana*s would bring *dukkha* to human life, as shown in figure 15.<sup>90</sup> From the figure, we see that human beings can train the internal sense bases by neither attaching to an agreeable object nor detaching from a disagreeable object. However, the treatment for the external *āyatana*s is different. The first five external *āyatana*s depend on the nature, which I will discuss in the next section. The last external *āyatana* is related to both *nāma* (mental phenomena) and *rūpa* (material phenomena). Therefore, we can partially control the external *āyatana*s. We are able to choose not to see pornography in order to avoid desire and lust to arise. However, we cannot control the flash of lightening that comes to our eyes. It is beyond human's control. In spite of this, with a well-trained mind, the external *āyatana*s do not cause *dukkha* to human life. Since the mind, as an assemblage place of the external *āyatana*s, acts as a guard to protect oneself.

In the *Sevitabbāsevitabba Sutta*, the Buddha mentions that the external *āyatana*s cognizable by the corresponding internal *āyatana*s are of two kinds as shown in figure 16,<sup>91</sup> namely,

1. the one that should be cultivated resulting in increasing wholesome mental states, and
2. the one that should not be cultivated resulting in increasing unwholesome states of mind.

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<sup>90</sup> S IV 70f.

<sup>91</sup> M III 45f.

**Figure 15. The Teaching of the Buddha on the Six Bases for Contact.** The Buddha teaches his followers to tame, guard, protect, and restrain the six bases for contact to avoid suffering and go beyond birth and death.

### *Samgayaha Sutta 1*

Just six, O bhikkhus, are bases for contact,  
Where one unrestrained meets with suffering.  
Those who know how to restrain them  
Dwell uncorrupted, with faith their partner.

Having seen forms that delight the mind  
And having seen those that give no delight,  
Dispel the path of lust towards the delightful  
And do not soil the mind by thinking,  
'[The other] is displeasing to me.'

Having heard sounds both pleasant and raucous  
Do not be enthralled with pleasant sound.  
Dispel the course of hate towards the raucous,  
And do not soil the mind by thinking,  
'[The other] is displeasing to me.'

Having smelt a fragrant, delightful scent,  
And having smelt a putrid stench,  
Dispel aversion towards the stench  
And do not yield to desire for the lovely.

Having enjoyed a sweet delicious taste,  
And having sometimes tasted what is bitter,  
Do not greedily enjoy the sweet taste,  
Do not feel aversion towards the bitter.

When touched by pleasant contact do not be enthralled,  
Do not tremble when touched by pain.  
Look evenly on both the pleasant and painful,  
Not drawn or repelled by anything.

When common people of proliferated perception  
Perceive and proliferate they become engaged.  
Having dispelled every mind-state bound to the home life,  
One travels on the road of renunciation.

When the mind is thus well developed in six,  
If touched, one's mind never flutters anywhere.  
Having vanquished both lust and hate, O bhikkhus,  
Go to the far shore beyond birth and death!

**Source Adaptive:**

1. S IV 70f: The Connected Discourses of the Buddha Volume II, pp. 1174-1175.

**Figure 16. The Teaching of the Buddha on the Objects of the Internal Sense Bases.** The Buddha teaches Sāriputta that there are two kinds of objects cognizable by the corresponding internal *āyatanas*, namely, the one that should be cultivated resulting in increasing wholesome states of mind, and the one that should not be cultivated resulting in increasing unwholesome states of mind.

### *Sevitabbāsevitabba Sutta*

'Sāriputta, forms cognizable by the eye are of two kinds, I say: to be cultivated and not to be cultivated.' So it was said by the Blessed One. And with reference to what was this said?

Venerable sir, such forms cognizable by the eye as cause unwholesome states to increase and wholesome states to diminish in one who cultivates them should not be cultivated. But such forms cognizable by the eye as cause unwholesome states to diminish and wholesome states to increase in one who cultivates them should be cultivated.

So it was with reference to this that it was said by the Blessed One: 'Sāriputta, forms cognizable by the eye are of two kinds, I say: to be cultivated and not to be cultivated.'

'Sounds cognizable by the ear are of two kinds, I say' ...

'Odours cognizable by the nose are of two kinds, I say' ...

'Flavours cognizable by the tongue are of two kinds, I say' ...

'Tangibles cognizable by the body are of two kinds, I say' ...

'Mind-objects cognizable by the mind are of two kinds, I say' : to be cultivated and not to be cultivated.' So it was said by the Blessed One. And with reference to what was this said?

...

**Source Adaptive:**

1. M III 58f: The Middle Length Discourses of the Buddha Volume 2, pp. 921-922.

Even though we try to cultivate wholesome states of mind by choosing objects that we interact carefully, there are still many chances that we encounter intrusive objects. Therefore, the Buddha suggests that one should be mindful (having *sati*) when one sees a form, hears a sound, smells an odor, enjoys a taste, feels a contact, and knows an object all the time, as can be seen in figure 17.

If we take a look in the *Vinaya Piṭaka*, many of the rules are related to the restraint of the twelve *āyatana*s, such as in the *Saṅghādisesa* II, as follows:

Whatever monk, affected by desire, with perverted heart, should come into physical contact with a woman, holding her hand, or holding a braid of her hair, or rubbing against any one or other of her limbs: this is an offence entailing a formal meeting of the Order.<sup>92</sup>

This discipline requests a monk to restrain<sup>93</sup> in touching a desirable object which is a woman in this case. Another example is from *dasasīla* #7 (ten precepts) which is “to abstain from dancing, singing, music and unseemly shows.” This precept is obviously asking Buddhists not to delight in seeing and hearing desirable objects.

In my opinion, there are four benefits that a person would receive immediately when he starts restraining his twelve *āyatana*s, which are:

1. one can be able to restrain the cankers in the present;
2. one can be able to ward off the cankers in the future;
3. one can diminish the unwholesome states of mind; and
4. one can increase the wholesome states of mind.

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<sup>92</sup> Vin III 120: I. B. Horner, trans., **The Book of the Discipline**, vol I (London: PTS, 1992), pp. 201-202.

<sup>93</sup> **restrain** = “to actively prevent another living being (or oneself) from performing some act, or from pursuing some course of action.” from **DP**, s.v. “restrain.”

**Figure 17. The Teaching of the Buddha on the Objects of the External Sense Bases.**  
 The Buddha teaches his followers to be mindful on the objects that come into contact with the internal sense bases by experiencing them with dispassionate mind.

### *Saṃgayaḥa Sutta 2*

Having seen a form with mindfulness muddled,  
 Attending to the pleasing sign,  
 One experiences it with infatuated mind  
 And remains tightly holding to it.

Many feelings flourish within,  
 Originating from the visible form,  
 Covetousness and annoyance as well  
 By which one's mind becomes disturbed.  
 For one who accumulates suffering thus  
 Nibbāna is said to be far away.

Having heard a sound ... Having smelt an odour ...  
 Having enjoyed a taste ... Having felt a contact ...  
 Having known an object with mindfulness muddled ...  
 For one who accumulates suffering thus  
 Nibbāna is said to be far away.

When, firmly mindful, one sees a form,  
 One is not inflamed by lust for forms;  
 One experiences it with dispassionate mind  
 And does not remain holding it tightly.

One fares mindfully in such a way  
 That even as one sees the form,  
 And while one undergoes a feeling,  
 [Suffering] is exhausted, not built up.  
 For one dismantling suffering thus,  
 Nibbāna is said to be close by.

When, firmly mindful, one hears a sound,  
 One is not inflamed by lust for sounds; ...  
 When, firmly mindful, one smells an odour,  
 One is not inflamed by lust for odours; ...  
 When, firmly mindful, one enjoys a taste,  
 One is not inflamed by lust for tastes; ...  
 When, firmly mindful, one feels a contact,  
 One is not inflamed by lust for contacts; ...  
 When, firmly mindful, one knows an object,  
 One is not inflamed by lust for objects; ...  
 For one dismantling suffering thus,  
 Nibbāna is said to be close by.

**Source Adaptive:**

1. S IV 73f: The Connected Discourses of the Buddha Volume II, pp. 1176-1177.

However, there still a disadvantage in the practicing of the restraint of the twelve *āyatanas*. Since the practice depends on the strength of a person's mind to prevent oneself from performing a course of action, therefore, each individual still can be overcome by his own desire and lust when he is daunted. Further practice is needed in order to pave a way to *nibbāna*.

### 2.7.2 The Development of the *Samādhi* and the Twelve *Āyatanas*

*Samādhi* refers to “the concentration of one's mind on a suitable meditation object for a reasonable length of time so as not to cause the mind to wander or to roam about.”<sup>94</sup> In the Buddhist tradition, there are forty types of subject of meditation. Each of them results in enhancing concentration power, tranquility of mind, and happiness. In this section, I will discuss about the relationship between the twelve *āyatanas* and the development of the *samādhi* in two aspects. The first one is the twelve *āyatanas* as a tool to develop the concentration. The second one is the result in the twelve *āyatanas* from the practicing of the *samādhi*.

#### 1. The twelve *āyatanas* as a tool to develop the *samādhi*

As mentioned above, there are forty types of subject of meditation in the Buddhist tradition. The relationship between the twelve *āyatanas* and these mental exercises, in my opinion, are as in table 14.

From the table, we can see that the mind is used as a tool to practice concentration in every type of meditation. However,

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<sup>94</sup> Vinai Ussivakul, **An Introduction to Buddhist Meditation for Results** (Bangkok: Buddhist Study and Development Center, 1996), p. 6.

**Table 14. The Relationship between the Twelve *Āyatanas* and the Subjects of *Samādhi*.** Each type of meditation subjects needs different medium in the practice. This table shows that the *āyatanas*, except *sota* and *sadda*, play an important role in practicing the meditation.

|   | <i>Cakkhu &amp; Rūpa</i> | <i>Sota &amp; Sadda</i> | <i>Ghāna &amp; Gandha</i> | <i>Jivhā &amp; Rasa</i> | <i>Kāya &amp; Phoṭṭhabba</i> | <i>Mano &amp; Dhamma</i> |
|---|--------------------------|-------------------------|---------------------------|-------------------------|------------------------------|--------------------------|
| <i>Kasiṇa</i> 10<br>(meditation devices)                                | ✓                        | ×                       | ×                         | ×                       | ×                            | ✓                        |
| <i>Asubha</i> 10<br>(ten kinds of foulness)                             | ✓                        | ×                       | ✓                         | ×                       | ×                            | ✓                        |
| <i>Anusati</i> 10<br>(recollection)                                     | ×                        | ×                       | ×                         | ×                       | ×                            | ✓                        |
| <i>Appamaññā</i> 4<br>(sublime states of mind)                          | ×                        | ×                       | ×                         | ×                       | ×                            | ✓                        |
| <i>Āhāre Paṭikūlasaññā</i><br>(perception of the loathsomeness of food) | ×                        | ×                       | ×                         | ✓                       | ×                            | ✓                        |
| <i>Catudhātuvaṭṭhāna</i><br>(analysis of the four elements)             | ×                        | ×                       | ×                         | ×                       | ✓                            | ✓                        |
| <i>Arūpa</i> 4<br>(absorption of the formless sphere)                   | ×                        | ×                       | ×                         | ×                       | ×                            | ✓                        |

before the mind can reach a point of concentration, other devices may be used.

We can see that in the practice of *kasiṇa*, the eye is needed to be fixed on a suitable device until the mind becomes concentrated. In the practice of *asubha*, we have to concentrate on the different stages of decay which is related in both seeing and smelling various states of corpses. In the practice of *anusati*, the mind recollects a suitable meditation subject. In the practice of *appamaññā*, a person needs to

exercise sublime states of the mind. In the practice of *āhāre-paṭikūlasaññā*, the tastes of food become a subject of concentration. In the practice of *catudhātuvavaṭṭhāna*, the body is analyzed based on the four primary elements. In the practice of *arūpa*, the mind has to contemplate on the immaterial states.

Now we can see that the twelve *āyatanas*, excluding *sota* and *sadda*, are used in the practice of meditation. It seems that in the *Theravāda* Buddhist tradition, sound is not a suitable subject for practicing meditation. *The Path of Purification* mentions that the place where one develops concentration should be quiet.<sup>95</sup> Therefore, sound is not a proper device for meditation. However, nowadays there are many techniques dealing with sound developed to help people to concentrate their mind. This technique may be useful for practicing a certain level of concentration. However, it may become an obstacle if the mind of a practitioner holds onto the sounds.

## 2 The development of the *samādhi* and its result on the twelve *āyatanas*

The Buddha mentions that when a person develops the concentration until his mind is concentrated, he will receive happiness and tranquility in his mind. In addition, he can see and understand things as they actually are, as can be seen in figure 18.

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<sup>95</sup> Vism 122: Buddhaghosa, 1956, *op. cit.*, p. 125.

**Figure 18. The *Samādhi Sutta*.** The Buddha teaches his followers to develop concentration, in order to see the impermanence in the twelve *āyatanas*.

### *Samādhi Sutta*

Bhikkhus, develop concentration. A bhikkhu who is concentrated understands things as they really are.

And what does he understand as they really are? He understands as it really is: 'The eye is impermanent.' He understands as it really is: 'Forms are impermanent.' ... 'Eye-consciousness is impermanent.' ... 'Eye-contact is impermanent.' ... 'Whatever feeling arises with eye-contact as condition – whether pleasant or painful or neither-painful-nor-pleasant – that too is impermanent.' ...

[The same is repeated for the remaining *āyatanas*.]

He understands as it really is: 'The mind is impermanent.' ... He understands as it really is: 'Whatever feeling arises with mind-contact as condition ... that too is impermanent.'

Bhikkhus, develop concentration. A bhikkhu who is concentrated understands things as they really are.

**Source Adaptive:**

1. S IV 80: The Connected Discourses of the Buddha Volume II, p. 1181.

The fruit from attaining the *samādhi* is called *jhāna*, which is classified according to the level of concentration. *Jhāna* lasts only as long as the mind is concentrated. It will disappear after a person emerges from the concentration. Therefore, the knowledge and the happiness that one receives during the meditation will not last forever. When *jhāna* disappears, *lobha* (covetousness), *dosa* (aversion), and *moha* (ignorance) may arise.<sup>96</sup> Further practice is needed to pave a way to *nibbāna*.

<sup>96</sup> Paṭṭh 154f: U Nārada, **Conditional Relations** (London: PTS, 1969), p. 143.

### 2.7.3 The Twelve *Āyatanas* and the Practice of the *Satipaṭṭhāna*

The *satipaṭṭhāna*, Foundations of Mindfulness, is believed to be the direct path to the realization. In order to practice the *satipaṭṭhāna*, four mental qualities are needed to be cultivated, which are diligent (*ātāpi*), clearly comprehension (*sampajāna*), mindful (*sati*), and the absent from desires and discontent (*vineyya abhijjhādomanassa*).<sup>97</sup> Nyanaponika explains the relationship between *sati* and *sampajāna* as follows:

Mindfulness (*sati*) applies preeminently to the attitude and practice of Bare Attention in purely receptive state of mind. Clear comprehension (*sampajāñña*) comes into operation when any kind of action is required, including active reflective thoughts on things observed.<sup>98</sup>

The practice of the *satipaṭṭhāna* consists of four main foundations of mindfulness; namely, contemplation of body (*kāyānupassanā*), contemplation of feelings (*vedanānupassanā*), contemplation of mind (*cittānupassanā*), and contemplation of mind-objects (*dhammānupassanā*). Each foundation has its own characteristic. However, all four foundations may be viewed as a sequence of practice in a progressive form, as shown in figure 19.<sup>99</sup>

The figure shows that the practice of the four *satipaṭṭhānas* is related to the twelve *āyatanas*. The contemplation starts from contemplating grosser physical form (*Kāyānupassanā Satipaṭṭhāna*) to finer and subtler mental form (*Dhammānupassanā Satipaṭṭhāna*), from body to mind-objects.

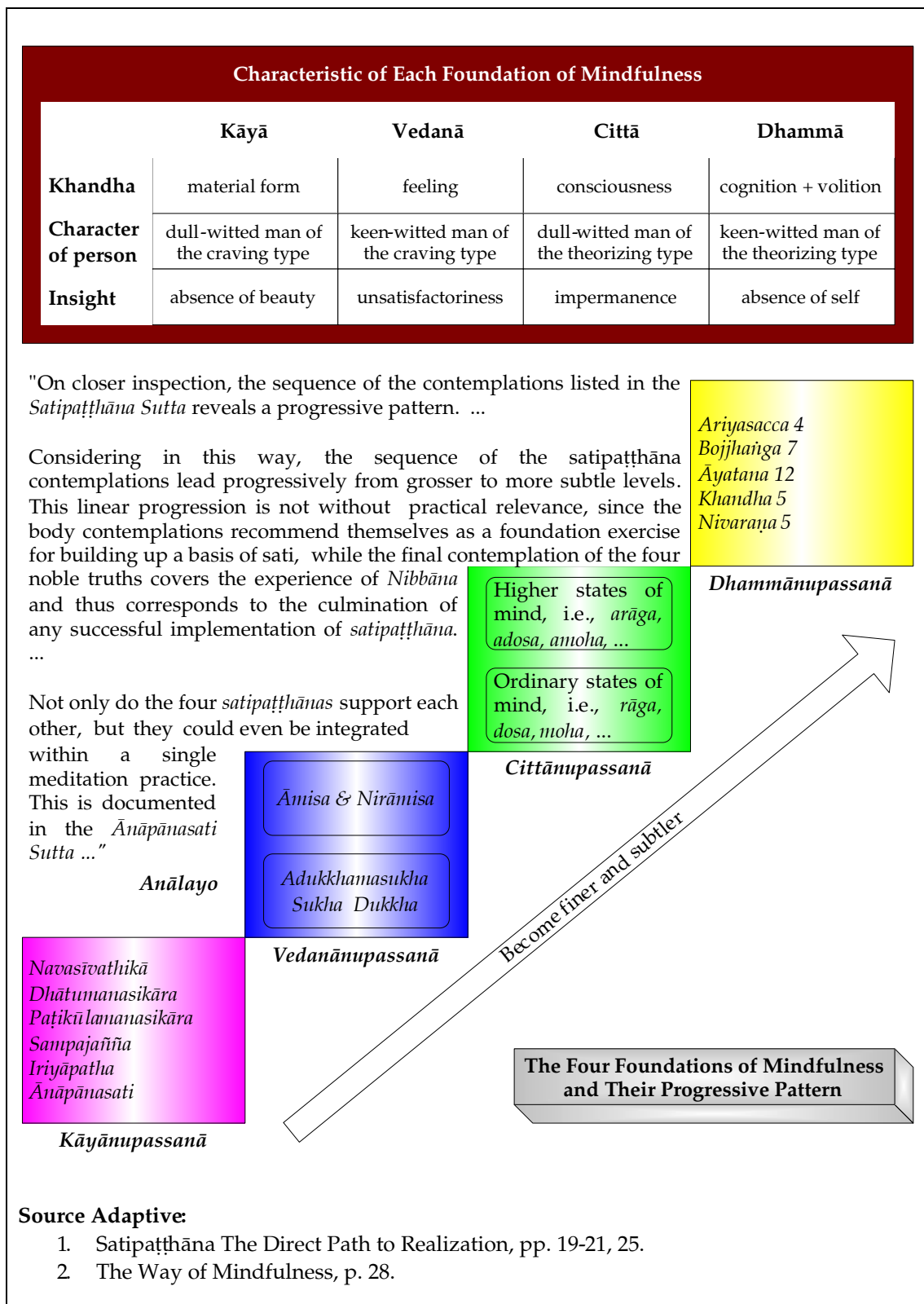
In the *Kāyānupassanā Satipaṭṭhāna*, the main idea of this practice is to focus on material form, by contemplating everything related to the body starting from simple and moving to more complex one. We observe

<sup>97</sup> Anālayo, *Satipaṭṭhāna The Direct Path to Realization*, Asian ed. (Kandy: BPS, 2003), p. 34.

<sup>98</sup> Nyanaponika, *The Heart of Buddhist Meditation* (Kandy: BPS, 1996), p. 29.

<sup>99</sup> Anālayo, 2003, *op. cit.*, p. 19.

**Figure 19. The Characteristic of the Four Foundations of Mindfulness and Their Progressive Pattern.** The figure shows the characteristic of the *satipaṭṭhāna* as shown in the Commentaries and the idea of progressive pattern proposed by Anālayo.



everything related to the first five internal sense bases and their corresponding external sense bases.

In the *Vedanānupassanā Satipaṭṭhāna*, the practice changes its focus from *rūpa* to *nāma*, which is *vedanā* in this section. The arising of the *vedanā* depends on *phassa* which is conditioned by the *saḷāyatana*. It's arising is also owing to the external sense bases.<sup>100</sup> The *vedanā* is a universal mental factor which is common to every consciousness. The contemplation of the *vedanā* is also concerned with ethical value, since there is a distinction between the *vedanā* accompanied by *āmisa* (material thing) and the *vedanā* accompanied by *nirāmisa* (non-material).

In the *Cittānupassanā Satipaṭṭhāna*, the practice focuses on the contemplation of the wholesome/unwholesome states of consciousness (*rāga*, *dosa*, *moha*, *vikkhitta* and *arāga*, *adosa*, *amoha*, *sankhitta*) and the absence/presence of the higher states of consciousness (*mahaggata*, *anuttara*, *samāhita*, *vimutta* and *amahaggata*, *sanuttara*, *asamāhita*, *avimutta*). Anālayo explains that this contemplation covers sixteen states of consciousness which are related to telepathic abilities.<sup>101</sup> These telepathic abilities represent “states of mind that is relevant both to personal introspection and to assessing another’s mind.”<sup>102</sup>

In the *Dhammānupassanā Satipaṭṭhāna*, the practice of this section concerns some specific groups of *dhamma* that either hinder or support a way to *nibbāna*. The Buddha expounds the contemplation of *dhamma* by way of *Nīvaraṇapabba*, *Khandhapabba*, *Āyatanapabba*, *Bojjhaṅgapabba*, and *Ariyasaccapabba*. The *Āyatanapabba* is a special sub-section contributing to the practice of the twelve *āyatanas*. The instructions are as shown in figure 20.

<sup>100</sup> Soma, **The Way of Mindfulness**, 5<sup>th</sup> rev. ed. (Kandy: BPS, 1981), p. 108.

<sup>101</sup> Anālayo, 2003, **op. cit.**, 2003, p. 174.

<sup>102</sup> **Ibid.**

**Figure 20. *Āyatanapabbā*.** The *Āyatanapabbā* is a sub-section in the *Mahāsatiipaṭṭhāna Sutta* contributing to the practice of the twelve *āyatanas*.

|  |  |
|--|--|
| <p style="text-align: center;"><b><i>Mahāsatiipaṭṭhāna Sutta (Āyatanapabbā)</i></b></p> <p>'Again, monks, a monk abides contemplating mind-objects as mind-objects in respect of the six internal and external sense-bases. How does he do so? Here a monk knows the eye, knows sight-objects, and he knows whatever fetter arises dependent on the two. And he knows how an unarisen fetter comes to arise, and he knows how the abandonment of an arisen fetter comes about, and he knows how the non-arising of the abandoned fetter in the future will come about. He knows the ear and knows sounds ... He knows the nose, and knows smells ... He knows the tongue and knows tastes ... he knows the body and knows tangibles ... He knows the mind and knows mind-objects, and he knows whatever fetter arises dependent on the two. And he knows how an unarisen fetter comes to arise, and he knows how the abandonment of an arisen fetter comes about, and he knows how the non-arising of the abandoned fetter in the future will come about.'</p> | <p style="text-align: center;"><b>Explanation from the Commentaries</b></p> <p><b>Knows the eye:</b> He understands the sensory apparatus of the eye, by way of its own distinct function and salient characteristic.</p> <p><b>Knows sight-objects:</b> He understands material form arising from the four producers of corporeality, namely, <i>kanhā</i>, <i>citta</i>, <i>utu</i>, and <i>ālāra</i>, by way of their own distinctive function and salient characteristic.</p> <p><b>Knows whatever fetter arises dependent on the two:</b> He understands according to distinct function and characteristic the tenfold fetter that arises dependent on both eye and forms - which are <i>kāmarāga</i>, <i>paṭigha</i>, <i>māna</i>, <i>diṭṭhi</i>, <i>vicikicchā</i>, <i>silabbataparāmāsa</i>, <i>bhavarāga</i>, <i>issā</i>, <i>macchariya</i>, and <i>avijjā</i>.</p> <p><b>Knows how an unarisen fetter comes to arise:</b> He understands that the (tenfold) fetter had not arisen earlier owing to some causes of non-occurrence.</p> <p><b>Knows how the abandonment of an arisen fetter comes about:</b> He understands the reason for the abandoning of just the (tenfold) fetter arisen through previous non-abandoning or through occurrence.</p> <p><b>Knows how the non-arising of the abandoned fetter in the future will come about:</b> He understands the reason for the non-arising in the future of even the (tenfold) fetter abandoned by way of rejection of separate factors through right reflection and through absorption.</p> <p>The remaining <i>āyatanas</i> have the same method of exegesis.</p> <p style="text-align: right;"><i>Continued</i></p> |
|--|--|

**Figure 20, continued.** *Āyatanapabbā*. The *Mahāsatiṭṭhāna Sutta* contributing to the practice of the twelve *āyatanas*.

|  |  |
|--|--|
| <p><b><i>Mahāsatiṭṭhāna Sutta (Āyatanapabbā)</i></b></p> <p><b>INSIGHT</b></p> <p>'So he abides contemplating mind-objects as mind-objects internally.<br/> He abides contemplating mind-objects as mind-objects externally,<br/> abides contemplating mind-objects as mind-objects both internally<br/> and externally. He abides contemplating arising phenomena in<br/> mind-objects, contemplating vanishing phenomena in mind-objects,<br/> he abides contemplating both arising and vanishing phenomena in<br/> mind-objects. Or else, mindfulness that "there are mind-objects" is<br/> present just to the extent necessary for knowledge and awareness.<br/> And he abides detached, not grasping at anything in the world.<br/> And that, monks, is how a monk abides contemplating mind-objects<br/> as mind-objects in respect of the six internal and external sense-<br/> bases.'</p> <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>1. D II 290ff: The Long Discourses of the Buddha, pp. 342-343.</li> <li>2. The Way of Mindfulness, pp. 131-133.</li> </ol> | <p><b>Explanation from the Commentaries</b></p> <p><b>Contemplating mind-objects internally:</b> He dwells in contemplating the mental objects by laying hold of the sense bases in his own mental objects.</p> <p><b>Contemplating mind-objects externally:</b> He dwells in contemplating the mental objects in another's mental objects.</p> <p><b>Contemplating mind-objects internally &amp; externally:</b> He dwells in contemplating the mental objects at one time in his own mental objects and at another time in another's mental objects (the mind moves back and forth).</p> <p><b>Contemplating arising / vanishing / arising and vanishing phenomena:</b> He lives contemplating origination-things, dissolution-things, and origination at one time and dissolution at another time in the mental objects.</p> <p><b>Mindfulness that "there are mind-objects" is present:</b> Mindfulness is established. He thinks: There are the mental objects, but there is no being, no person, no woman, no man, no soul, nothing pertaining to a soul, no "I", nothing that is mine, no one, and nothing belonging to anyone.</p> <p><b>Just to the extent necessary for knowledge and awareness:</b> For the purpose of increasing of mindfulness and clear comprehension.</p> <p><b>Detached, not grasping at anything in the world:</b> He lives emancipated from dependence on craving and wrong views.</p> |
|--|--|

According to the *Mahāsatiṭṭhāna Sutta*, a fetter may arise dependent on the internal sense bases and the external sense bases. Fetters play a very important role in Buddhism, since they bind humans to the wheel of existence. There are ten kinds of *sāṃyojana*. The commentators explain how these ten fetters arise and cease as can be seen in table 15.

In the *Suttanta Piṭaka*, the Buddha teaches how to abandon these fetters to his followers, as shown in table 16.

## 2.8 Summary of the Chapter

Summing up I found that the concept of the twelve *āyatanas* was developed during the Buddha's time, in both technical and metaphorical senses. The twelve *āyatanas* play a very important role in Buddhism as a cause of the arising of fetters binding humans to the cycle of rebirth. Followings are the twelve *āyatanas* and their conditions:

1. The twelve *āyatanas* become a condition by way of object predominance (*ārammaṇādhīpati-paccaya*), when a person heavily ponders on an object. The object, in this case the twelve *āyatanas*, is highly esteemed by *citta* and *cetasikas*. This condition may result in the arising of *rāga* and *diṭṭhi*.
2. The twelve *āyatanas* become a condition by way of object strong dependence (*ārammaṇūpanissaya-paccaya*), when a person delights in an object. The object, in this case the twelve *āyatanas*, has a very powerful influence on a subsequence phenomenon.

**Table 15. The Ten *Saṃyojanas*.** The table shows the ten fetters mentioned in the Commentaries of the *Mahāsatipatṭhāna Sutta* in the *Āyatanapabba*, how they arise and cease.

|                           | Cause of Arising  | Cause of Ceasing   |
|---------------------------|---|--|
| <i>Kāmarāga</i>           | By taking delight in a pleasant sense-object  | (For a gross kind) by attaining <i>Sakadāgāmi-magga</i> and (for finally ceases) by attaining <i>Anāgāmi-magga</i> |
| <i>Paṭigha</i>            | Being annoyed or angry at an unpleasant object  | Same as in <i>Kāmarāga</i>   |
| <i>Māna</i>               | By thinking that “No one but me is able to consider the object wisely”  | By attaining <i>Arahatta-magga</i>   |
| <i>Diṭṭhi</i>             | By taking material form to be permanent and everlasting.  | By attaining <i>Sotāpatti-magga</i>  |
| <i>Vicikicchā</i>         | By thinking that “Is the material form a being or a being’s”  | By attaining <i>Sotāpatti-magga</i>  |
| <i>Sīlabbata-parāmāsa</i> | By thinking that “In the future it will be possible to obtain such an object as this by taking up the observance of rites and ceremonies” | By attaining <i>Sotāpatti-magga</i>  |
| <i>Bhavarāga</i>          | By wishing: To be sure, in a favourable state of existence this material form will become easy of access                                  | By attaining <i>Arahatta-magga</i>   |
| <i>Issā</i>               | By contemplating grudgingly: Should no others get this material form, it would be good, indeed.   | By attaining <i>Sotāpatti-magga</i>  |
| <i>Macchhariya</i>        | By stinting for another the material form belonging to one  | By attaining <i>Sotāpatti-magga</i>  |
| <i>Avijjā</i>             | Arising with all types of fetters, all sensuous passion and the like, by way of <i>sahajāta paccaya</i>                                   | By attaining <i>Arahatta-magga</i>   |

Source Adaptive:

1. The Way of Mindfulness, pp. 131-133.

**Table 16. The Ten *Saṃyojanas* and a Way of Practice in the *Suttanta Piṭaka*.** The table shows the ten fetters and a way to practice in order to abandon each fetter. These are the examples of the Buddha's teachings that can be found in many discourses taught by the Buddha.

|                           | Examples How to Abandon each Fetter   |
|---------------------------|---|
| <i>Kāmarāga</i>           | <ul style="list-style-type: none"> <li>Developing meditation on foulness (<i>asubha</i>) and body (<i>kāyaḡatāsati</i>) for any lust will be abandoned, found in the <i>Mahārāhulovāda Sutta</i> (M I 424) and in the <i>Udāyī Sutta</i> (A III 323)</li> <li>Developing and cultivating the perception of impermanence (<i>aniccasaññā</i>) to eliminate all sensual lust, found in the <i>Khandhasaṃyutta</i> (S III 155)</li> </ul>                        |
| <i>Paṭigha</i>            | <ul style="list-style-type: none"> <li>Developing meditation on equanimity (<i>upekkhā</i>) for any aversion will be abandoned, found in the <i>Mahārāhulovāda Sutta</i> (M I 424)</li> </ul>   |
| <i>Māna</i>               | <ul style="list-style-type: none"> <li>Developing and cultivating the seven factors of enlightenment (<i>bojjhaṅga</i>) to eliminate three fold discrimination, found in the <i>Bojjhaṅgasamīyutta</i> (S V 98)</li> <li>Cultivating concentration on the void (<i>suññatasamādhi</i>), on the signless (<i>animittasamādhi</i>), and on no more hankering (<i>appaṇihitasamādhi</i>), for the full comprehension and giving up of pride (A I 299)</li> </ul> |
| <i>Diṭṭhi</i>             | <ul style="list-style-type: none"> <li>Seeing the object in relation to which those views (<i>diṭṭhi</i>) arise as it actually is with proper wisdom (<i>manasikāra</i>), then the abandoning and relinquishing of those views will come about, found in the <i>Sallekha Sutta</i> (M I 40)</li> </ul>  |
| <i>Vicikicchā</i>         | <ul style="list-style-type: none"> <li>Giving systematic attention (<i>yoniso manasikāra</i>) doubt and wavering will be abandoned (A I 4)</li> <li>Developing <i>dhammavavatthāna</i> (Ps I 47)</li> <li>Attending wisely the four noble truth (<i>ariyasacca</i>), doubt is abandoned, found in the <i>Sabbāsava Sutta</i> (M I 9)</li> </ul>   |
| <i>Sīlabbata-parāmāsa</i> | <ul style="list-style-type: none"> <li>Attending wisely the four noble truth (<i>ariyasacca</i>), adherence to rules and observances is abandoned, found in the <i>Sabbāsava Sutta</i> (M I 9)</li> </ul>   |
| <i>Bhavarāga</i>          | <ul style="list-style-type: none"> <li>Developing and cultivating the perception of impermanence (<i>aniccasaññā</i>) to eliminate all lust for existence, found in the <i>Khandhasaṃyutta</i> (S III 155)</li> </ul>   |

Continued

**Table 16, continued. The Ten *Saṃyojanas* and a Way of Practice in the *Suttanta Piṭaka*.** The table shows the ten fetters and a way to practice in order to abandon each fetter. These are the examples of the Buddha's teachings that can be found in many discourses taught by the Buddha.

|                    | Examples How to Abandon each Fetter  |
|--------------------|--|
| <i>Issā</i>        | <ul style="list-style-type: none"> <li>Cultivating concentration on the void (<i>suññātasamādhī</i>), on the signless (<i>animittasamādhī</i>), and on no more hankering (<i>appaṇihitasamādhī</i>), for the full comprehension and giving up of enmity (A I 299)</li> </ul>   |
| <i>Macchhariya</i> | <ul style="list-style-type: none"> <li>Cultivating concentration on the void (<i>suññātasamādhī</i>), on the signless (<i>animittasamādhī</i>), and on no more hankering (<i>appaṇihitasamādhī</i>), for the full comprehension and giving up of meanness (A I 299)</li> </ul>   |
| <i>Avijjā</i>      | <ul style="list-style-type: none"> <li>Hearing the <i>Ariyan Dhamma</i>, paying close attention and practicing in conformity with it, found in the <i>Jāṇasabha Sutta</i> (D II 215)</li> <li>Developing and cultivating wisdom (Ps I 47)</li> <li>Developing and cultivating the perception of impermanence (<i>aniccasaññā</i>) to eliminate all ignorance, found in the <i>Khandhasaṃyutta</i> (S III 155)</li> </ul> |

- The twelve *āyatana*s become a condition by way of pre-nascence condition (*purejāta-paccaya*). They are regarded as pre-existent things. They exist before *viññāṇadhātu* arises and in the presence of *viññāṇadhātu*.
- The external sense bases become a condition by way of object condition (*ārammaṇa-paccaya*). They become an object of sense acting as a causal relation to the mind. This is how the mind experiences an object.

Even though, the twelve *āyatana*s are a cause of rebirth, they also play a very important role in the process of enlightenment. The *Tiṭṭhaka* shows that the twelve *āyatana*s take part in all level of the threefold training,

namely, *sīla* (morality), *samādhi* (concentration), and *paññā* (wisdom) as can be seen in section 2.7.

In the next chapter, I will explore the information about the twelve *āyatanas* in more detail. In addition, the parallels information of the twelve *āyatanas* in human anatomy, which are sensory receptors and sense stimuli, will be studied.

## CHAPTER III

### THE TWELVE ĀYATANAS IN THE BUDDHIST SCRIPTURES AND THEIR PARALLELS IN HUMAN ANATOMY

In the previous chapter, a clear definition of *āyatana* in the general and the specific senses were given. In this chapter, I would like to dedicate it to explore the information of the twelve *āyatanas* in the Buddhist scriptures and the information of the sensory receptors and the sense stimuli in human anatomy. This chapter will present a raw data of the twelve *āyatanas* in the spiritual world and the sensory receptors and sense stimuli in the material world. The information from this chapter will be used to find the similarities between the twelve *āyatanas* and their parallels in the next chapter.

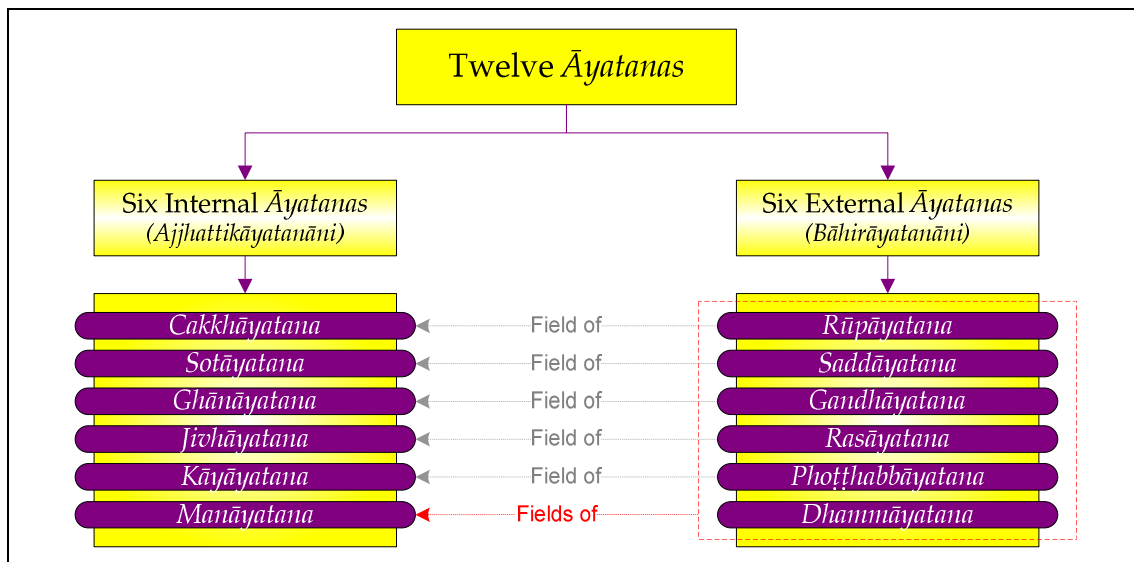
#### 3.1 The Twelve *Āyatanas* in the Buddhist Scriptures

The twelve *āyatanas* comprise two groups, six internal sense bases (*ajjhattikāyatanāni*) and six external sense bases (*bāhirāyatanāni*), as shown in figure 21.<sup>103</sup> The six internal sense bases consist of five physical sense organs (*cakkhāyatana*, *sotāyatana*, *ghānāyatana*, *jivhāyatana*, and *kāyāyatana*) and mind (*manāyatana*). The six external sense bases, sense objects, consist of *rūpāyatana*, *saddāyatana*, *gandhāyatana*, *rasāyatana*, *phoṭṭhabbāyatana*, and *dhammāyatana*.

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<sup>103</sup> DPL, s.v. “ĀYATANAM.”

**Figure 21. The Twelve *Āyatanas* and Their Classifications.** The twelve *āyatanas* are separated into two groups, the six internal sense bases and the six external sense bases.



### 3.1.1 The Internal *Āyatanas* and Their Description in the Buddhist Scriptures

The first five internal *āyatanas* are known as the five physical sense organs. They are also called *indriya* or the sense faculties, because they are the controlling principal of each sense base’s function.<sup>104</sup> In the *Mahāvedalla Sutta*, Venerable Sāriputta said that “... these five faculties each have a separate field, a separate domain, and do not experience each other’s field and domain ... have mind as their resort, and mind experiences their fields and domains.”<sup>105</sup> This *sutta* shows that the first five internal sense bases have their own specific function and do not interfere with each other. However, the last internal sense base, *manāyatana*, partakes of the fields of other bases.

<sup>104</sup> BD, s.v. “ĀYATANA.”

<sup>105</sup> M I 295: Nanamoli and Bodhi, 1995a, *op. cit.*, p. 391.

### 3.1.1.1 *Cakkhāyatana*

*Cakkhāyatana* comes from *cakkhu* and *āyatana*. It means “the organ of the eye or the sense of sight.”<sup>106</sup> Rhys Davids mentions that the etymology of the term *cakkhu* is unclear.<sup>107</sup> However, Nyanatiloka indicates  $\sqrt{cikkh}$  (to see, to say) as the root of this term.<sup>108</sup>

In order to understand what the *cakkhāyatana* is, I will analyze the term *cakkhu* first. The term *cakkhu* is explained as “It relishes (*cakkhati*), thus it is an eye (*cakkhu*); the meaning is that it enjoys a visible datum and turns it to account.”<sup>109</sup> The sentence indicates that the eye enjoys seeing a visible object. Figure 22 shows that there are two kinds of *cakkhu* in Buddhism as follows:

1. *Manisacakkhu* (the eye of flesh)

The *Aṭṭhasālīnī* indicates that the *manisacakkhu* is twofold,<sup>110</sup> which are;

- a. *Sasambhāracakkhu* (as compound organ)

The *sasambhāracakkhu* is the perceptible physical eye consisting of the lump of flesh located in the cavity of the eye, which is bound to the brain by sinewy threads. It comprises nine constituents, namely, the *mahābhūta-rūpa* (the four primary elements), the four *upādārūpa* (color, odor, taste, and sap), and the *jīvitindriya* (vitality).<sup>111</sup>

<sup>106</sup> DPL, s.vv. “CAKKHU” and “CAKKHUM.”

<sup>107</sup> PED, s.v. “Cakkhu.”

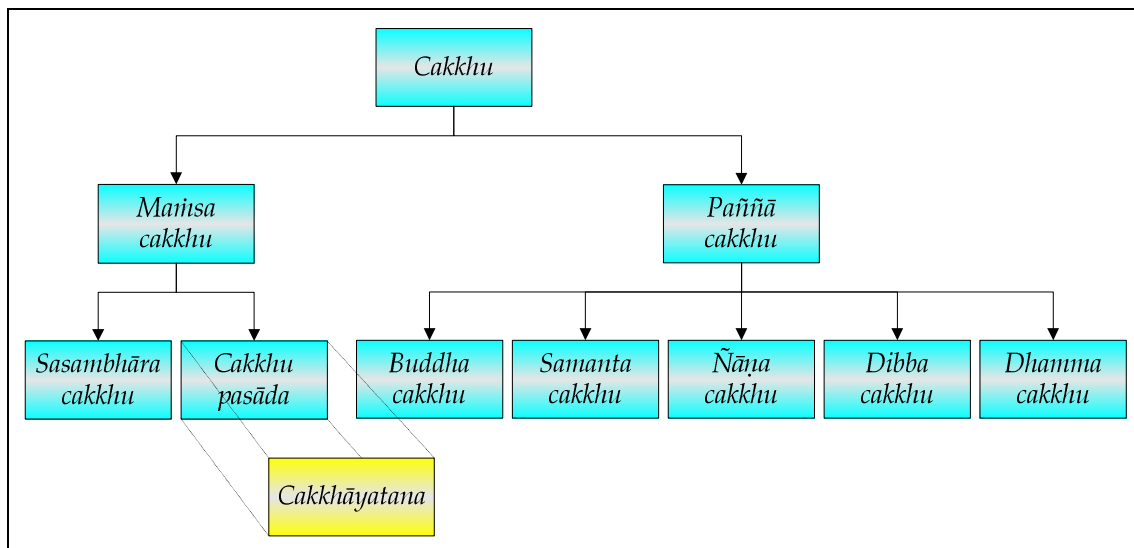
<sup>108</sup> PAW, s.v. “CAKKHU.”

<sup>109</sup> Vism 481: Buddhaghosa, 1956, *op. cit.*, p. 547.

<sup>110</sup> As 306: Pe Maung Tin, 1958b, *op. cit.*, p. 402.

<sup>111</sup> Anuruddhācariya, 1987, *op. cit.*, p. 291. In the *Aṭṭhasālīnī*, Venerable Buddhaghosa mentions fourteen constituents of the eye, which are the four primary

**Figure 22. The Classifications of *Cakkhu* and *Cakkhāyatana*.** There are two kinds of *cakkhu* in Buddhism, namely, the *maṇisa cakkhu* and the *paññā cakkhu*. Only the *cakkuhuppasāda* that is the sentient organ of *maṇisa cakkhu* is classified as *cakkhāyatana*.



b. *Cakkuhuppasāda* (as sentient organ)

*Cakkuhuppasāda* denotes the receptive reacting sense-agency part of the eye, located at the center of the retina.<sup>112</sup> It is derived from the *mahābhūtarūpa*, invisible and reacting (*anidassano sappatigho*),<sup>113</sup> located spread through seven layers of ocular membranes (*satta akkhipaṭalāni*),<sup>114</sup> where images appear. In addition, Venerable Sāriputta indicates that the size of the *cakkuhuppasāda* is not bigger than the head of a louse.<sup>115</sup>

elements, color, odor, taste, nutritive essence, collocation, appearance, life, nature, sensitive skin, and sentient eye (As 306).

<sup>112</sup> Anuruddhācariya, 1987, *op. cit.*, p. 291.

<sup>113</sup> Dhs 134.

<sup>114</sup> As 307: Pe Maung Tin, 1958b, *op. cit.*, p. 403.

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

2. *Paññācakkhu* (the eye of insight)

The *Aṭṭhasālinī* classifies *paññācakkhu* into fivefold,<sup>116</sup> namely:

- a. *Buddhacakkhu* (the eye of the Buddha)
- b. *Samantacakkhu* (the eye of omniscience)
- c. *Ñāṇacakkhu* (the eye of knowledge)
- d. *Dibbacakkhu* (the divine eye)
- e. *Dhammacakkhu* (the eye of *dhamma*)

The *Yamaka* indicates that the *paññācakkhu* is not the *cakkhāyatana*.<sup>117</sup> Therefore, of these classifications only the *cakkhuppasāda* is the *cakkhāyatana*.

Figure 23 shows that the *cakkhāyatana* is the sentient organ of the eye derived from the *mahābhūtarūpa*. It is a part of personality. Beings can see an object (*rūpa*) that is visible and reacting by the eye, when it comes into focus. The impact between the *chakkhāyatana* and *rūpa* allows *phassapañcaka* to arise.

The *cakkhuppasāda* denotes one of the twenty-four *upādārūpa* (derivative materiality).<sup>118</sup> It is described as can be seen in figure 24.

The *Tipiṭaka* indicates several synonyms of the term *cakkhāyatana*, such as *cakkhu* and *cakkhudhātu*, as can be seen in table 17. Even though, there are many terms represented the *cakkhāyatana*, it should be kept in mind that only the sentient organ of the sense of sight is classified as the *cakkhāyatana*. Table 17 shows the synonyms of the term *cakkhāyatana* and the reason why these terms are called like that.

<sup>116</sup> As 306.

<sup>117</sup> Yam I 53.

<sup>118</sup> DB, s.v. “[40] Upādārūpa.”

**Figure 23. Cakkhāyatana and Its Description.** The *cakkhāyatana* is the sentient organ of the eye (*cakkhuppasāda*), by which the ability of seeing depends on the impact between its corresponding object, *rūpa*, and itself.

|  |  |
|--|--|
| <div> <p><i>Cakkhāyatana</i></p> <p>[597] What is that [material] form which is the sphere of vision (<i>cakkhāyatanaṇi</i>)?</p> <p>The eye, that is to say the sentient organ, derived from the Great Phenomena, included in the self-state, nature of the self, invisible and reacting - by which eye, invisible and reacting, one has seen, sees, will, or may see material shape that is visible and reacting - ...</p> <p>[598] What is ... the sphere of vision?</p> <p>The eye, ..., invisible and reacting, and against which eye, invisible and reacting, [material] shape that is visible and reacting, has impinged, impinges, will, or may impinge - ...</p> <p>[599] What is ... the sphere of vision?</p> <p>The eye, ..., invisible and reacting, which eye, invisible and reacting, has impinged, impinges, will, or may impinge on [material] shape that is visible and impinging - ...</p> </div> | <div> <p>Explanation from the Commentaries</p> <p>The eye is the sentient organ: <i>Cakkhāyatana</i> is the sentient organ of the eye.</p> <p>Included in the self-state: It is a part of personality and also depending on personality.</p> <p>Nature of the self: This represents the body and the five aggregates which are nature of the self.</p> <p>Invisible and reacting: Impact and reaction are set up in the eye and cannot be seen by visual cognition.</p> <p>Four methods of vision: in the past, in the present, in the future, and conditional.</p> <p>Four methods of involuntary vision: in the past, in the present, in the future, and conditional.</p> <p>Four methods of voluntary vision: in the past, in the present, in the future, and conditional.</p> </div> |
|--|--|

Continued

**Figure 23, continued. Cakkhāyatana and Its Description.** The *cakkhāyatana* is the sentient organ of the eye (*cakḥuppassāda*), by which the ability of seeing depends on the impact between its corresponding object, *rūpa*, and itself.

## Cakkhāyatana

[600] What is ... the sphere of vision?

The eye, ..., invisible and reacting, depending on which eye, in consequence of some [visible] shape, there has arisen, arises, will, or may arise

[i] visual contact; ...

and depending on which eye, in consequence of some [visible] shape, there has arisen, arises, will, or may arise - born of that visual contact -

[ii] a feeling ... [or iii] a perception ...

[or iv] volition ... [or v] a visual cognition ...

[further] depending on which eye, and having a [visible] shape as its object, there has arisen, arises, will, or may arise

[vi] visual contact,

and depending on which eye, and having a [visible] form as its object, there has arisen, arises, will, or may arise, born of that visual contact

[vii] a feeling ... [or viii] a perception ...

[or ix] volition ... [or x] visual cognition -

this that is sight, the sphere of sight, the element of vision, the faculty of vision, [this that is] "the world", "a door", "an ocean", "lucent", ..., the "hither shore", an "empty village" - ...

## Explanation from the Commentaries

Twenty methods how *phassapañcaka* arises in consequence of visible objects: in the past, in the present, in the future, and conditional by way of *purejātapaccaya*, *ārammaṇādhipatipaccaya* and *ārammaṇīpariṇissayapaccaya*.

Twenty methods how *phussapañcaka* arises in connection with visible objects as an object of mind: in the past, in the present, in the future, and conditional by way of *ārammaṇapaccaya*.

Sight, the sphere of sight, the element of vision, the faculty of vision, [this that is] "the world", "a door", "an ocean", "lucent", ..., the "hither shore", an "empty village": These are synonyms of the term *cakkhāyatana*.

## Source Adaptive:

1. Dhs 134f: A Buddhist Manual of Psychological Ethics, pp. 159-162.
2. The Expositor Vol.II, pp. 403-407.
3. The Dispeller of Delusion Part I, pp. 326-327.

**Figure 24. Cakkhuppasāda and Its Description.** The *cakkhuppasāda* is located inside the eye. Its location spreads through seven layers of ocular membranes.

| The Eye & Cakkhuppasāda  |  |
|--|--|
| <p>The eye is white from the abundance of phlegm, black from that of bile, red from that of blood, rigid from that of the element of extension, fluid from that of cohesion, hot from that of heat, and oscillating from that of mobility. Such is the compound organ of the eye. And that sentient organ situated in and bound to it is called the sentient eye as derived from the four great essentials. In the circle of vision where arise images of the bodies of men standing, right in front, in the middle of black disc surrounded by white circles of the constituent organism, it [the sentient organ] permeates the ocular membranes as sprinkled oil permeates seven cotton wicks. And it is served by the four elements doing the functions of sustaining, binding, maturing, and vibrating, just as a princely boy is tended by four nurses doing the function of holding, bathing, dressing and fanning him. And being upheld by the caloric order, by thought and nutriment, and guarded by life and attended by colour, odour, taste, etc., the organ, no bigger than the head of a louse, stands duly fulfilling the nature of the basis and the door of visual cognition, etc. As it has been said by the 'General of the Dhamma':-</p> <p style="text-align: center;"> <i>That organ of the visual sense, by which<br/>           Objects are apprehended, is a small<br/>           And subtle thing, and like a louse's head.</i> </p> <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>As 307: The Expositor Vol.II, pp. 403-404.</li> </ol> | <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>Explanation</b></p> <div style="background-color: yellow; padding: 5px; margin-bottom: 10px;"> <p><b>The eye:</b> This is <i>sasambhāra-cakku</i>. Inside it, there is the sentient organ.</p> </div> <div style="background-color: #e0ffff; padding: 5px; margin-bottom: 10px;"> <p><b>The sentient organ:</b> <i>Cakkhuppasāda</i> is located spreading through seven layers of ocular membranes (<i>satta akkhipaṭalāni</i>).</p> </div> <div style="background-color: #e0ffff; padding: 5px; margin-bottom: 10px;"> <p><b>Served by the four elements:</b> It is derived from <i>mahābhūta-rūpa</i>.</p> </div> <div style="background-color: #ffe0ff; padding: 5px;"> <p><b>No bigger than the head of a louse:</b> The size of the <i>cakkhuppasāda</i> is not bigger than a head of a louse.</p> </div> </div> |

In order to understand the *cakkhāyatana* correctly, we should explore the intrinsic nature of the *cakkhāyatana* by way of *lakṣhaṇādicatuka*, the fourfold defining device, as in table 18. *Lakṣhaṇādicatuka* is a device proposed by the commentators to delimit the nature of ultimate reality. Bodhi explains that:

These four devices are: (1) its characteristic (*lakṣhaṇa*), i.e. the salient quality of the phenomenon; (2) its function (*rasa*), its performance of a concrete task (*kicca*) or achievement of a goal (*sampatti*); (3) its manifestation (*paccupaṭṭhāna*), the way it presents itself within experience; and (4) its proximate cause (*padaṭṭhāna*), the principal condition upon which it depends.<sup>119</sup>

**Table 17. Synonyms for the Term *Cakkhāyatana*.** The synonyms of the term *cakkhāyatana* and the reason why these terms are called as they are.

| Synonyms for <i>Cakkhāyatana</i> | Reason  |
|----------------------------------|---|
| <i>Cakkhu</i>                    | <i>Cakkhu</i> is used to show the eye as the director of seeing.  |
| <i>Cakkhāyatana</i>              | <i>Cakkhāyatana</i> represents the eye as a source and a meeting place (of <i>vīthicitta</i> ).                                 |
| <i>Cakkhudhātu</i>               | <i>Cakkhudhātu</i> represents the eye as emptiness of essence, not a being.   |
| <i>Cakkhundriya</i>              | <i>Cakkhundriya</i> is used as the controlling principle of seeing.   |
| <i>Loka</i>                      | <i>Loka</i> is used to show the eye as being perishable.  |
| <i>Dvāra</i>                     | <i>Dvāra</i> is used to show the eye as being an entry.   |
| <i>Samudda</i>                   | <i>Samudda</i> is used to show that the eye cannot be filled.   |
| <i>Paṇḍara</i>                   | <i>Paṇḍara</i> is used to show the pureness of the eye.   |
| <i>Khetta</i>                    | <i>Khetta</i> is used to show the origin of contact, etc.   |
| <i>Vatthu</i>                    | <i>Vatthu</i> is used to show the eye as being a base or a fixed seat of <i>dhamma</i> , such as the base where contact arises. |
| <i>Netta</i>                     | <i>Netta</i> is used to show that the eye is guidance. It guides the subject showing what is level and not level.               |
| <i>Nayana</i>                    | <i>Nayana</i> is used to show that the eye is the leader.   |
| <i>Orima-tira</i>                | <i>Orimantī</i> represents that the eye is included in individuality.   |
| <i>Suññāgāma</i>                 | <i>Suññāgāma</i> is used to show that the eye is common to many and the eye is absent of a possessor.                           |

**Source Adaptive:**

1. The Expositor vol. II, p. 405.

<sup>119</sup> Anuruddhācariya, **A Comprehensive Manual of Abhidhamma**, trans. Bodhi (Kandy: Buddhist Publication Society, 1993), p. 29.

**Table 18. The *Lakkhaṇādicatuka* of the *Cakkhāyatana*.** The table shows an explanation of the intrinsic nature of the *cakkhāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Cakkhāyatana</i>  |
|-------------------------|--|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>cakkhāyatana</i> is sensitive to the impact of visible data.  |
| <i>Rasa</i>             | The function of the <i>cakkhāyatana</i> is drawing the consciousness toward a selected visible object.                                     |
| <i>Paccupaṭṭhāna</i>    | The manifestation of the <i>cakkhāyatana</i> is being the base of the eye-consciousness.   |
| <i>Padaṭṭhāna</i>       | The proximate cause of the <i>cakkhāyatana</i> is the primary element ( <i>mahābhūta</i> ) born of <i>kamma</i> caused by a desire to see. |

Source Adaptive:

1. The Expositor Vol.II, pp. 408-409.
2. The Path of Purification, pp. 489-490.

### 3.1.1.2 *Sotāyatana*

*Sotāyatana* comes from *sota* and *āyatana*. It refers to “the sense of hearing.”<sup>120</sup> The term *sota* is derived from the root  $\sqrt{su}$  (to hear).<sup>121</sup> The term *sota* is explained in *The Path of Purification* as “It hears (*suṇāti*), thus it is an ear (*sota*).”<sup>122</sup> There are many types of *sota* mentioned in the *Tipiṭaka*, such as *dibbasota* (the divine ear), *dhammasota* (the ear of the *Dhamma*), *taṇhāsota* (the stream of craving, known as a *lobha cetasika*), and *manīsasota* (the physical ear), however, they are not classified as the *sotāyatana*.<sup>123</sup> Only the *sotappasāda* (the sentient organ of the ear) as shown in figure 25 is called *sotāyatana*. Figure 26 explains the *sotappasāda* in more detail.

<sup>120</sup> PED, s.v. “Sota<sup>1</sup>.”

<sup>121</sup> PAW, s.v. “SOTA<sup>1</sup>.”

<sup>122</sup> Vism 481: Buddhaghosa, 1956, loc. cit.

<sup>123</sup> Yam I 53.

**Figure 25. *Sotāyatana* and Its Description.** The *sotāyatana* is the sentient organ of the ear (*sotappasāda*), by which the ability of hearing is conditional.

| <b><i>Sotāyatana</i></b>   | <b>Explanation from the Commentaries</b>  |
|--|---|
| [601-4] What is that [material] form which is the sphere of hearing?   | <b>The ear is the sentient organ:</b> <i>Sotāyatana</i> is the sentient organ of the ear.   |
| The ear, that is to say the sentient organ, derived from the four Great Phenomena, forming part of the nature of the self, <b>invisible and reacting</b> , -   | <b>Invisible and reacting:</b> Impact and reaction are set up in the ear and cannot be seen by visual cognition.  |
| (a) by which ear, invisible and reacting, one has heard, hears, will, or may hear sound that is invisible and reacting;  | <b>Four methods of auditory:</b> in the past, in the present, in the future, conditional.   |
| (b) against which ear, invisible and reacting, sound that is invisible and reacting, has impinged, impinges, will, or may impinge;   | <b>Four methods of involuntary auditory:</b> in the past, in the present, in the future, and conditional.   |
| (c) which ear, invisible and reacting, has impinged, impinges, will, or may impinge on sound that is invisible and reacting;   | <b>Four methods of voluntary auditory:</b> in the past, in the present, in the future, and conditional.   |
| (d) depending on which ear, in consequence of a sound, there has arisen, arises, will or may arise,  | <b>Twenty methods how <i>phassapañcaka</i> arises in consequence of sound:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i> , <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇūpanissayapaccaya</i> . |
| [i] auditory contact; ...  | <b>Twenty methods how <i>phassapañcaka</i> arises in connection with sound as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i> .   |
| and, depending on which ear, in consequence of a sound, there has arisen, arises, will, or may arise, born of that auditory contact,   | <b>Hearing the sphere of hearing, the constituent element of hearing, the faculty of hearing, the world, a door, an ocean, lucent, a field, a basis, the hither shore, an empty village:</b> These are synonyms of the term <i>sotāyatana</i> .   |
| [ii] a feeling ...<br>[or iii] a perception ...<br>[or iv] volition ...<br>[or v] auditory cognition;  |   |
| [further] depending on which ear, and having a sound as its object, there has arisen, arises, will, or may arise   |   |
| [vi] auditory contact,   |   |
| and depending on which ear, and having a sound as its object, there has arisen, arises, will, or may arise, born of that auditory contact,   |   |
| [vii] a feeling ...<br>[or viii] a perception ...<br>[or ix] volition<br>[or x] auditory cognition;  |   |
| this that is hearing, the sphere of hearing, the constituent element of hearing, the faculty of hearing, this that is "the world", "a door", "an ocean", "lucent", "a field", "a basis", "the hither shore", "an empty village" - this is that [material] form which is the sphere of hearing. |   |
| <b>Source Adaptive:</b>  |   |
| 1. Dhs 135f: A Buddhist Manual of Psychological Ethics, pp. 163-164.<br>2. The Expositor Vol.II, p. 407.   |   |

**Figure 26. *Sotappasāda* and Its Description.** The *sotappasāda* is located inside the ear. Its location is shaped like a finger-ring or a finger-wrapper.

| The Ear & <i>Sotappasāda</i>  | Explanation  |
|---|--|
| <p><i>Sotaṃ</i> means hearing (or ear). In the interior of the compound organ of the interior of the ear, at a spot shaped like a finger-ring and fringed by tender, tawny hairs, tended by the elements of which the different kinds have been mentioned, sustained by the caloric order, by mind, by nutriment, guarded by life, attended by colour, etc., it stands duly fulfilling the nature of the basis and door of auditory cognition, etc.</p> | <p><b>At a spot shaped like a finger-ring and fringed by tender, tawny hairs:</b> <i>Sotappasāda</i> is located at an organ shaped liked a finger-wrapper (<i>aṅguliveṭṭhanaka-saṅṭhāne padese</i>) with tiny tawny hair (<i>tanutambalomācīte</i>).</p> |
| <b>Source Adaptive:</b>   | <p><b>Tended by the elements:</b> It is derived from <i>mahābhūtarūpa</i>.</p>   |
| <ol style="list-style-type: none"> <li>1. As 310: The Expositor Vol.II, p. 407.</li> </ol>  |  |

The *Tipiṭaka* indicates several synonyms of the term *sotāyatana* as follows: *sota*, *sotāyatana*, *sotadhātu*, *sotindriya*, *loka*, *dvāra*, *samuudda*, *paṇḍara*, *khetta*, *vattlu*, *orima-tīra*, and *suñña gāma*. From these synonyms, they are nearly the same as the synonyms of the *cakkhāyatana*, only the terms having the meaning of guidance are omitted here. In addition, it should always be kept in mind that only the sentient organ of the sense of hearing is classified as the *sotāyatana*. Table 19 shows the *lakkaṇādicatuka* of the *sotāyatana*.

### 3.1.1.3 *Ghānāyatana*

*Ghānāyatana* is derived from the root  $\sqrt{ghā}$  (*to smell*),<sup>124</sup> which refers to “the organ of smell.”<sup>125</sup> It comes from the term *ghāna*, the nose, combined with the term *āyatana*. The term *ghāna* is described by Buddhaghosa as “It

<sup>124</sup> PAW, s.v. “GHĀNA.”

<sup>125</sup> PED, s.v. “Ghāna.”

**Table 19. The *Lakkhaṇādicatuka* of the *Sotāyatana*.** The table shows an explanation of the intrinsic nature of the *sotāyatana* by way of the fourfold defining device; namely, *lakkhaṇa*, *rasa*, *paccupaṭṭhāna*, and *padaṭṭhāna*.

| <i>Lakkhaṇādicatuka</i> | <i>Sotāyatana</i>   |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>sotāyatana</i> is sensitive to the impact of sounds.   |
| <i>Rasa</i>             | The function of the <i>sotāyatana</i> is drawing the consciousness toward an object among sounds.   |
| <i>Paccupaṭṭhāna</i>    | The manifestation of the <i>sotāyatana</i> is being the base of the ear-consciousness.  |
| <i>Paḍaṭṭhāna</i>       | The proximate cause of the <i>sotāyatana</i> is the primary element ( <i>mahābhūta</i> ) born of <i>kanma</i> caused by a desire to hear. |

Source Adaptive:

1. The Expositor Vol.II, p. 409.
2. The Path of Purification, p. 490.

smells (*ghāyati*), thus it is a nose (*ghāna*).<sup>126</sup> The nose is composed of the *sasambhāraghāna* (compound organ) and the *ghānappasāda* (sentient organ). As shown in figure 27, only the part of the *ghānappasāda* is the *ghānāyatana*.

The *ghānappasāda* is derived from the *mahābhūtarūpa*, invisible and reacting,<sup>127</sup> spreading at the spot shaped like a goat's hoof (*ajapadasaṇṭhāne padese*),<sup>128</sup> where the three goat's hooves meet,<sup>129</sup> in the interior of the *sasambhāraghāna*. Figure 28 explains the location of *ghānappasāda* and what it looks like.

<sup>126</sup> Vism 481: Buddhaghosa, 1956, **loc. cit.**

<sup>127</sup> Dhs 136.

<sup>128</sup> As 310: Pe Maung Tin, 1958b, **op. cit.**, p. 407.

<sup>129</sup> N.R.M. Ehara, Soma, and Kheminda, **The Path of Freedom (Vimuttimagga)**, BPS ed. (Kandy: BPS, 1995), p. 239.

**Figure 27. *Ghānāyatana* and Its Description.** The *ghānāyatana* is the sentient organ of the nose (*ghānappasāda*), by which the ability of smelling is conditional.

| <i>Ghānāyatana</i>   | Explanation from the Commentaries  |
|--|--|
| <p>[605-8] What is that [material] form which is the sphere of smell?</p>  | <p><b>The nose is the sentient organ:</b> <i>Ghānāyatana</i> is the sentient organ of the nose.</p>  |
| <p>The nose, that is to say the sentient organ, derived from the four Great Phenomena, forming part of the nature of the self, <b>invisible and reacting</b> -</p>   | <p><b>Invisible and reacting:</b> Impact and reaction are set up in the nose and cannot be seen by visual cognition.</p>   |
| <p>(a) by which nose, invisible and reacting, one has smelt, smells, will, or may smell odour that is invisible and reacting; -</p>  | <p><b>Four methods of olfaction:</b> in the past, in the present, in the future, and conditional.</p>  |
| <p>(b) against which nose, invisible and reacting, odour that is invisible and reacting, has impinged, impinges, will, or may impinge; -</p>   | <p><b>Four methods of involuntary olfaction:</b> in the past, in the present, in the future, and conditional.</p>  |
| <p>(c) which nose, invisible and reacting, has impinged, impinges, will, or may impinge on odour that is invisible and reacting; -</p>   | <p><b>Four methods of voluntary olfaction:</b> in the past, in the present, in the future, and conditional.</p>  |
| <p>(d) depending on which nose, in consequence of an odour, there has arisen, arises, will or may arise,<br/>                     [i] olfactory contact,<br/>                     and, depending on which nose, in consequence of an odour, there has arisen, arises, will, or may arise, born of that olfactory contact,<br/>                     [ii] a feeling ...<br/>                     [or iii] a perception ...<br/>                     [or iv] volition ...<br/>                     [or v] olfactory cognition;</p>              | <p><b>Twenty methods how <i>phassapañcaka</i> arises in consequence of a smell:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i>, <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇiṭṭhanissayapaccaya</i>.</p> |
| <p>and, depending on which nose, and having an odour as its object, there has arisen, arises, will, or may arise<br/>                     [vi] olfactory contact,<br/>                     and depending on which nose, and having an odour as its object, there has arisen, arises, will, or may arise, born of that olfactory contact,<br/>                     [vii] a feeling ...<br/>                     [or viii] a perception ...<br/>                     [or ix] volition<br/>                     [or x] olfactory cognition;</p> | <p><b>Twenty methods how <i>phassapañcaka</i> arises in connection with smell as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i>.</p>  |
| <p>this that is smell, the sphere, the constituent element, the faculty of smell, this that is "the world", "a door", "an ocean", "lucent", "a field", "a basis", "the hither shore", "an empty village" - ...</p>   | <p><b>Smell, the sphere, the constituent element, the faculty of smell, the world, a door, an ocean, lucent, a field, a basis, the hither shore, an empty village:</b> These are synonyms of the term <i>ghānāyatana</i>.</p>                              |
| <p><b>Source Adaptive:</b><br/>                     1. Dhs 136f: A Buddhist Manual of Psychological Ethics, pp. 164-165.<br/>                     2. The Expositor Vol.II, p. 407.</p>   |  |

The synonyms of the *ghānāyatana* as appeared in the *Dhammasaṅgaṇī* are as follows: *ghāna*, *ghānāyatana*, *ghānadhātu*, *ghānindriya*, *loka*, *dvāra*, *samuudda*, *paṇḍara*, *khetta*, *vatthu*, *orima-tīra*, and *suñña gāma*.<sup>130</sup> In order to have a deeper understanding of the *ghānāyatana*, the information about the *lakkhaṇādicatuka* of the *ghānāyatana* is provided in table 20.

### 3.1.1.4 *Jivhāyatana*

*Jivhāyatana* refers to “the organ of taste.”<sup>131</sup> It is derived from the term *jivhā*, the tongue, combined with the term *āyatana*. *The Path of Purification* explains the term *jivhā* as “It evokes (*avhayati*) life (*jīvita*), thus it is a tongue (*jivhā*).”<sup>132</sup> The physical tongue consists of the *sasambhārajivhā* (compound organ) and the *jivhāppasāda* (sentient organ), however, only the *jivhāppasāda* is classified as the *jivhāyatana*, as shown in figure 29.

**Figure 28. *Ghānappasāda* and Its Description.** The *ghānappasāda* is located inside the nose. Its shape is like a goat’s hoof.

| The Nose & <i>Ghānappasāda</i>   | Explanation  |
|--|--|
| <p><i>Ghānaṃ</i> is smelling. In the interior of the compound organ of the nose, at a spot shaped like a goat's hoof, tended, supported, guarded, attended [as aforesaid], it stands duly fulfilling the nature of the basis and door of olfactory cognition, etc.</p> | <p><b>At a spot shaped like a goat's hoof:</b> <i>Ghānappasāda</i> is shaped like a goat's hoof (<i>ajapadasaṇṭhāne padese</i>).</p> <p><b>Tended [as aforesaid]:</b> It is derived from <i>mahābhūtarūpa</i>.</p> |
| <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>1. As 310f: The Expositor Vol.II, p. 407.</li> </ol>   |  |

<sup>130</sup> Dhs 136.

<sup>131</sup> PED, s.v. “*Jivhā*.”

<sup>132</sup> Vism 481: Buddhaghosa, 1956, loc. cit.

**Table 20. The *Lakkhaṇādicatuka* of the *Ghāṇāyatana*.** The table shows an explanation of the intrinsic nature of the *ghāṇāyatana* by way of the fourfold defining device; namely, *lakkhaṇa*, *rasa*, *paccupaṭṭhāna*, and *padaṭṭhāna*.

| <i>Lakkhaṇādicatuka</i> | <i>Ghāṇāyatana</i>  |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>ghāṇāyatana</i> is sensitive to the impact of odors.   |
| <i>Rasa</i>             | The function of the <i>ghāṇāyatana</i> is drawing the consciousness toward an object among odors.   |
| <i>Paccupaṭṭhāna</i>    | The manifestation of the <i>ghāṇāyatana</i> is being the base of the nose-consciousness.  |
| <i>Paḍaṭṭhāna</i>       | The proximate cause of the <i>ghāṇāyatana</i> is the primary element ( <i>mahābhūta</i> ) born of <i>kanma</i> caused by a desire to smell. |

Source Adaptive:

1. The Expositor Vol.II, p. 409.
2. The Path of Purification, p. 490.

The *jivhāppasāda* spreads in the upper surface of the tongue,<sup>133</sup> at a spot shaped like the upper part of a torn lotus petal/leaf (*uppaladalaggasaṅṭhāne padese*).<sup>134</sup> Its detail can be seen in figure 30.

The synonyms of the *jivhāyatana* as appeared in the *Dhammasaṅgaṇī* are as follows: *jivhā*, *jivhāyatana*, *jivhādhiātu*, *jivhindriya*, *loka*, *dvāra*, *samuḍḍa*, *paṇḍara*, *khetta*, *vattthu*, *orima-tīra*, and *suñña gāma*.<sup>135</sup> In order to have a deeper understanding of the *jivhāyatana*, the information about its *lakkhaṇādicatuka* is provided in table 21.

<sup>133</sup> Mehm Tin Mon, 1995, **op. cit.**, p. 229.

<sup>134</sup> As 311: Pe Maung Tin, 1958b, **op. cit.**, p. 407.

<sup>135</sup> Dhs 137.

**Figure 29. *Jivhāyatana* and Its Description.** The *jivhāyatana* is the sentient organ of the tongue (*jivhāppasāda*), by which the ability of tasting is conditional.

| <i>Jivhāyatana</i>  |  |
|---|--|
| [609-12] What is that [material] form which is the sphere of taste?   |  |
| The tongue, that is to say the sentient organ, derived from the four Great Phenomena, included in the self-state, invisible and reacting;   |  |
| (a) by which tongue, invisible and reacting, one has tasted, tastes, will, or may taste sapids that are invisible and reacting;   |  |
| (b) against which tongue, invisible and reacting, sapids that are invisible and reacting, have impinged, impinge, will, or may impinge;   |  |
| (c) which tongue, invisible and reacting, has impinged, impinges, will, or may impinge on sapids that are invisible and reacting;   |  |
| (d) depending on which tongue, in consequence of a sapid, there has arisen, arises, will or may arise,<br>[i] gustatory contact,<br>and, depending on which tongue, in consequence of a sapid, there has arisen, arises, will, or may arise, born of that gustatory contact,<br>[ii] a feeling ...<br>[or iii] a perception ...<br>[or iv] volition ...<br>[or v] gustatory cognition;              |  |
| and, depending on which tongue, and having a sapid as its object, there has arisen, arises, will, or may arise<br>[vi] gustatory contact,<br>and depending on which tongue, and having a sapid as its object, there has arisen, arises, will, or may arise, born of that gustatory contact,<br>[vii] a feeling ...<br>[or viii] a perception ...<br>[or ix] volition<br>[or x] gustatory cognition; |  |
| this that is taste, the sphere, the constituent element, the faculty of taste, this that is "the world", "a door", "an ocean", "lucent", "a field", "a basis", "the hither shore", "an empty village" - ...   |  |
| Explanation from the Commentaries   |  |
| The tongue is the sentient organ: <i>Jivhāyatana</i> is the sentient organ of the tongue.   |  |
| Invisible and reacting: Impact and reaction are set up in the tongue and cannot be seen by visual cognition.  |  |
| Four methods of gustation: in the past, in the present, in the future, and conditional.   |  |
| Four methods of involuntary gustation: in the past, in the present, in the future, and conditional.   |  |
| Four methods of voluntary gustation: in the past, in the present, in the future, and conditional.   |  |
| Twenty methods how <i>phassapañcaka</i> arises in consequence of taste: in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i> , <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇīpanissayapaccaya</i> .  |  |
| Twenty methods how <i>phassapañcaka</i> arises in connection with taste as an object of mind: in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i> .  |  |
| Taste, the sphere, the constituent element, the faculty of taste, the world, a door, an ocean, lucent, a field, a basis, the hither shore, an empty village: These are synonyms of the term <i>jivhāyatana</i> .  |  |
| Source Adaptive:<br>1. Dhs 137f: A Buddhist Manual of Psychological Ethics, p. 165.<br>2. The Expositor Vol II, p. 407.   |  |

**Figure 30. *Jivhāppasāda* and Its Description.** The *jivhāppasāda* is located inside the tongue. Its shape is like a torn lotus petal/leaf.

### The Tongue & *Jivhāppasāda*

'Tongue' is so called in the sense of tasting flavours. Above the middle of the compound organ of the tongue, at a spot shaped like the upper part of a torn lotus leaf, it stands duly fulfilling the nature of the basis and door of gustatory cognition, etc.

**Source Adaptive:**

- As 311: The Expositor Vol. II, p. 407.

**Explanation**

At a spot shaped like the upper part of a torn lotus leaf: *Jivhāppasāda* is shaped liked like a lotus petal (*uppaladalaggasaṇṭhāne padese*).

**Table 21. The *Lakkhaṇādicatuka* of the *Jivhāyatana*.** The table shows an explanation of the intrinsic nature of the *jivhāyatana* by way of the fourfold defining device; namely, *lakkhaṇa*, *rasa*, *paccupaṭṭhāna*, and *padaṭṭhāna*.

| <i>Lakkhaṇādicatuka</i> | <i>Jivhāyatana</i>  |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>jivhāyatana</i> is sensitive to the impact of flavors.   |
| <i>Rasa</i>             | The function of the <i>jivhāyatana</i> is drawing the consciousness toward an object among flavors.   |
| <i>Paccupaṭṭhāna</i>    | The manifestation of the <i>jivhāyatana</i> is being the base of the tongue-consciousness.  |
| <i>Paḍaṭṭhāna</i>       | The proximate cause of the <i>jivhāyatana</i> is the primary element ( <i>mahābhūta</i> ) born of <i>kanma</i> caused by a desire to taste. |

**Source Adaptive:**

- The Expositor Vol.II, p. 409.
- The Path of Purification, pp. 490-491.

### 3.1.1.5 *Kāyāyatana*

*Kāyāyatana* or “the sense of touch”<sup>136</sup> comes from the root  $\sqrt{ci}$  (to pile up, to accumulate) combined with the term *āyatana*.<sup>137</sup> *The Path of Purification* explains the term *kāya* as “It is the origin (*āya*) of vile (*kucchita*) states subjects to cankers, thus it is a body (*kāya*), origin being the place of arising.”<sup>138</sup> The human body is composed of the *sasamblhārakāya* (compound organ) and the *kāyappasāda* (sentient organ). As figure 31 shows, only the *kāyappasāda* is classified as the *kāyāyatana*.<sup>139</sup> The *kāyappasāda* is derived from the *mahābūtarūpa*, spreading throughout the whole body like oil diffusing over cotton-rag (*kappāsapaṭalasineho*).<sup>140</sup> It is a sensory matter that is sensitive to touch, except the insensitive parts such as hair on the head and the body, nails, teeth, and hard dried skin.<sup>141</sup> Figure 32 describes what the *kāyappasāda* looks like.

The synonyms of the *kāyāyatana* as appeared in the *Dhammasaṅgaṇī* are as follows: *kāya*, *kāyāyatana*, *kāyadhātu*, *kāyindriya*, *loka*, *dvāra*, *samudda*, *paṇḍara*, *khetta*, *vattthu*, *orima-tīra*, and *suñña gāma*.<sup>142</sup> In order to have a deeper understanding of the *kāyāyatana*, the information about its *lakṣhaṇādicatuka* is provided in table 22.

<sup>136</sup> PED, s.v. “Kāya.”

<sup>137</sup> PAW, s.v. “KĀYA.”

<sup>138</sup> Vism 481: Buddhaghosa, 1956, *op. cit.*, p. 547.

<sup>139</sup> Dhs 138f.

<sup>140</sup> As 311: Pe Maung Tin, 1958b, *op. cit.*, p. 408.

<sup>141</sup> N.R.M. Ehara, Soma, and Kheminda, 1995, *op. cit.*, p. 240.

<sup>142</sup> Dhs 138f.

**Figure 31. *Kāyāyatana* and Its Description.** The *kāyāyatana* is the sentient organ of the body (*kāyappasāda*), by which the ability of sensibility is conditional.

| <i>Kāyāyatana</i>   | Explanation from the Commentaries   |
|---|---|
| [613-16] What is that [material] form which is the sphere of body[-sensibility]?  | <b>The body is the sentient organ:</b> <i>Kāyāyatana</i> is the sentient organ of the body.   |
| The body, that is to say the sentient organ, derived from the four Great Phenomena, included in the self-state, <b>invisible and reacting;</b>  | <b>Invisible and reacting:</b> Impact and reaction are set up in the body and cannot be seen by visual cognition.   |
| (a) by which body-sensibility, invisible and reacting, one has touched, touches, will, or may touch the tangible that is invisible and reacting;  | <b>Four methods of tactility:</b> in the past, in the present, in the future, and conditional   |
| (b) against which body-sensibility, invisible and reacting, the tangible, which is invisible and reacting, has impinged, impinges, will, or may impinge;  | <b>Four methods of involuntary tactility:</b> in the past, in the present, in the future, and conditional.  |
| (c) which body-sensibility, invisible and reacting, has impinged, impinges, will, or may impinge on the tangible that is invisible and reacting;  | <b>Four methods of voluntary tactility:</b> in the past, in the present, in the future, and conditional.  |
| (d) depending on which body-sensibility, in consequence of something tangible, there has arisen, arises, will or may arise,   | <b>Twenty methods how <i>phassapañcaka</i> arises in consequence of touch:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i> , <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇūpanissayapaccaya</i> . |
| [i] tactile contact, and, depending on which body-sensibility, in consequence of something tangible, there has arisen, arises, will, or may arise, born of that tactile contact,  | <b>Twenty methods how <i>phassapañcaka</i> arises in connection with touch as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i> .   |
| [ii] a feeling ...  | <b>Body-sensibility, sphere, the constituent element, the faculty of body-sensibility, the world, a door, an ocean, lucent, a field, a basis, the hither shore, an empty village:</b> These are synonyms of the term <i>kāyāyatana</i> .          |
| [or iii] a perception ...   |   |
| [or iv] volition ...  |   |
| [or v] tactile cognition;   |   |
| and, depending on which body-sensibility, and having something tangible as its object, there has arisen, arises, will, or may arise   |   |
| [vi] tactile contact, and depending on which body-sensibility, and having something tangible as its object, there has arisen, arises, will, or may arise, born of that tactile contact,   |   |
| [vii] a feeling ...   |   |
| [or viii] a perception ...  |   |
| [or ix] volition  |   |
| [or x] tactile cognition;   |   |
| this that is body-sensibility, the sphere, the constituent element, the faculty of body-sensibility, this that is "the world", "a door", "an ocean", "lucent", "a field", "a basis", "the hither shore", "an empty village" - ... |   |

**Source Adaptive:**

1. Dhs 138f: A Buddhist Manual of Psychological Ethics, pp. 166-167.
2. The Expositor Vol.II, p. 408.

**Figure 32. *Kāyappasāda* and Its Description.** The *kāyappasāda* is located inside the body. Its location spreads throughout the whole body.

| The Body & <i>Kāyappasāda</i>  | Explanation   |
|--|---|
| <p>But in <b>this body</b>, wherever there is a matter grasped at the 'body as field of touch' everywhere becomes [the object of] service, sustenance, protection, attendance, as said above. <b>Like oil diffusing over cotton-rag</b>, it stands duly fulfilling the nature of basis and of door of bodily cognition, etc.</p> | <p><b>Body:</b> The body is <i>upādinnakarūpa</i> (karmically grasped materiality).</p> <p><b>Like oil diffusing over cotton-rag:</b> <i>Kāyappasāda</i> is located inside the body, spreading throughout the whole body like oil diffusing over cotton-rag (<i>kappāsapaṭalasineho</i>).</p> |
| <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>As 311: The Expositor Vol.II, p. 408.</li> </ol>   |   |

**Table 22. The *Lakkhaṇādicatuka* of the *Kāyāyatana*.** The table shows an explanation of the intrinsic nature of the *kāyāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Kāyāyatana</i>   |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>kāyāyatana</i> is sensitive to the impact of tangible objects.   |
| <i>Rasa</i>             | Its function is drawing the consciousness toward an object among tangible data.               |
| <i>Paccupaṭṭhāna</i>    | Its manifestation is being the base of the body-consciousness.                                |
| <i>Paḍaṭṭhāna</i>       | Its proximate cause is the <i>mahābhūta</i> born of <i>kanma</i> caused by a desire to touch. |

**Source Adaptive:**

- The Expositor Vol.II, p. 409.
- The Path of Purification, p. 491.

### 3.1.1.6 *Manāyatana*

*Manāyatana*, the mind, comes from the root  $\sqrt{man}$  (to think, to believe).<sup>143</sup> The root of the term *manāyatana* implies that the mind has a tendency to think and to believe. *The Path of Purification* explains the term *mano* as “It measures (*munāti*), thus it is a mind (*mano*).”<sup>144</sup> The term *mano* has various meanings, including the intellect, the thoughts, and the heart.

The *Yamaka* indicates that *mano* is *manāyatana*, and vice versa (*Mano manāyatanaṇ ti: Āmantā. Manāyatanaṇṇ mano ti: Āmantā*).<sup>145</sup> The commentators describe three reasons why *mano* is *āyatana*, as follows:

For mind is *āyatana* in the sense of [1.] birth-place as in the passage:- 'states such as "contact" and so on, are born in the mind.' And mind is *āyatana* in the sense of [2.] a meeting-place, as in the passage:- 'External objects, visible, audible, olfactory, gustatory and tangible assemble there as objects in mind.' And mind is *āyatana* in the sense of [3.] reason (or ground), because of its being the cause-in-relation of the co-existence, etc., of contact and so on.<sup>146</sup>

The *manāyatana* is classified into eighty-nine kinds by way of plane of existence (eighty-one kinds in the three mundane planes,<sup>147</sup> and eight kinds in the supramundane plane). This classification is known as the classification of *citta* in the *Abhidhamma Piṭaka*. In figure 33, the picture presents the classification of the *citta* in more detail.

<sup>143</sup> PAW, s.v. "MANAS."

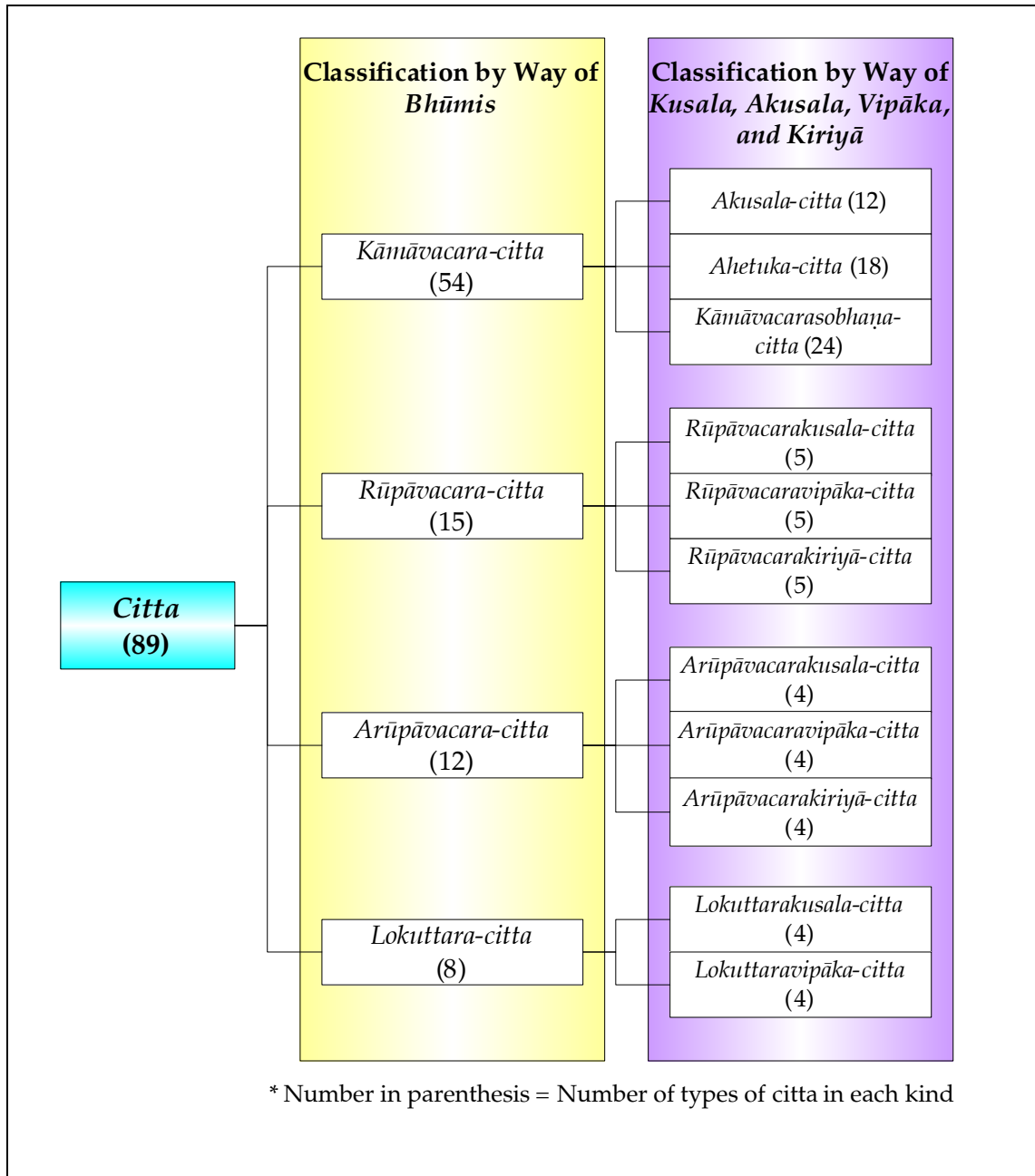
<sup>144</sup> Vism 481: Buddhaghosa, 1956, *op. cit.*, p. 547.

<sup>145</sup> Yam I 54.

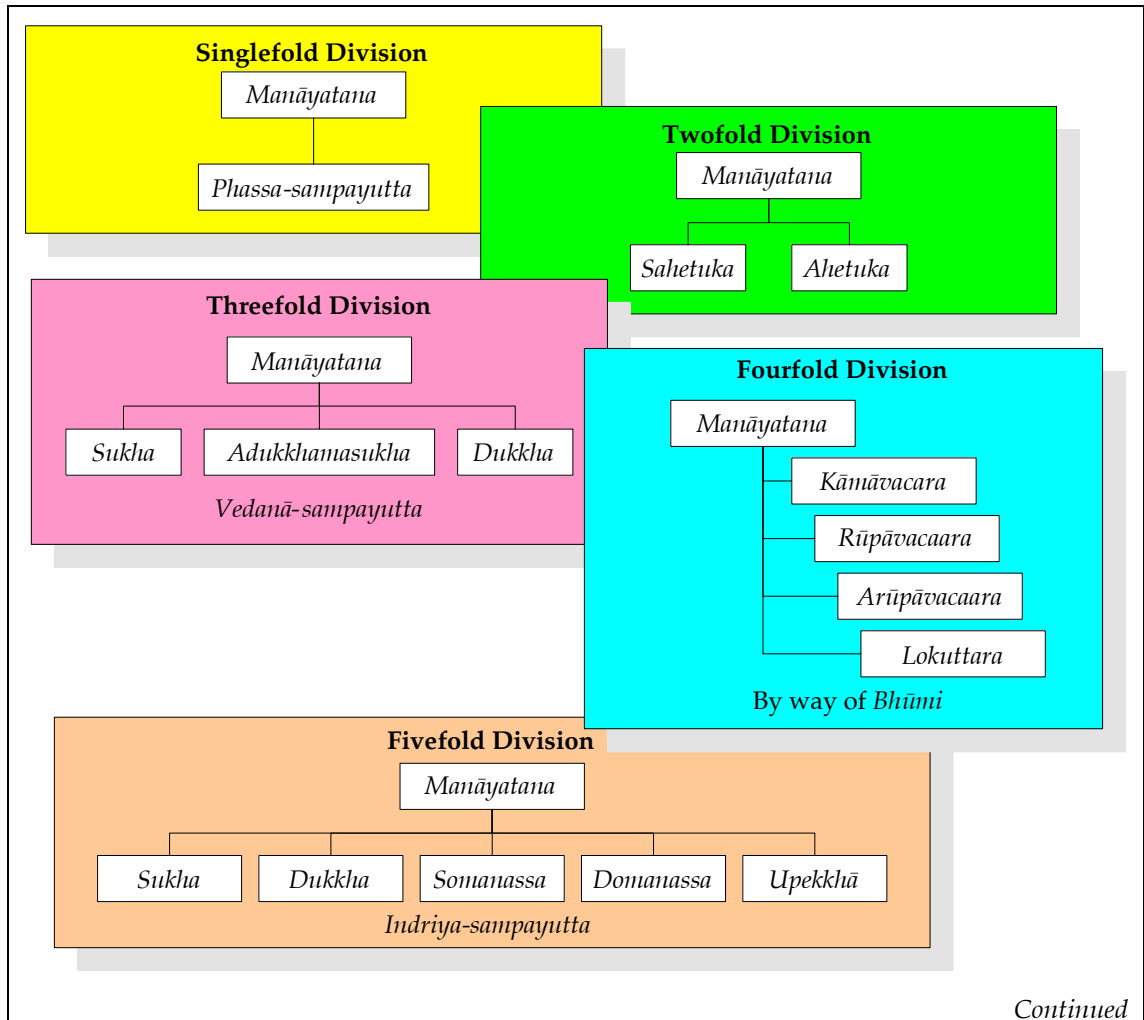
<sup>146</sup> Pe Maung Tin, 1958a, *op. cit.*, p. 186.

<sup>147</sup> VbhA 47: Ñānamoli, 1987, **op. cit.**, p.56.

**Figure 33. The Classification of *Citta*.** The *citta* is classified according to their *bhūmis* (the plane of existence), namely, *kusala-viññāṇa* (moral consciousness), *akusala-viññāṇa* (immoral consciousness), *vipāka-viññāṇa* (resultant consciousness), and *kiriya-viññāṇa* (functional consciousness).



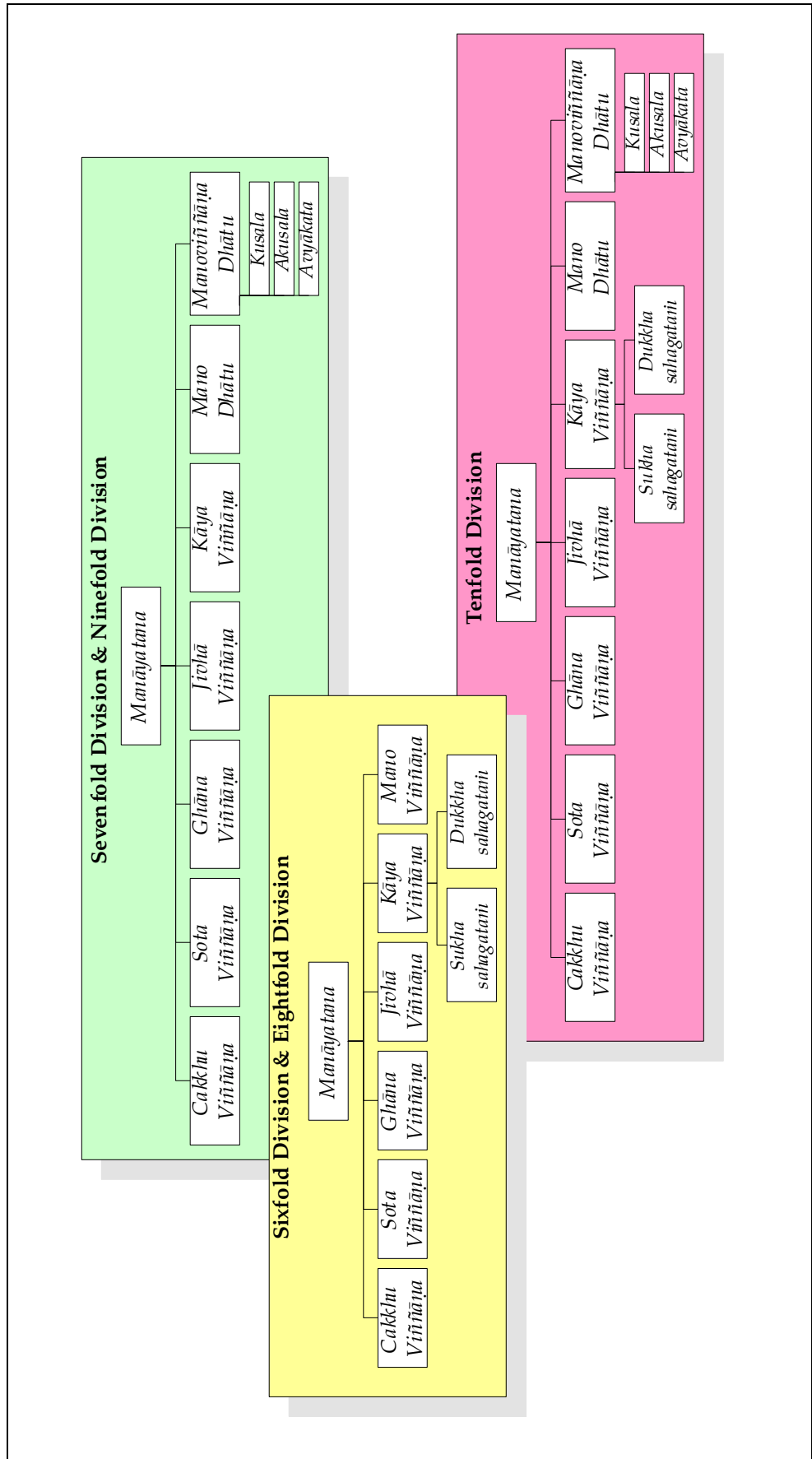
**Figure 34. *Manāyatana* and Its Different Enumerations.** This picture shows some examples of different enumerations of the *manāyatana* in the *Vibhaṅga*.



The different classifications of *manāyatana* also can be found in the *Vibhaṅga*. It has been enumerated in many different ways. Figure 34 shows some example of different enumerations of the *manāyatana*.<sup>148</sup>

<sup>148</sup> Vbh 71.

Figure 34, continued. *Manāyatana* and Its Different Enumerations. This picture shows some examples of different enumerations of the *manāyatana* in the *Vibhāṅga*.



Unlike other internal *āyatana*s, The Buddha never specified a specific location for the *manāyatana*. In the *Paṭṭhāna*, there is a reference to *manovīññāṇa-dhātu* which is a synonym of *manāyatana* as follows:

*Yanī rūpaṇi nissāya manodhātu ca manovīññāṇadhātu ca vattanti, taṇi rūpaṇi manodhātuyā ca manovīññāṇadhātuyā ca taṇi-sampayuttakāṇaṇi ca dhammāṇaṇi nissayapaccayena paccayo*

*That material thing on the basis of which apprehension and comprehension take place – that thing is related to both of them, as well as to their concomitants by way of the relation of Base.*<sup>149</sup>

Latter commentators, such as Buddhaghosa and Anuruddha, used the word ‘heart’ instead of ‘that material thing’ because the Buddha used the word *hadaya* in his discourses to express the concept of thought or mind.<sup>150</sup> Figure 35 shows the description of the material phenomena of the heart (*hadayarūpa*) as described by the commentators. The term *hadayarūpa* and *hadayavattthu* do not appear in the *Tipiṭaka*. These two terms were used latter by commentators in an attempt to explain the location of the mind.

From figure 35, there are four terms related to plants mentioned in the figure, which are lotus bud, loofah gourd, *punnāga* seed, and *kaṇikāra*. *Punnāga* is one of a sacred tree, whose flowers are used to offer to *Shiva* during early morning worship.<sup>151</sup> *Kaṇikāra* is also known as the tree *Pterospermum acerifolium* or the Dinnerplate tree. Its leaf is huge and used as a plate in India. Figure 36 shows the pictures of these plants, except lotus bud since it is a commonly known flower. It must be noted here that these plants may not be the same plants as mentioned in the *Tipiṭaka*.

<sup>149</sup> Paṭṭh 4: Caroline A.F. Rhys Davids, ed., **Compendium of Philosophy**, 5<sup>th</sup> ed. (London: PTS, 1972), pp. 278.

<sup>150</sup> **Ibid.**

<sup>151</sup> Envis Centre on Conservation of Ecological Heritage and Sacred Sites of India, **List of Sacred Trees**, retrieved 30 September 2006, <[http://ecoheritage.cpreec.org/04\\_topics/01\\_sacred\\_trees/01\\_sacred\\_trees\\_datas.html](http://ecoheritage.cpreec.org/04_topics/01_sacred_trees/01_sacred_trees_datas.html)>.

**Figure 35. *Hadayarūpa* and Its Description.** There are two types of *hadayarūpa*, which are *maṇisahadaya-rūpa* & *vatthuhadaya-rūpa* (*hadaya-vatthū*). *Maṇisahadaya-rūpa* is the physical appearance of the heart; while *hadaya-vatthū* is a *kanumajarūpa* (material phenomena arising from *kanma*) appeared inside the *maṇisahadaya-rūpa*. The *hadaya-vatthū* is a proximate cause of the arising of *monoviññāṇadhātu*.

### *Hadayarūpa & Hadaya-vatthū*

**“Heart”: the heart flesh.** As to *colour*, it is the colour of the back of a red lotus petal. As to *shape*, it is the shape of a red lotus bud placed upside down after removing the outer petals; smooth outside, and inside like the interior of a *kosātakī* fruit (loofah gourd). In those possessed of understanding it is a little expanded, in those of dull understanding it is still only a bud. Inside it there is a hollow the size of a *punnāga* seed’s bed, where half a *pasata* (measure) [= a handful] of blood is kept, dependent on which the mind element and mind-consciousness element occur. But that in one of greedy temperament is red; that in one of hating temperament is black; that in one of deluded temperament is like the water that meat has been washed in; that in one of speculative temperament is like the colour of lentil soup; that in one of faithful temperament is the colour of (yellow) *kaṇikāra* flowers; that in one of understanding temperament is limpid, clear, unturbid, bright, pure, like a washed gem of pure water and seems to shine. As to *direction*, it lies in the upper direction. As to *location*, it is to be found in the middle between the two breasts inside the body. As to *delimitation*, it is bounded by what belongs to the heart.

#### Comments

**The heart flesh:** This is *maṇisahadaya-rūpa*.

**In those possessed of understanding it is a little expanded, in those of dull understanding it is still only a bud:** The shape of the heart can indicate whether a person is wise or not.

**There is a hollow the size of a *punnāga* seed’s bed, where half a *pasata* of blood is kept:** This is believed to be the physical location of the *hadaya-vatthū*.

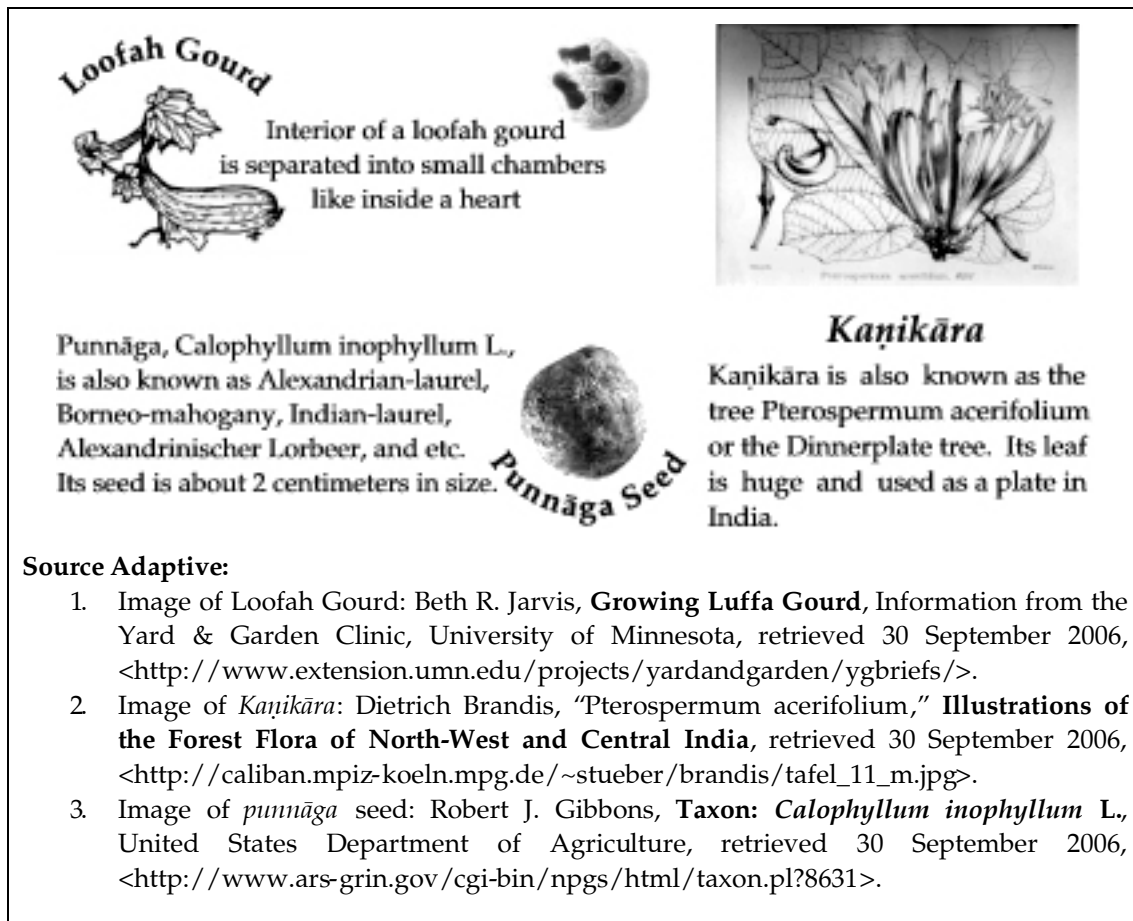
**But that in one of greedy temperament is red ...:** Blood colour can indicate personality of a person.

**As to delimitation, it is bounded by what belongs to the heart:** If blood belongs to the heart, then the delimitation of the heart is bounded by wherever the blood flows. This shows that we could not specify a specific location of *hadaya-vatthū*.

#### Source Adaptive:

1. VbhA 239f: The Dispeller of Delusion Part I, pp. 297-298.
2. Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 6, p. 40.

**Figure 36. Images of Loofah Gourd, *Punnāga* Seed, and *Kañikāra* Flower.** The figure shows three images of plants that are mentioned in the *hadayārūpa* description.



There are two kinds of *hadayārūpa*: the *maṇisahadayaṛūpa* (the flesh of heart that has a shape of a lotus bud), and the *vatthuhadayaṛūpa* (or *hadayavatthu*, a material phenomenon arising from *kanuma*). The *hadayavatthu* is located inside the *maṇisahadayaṛūpa*. Anuruddha mentions that “In the *Aṭṭhasālinī*, *hadayavatthu* is explained as *cittassa vatthu* (basis of consciousness).”<sup>152</sup> The *hadayavatthu* is not the *maṇāyatana*. It is a proximate cause of the arising of *manoviññāṇadhātu*. The synonyms of the *maṇāyatana* are as shown in table 23.

<sup>152</sup> Anuruddhācariya, 1987, *op. cit.*, p. 292.

**Table 23. Synonyms for the Term *Manāyatana*.** The synonyms of the term *manāyatana* and the reason why these terms are called as they are.

| Synonyms for <i>Manāyatana</i> | Reason  |
|--------------------------------|---|
| <i>Citta</i>                   | <i>Citta</i> is used to refer to its variegated nature.   |
| <i>Mano</i>                    | <i>Mano</i> represents its property of knowing the measure of an object.  |
| <i>Mānasa</i>                  | <i>Mānasa</i> is used to represent mental action.   |
| <i>Hadaya</i>                  | <i>Hadaya</i> is used to show the sense of inwardness.  |
| <i>Paṇḍara</i>                 | <i>Paṇḍara</i> is used in a sense of pure with reference to <i>bhavaṅga-citta</i> since it issues from sub-consciousness.   |
| <i>Manāyatana</i>              | <i>Manāyatana</i> is used to represent an act of grasping. It is an <i>āyatana</i> in the sense of the birth-place (of various states such as <i>phassa</i> ), the meeting place (for external sense-bases), and the reason (as a cause and condition of various states). |
| <i>Manindriya</i>              | <i>Manindriya</i> is used to show its quality of measuring, hence mind knows an object ( <i>mano</i> ) and by this quality of measuring, mind exercises associated states arising from mind ( <i>indriya</i> ), therefore it is also a controlling faculty.               |
| <i>Viññāṇa</i>                 | <i>Viññāṇa</i> is used to represent it's function as cognizing.   |
| <i>Viññāṇakkhandha</i>         | <i>Viññāṇakkhandha</i> is used to represent mind as being a group and cognizing.  |
| <i>Manovīññādhātu</i>          | <i>Manovīññādhātu</i> is used to represent the sense of measuring ( <i>mano</i> ), the sense of discrimination ( <i>viññāṇa</i> ), and the sense of non-living entity ( <i>dhātu</i> ).   |

**Source Adaptive:**

1. The Expositor Vol. I, pp. 162, 185-187.

It should be kept in mind that even though *citta*, *mano*, *manāyatana*, and *viññāṇa* are synonymous, these terms have different usages, as follows:

- *Mano* represents “the intellectual functioning of consciousness.”<sup>153</sup>
- *Manāyatana* refers to a birthplace of *vīthicitta*, which covers eighty-nine kinds of *citta*.
- *Citta* refers to “the subjective aspect of consciousness.”<sup>154</sup> Of the eighty-nine kinds of *citta*, ten of them are *dvīpañcaviññāṇa*, three of them are *manodhātu*, and seventy-six of them are *manoviññāṇadhātu*.
- *Viññāṇa* represents “the field of sense and sense-reaction.”<sup>155</sup> The ten *dvīpañcaviññāṇas* are always called *viññāṇa*, since they know objects through doors (eye, ear, nose, tongue, and body).<sup>156</sup>

Figure 37 portrays the relationship between the *manāyatana* and the different kinds of *citta*. In addition, the *Dhammapada* further clarifies *citta* as follows: *Yatthakāmanipātino* (wandering wherever it desires), *Dūraṅgamanī* (going far), *Asarīraṇi* (formless), and *Guhāsayaṇi* (living in a cave).<sup>157</sup>

In order to have a deeper understanding of the *manāyatana*, the information about its *lakṣhaṇādicatuka* and some of its synonyms are provided in table 24.

<sup>153</sup> PED, s.v. “Mano & Mana(s).”

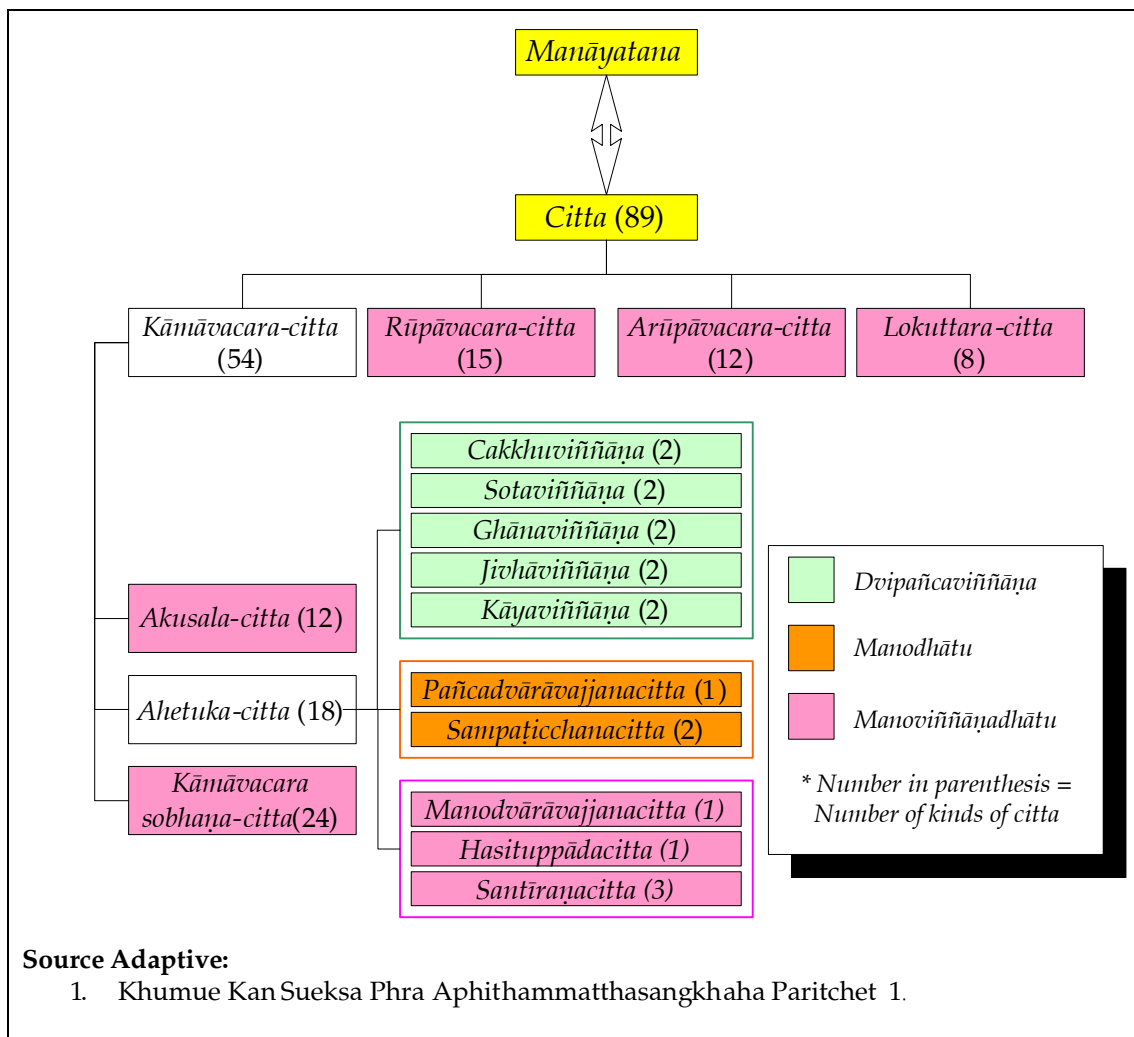
<sup>154</sup> Ibid.

<sup>155</sup> Ibid.

<sup>156</sup> Bunmi Methangkun and Butsakon Methangkun, **Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 1 Part 1** (Nakhon Pathom: Abhidhamma Foundation, 2545a B.E.), p. 68.

<sup>157</sup> Dhṛp 35 and Dhṛp 37.

**Figure 37. *Manāyatana* and the Different Types of *Citta*.** The *manāyatana* is classified into eighty-nine kinds of *citta*. These *cittas* are divided into three main categories: *dvipaṇcaviññāṇa*, *manodhātu*, and *manoviññādhātu*.



### 3.1.2 The External *Āyatana*s and Their Description in the Buddhist Scriptures

The six external sense bases consist of *rūpāyatana*, *saddāyatana*, *gandhāyatana*, *rasāyatana*, *phoṭṭhabbāyatana*, and *dhammāyatana*. Of these, the first five external sense bases are frequently observed by *dvipaṇcaviññāṇa*.

**Table 24. The *Lakkhaṇādicatuka* of the *Manāyatana*.** The table shows an explanation of the intrinsic nature of the *Manāyatana* and some of its related terms by way of *lakkhaṇādicatuka*.

|                         | <i>Lakkhaṇa</i>  | <i>Rasa</i>  | <i>Paccupaṭṭhāna</i>   | <i>Paḍaṭṭhāna</i>  |
|-------------------------|--|--|--|--|
| <i>Manāyatana</i>       | It is being the resort of <i>manodhātu</i> and <i>mano-viññāṇadhātu</i> .                          | Its function is to observe <i>manodhātu</i> and <i>mano-viññāṇadhātu</i> . | Not Available.   | Not Available.   |
| <i>Hadayaavatthu</i>    | Its characteristic is being (material) support for <i>manodhātu</i> and <i>mano-viññāṇadhātu</i> . | Its function is to observe <i>manodhātu</i> and <i>mano-viññāṇadhātu</i> . | Its manifestation is to carry <i>manodhātu</i> and <i>manovijñāṇadhātu</i> . | It has <i>maḍaḍhūtarūpa</i> as its proximate cause.                                |
| <i>Citta</i>            | Its characteristic is cognizing an object.   | Its function is being a “forerunner” of <i>cetasikas</i> .                 | Its manifestation is connecting.   | <i>Nānanāpa</i> is its proximate cause.  |
| <i>Manodhātu</i>        | It has the characteristic of knowing an object after cognition.                                    | Its function is receiving objects.   | Its manifestation is the state of related reception.                         | The presence of <i>viññāṇa</i> , such as visual cognition, is its proximate cause. |
| <i>Manovijñāṇadhātu</i> | It has the characteristic of knowing the six sense-objects   | Its function is receptiveness.   | It manifests a state of receiving.   | The proximate cause is the heart-basis ( <i>hadaya-vatthu</i> ).                   |

**Source Adaptive:**

1. The Expositor Vol. I, pp. 148-149.
2. The Expositor Vol. II, pp. 350-351.
3. The Path of Purification, pp. 496-497
4. A Comprehensive Manual of Abhidhamma, p. 29.

### 3.1.2.1 *Rūpāyatana*

*Rūpāyatana* is derived from the term *rūpa* combined with the term *āyatana*. A possible root of *rūpa* is  $\sqrt{rup}$ , meaning “is vexed or changed.”<sup>158</sup>

*The Path of Purification* explains this term as “It makes visible (*rūpayati*), thus it is visible datum (*rūpa*); the meaning is that by undergoing an alteration in appearance (colour) it evidences what state is in the mind (lit. heart).”<sup>159</sup> Not all types of *rūpa* are the *rūpāyatana*,<sup>160</sup> only *vaṇṇanibhā* is classified as the *rūpāyatana*.<sup>161</sup>

Figure 38 shows that the *rūpāyatana* is the “appearance of color.”<sup>162</sup> Table 25 provides information about the *lakṣhaṇādicatuka* of the *rūpāyatana*. The corresponding internal *āyatana* of the *rūpāyatana* is the *cakkhāyatana*. The *Abhidhamma* further explains that the *cakkhāyatana* neither directly reach nor touch (*asampatta*) the *rūpāyatana* and the *rūpāyatana* is a material phenomenon that is inseparable from an object (*avinibhogarūpa*).<sup>163</sup>

The synonyms of the term *rūpāyatana* as appeared in the *Dhammasaṅgāṇī* are *rūpa*, *rūpāyatana*, and *rūpadhātu*.

### 3.1.2.2 *Saddāyatana*

*Saddāyatana* is derived from the term *sadda* combined with the term *āyatana*. The meanings of *sadda* are sound, noise, voice, and word.<sup>164</sup>

<sup>158</sup> Luang Thepdarunanusit, comp., *Dhātuppadīpikā*, 7<sup>th</sup> ed. (Bangkok: Mahamakuta Rajavidyalaya Press, 2540 B.E.), p. 328.

<sup>159</sup> Vism 481: Buddhaghosa, *loc. cit.*

<sup>160</sup> Yam I 54.

<sup>161</sup> Vbh 72, and Dhs 139.

<sup>162</sup> Caroline A.F. Rhys Davids, 1974, *op. cit.*, p. 167.

<sup>163</sup> Referred to Anurudhācariya, 1993, *op. cit.*, pp. 245-246.

<sup>164</sup> PED, s.v. “Sadda.”

**Figure 38. *Rūpāyatana* and Its Description.** The *rūpāyatana* is what is visible under the appearance of colour, by which the ability of seeing is conditional.

## *Rūpāyatana*

[617] What is that [material] form which is the sphere of [visible] shape?

The [material] form which, derived from the great principles, is **visible** under the **appearance of colour** and **reacting** – is blue, yellow, red, white, black, crimson, bronze, green-coloured, of the hue of the mango-bud; is long, short, big, little, circular, oval, square, hexagonal, octagonal, hekkaidecagonal; low, high, shady, glowing, light, dim, dull, frosty, smoky, dusty; **like in colour to the disc of moon**, sun, stars, a mirror, a gem, a shell, a pearl, a cat's eye, gold or silver; or whatever other shape there is which, derived from the four Great Phenomena, is visible and reacting – shape which, visible and reacting, one has seen, sees, will, or may see with the eye that is invisible and reacting – this which is visible shape, this which is the sphere of visible shape, the constituent element of visible shape – this is that form which is the sphere of visible shape.

[618] What is that [material] form which is the sphere of [visible] shape?

That [material] form which, derived from the Great Phenomena, is visible under the appearance of colour and reacting ... on which shape, visible and reacting, the eye, invisible and reacting, has impinged, impinges, will, or may impinge – this that is visible shape, etc. ...

[619] What is that [material] form which is the sphere of [visible] shape?

That [material] form which, derived from the Great Phenomena, is visible under the appearance of colour and produces impact – which form, visible and producing impact, has impinged, impinges, will, or may impinge on the eye that is invisible and reacting – this which is visible form, etc. ...

### Explanation from the Commentaries

**Visible:** It is to be seen by visual cognition.

**The appearance of colour:** *Rūpāyatana* is coloured appearance. It is also called *vaṇṇantibhā* since it shines.

**Reacting:** It is producing the friction of impact.

**Long, short, ... hekkaidecagonal:** Accomplished by mutual reference and by juxtaposition.

**Colour to the disc of moon:** This shows the radiant colours of the moon.

**Four methods of a visible object is being seen:** in the past, in the present, in the future, and conditional.

**Four methods of a visible object as deliberate object:** in the past, in the present, in the future, and conditional.

**Four methods of a visible object as intrusive object:** in the past, in the present, in the future, and conditional.

*Continued*

**Figure 38, continued. *Rūpāyatana* and Its Description.** The *rūpāyatana* is what is visible under the appearance of colour, by which the ability of seeing is conditional.

### *Rūpāyatana*

[620] What is that [material] form which is the sphere of [visible] shape?

That [material] form which, derived from the four Great Phenomena, is visible and produces impact – in consequence of which form, and depending on the eye, there has arisen, arises, will, or may arise

visual contact; ...

in consequence of which form, and depending on the eye, there has arisen, arises, will, or may arise, born of that visual contact –

a feeling ...

[or] a perception ...

[or] volition ... [or] visual cognition ...

[further] having which visible shape as its object, and depending on the eye there has arisen, arises, will, or may arise

visual contact,

and, having which visible shape as its object, and depending on the eye there has arisen, arises, will, or may arise, [born of that visual contact]

a feeling ...

[or] a perception ...

[or] volition ... [or] visual cognition –

this which is visible shape, this which is the sphere, the constituent element of visible shape – this is that [material] form which is the sphere of visible shape.

#### Explanation from the Commentaries

Twenty methods how *phassapañcaka* arises in consequence of visible objects: in the past, in the present, in the future, and conditional by way of *purejātapaccaya*, *ārammaṇādhipatipaccaya* and *ārammaṇūpanissayapaccaya*.

Twenty methods how *phassapañcaka* arises in connection with visible objects as an object of mind: in the past, in the present, in the future, and conditional by way of *ārammaṇapaccaya*.

Visible shape, the sphere of visible shape, the constituent element of visible shape: These are synonyms of the term *rūpāyatana*.

#### Source Adaptive:

1. Dhs 139f: A Buddhist Manual of Psychological Ethics, pp. 167-170.
2. The Expositor Vol.II, pp. 414-417.

**Table 25. The *Lakkhaṇādicatuka* of the *Rūpāyatana*.** The table shows an explanation of the intrinsic nature of the *rūpāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Rūpāyatana</i>  |
|-------------------------|--|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>rūpāyatana</i> is impinging on the eye. |
| <i>Rasa</i>             | Its function is to be the objective field of <i>cakkhuvīññāṇa</i> .  |
| <i>Paccupaṭṭhāna</i>    | Its manifestation is being the resort of <i>cakkhuvīññāṇa</i> .      |
| <i>Paḍaṭṭhāna</i>       | Its proximate cause is the <i>mahābhūta</i> .                        |

Source Adaptive:

1. The Path of Purification, p. 495.

*The Path of Purification* explains the term *saddāyatana* as “It is emitted (*sappati*), thus it is sound (*sadda*); the meaning is that it is uttered.”<sup>165</sup> The *Yamaka* indicates that *sadda* is the *saddāyatana*.<sup>166</sup>

Figure 39 explains that the *saddāyatana* is the sound, whatever sound there is. The information about the *lakkhaṇādicatuka* of the *saddāyatana* is provided in table 26. The corresponding internal *āyatana* of the *saddāyatana* is the *sotāyatana*. The *Abhidhamma* further explains that the *sotāyatana* does not directly reach or touch the *saddāyatana*.<sup>167</sup>

The synonyms of the term *saddāyatana* as appeared in the *Dhammasaṅgaṇī* are *sadda*, *saddāyatana*, and *saddadhātu*.

<sup>165</sup> Vism 481: Buddhaghosa, *loc. cit.*

<sup>166</sup> Yam I 54.

<sup>167</sup> Referred to Anurudhācariya, 1993, *op. cit.*, p. 245.

**Figure 39. *Saddāyatana* and Its Description.** The *saddāyatana* is whatever sound there is that creates an impact and reaction in the sentient organ of the ear.

| <i>Saddāyatana</i>  | Explanation from the Commentaries  |
|---|--|
| <p>[621] What is that [material] form which is the sphere of sound?</p> <p><b>That sound</b> which is derived from the four Great Phenomena, is invisible and reacting, such as the sound of drums, of tabors, of chank-shells, of tom-toms, of singing, of music; clashing sounds, manual sounds, the noise of people, the sound of the concussion of substances, of wind, of water, <b>sounds human and other than human, or whatever other sound there is,</b> derived from the four Great Phenomena, invisible and reacting - such a sound, invisible and reacting, as, by the ear, <b>invisible and reacting, one has heard, hears, will or may hear ...</b></p> <p>[622] ... and on which sound, invisible and reacting, the ear, invisible and reacting, has impinged, impinges, will, or may impinge ...</p> <p>[623] ... which sound, invisible and reacting, has impinged, impinges, will, or may impinge on the ear that <b>is invisible and reacting ...</b></p> <p>[624] ... in consequence of which sound and depending on the ear, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">auditory contact; ...</p> <p>... and ... born of that auditory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p style="padding-left: 40px;">[or] a perception ...</p> <p style="padding-left: 40px;">[or] volition ...</p> <p style="padding-left: 40px;">[or] auditory cognition ...</p> <p>... [further] having a sound as its object and depending on the ear, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">auditory contact,</p> <p>... and ... born of that auditory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p style="padding-left: 40px;">[or] a perception ...</p> <p style="padding-left: 40px;">[or] volition ...</p> <p style="padding-left: 40px;">[or] auditory cognition -</p> <p><b>this that is sound, the sphere and constituent element of sound - this is that form which is the sphere of sound.</b></p> | <p><b>The sound: <i>Saddāyatana</i></b> is the sound that cannot be seen by visual cognition. Its impact and reaction are set up in the sentient organ of the ear. Even though sounds are distinguished in the Text. All sounds have the characteristic of striking the ear.</p> <p><b>Sounds human and other than human, or whatever sound:</b> This includes all types of sound that are invisible and reacting</p> <p><b>Four methods of a sound is being heard:</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of a sound as deliberate object</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of a sound as intrusive object</b> in the past, in the present, in the future, and conditional.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in consequence of sound:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i>, <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇūpanissayapaccaya</i>.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in connection with sound as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i>.</p> <p><b>Sound, the sphere and the constituent element of sound:</b> These are synonyms of <i>saddāyatana</i>.</p> |
| <b>Source Adaptive:</b>   |  |
| <ol style="list-style-type: none"> <li>1. Dhs 140f: A Buddhist Manual of Psychological Ethics, pp. 170-171.</li> <li>2. The Expositor Vol.II, p. 417.</li> </ol>  |  |

**Table 26. The *Lakkhaṇādicatuka* of the *Saddāyatana*.** The table shows an explanation of the intrinsic nature of the *saddāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Saddāyatana</i>  |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of <i>saddāyatana</i> is impinging on the ear. |
| <i>Rasa</i>             | Its function is to be the objective field of <i>sotaviññāṇa</i> . |
| <i>Paccupaṭṭhāna</i>    | Its manifestation is being the resort of <i>sotaviññāṇa</i> .     |
| <i>Padaṭṭhāna</i>       | Its proximate cause is <i>mahābhūta</i> .                         |

Source Adaptive:

1. The Path of Purification, p. 495.

### 3.1.2.3 *Gandhāyatana*

*Gandhāyatana* is derived from the term *gandha* combined with the term *āyatana*. The root of *gandha* is  $\sqrt{ghā}$  (to smell)<sup>168</sup> meanings “odour, smell, scent.”<sup>169</sup> The term *gandha* is explained as “It is smelt (*gandhayati*), thus it is odour (*gandha*); the meaning is that it betrays its own physical basis.”<sup>170</sup>

*Silagandha* (*saṃmāvācā*, *saṃmākaṃmanta*, and *saṃmā-ājīva*), *samādhigandha* (*saṃmāvāyāma*, *saṃmāsati*, and *saṃmāsamiādhi*), and *paññāgandha* (*saṃmādiṭṭhi* and *saṃmāsaiṅkappa*) are the factors of the Eightfold Path. They are not classified as the *gandhāyatana*.<sup>171</sup> The detail of the *gandhāyatana* and the information about the *lakkhaṇādicatuka* are shown in figure 40 and table 27 respectively.

<sup>168</sup> PAW, s.v. “GANDHA.”

<sup>169</sup> PED, s.v. “Gandha.”

<sup>170</sup> Vism 481: Buddhaghosa, *loc. cit.*

<sup>171</sup> Yam I 54f.

**Figure 40. *Gandhāyatana* and Its Description.** The *gandhāyatana* is whatever odour there is that creates impact and reaction in the sentient organ of the nose.

| <i>Gandhāyatana</i>   |  |
|---|--|
| <p>[625] What is that [material] form which is the sphere of odour?</p> <p><b>That odour</b> which is derived from the four Great Phenomena, is <b>invisible and produces impact</b>, such as the odour of roots, sap, bark, leaves, flowers, fruit; verminous odours, putrid odours, <b>pleasant and unpleasant odours</b>, or whatever other odour there is, derived from the four Great Phenomena, invisible and reacting; such an odour, invisible and reacting, as one has smelt, smells, will, or may smell with the nose, that is invisible and reacting ...</p> <p>[626] ... on which odour, invisible and reacting, the nose, invisible and reacting, has impinged, impinges, will, or may impinge ...</p> <p>[627] ... such an odour, invisible and reacting, as has impinged, impinges, will, or may impinge on the nose, invisible and reacting ...</p> <p>[628] ... in consequence of which odour and depending on the nose, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">olfactory contact; ...</p> <p>... and ... born of that olfactory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p style="padding-left: 40px;">[or] a perception ...</p> <p style="padding-left: 40px;">[or] volition ...</p> <p style="padding-left: 40px;">[or] olfactory cognition ...</p> <p>... [further] having an odour as its object and depending on the nose, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">olfactory contact,</p> <p>... and ... born of that olfactory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p style="padding-left: 40px;">[or] a perception ...</p> <p style="padding-left: 40px;">[or] volition ...</p> <p style="padding-left: 40px;">[or] olfactory cognition;</p> <p>this that is odour, the sphere and the constituent element of odour - this is that [material] form which is the sphere of odours.</p> | <p><b>Explanation from the Commentaries</b></p> <p><b>The Odour:</b> <i>Gandhāyatana</i> is the odour</p> <p><b>Invisible and produces impact:</b> It cannot be seen by visual cognition. Its impact and reaction are set up in the sentient organ of the nose.</p> <p><b>Pleasant and unpleasant odours, whatever odour there is:</b> This includes all types of odours.</p> <p><b>Four methods of an odour is being smelt:</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of an odour as deliberate object</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of an odour as intrusive object</b> in the past, in the present, in the future, and conditional.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in consequence of odour:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i>, <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇūpanissayapaccaya</i>.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in connection with odour as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i>.</p> <p><b>Odour, the sphere and the constituent element of odour:</b> These are synonyms of <i>gandhāyatana</i>.</p> |
| <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>1. Dhs 141f: A Buddhist Manual of Psychological Ethics, pp. 171-173.</li> <li>2. The Expositor Vol.II, pp. 417-418.</li> </ol>  |  |

**Table 27. The *Lakkhaṇādicatuka* of the *Gandhāyatana*.** The table shows an explanation of the intrinsic nature of the *gandhāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Gandhāyatana</i>   |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>gandhāyatana</i> is impinging on the nose. |
| <i>Rasa</i>             | Its function is to be the objective field of <i>ghānaviññāṇa</i> .      |
| <i>Paccupaṭṭhāna</i>    | Its manifestation is being the resort of <i>ghānaviññāṇa</i> .          |
| <i>Paḍaṭṭhāna</i>       | Its proximate cause is <i>mahābhūta</i> .                               |

**Source Adaptive:**

1. The Path of Purification, p. 495.

The corresponding internal *āyatana* of the *gandhāyatana* is the *ghānāyatana*. The *Abhidhamma* further explains that the *ghānāyatana* directly touches (*sampatta*) the *gandhāyatana*.<sup>172</sup> In addition, the *gandhāyatana* is a material phenomenon that is inseparable from an object.<sup>173</sup>

The synonyms of the *gandhāyatana* are *gandha*, *gandhāyatana*, and *gandhadhātu*.

#### 3.1.2.4 *Rasāyatana*

*Rasāyatana* is derived from the term *rasa* combined with the term *āyatana*. Buddhaghosa explains the term *rasa* as “Living beings taste (*rasanti*) it, thus it is flavour (*rasa*); the meaning is that they enjoy it.”<sup>174</sup> Even though

<sup>172</sup> Referred to Anurudhācariya, 1993, *op. cit.*, p. 246.

<sup>173</sup> *Ibid.*

<sup>174</sup> Vism 481: Buddhaghosa, *loc. cit.*

*attharasa* (*phalacittuppāda*), *dhanmarasa* (*maggacittuppāda*), and *vimuttirasa* (*nibbāna*) are called *rasa*, however, they are not classified as *rasāyatana*.<sup>175</sup>

The description of *rasāyatana* is as also shown in figure 41. Table 28 shows the information about the intrinsic nature of the *rasāyatana*. The corresponding internal *āyatana* of the *rasāyatana* is the *jivhāyatana*. The *Abhidhamma* explains that the *jivhāyatana* directly contacts or reaches its objects and the *rasāyatana* is a material phenomenon that is inseparable from an object.<sup>176</sup>

The synonyms of the *rasāyatana* as appeared in the *Dhammasaṅgaṇī* are *rasa*, *rasāyatana*, and *rasadhātu*.

### 3.1.2.5 *Phoṭṭhabbāyatana*

*Phoṭṭhabbāyatana* is derived from the term *phoṭṭhabba* combined with the term *āyatana*. The root of *phoṭṭhabba* is  $\sqrt{\text{phus}}$  (to touch)<sup>177</sup> meanings “tangible, touch, contact.”<sup>178</sup> It is also explained in *The Path of Purification* as “It is touched (*phuṣṣati*), thus it is a tangible datum (*phoṭṭhabba*).”<sup>179</sup>

As figure 42 shows, the *phoṭṭhabbāyatana* consists of *paṭhavīdhatu*, *tejodhātu*, and *vāyodhātu* (having characteristic of hardness, heat, and strengthening accordingly). Table 29 provides the information about the intrinsic nature of these three elements.

<sup>175</sup> Yam I 55.

<sup>176</sup> Referred to Anurudhācariya, 1993, *op. cit.*, p. 246.

<sup>177</sup> PAW, s.v. “PHOṬṬHABBA.”

<sup>178</sup> PED, s.v. “Phoṭṭhabba.”

<sup>179</sup> Vism 481: Buddhaghosa, *loc. cit.*

**Figure 41. *Rasāyatana* and Its Description.** The *rasāyatana* is whatever taste there is that creates impact and reaction in the sentient organ of the tongue.

| <i>Rasāyatana</i>   |  |
|---|--|
| <p>[629] What is that [material] form which is the sphere of taste?</p> <p><b>That taste</b> which is derived from the four Great Phenomena, <b>is invisible and reacting</b>, such as the taste of roots, stems, bark, leaves, flowers, fruits, of sour, sweet, bitter, pungent, saline, alkaline, acrid, astringent, <b>nice and nauseous sapids, or whatever other taste there is</b>, derived from the four Great Phenomena, invisible and reacting - such tastes, invisible and reacting, <b>as with the tongue, invisible and reacting, one has tasted, tastes, will, or may taste ...</b></p> <p>[630] ... against which taste, invisible and reacting, the tongue, invisible and impinging, has impinged, impinges, will, or may impinge ...</p> <p>[631] ... a taste, which, invisible and reacting, has impinged, impinges, will, or may impinge on the tongue, invisible and reacting ...</p> <p>[632] ... in consequence of which taste and depending on the tongue, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">gustatory contact; ...</p> <p>... and ... born of that gustatory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p>[or] a perception ...</p> <p>[or] volition ...</p> <p>[or] gustatory cognition ...</p> <p>[further] having a taste as its object and depending on the tongue, there has arisen, arises, will, or may arise</p> <p style="padding-left: 40px;">gustatory contact,</p> <p>... and ... born of that gustatory contact,</p> <p style="padding-left: 40px;">a feeling ...</p> <p>[or] a perception ...</p> <p>[or] volition ...</p> <p>[or] gustatory cognition;</p> <p>this that is taste, the sphere and constituent element of taste - this is that form which is the sphere of taste.</p> |  |
| <p><b>Explanation from the Commentaries</b></p> <p><b>The taste <i>Rasāyatana</i> is the taste.</b></p> <p><b>Invisible and reacting:</b> <i>Rasāyatana</i> cannot be seen by visual cognition. Its impact and reaction are set up in the sentient organ of the tongue.</p> <p><b>Nice and nauseous sapids, whatever other taste there is:</b> This includes all tastes including taste of a stone.</p> <p><b>Four methods of a taste is being tasted:</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of a taste as deliberate object:</b> in the past, in the present, in the future, and conditional.</p> <p><b>Four methods of a taste as intrusive object:</b> in the past, in the present, in the future, and conditional.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in consequence of taste:</b> in the past, in the present, in the future, and conditional by way of <i>purejātapaccaya</i>, <i>ārammaṇādhipatipaccaya</i> and <i>ārammaṇūpanissayapaccaya</i>.</p> <p><b>Twenty methods how <i>phassapañcaka</i> arises in connection with taste as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i>.</p> <p><b>Taste, the sphere and constituent element of taste:</b> These are synonyms of the term <i>rasāyatana</i>.</p>   |  |
| <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>1. Dhs 142f: A Buddhist Manual of Psychological Ethics, pp. 173-174.</li> <li>2. The Expositor Vol.II, pp. 418-419.</li> </ol>  |  |

**Table 28. The *Lakkhaṇādicatuka* of the *Rasāyatana*.** The table shows an explanation of the intrinsic nature of the *rasāyatana* by way of *lakkhaṇādicatuka*.

| <i>Lakkhaṇādicatuka</i> | <i>Rasāyatana</i>   |
|-------------------------|---|
| <i>Lakkhaṇa</i>         | The characteristic of the <i>rasāyatana</i> is impinging on the tongue. |
| <i>Rasa</i>             | Its function is to be the objective field of <i>jivhāviññāṇa</i> .      |
| <i>Paccupaṭṭhāna</i>    | Its manifestation is being the resort of <i>jivhāviññāṇa</i> .          |
| <i>Padaṭṭhāna</i>       | Its proximate cause is <i>mahābhūta</i> .                               |

**Source Adaptive:**

1. The Path of Purification, p. 495.

*Paṭhavīdhatu*, *tejodhātu*, and *vāyodhātu* can give rise to either pleasant or unpleasant contact. The Commentaries indicate that the three elements can reach the sentient organ of the body simultaneously, however, the body cognizes them in a series of tactile cognition. The strongest impact in the series would be cognized first. The mind can shift its interest from the current object to another object using two methods: - by one's own wish and by the arising of a new object.<sup>180</sup>

The corresponding internal *āyatana* of the *phoṭṭhabāyatana* is the *kāyāyatana*. The *Abhidhamma* explains that the *kāyāyatana* directly touches the *phoṭṭhabāyatana*.<sup>181</sup> The synonyms of the term *phoṭṭhabāyatana* as appeared in the *Dhammasaṅgani* are *phoṭṭhabba*, *phoṭṭhabbāyatana*, and *phoṭṭabbadhātu*.

<sup>180</sup> As 334: Pe Maung Tin, 1958b, **op. cit.**, pp. 433-435.

<sup>181</sup> Referred to Anurudhācariya, 1993, **op. cit.**, p. 246.

**Figure 42. *Phoṭṭhabbāyatana* and Its Description.** The *phoṭṭhabbāyatana* is the sphere of tangible which consists of *paṭhavīdhātu*, *tejo dhātu*, and *vāyodhātu*.

| <i>Phoṭṭhabbāyatana</i>   | Explanation from the Commentaries   |
|---|---|
| [648] What is that [material] form which is the sphere of the tangible ( <i>phoṭṭhabbāyatanaṇi</i> )?   | <b>The earthly element, the lambent element, the gaseous element:</b> The body can sense only <i>paṭhavīdhātu</i> , <i>tejo dhātu</i> , and <i>vāyodhātu</i> , excluding <i>āpodhātu</i> in <i>mahābhūta</i> .  |
| The earthly (solid) element, the lambent (calorific) element, the gaseous (aerial) element; the hard and the soft; the smooth and the rough; pleasant (easeful) contact, painful contact; the heavy and the light - such a tangible, invisible and reacting, as, with the body-sensibility, invisible and reacting, one has touched, touches, will or may touch ... | <b>Pleasant and painful contact</b> means desirable and undesirable touch causing pleasurable and painful feeling, which belong to the analysis of <i>paṭhavīdhātu</i> , <i>tejo dhātu</i> , and <i>vāyodhātu</i> .                                     |
| [649] ... against which tangible, invisible and reacting, the body-sensibility, invisible and reacting, has impinged, impinges, will, or may impinge ...  | <b>With the body-sensibility, invisible and reacting:</b> <i>Phoṭṭhabbāyatana</i> is the body-sensibility that cannot be seen by visual cognition. Its impact and reaction are set up in the sentient organ of the body.                                |
| [650] ... such a tangible, invisible and reacting, as has impinged, impinges, will, or may impinge against the body-sensibility, invisible and reacting ...   | <b>Four methods of a tangible object is being touched:</b> in the past, in the present, in the future, and conditional.   |
| [632] ... in consequence of which tangible and depending on the body-sensibility, there has arisen, arises, will, or may arise<br>bodily contact; ...<br>and ... born of that bodily contact,<br>a feeling ...<br>[or] a perception ...<br>[or] volition ...<br>[or] cognition of body ...  | <b>Four methods of a tangible as deliberate object:</b> in the past, in the present, in the future, and conditional.  |
| [further] having a tangible as its object and depending on the body(-sensibility), there has arisen, arises, will, or may arise<br>bodily contact, ...<br>and ... born of that bodily contact,<br>a feeling ...<br>[or] a perception ...<br>[or] volition ...<br>[or] cognition of body;  | <b>Four methods of a tangible as intrusive object:</b> in the past, in the present, in the future, and conditional.   |
| this that is the tangible, the sphere and element of the tangible - this is that form which is the sphere of the tangible.  | <b>Twenty methods how <i>phassa-pañcaka</i> arises in consequence of tangible:</b> in the past, in the present, in the future, and conditional by way of <i>purejāta-paccaya</i> , <i>ārammaṇādhīpatipaccaya</i> and <i>ārammaṇūpanissaya-paccaya</i> . |
|   | <b>Twenty methods how <i>phassa-pañcaka</i> arises in connection with tangible as an object of mind:</b> in the past, in the present, in the future, and conditional by way of <i>ārammaṇapaccaya</i> .   |
|   | <b>The tangible, the sphere and constituent element of the tangible:</b> These are synonyms of the term <i>phoṭṭhabbāyatana</i> .   |

**Source Adaptive:**

1. Dhs 145: A Buddhist Manual of Psychological Ethics, pp. 181-184.
2. The Expositor Vol.II, pp. 432-435.

**Table 29. The *Lakkhaṇādicatuka* of the *Phoṭṭhabbāyatana*.** The table shows an explanation of the intrinsic nature of the *phoṭṭhabbāyatana* by way of *lakkhaṇādicatuka*.

|                       | <i>Lakkhaṇa</i>  | <i>Rasa</i>  | <i>Paccupaṭṭhāna</i>  | <i>Padaṭṭhāna</i>   |
|-----------------------|--|--|---|---|
| <i>Paṭṭhavīdhiātu</i> | <i>Paṭṭhavīdhiātu</i> has the characteristic of hardness, and stiffenedness.           | Its function is to act as a foundation (for the other primary elements and derived matters). | Receiving fulcrum is its manifestation.   | It has <i>āpodhiātu</i> , <i>tejodhiātu</i> , and <i>vāyodhiātu</i> as its proximate cause.     |
| <i>Tejodhiātu</i>     | <i>Tejodhiātu</i> has the characteristic of heat and ripening.                         | Its function is maturing or ripening other material phenomena.                               | Supplying of softness is its manifestation.   | It has <i>paṭṭhavīdhiātu</i> , <i>āpodhiātu</i> , and <i>vāyodhiātu</i> as its proximate cause. |
| <i>Vāyodhiātu</i>     | <i>Vāyodhiātu</i> has the characteristic of distension, distending, and strengthening. | Its function is impelling or causing motion.   | Conveying, causing for the successive arising at adjacent locations is its manifestation. | It has <i>paṭṭhavīdhiātu</i> , <i>āpodhiātu</i> , and <i>tejodhiātu</i> as its proximate cause. |

*Phoṭṭhabbāyatana*

**Source Adaptive:**

1. The Expositor Vol.II, p. 432.
2. The Path of Purification, p. 399.
3. A Comprehensive Manual of Abhidhamma, pp. 237-238.
4. Khumue Kan Sueksa Phra Aphithammatthasangkhaha, Paritchet 6, pp. 12-20.

### 3.1.2.6 *Dhammāyatana*

*Dhammāyatana* comes from the term *dhamma* combined with the term *āyatana*. *The Path of Purification* explains this term as “They cause their own characteristic to be borne (*dhārayanti*), thus they are mental data (*dhammā*).”<sup>182</sup> Not all *dhammas* are classified as *dhammāyatana*. The *dhammāyatana* consists of both *nāma* (mind) and *rūpa* (matter). Figure 43 shows that only *vedanākkhandha* (feeling), *saññākkhandha* (perception), *saṅkhārakkhandha* (mental formations), *nibbāna* (the Summum Bonum of Buddhism), and *sukkhuma-rūpas* (subtle materiality) are classified under the *dhammāyatana*.<sup>183</sup>

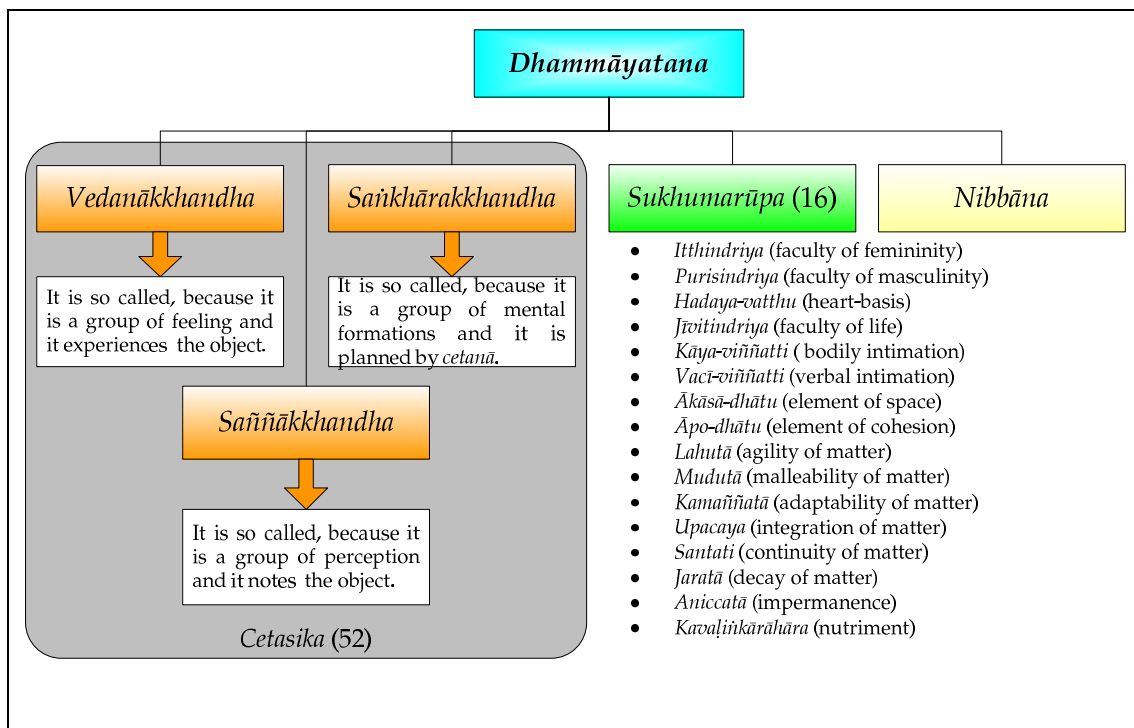
**Figure 43. *Dhammāyatana* and Its Description.** *Dhammāyatana* is the sphere of mental states (ideational base) which covers *vedanākkhandha*, *saññākkhandha*, *saṅkhārakkhandha*, *sukkhuma-rūpas*, and *nibbāna*.

|   |   |
|---|---|
| <p style="text-align: center;"><b><i>Dhammāyatana</i></b></p> <p>Therein what is ideational base?</p> <p>The aggregate of feeling, aggregate of perception, aggregate of mental concomitants and that invisible non-impingent material quality included in the ideational base; the unconditioned element.</p> <p><b>Source Adaptive:</b></p> <ol style="list-style-type: none"> <li>1. The Book of Analysis, pp. 93-94.</li> </ol> | <p style="text-align: center;"><b>Explanation from the Commentary</b></p> <p><b>The aggregate of feeling, of perception, of mental concomitants:</b> These terms refer to <i>vedanākkhandha</i>, <i>saññākkhandha</i>, <i>saṅkhārakkhandha</i> or fifty-two <i>cetasikas</i>.</p> <p><b>That invisible non-impingent material quality:</b> This term refer to sixteen <i>sukkhuma-rūpas</i>.</p> <p><b>The unconditioned element:</b> This is <i>asaṅkhata-dhātu</i> or <i>nibbāna</i>, referring to the destruction of lust, hatred, and delusion.</p> |
|---|---|

<sup>182</sup> Vism 481: Buddhaghosa, **loc. cit.**

<sup>183</sup> Vbh 72.

**Figure 44. *Dhammāyatana* and Its Detailed Classification.** *Dhammāyatana* is the sphere of mental states which covers fifty-two *cetasikas*, sixteen *sukhumarūpas*, and *nibbāna*.



The detailed classification of the *dhammāyatana* and the information about its intrinsic nature are shown in figure 44 and table 30 respectively. The *manāyatana* is the corresponding internal sense-base of the *dhammāyatana*.

### 3.1.3 The Conditions for the Arising of the Thought-Process of the Twelve *Āyatanas*

Thought-process, *vīthi*, is “a chain of consciousness or cognitive series that arises when a sense object appears at one of the sense-doors in order to be aware of the object.”<sup>184</sup>

<sup>184</sup> Mehm Tin Mon, *The Essence of Buddha Abhidhamma*, 1<sup>st</sup> ed. (Myanmar: Mya Mon Yadanar Publication, 1995), p. 131.

**Table 30. The *Lakkhaṇādicatuka* of the *Dhammāyatana*.** The table shows an explanation of the intrinsic nature of the *dhammāyatana* by way of *lakkhaṇādicatuka*.

|                       | <i>Lakkhaṇa</i>   | <i>Rasa</i>   | <i>Paccupaṭṭhāna</i>   | <i>Padatṭhāna</i>   |
|-----------------------|---|---|--|---|
| <i>Cetasika</i>       | Its characteristic is to occur in immediate conjunction with <i>citta</i> .                       | Its function is to arise with <i>citta</i> .                            | It is manifested as having the same object as <i>citta</i> .                         | Its proximate cause is the arising of <i>citta</i> .                    |
| <i>Āpodhātu</i>       | Its characteristic is the cohesion and trickle.   | Its function is intensifying the coexisting material states.            | It is manifested as holding together of material phenomena.                          | Its proximate cause is <i>paṭhavādihātu, tejodhātu, and vāyodhātu</i> . |
| <i>Itthibhūvarūpa</i> | Its characteristic is the state of a female gender.   | Its function is showing femininity.                                     | It is manifested as the sign of female.  | Its proximate cause is <i>mahābhūtarūpa</i> .                           |
| <i>Purisabhūva</i>    | Its characteristic is the state of a male gender.   | Its function is showing masculinity.                                    | It is manifested as the sign of male.  | Its proximate cause is <i>mahābhūtarūpa</i> .                           |
| <i>Hadaya-rūpa</i>    | Its characteristic is being material support for <i>mano-dhātu</i> and <i>manovāññāna-dhātu</i> . | Its function is observing <i>manodhātu</i> and <i>mano-viññānadhātu</i> | It is manifested as the carrying of <i>manodhātu</i> and <i>manovāññānadhātu</i> .   | Its proximate cause is <i>mahābhūtarūpa</i> .                           |
| <i>Jīvitindriya</i>   | Its characteristic is to maintain the coexistent kinds of matter at the moment of their presence. | Its function is making the coexistent kinds of matter occur.            | It is manifested in the establishment of the presence of coexistent kinds of matter. | Its proximate cause is <i>mahābhūtarūpa</i> that is to be maintained.   |
| <i>Kaṇḍikā-rāṭṭam</i> | Its characteristic is nutritive essence.  | Its function is to sustain the body.                                    | It is manifested as the fortifying of the physical body.                             | Its proximate cause is gross edible food.                               |

*Continued*

**Table 30, continued. The *Lak khaṇādicatuka* of the *Dhammāyatana*.** The table shows an explanation of the intrinsic nature of the *dhammāyatana* by way of *lak khaṇādicatuka*.

|                     | <i>Lak khaṇa</i>   | <i>Rasa</i>   | <i>Paccupaṭṭhāna</i>   | <i>Paḍaṭṭhāna</i>                            |
|---------------------|--|---|--|--|
| <i>Ākāsaḍḍātu</i>   | Its characteristic is the delimiting matter.                         | Its function is to display the boundaries of matter.                  | It is manifested as the confines of matter or state of gaps and apertures. | Its proximate cause is the matter delimited. |
| <i>Kāya-viññāti</i> | Its characteristic is to reveal one's intention through the body.    | Its function is to display intention.                                 | It is manifested as bodily movement.                                       | Its proximate cause is <i>vāyodhātu</i> .    |
| <i>Vaci-viññāti</i> | Its characteristic is to reveal one's intention through verbal.      | Its function is to display intention.                                 | It is manifested as verbal expression.                                     | Its proximate cause is <i>pañhavādhātu</i> . |
| <i>Lahutā</i>       | Its characteristic is non-sluggishness.                              | Its function is to dispel heaviness in matter.                        | It is manifested as light transformability.                                | Its proximate cause is light matter.         |
| <i>Mudutā</i>       | Its characteristic is non-rigidity.                                  | Its function is to dispel rigidity in matter.                         | It is manifested as non-opposition to any kinds of action.                 | Its proximate cause is malleable matter.     |
| <i>Kammaññatā</i>   | Its characteristic is wieldiness that is favorable to bodily action. | Its function is to dispel unwieldiness.                               | It is manifested as non-weakness.  | Its proximate cause is wieldy matter.        |
| <i>Upacaya</i>      | Its characteristic is setting up.                                    | Its function is to make material instances emerge for the first time. | It is manifested as the completed state.                                   | Its proximate cause is the matter produced.  |

*Continued*

**Table 30, continued. The *Lakkhaṇādicatuka* of the *Dhammāyatana*.** The table shows an explanation of the intrinsic nature of the *dhammāyatana* by way of *lakkhaṇādicatuka*.

|                | <i>Lakkhaṇa</i>  | <i>Rasa</i>   | <i>Paccupaṭṭhāna</i>   | <i>Paḍaṭṭhāna</i>   |
|----------------|--|---|--|---|
| <i>Santati</i> | It has the characteristic of occurrence.                                     | Its function is to anchor.  | It is manifested as non-interruption.  | Its proximate cause is matter to be anchored.                 |
| <i>Jaratā</i>  | It has the characteristic of maturing or aging of material phenomena.        | Its function is to lead material phenomena towards their termination. | It is manifested as loss of newness without loss of being.                               | Its proximate cause is the decaying of matter.                |
| <i>Aniccā</i>  | It has the characteristic of the complete breaking up of material phenomena. | Its function is to make material phenomena subside.                   | It is manifested as destruction and falling away.  | Its proximate cause is matter that is completely breaking up. |
| <i>Nibbāna</i> | It has the characteristic of tranquility.                                    | Its function is everlasting.  | It is manifested as being freed or escaped from <i>saṁsāra</i> (the round of existence). | None  |

**Source Adaptive:**

1. The Expositor Vol.II, p. 432.
2. The Path of Purification, pp. 495ff.
3. A Comprehensive Manual of Abhidhamma, pp. 239-242.
4. Khumue Kan Sueksa Phra Aphithammatthasangkhaha, Parichet 2, p. 5.
5. Khumue Kan Sueksa Phra Aphithammatthasangkhaha, Parichet 6.
6. Abhidhammavātara, p. 278: *Etāni ca nibbānaṇi nāna tayidaṇi saṁtilakkhaṇaṇi, accuṭṭiraṇaṇi assāsa-karaṇa-rasaṇi vā, aninitta-paccupaṭṭhānaṇi nissaraṇapaccupaṭṭhānaṇi vāti veditaḥḥaṇi.*

There are six classes of *vīthi* classified according to the six sense-doors. In order for these classes of *vīthi* to arise, some conditions must be met, as shown in table 31.

**Table 31. Six Classes of *Vīthi*.** Followings are the conditions that are needed to the arising of the thought-process connected to the twelve *āyatana*s.

| <i>Vīthi</i>  | Required Conditions  |
|---|--|
| <b><i>Cakkhu-dvāra-vīthi</i></b><br>(The thought process connected to the eye-door)   | <ul style="list-style-type: none"> <li>• <i>Cakkhuppasāda</i> must be good.</li> <li>• <i>Rūpārammaṇa</i> must be present.</li> <li>• <i>Āloka</i> (light) must be present.</li> <li>• <i>Manasikāra</i> or attention, one of the general mental factors, must always be present.</li> </ul> |
| <b><i>Sota-dvāra-vīthi</i></b><br>(The thought process connected to the ear-door)     | <ul style="list-style-type: none"> <li>• <i>Sotappasāda</i> must be good.</li> <li>• <i>Saddārammaṇa</i> must be present.</li> <li>• <i>Ākāsa</i> (space) must be present.</li> <li>• <i>Manasikāra</i> must be present.</li> </ul>  |
| <b><i>Ghāna-dvāra-vīthi</i></b><br>(The thought process connected to the nose-door)   | <ul style="list-style-type: none"> <li>• <i>Ghānappasāda</i> must be good.</li> <li>• <i>Gandhārammaṇa</i> must be present.</li> <li>• <i>Vāyodhātu</i> (air-element) must be present.</li> <li>• <i>Manasikāra</i> must be present.</li> </ul>  |
| <b><i>Jivhā-dvāra-vīthi</i></b><br>(The thought process connected to the tongue-door) | <ul style="list-style-type: none"> <li>• <i>Jivhāppasāda</i> must be good.</li> <li>• <i>Rasārammaṇa</i> must be present.</li> <li>• <i>Āpodhātu</i> (liquid-element) must be present.</li> <li>• <i>Manasikāra</i> must be present.</li> </ul>  |
| <b><i>Kāya-dvāra-vīthi</i></b><br>(The thought process connected to the body-door)    | <ul style="list-style-type: none"> <li>• <i>Kāyappasāda</i> must be good.</li> <li>• <i>Phoṭṭhabbārammaṇa</i> must be present.</li> <li>• <i>Thaddha-pathavī</i> (solid element) must be present.</li> <li>• <i>Manasikāra</i> must be present.</li> </ul>                                   |
| <b><i>Mano-dvāra-vīthi</i></b><br>(The thought process connected to the mind-door)    | <ul style="list-style-type: none"> <li>• <i>Manodvāra</i> (mind door) must be present.</li> <li>• <i>Dhammārammaṇa</i> must be present.</li> <li>• <i>Hadayaavatthū</i> must be present.</li> <li>• <i>Manasikāra</i> must be present.</li> </ul>  |

Source Adaptive:

1. The Essence of Buddha Abhidhamma, pp. 134-135.

These conditions are vital to the arising of the thought-process related to the twelve *āyatanas*. The thought-process related to the twelve *āyatanas* will not arise without these conditions being fulfilled. From the table, we can see that even a pair of internal and external *āyatanas* is present; the thought-process will never arise if there is no *manasikāra* (attention). A sample situation is when a person talks to our ears, we may not hear a word if we do not pay attention to that person. This means that the *manasikāra* is not present at that time.

### 3.1.4 The Twelve *Āyatanas* and the Fivefold Consequent Processes

A consequent process is the process that arises after one of the first five internal sense bases has been impinged by its object. They are fivefold by way of the five physical sense door processes. These processes recognize the objects receiving through the first five internal *āyatanas*. However, these processes do not occur at their physical bases, but they arise in the mind-door process.<sup>185</sup>

In Buddhism, the process of recognition occurs in a uniform order in a series of discrete cognitive events. After one of the five physical sense-bases is impinged by an object, a series of mind-door processes (*tadanuvattikā manodvāravīthi*) arises. This series of mind-door processes reproduces the object perceived by one of the five physical sense-bases in the mind-door, which will then interpret the meaning of the object. Table 32 and 33 explain the processes that arise after the *cakkhudvāravīthi* and *sotadvāravīthi* cease, respectively. The processes that arise after *ghānavdvāravīthi*, *jivhādvāravīthi*, and *kāyadvāravīthi* cease are the same as shown in table 32.

<sup>185</sup> See details in Anurudhācariya, 1993, *op. cit.*, pp. 163-164.

**Table 32. The Arising of *Tadanuvattikā Manodvāravīthi* after *Cakkhudvāravīthi* ceases.** After the *cakkhudvāravīthi* has ceased, the following series of *manodvāravīthi* arise and cease in order. The process starts by reproducing the object just perceived in the mind-door, collecting the information, and then processing the information. These whole processes (from *atitaggahaṇavīthi* to *nāmaggaṇavīthi*) are also the same for *ghānadvāravīthi*, *jīḥādvāravīthi*, and *kāyadvāravīthi*.

| <i>Vīthi</i>                                |                          | Meaning   |
|---|--------------------------|---|
| --- <i>Tadanuvattikā Manodvāravīthi</i> --- | <i>Cakkhudvāravīthi</i>  | <i>Cakkhudvāravīthi</i> is the thought-process that is connected to the eye-door.   |
|   | <i>Atitaggahaṇavīthi</i> | <i>Atitaggahaṇavīthi</i> is the process that reproduces the visible object just perceived in the mind-door. <i>Atitaggahaṇavīthi</i> and <i>cakkhudvāravīthi</i> arise alternately and repeatedly many times. |
|   | <i>Samūggahaṇavīthi</i>  | <i>Samūggahaṇavīthi</i> is the process that grasps the visible object as a whole by collecting information received from the two preceding processes.   |
|   | <i>Atthaggahaṇavīthi</i> | <i>Atthaggahaṇavīthi</i> is the process that conveys the concept of the object ( <i>attha paññatti</i> ).   |
|   | <i>Nāmaggaṇavīthi</i>    | <i>Nāmaggaṇavīthi</i> is the process that recognizes designation of the object ( <i>nāma paññatti</i> ).  |

Source Adaptive:

1. Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 4, pp. 60-61.
2. A Comprehensive Manual of Abhidhamma, p. 164.

**Table 33. The Arising of *Tadanuvattikā Manodvāravīthi* after *Sotadvāravīthi* ceases.** After the *sotadvāravīthi* has ceased, the following series of *manodvāravīthi* arise and cease in order. The process starts by reproducing the object just perceived in the mind-door, collecting the information, and then processing the information. If the sound contains only one pitch, *samūggahaṇavīthi* will not arise.

| <i>Vīthi</i>                              | Meaning  |
|---|--|
| <i>Sotadvāravīthi</i>                     | <i>Sotadvāravīthi</i> is the thought-process that is connected to the ear-door.  |
| -- <i>Tadanuvattikā Manodvāravīthi</i> -- | <i>Atitaggahaṇavīthi</i> is the process that reproduces the auditory object just perceived in the mind-door. <i>Atitaggahaṇavīthi</i> and <i>sotadvāravīthi</i> arise alternately and repeatedly many times.                         |
|   | <i>Samūggahaṇavīthi</i> is the process that grasps the auditory object as a whole by collecting information received from the two preceding processes.   |
|   | <i>Nāmaggaṇavīthi</i> is the process that recognizes designation of the object ( <i>nāma paññatti</i> ). This process arises before <i>Atthaggahaṇavīthi</i> since we hear the designation of the object before we know its meaning. |
|   | <i>Atthaggahaṇavīthi</i> is the process that conveys the concept of the object ( <i>attha paññatti</i> ).  |

Source Adaptive:

1. Khumue Kan Sueksa Phra Aphithammatthasangkhaha Paritchet 4, pp. 60-61.
2. A Comprehensive Manual of Abhidhamma, p. 164.

### 3.1.5 *Mahābhūtarūpa*: The Primary Element of the Twelve *Āyatanas*

From the previous sections, we see that the twelve *āyatanas* are derived from the *mahābhūtarūpa*. The *mahābhūtarūpa* is the primary material elements, which is fourfold consisting of *paṭhavīdhātu* (the element of extension), *āpodhātu* (the element of cohesion), *tejodhātu* (the element of heat), and *vāyodhātu* (the element of vibration). Bodhi mentions that:

These [*mahābhūtarūpa*] are the fundamental constituents of matter which are inseparable and which, in their various combinations, enter into the composition of all material substances, from the most minute particle to the most massive mountain.<sup>186</sup>

From this point of view, we can see that the *mahābhūtarūpa* is a basic part of everything. Follows are the detail of each element in the *mahābhūtarūpa*:

1. *Paṭhavīdhātu*

*Paṭhavīdhātu*, the element of extension, is derived from the root  $\sqrt{\text{puṭh}}$ , meaning ‘to expand.’<sup>187</sup> It is a fundamental structure of elements. Without *paṭhavīdhātu*, objects could not occupy space. The qualities of hardness and softness are characteristics of this particular element. *The Book of Analysis* mentions that the element of extension is two fold, internal and external, as follows:<sup>188</sup>

a. Internal:

This refers to the internal element of extension which is personal, self-referable and grasped by craving and false view, such as skin and bone.

b. External:

This refers to the external element of extension which is not grasped by craving and false view, such as stone.

<sup>186</sup> Referred to Anuruddhācariya, 1993, **op. cit.**, p. 235.

<sup>187</sup> Anuruddhācariya, 1987, **op. cit.**, p. 290.

<sup>188</sup> Paṭhamakyaw Ashin Thīṭṭila (Setṭhila), 1969, **op. cit.**, p. 107.

## 2. *Āpodhātu*

*Āpodhātu*, the element of cohesion, is derived from  $\sqrt{ap}$  (to arrive) or  $a + \sqrt{pay}$  (to grow, to increase).<sup>189</sup> It is the element that makes scattered particles of matter cohered. The qualities of fluidity and contraction are characteristics of this particular element. *The Book of Analysis* mentions that the element of cohesion is two fold, internal and external, as follows:<sup>190</sup>

### a. Internal:

This refers to the internal element of cohesion which is personal, self-referable and grasped by craving and false view, such as blood.

### b. External:

This refers to the external element of cohesion which is not grasped by craving and false view, like honey.

## 3. *Tejodhātu*

*Tejodhātu*, the element of heat, is derived from  $\sqrt{tij}$  (to sharpen, to mature).<sup>191</sup> It possesses the power of vitality. Preservation and decay are due to this element. Unlike other elements, this element has a power to regenerate matter by itself. The qualities of vivacity and maturity are characteristics of this

<sup>189</sup> Anuruddhācariya, 1987, **op. cit.**, p. 290.

<sup>190</sup> Paṭhamakyaw Ashin Thitṭila, 1969, **op. cit.**, pp. 107-108.

<sup>191</sup> Anuruddhācariya, 1987, **op. cit.**, p. 291.

particular element. The twofold of this element is as follows:<sup>192</sup>

a. Internal:

This refers to the internal element of heat which is personal, self-referable and grasped by craving and false view, such as the food that is eaten.

b. External:

This refers to the external element of heat which is not grasped by craving and false view, like the heat from the sun.

4. *Vāyodhātu*.

*Vāyodhātu*, the element of vibration, is derived from  $\sqrt{\text{vay}}$  (to move, to vibrate).<sup>193</sup> The qualities of motion, vibration, oscillation and pressure are caused by this particular element. The twofold of this element is as follows:<sup>194</sup>

a. Internal:

This refers to the internal element of vibration which is personal, self-referable and grasped by craving and false view, such as in-breath or out-breath.

b. External:

This refers to the external element of vibration which is not grasped by craving and false view, like easterly winds.

<sup>192</sup> Paṭhamakyaw Ashin Thiṭṭila, 1969, **op. cit.**, p. 108.

<sup>193</sup> Anuruddhācariya, 1987, **op. cit.**, p. 291.

<sup>194</sup> Paṭhamakyaw Ashin Thiṭṭila, 1969, **op. cit.**, p. 108.

In the *Samādapaka Sutta*, the Buddha indicates that the *mahābhūtarūpa* can be changed.<sup>195</sup> Therefore, the *mahābhūtarūpa* also subjects to the *Tilakkhaṇa* and is one of the causes of *dukkha*. The intrinsic nature of the *mahābhūtarūpa* is already mentioned in table 29 and table 30. Table 34 summarizes the information of the *mahābhūtarūpa* in brief.

### 3.2 The Sensory Receptors and the Sense Stimuli in Human Anatomy

The sensory receptors and the sense stimuli are selected to be the topics of study in this section, since they may be identified with the twelve *āyatana*s in Buddhism. Even though the status of the mind in science is still unclear, I will discuss about it under the section of the sensory receptors.

**Table 34. The Information of the *Mahābhūtarūpa*.** The table shows the summarization of the information on the *mahābhūtarūpa*.

| <i>Mahābhūtarūpa</i> | Meaning of its Root   | Characteristic                            | Function             | Manifestation         |
|----------------------|-----------------------|---|----------------------|-----------------------|
| <i>Paṭhavīdhātu</i>  | To expand             | Hardness                                  | Acting as foundation | Receiving fulcrum     |
| <i>Āpodhātu</i>      | To grow, to increase  | Cohesion and trickle                      | Intensifying         | Holding together      |
| <i>Tejodhātu</i>     | To sharpen, to mature | Heat                                      | Maturing, ripening   | Supplying of softness |
| <i>Vāyodhātu</i>     | To move, to vibrate   | Distension, distending, and strengthening | Causing motion       | Conveying             |

<sup>195</sup> A I 222.

### 3.2.1 The Sensory Receptors

As mentioned earlier in chapter I, the sensory receptors in this thesis refer to the eye, the ear, the nose, the tongue, and the body. The mind also is discussed here. In this section, I will explore the sensory receptors from the scientific perspective.

#### 3.2.1.1 The Eye

The eye is the sense organ of sight. The human eye has a shape of a sphere. Its structure is as shown in figure 45. Basically, the human eye consists of three main layers:- the outer layer, the middle layer, and the inner layer.

1. Outer Layer

This layer mainly consists of the sclera (the white of the eye) and the cornea (a thin transparent membrane).

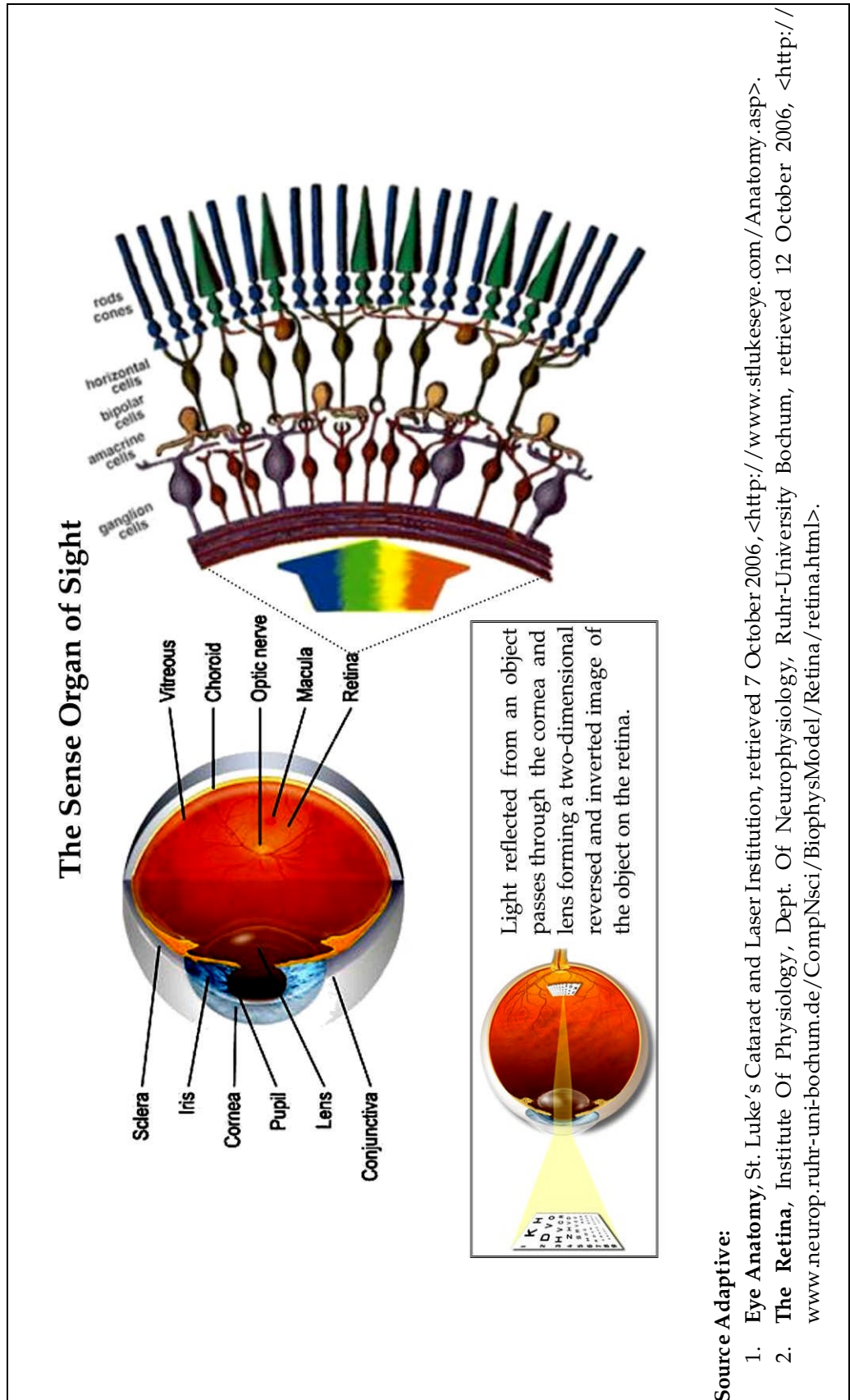
2. Middle Layer

This layer mainly consists of the choroids (consisting of blood vessels to nourish the eye), the iris (a muscle controlling the size of the pupil), lens, and the pupil (the hole in the eye where the light passes through).

3. Inner Layer

This layer consists of special cells called the retina (consisting of photoreceptors). In the center of the retina is a location of the optic nerve, which has a diameter about 1.6 millimeters.

**Figure 45. The Anatomy of the Human Eye.** The figure shows the anatomy of the human eye.

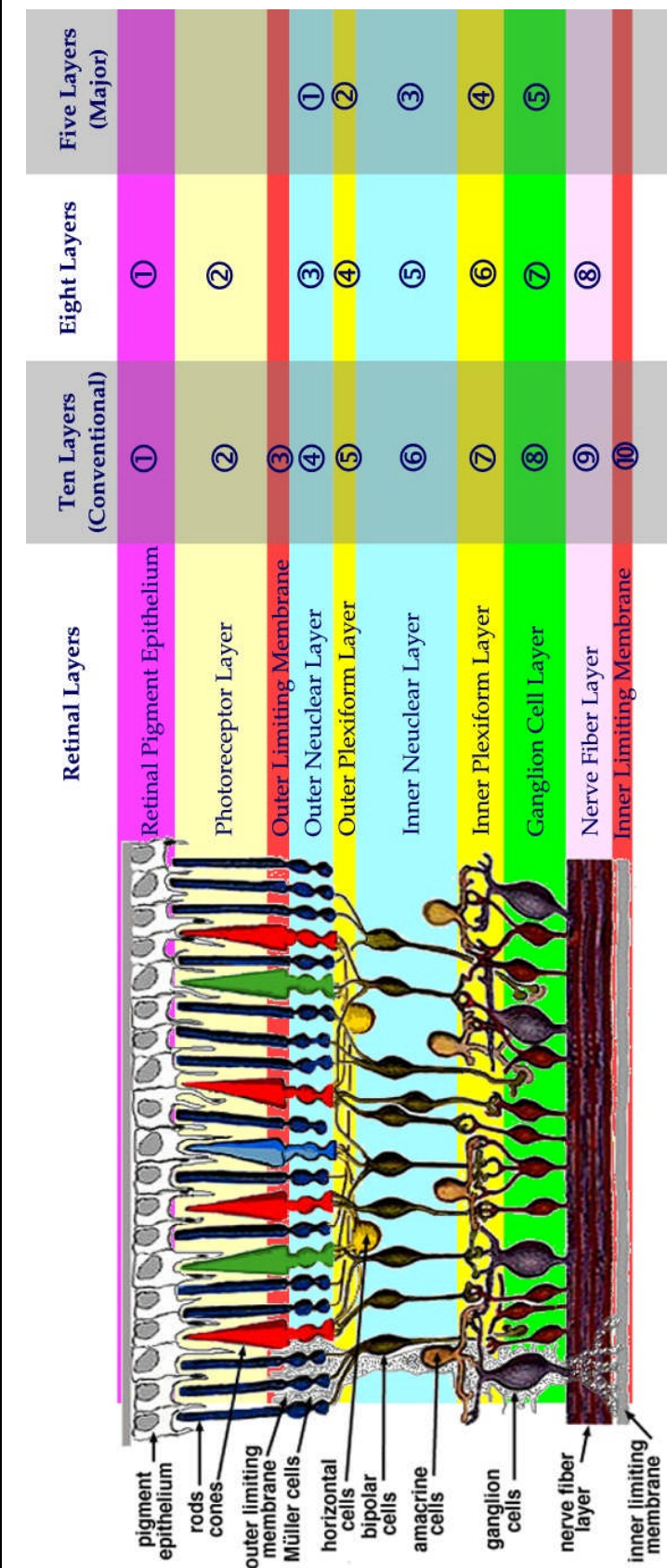


When the eye sees an object, light reflected from the object passing through the cornea and lens forms a two-dimensional reversed and inverted image of the object on the retina. The retina is the light sensitive part of the eye, consisting of several layers. The classification of the retinal layers is varied from five to ten layers.

The basic structure of the retina is separated into five major layers, consisting of three layers of nerve cells and two layers of synapses. Synapses are specialized junctions where communication between nerve cells takes place. The five major layers of the retina are the outer nuclear layer, the outer plexiform layer, the inner nuclear layer, the inner plexiform layer, and the ganglion cell layer. The synapses are made between the two plexiform layers, the outer and the inner plexiform layer. The different classifications of five, eight and ten layers of the retina are shown in figure 46 and the detail of each retinal layer is shown in table 35.

From table 35, it shows that the ganglion layer is the layer that transmits the resulting image from the retina through the optic nerve to the brain. The ganglion cells have a function to receive visual information from various retinal cells. They are the last relay station of visual signals before the signals are sent to the brain. Therefore, the two layers located next to the ganglion layer, the nerve fiber layer and the inner limiting membrane, have no roles of the signal transduction.

**Figure 46. The Different Classifications of the Retinal Layers.** The classification of the retinal layers is varied from five to ten layers. The basic structure of the retina is separated into five major layers, consisting of three layers of nerve cells and two layers of synapses. However, the most conventional classification of the retinal layers is the ten-layered classification.



Source Adaptive:

1. Five-Layered Classification: Helga Kolb, et al., **Simple Anatomy of the Retina**, John Moran Eye Center, University of Utah, retrieved 8 October 2006, <<http://webvision.med.utah.edu/sretina.html>>.
2. Eight-Layered Classification: Physiology, p. 73.
3. Ten-Layered Classification: The New Encyclopædia Britannica, Micropædia, s.v. "retina."

**Table 35. The Ten Distinct Layers of the Human Retina.** The human retina consists of ten distinct layers. These layers are located at the back portion of the eyeball. They contain cells that response to light.

| Layers of the Retina              | Function   |
|-----------------------------------|--|
| <b>Retinal Pigment Epithelium</b> | The layer of pigment cells acting like a barrier that separates the retina from the choroids   |
| <b>Photoreceptor Layer</b>        | The layer of rods and cones where the process of light reception first takes place   |
| <b>External Limiting Membrane</b> | Protecting the inner layers of retina from harmful material in blood circulation   |
| <b>Outer Nuclear Layer</b>        | The layer of the nuclei of the rods and cones  |
| <b>Outer Plexiform layer</b>      | Synaptic layer between the rod and cone cells and the processes of various integrator neurons  |
| <b>Inner Nuclear Layer</b>        | Consisting of cell bodies of retinal interneurons, including bipolar cells, horizontal cells, and amacrine cells which involve in visual process |
| <b>Inner Plexiform Layer</b>      | Synaptic layer between retinal interneurons and ganglion cells   |
| <b>Ganglion Cell Layer</b>        | Consisting of cell bodies of ganglion cells, which are the output of the retina  |
| <b>Nerve Fiber Layer</b>          | The layer of optic nerve fibers or axon of the ganglion cells  |
| <b>Inner Limiting Membrane</b>    | Sealing off the retinal components from the harmful materials in the vitreous chamber  |

**Source Adaptive:**

1. The New Encyclopædia Britannica, Micropædia, s.v. "retina."
2. The New Encyclopædia Britannica, Macropædia 7:95.
3. Thomas Caceci, "The Retinal Tunic," **Anatomy and Physiology of the Eye**, Virginia Polytechnic Institute & State University, retrieved 29 November 2005, <<http://education.vetmed.vt.edu/Curriculum/VM8054/EYE/RETINA.HTM>>.
4. Henry Gray, "The Tunics of the Eye," **Anatomy of the Human Body**, retrieved 29 November 2005, <<http://www.bartleby.com/107/225.html>>.
5. Physiology, pp. 73-74.

The sensitive part of the retina is of two types:- rods and cones. The cones have the ability to detect bright light and color, while the rods have the ability to detect dim light.<sup>196</sup> The rods and cones span several layers of the retina. However, the cell bodies of the rods and cones are located in the photoreceptor layer.<sup>197</sup>

The working process of visual receptive fields is not random. The retina works in a point-to-point, and orderly manner, such that when a given spot of the retina is stimulated, the information will be recorded on a small part of the brain corresponding to that particular retinal spot.<sup>198</sup> When the whole retinal field is stimulated, the visual part of the brain will be plotted.

When light hits the retina, the retina translates light into nerve signals which then are transmitted to the brain along the optic nerve. The brain then will process all information and identify the object as shown in figure 47. Even though, the image appeared on the retina is inverted and two-dimensional. However, the brain creates an illusion that the object is upright and three-dimensional.

There was an experiment where a candidate was requested to wear a pair of inverted-glasses. He saw objects upside-down at first. However, after a while his ability of seeing got back to normal. Stephen Westland

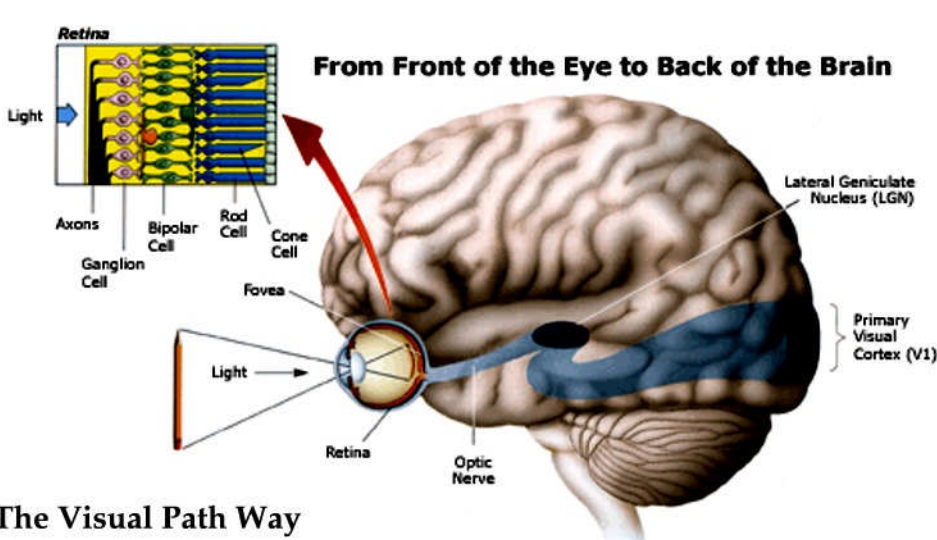
<sup>196</sup> Dee Unglaub Silverthorn, **Human Physiology An Integrated Approach**, 2<sup>nd</sup> ed. (CA: Benjamin Cummings, 2001), p. 315.

<sup>197</sup> Linda S. Constanzo, **Physiology**, 2<sup>nd</sup> ed. (CA: Saunders, 2002), p. 74.

<sup>198</sup> **The New Encyclopædia Britannica**, Macropædia, s.v. "Eye and Vision, Human." See also Dee Unglaub Silverthorn, 2001, **op. cit.**, p. 318.

comments that the whole mechanism how these nerve signals are released is still not completely understood by scientists.<sup>199</sup>

**Figure 47. The Retina and the Visual Pathway.** When light hits the retina, it creates nerve signals which are transmitted to the brain for further processing.



**From Front of the Eye to Back of the Brain**

**The Visual Path Way**

Light rays reflected by an object - for example, a pencil - enter the eye and pass through its lens. The lens projects an inverted image of the pencil onto the retina at the back of the eye. Signals produced by rod and cone cells in the retina then start on their way into the brain through the optic nerve and reach a major relay station, the LGN (lateral geniculate nucleus).

Signals about particular elements of the pencil then travel to selected areas of the primary visual cortex ... . From there, signals fan out to "higher" areas of cortex that process more global aspects of the pencil such as its shape, color, or motion.

*-Geoffrey Montgomery-*

**Source Adaptive:**

1. A Report from the Howard Hughes Medical Institute: Seeing, Hearing, and Smelling the World, p. 17.

<sup>199</sup> Stephen Westland, "How does the eye work?," **State of Connecticut: Board of Education and Services for the Blind**, retrieved 23 December 2005, <[http://www.besb.state.ct.us/\\_INFORMATION\\_ABOUT\\_BLINDNESS/How\\_does\\_the\\_eye\\_work.htm](http://www.besb.state.ct.us/_INFORMATION_ABOUT_BLINDNESS/How_does_the_eye_work.htm)>.

### 3.2.1.2 The Ear

The ear is the sense organ for hearing. Its structure is as shown in figure 48. Basically, the human ear consists of three main parts, namely, the external ear, the middle ear, and the inner ear.

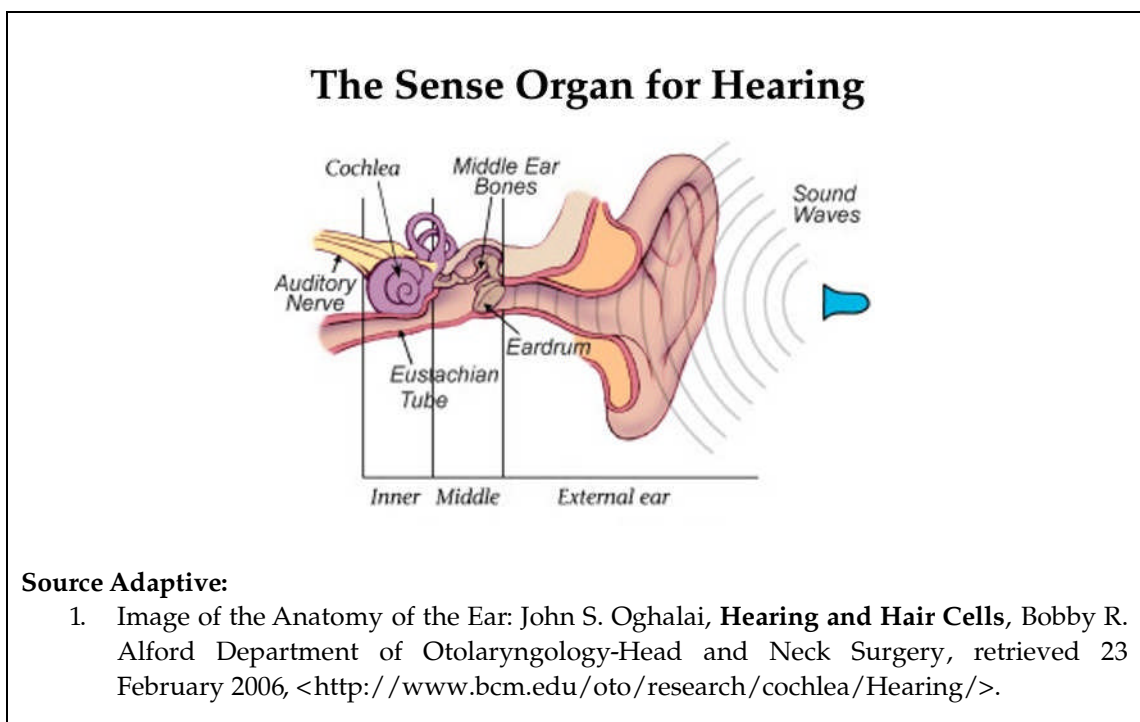
#### 1. External Ear

The outer ear has a function to trap sound wave and pass it to the middle ear.

#### 2. Middle Ear

Sound wave sent to the middle ear causes the ear drum and three auditory ossicles to vibrate.

**Figure 48. The Anatomy of the Ear.** When sound enters the ear canal, it is changed into electrical signals inside the cochlea located at the inner part of the ear.



### 3. Inner Ear

When sound wave reaches the inner ear, fluids in the cochlear begin to vibrate. This is the place where sound wave is changed into electrical nerve signals.

The cochlea has a shape like a snail with two and a half spiral turns like.<sup>200</sup> It is responsible for converting sound wave to electrical nerve signals. This process is carried out by the hair cells and the organ of Corti located inside the cochlea, as can be seen in figure 49.<sup>201</sup> The process of hearing starts from sound waves in the air vibrating the eardrum and three tiny ear bones. The vibration displaces the fluid in the inner ear causing pressure waves in the fluid inside the cochlea. Finally, the organ of Corti inside the cochlea changes the pressure waves into electrical nerve signals. The signals then are transmitted from the organ of Corti to the brain's hearing center. When electrical nerve signals reach the auditory part of the brain, the brain interprets the signals into different types of sound, such as musical sound or human voices.

#### 3.2.1.3 The Nose

The nose is the sense organ of smell. Its structure is shown in figure 50. The organ of the nose consists of the olfactory function,<sup>202</sup> which has a specialized tissue called the olfactory epithelium. The epithelium is located inside the nasal cavity, lying on the roof of the nasal cavity.

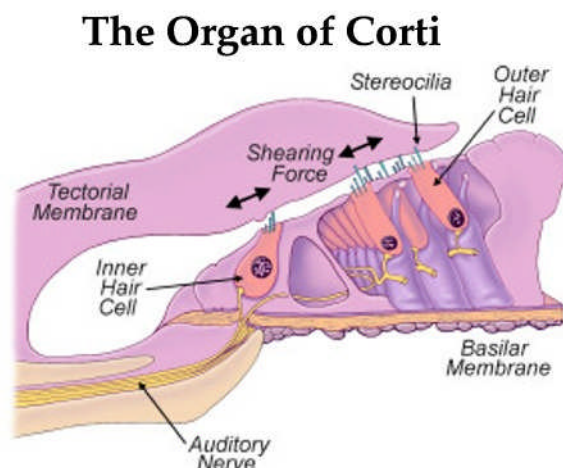
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<sup>200</sup> Linda S. Constanzo, 2002, *op. cit.*, p. 80.

<sup>201</sup> Philip Whitfield, ed., **The Human Body Explained**, 1<sup>st</sup> ed. (New York: Henry Holt and Company, 1995), p. 63.

<sup>202</sup> **The New Encyclopædia Britannica**, Micropædia, s.v. "nose."

**Figure 49. The Organ of Corti and the Hearing Pathway.** The organ of Corti is located inside the cochlea. Inside it, there are hair cells having a function of converting sound energy to electrical nerve signals. The signals will then be sent to the brain for further interpretation.



### The Hearing Pathway

Sound waves generated by mechanical forces, such as a bow being drawn across a string, water splashing on a hard surface, or air being expelled across the larynx, cause the eardrum - and, in turn, the three tiny bones of the middle ear - to vibrate. The last of these three bones (the stapes, or "stirrup") jiggles a flexible layer of tissue at the base of the cochlea. This pressure sends waves rippling along the basilar membrane, stimulating some of its hair cells. These cells then send out a rapid-fire code of electrical signals about the frequency, intensity, and duration of a sound. The messages travel through auditory nerve fibers that run from the base of the hair cells to the center of the cochlea, and from there to the brain. After several relays within the brain, the messages finally reach the auditory areas of the cerebral cortex, which processes and interprets these signals as a musical phrase, a dripping faucet, a human voice, or any of the myriad sounds in the world around us at any particular moment.

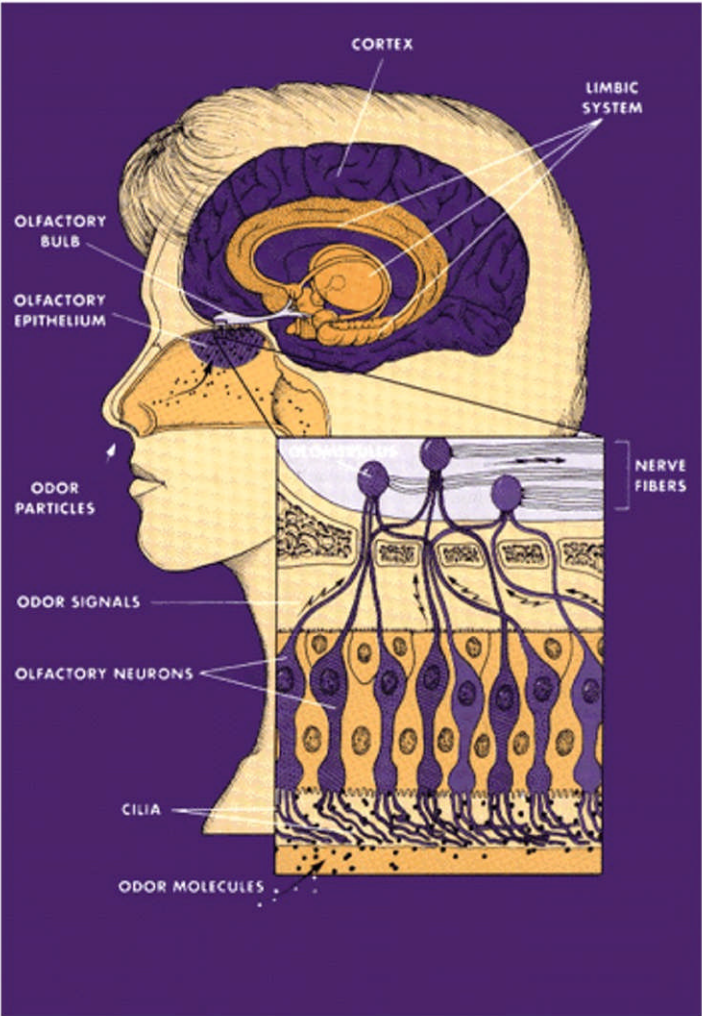
-Jeff Goldberg-

### Source Adaptive:

1. Image of the Organ of Corti: John S. Oghalai, **Hearing and Hair Cells**, Bobby R. Alford Department of Otolaryngology-Head and Neck Surgery, retrieved 23 February 2006, <<http://www.bcm.edu/oto/research/cochlea/Hearing/>>.
2. A Report from the Howard Hughes Medical Institute: Seeing, Hearing, and Smelling the World, p. 36.

**Figure 50. The Anatomy of the Nose and the Olfactory Pathway.** Inside the organ of the nose, there is a specialized tissue called the olfactory epithelium. The olfactory epithelium is a part of the olfactory system. It is responsible for detecting odors.

### The Sense Organ of Smell



**The Pathway of Smelling**

Odor molecules entering the nose are thought to be recognized by receptors found in cilia of olfactory neurons. Neurons with specific receptors are arranged randomly within zones in the olfactory lining of the nasal cavity. Signals from neurons with the same receptors converge on structures called glomeruli in the olfactory bulb. The pattern of activity in these glomeruli creates a pattern or code that the brain may interpret as different odors. The information is carried by nerve fibers to many brain regions, where it affects thoughts, emotions, and behavior.

*-Lydia Kibiuk & Leah Ariniello-*

**Source Adaptive:**

1. Image and Information of the Nasal Anatomy: Lydia Kibiuk, "Smell and Olfactory System," **Brain Briefing**, retrieved on 23 February 2006, <<http://www.sfn.org/content/Publications/BrainBriefings/smell.html>>.

Inside the nasal cavity, there are conchae. The nasal conchae are divided into three portions, having a shape like three shelf-like ridges of bone.<sup>203</sup> The function of the nasal conchae is to deflect the air up to the upper part of the concha. Beside and above the upper most concha is the olfactory region,<sup>204</sup> where odor molecules are dissolved and come into contact with the olfactory sensory cells located inside the epithelium.<sup>205</sup> When the molecules of an odor are dissolved, they turn into chemical substances which attach to the sensory receptors. The olfactory cells send the signals to the olfactory region of the brain to complete the processing of the information they receive about the odor.

#### 3.2.1.4 The Tongue

The tongue is the sense organ for processing taste. Its structure is as shown in figure 51. The upper surface of the tongue contains numerous papillae. On the sides and around the base of the papillae are the locations of taste buds which are sensitive to flavors. The cells in each taste bud have a capability to detect chemicals from flavors and generate nerve signals, which will be sent to the taste center of the brain.<sup>206</sup> Different parts of the tongue can detect different flavors dependent on the types of the taste buds. The five basic flavors are bitter, sweet, salty, sour, and umami. Umami flavor responses to salts of glutamic acid. It expands the taste of other flavors. When the molecules of flavors are dissolved in saliva, they turn into chemical substances which can be detected by the taste receptor cells located in the taste buds. The taste receptor cells send signals to the taste region of the brain to complete the processing of the information they receive about flavors.

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<sup>203</sup> Philip Whitfield, 1995, *op. cit.*, p. 65.

<sup>204</sup> *The New Encyclopædia Britannica*, Micropædia, s.v. "nose."

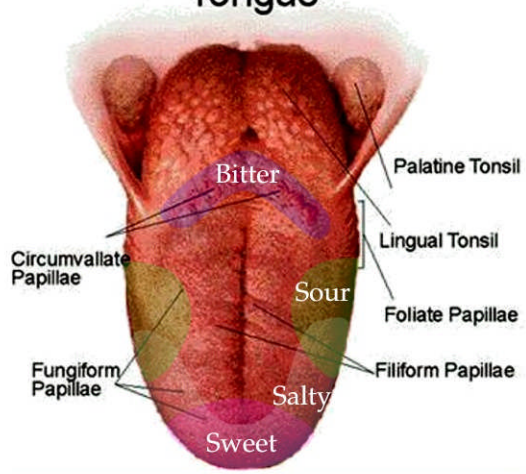
<sup>205</sup> Philip Whitfield, 1995, *op. cit.*, p. 64.

<sup>206</sup> *Ibid.*, pp. 66-67.

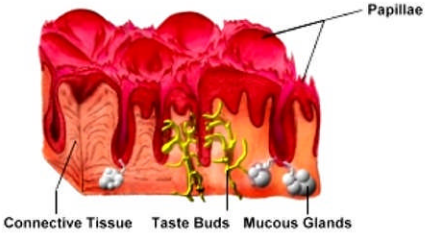
**Figure 51. The Anatomy of the Human Tongue and the Gustatory Pathway.** The sense of taste is situated in the tongue. The upper surface of the tongue contains numerous papillae. On the sides and around the base of the papillae are taste buds sensitive to flavors. These taste buds are responsible for detecting different tastes. There are five basic flavors, which are bitter, sweet, salty, sour, and umami. Umami is the flavor that expands other flavors; therefore, there is no specific location of it on the tongue.

### The Sense Organ of Taste

#### Tongue



The diagram shows the tongue with color-coded regions for taste: Bitter (purple, back), Sour (green, sides), Salty (yellow, front), and Sweet (pink, tip). Labels include: Palatine Tonsil, Lingual Tonsil, Foliate Papillae, Filiform Papillae, Circumvallate Papillae, Fungiform Papillae, and Sweet.



This diagram shows a cross-section of a papilla with labels: Papillae, Connective Tissue, Taste Buds, and Mucous Glands.

#### The Pathway of Taste

Taste buds are located on the sides and around the base of papillae. The tasting, or gustatory, cells in the buds have hairy tips which detect chemicals in solution. When stimulated by flavor molecules, these cells generate nerve signals which they send to the taste center on the brain's cortex, and also to the hypothalamus, which is concerned with appetite and the salivating reflex.

**Source Adaptive:**

1. Image of the Tongue Anatomy (top): Martin S. Spiller, **Oral-Dental Anatomy**, retrieved 2 December 2005, <<http://doctorspiller.com/oral%20anatomy.htm#tongue>>.
2. Image of the Tongue Anatomy (bottom): The Dental Venue Multi Specialty Hospital, "Tongue Anatomy," **Dental Conditions**, retrieved 2 December 2005, <<http://www.dentalvenue.com/tongueanatomy.html>>.
3. The Human Body Explained, p. 66.

### 3.2.1.5 The Body

The body is the sense organ of touch. In our body, there are millions of small sensors buried under the surface of our skin.<sup>207</sup> These sensors are located in the nervous system. The structure of the nervous system is as shown in figure 52. The function of these sensors is to produce nerve signals to response to different kinds of reactions, such as pressure, vibration, temperature, and pain. These nerve sensors are interwoven spreading throughout the whole body.

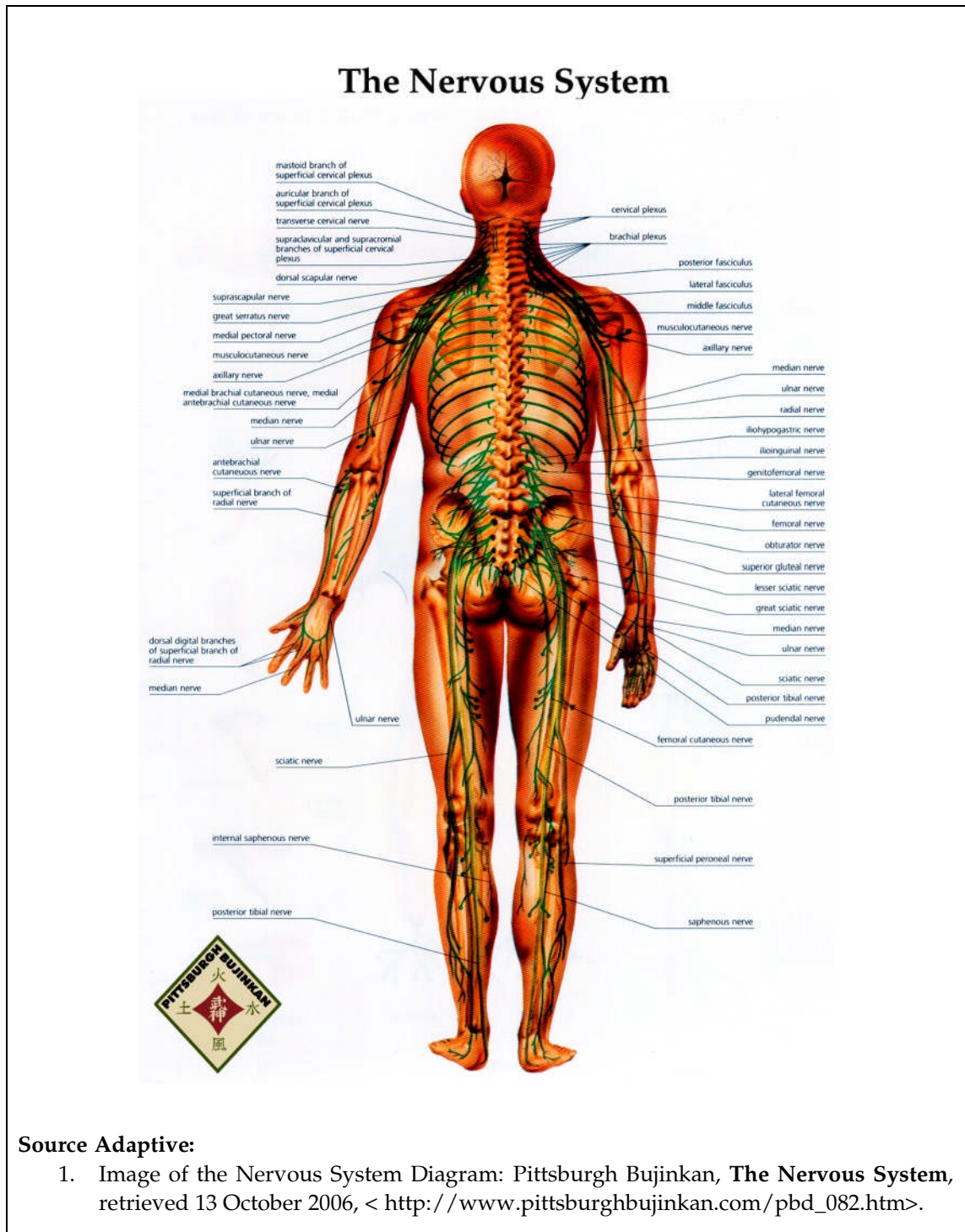
There are many types of touch receptors under the skin, such as Meissner's endings for detecting light touch and vibrations, Markel's endings for detecting light touch, Pacinian endings for detecting heavy pressure and fast vibrations, and free nerve endings for detecting light touch, heavy pressure, heat, cold, and pain.<sup>208</sup> Figure 53 shows the skin anatomy with various types of touch receptors. When there is a physical contact onto the skin, these touch receptors send the information to the spinal cord, which relays the information to the brain. The brain interprets the information it just received into different kinds of reactions.

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<sup>207</sup> **Ibid.**, pp. 68-69.

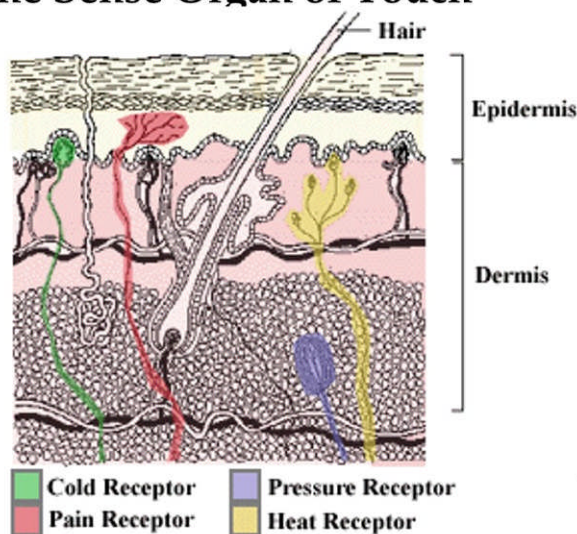
<sup>208</sup> **Ibid.**

**Figure 52. The Nervous System Diagram.** The nervous system is responsible for the sense of touch. It is buried under the surface of the skin. Its function is to produce nerve signals to response to different kinds of reactions. The nerve sensors are interwoven throughout the body.



**Figure 53. The Sense Organ of Touch and the Tangible Pathway.** The sense organ of touch is buried under the skin. There are many types of touch receptors, which correspond to different types of reactions. The information from the touch receptors will be sent to the brain for further interpretation.

### The Sense Organ of Touch



### The Pathway of Touch

Touch sensors respond in different ways. Some react to physical changes that mechanically distort their shape - they are mechanoreceptors. Some of these respond quickly, keeping up with fast vibration, like those from a tuning fork; others are slower and react to alterations in the shape of the skin that take place over few seconds. Some are triggered by the lightest touch; others send most signals when squashed by heavy pressure or when damaged skin releases specific chemicals. The brain figures out what is happening from the overall pattern of signals.

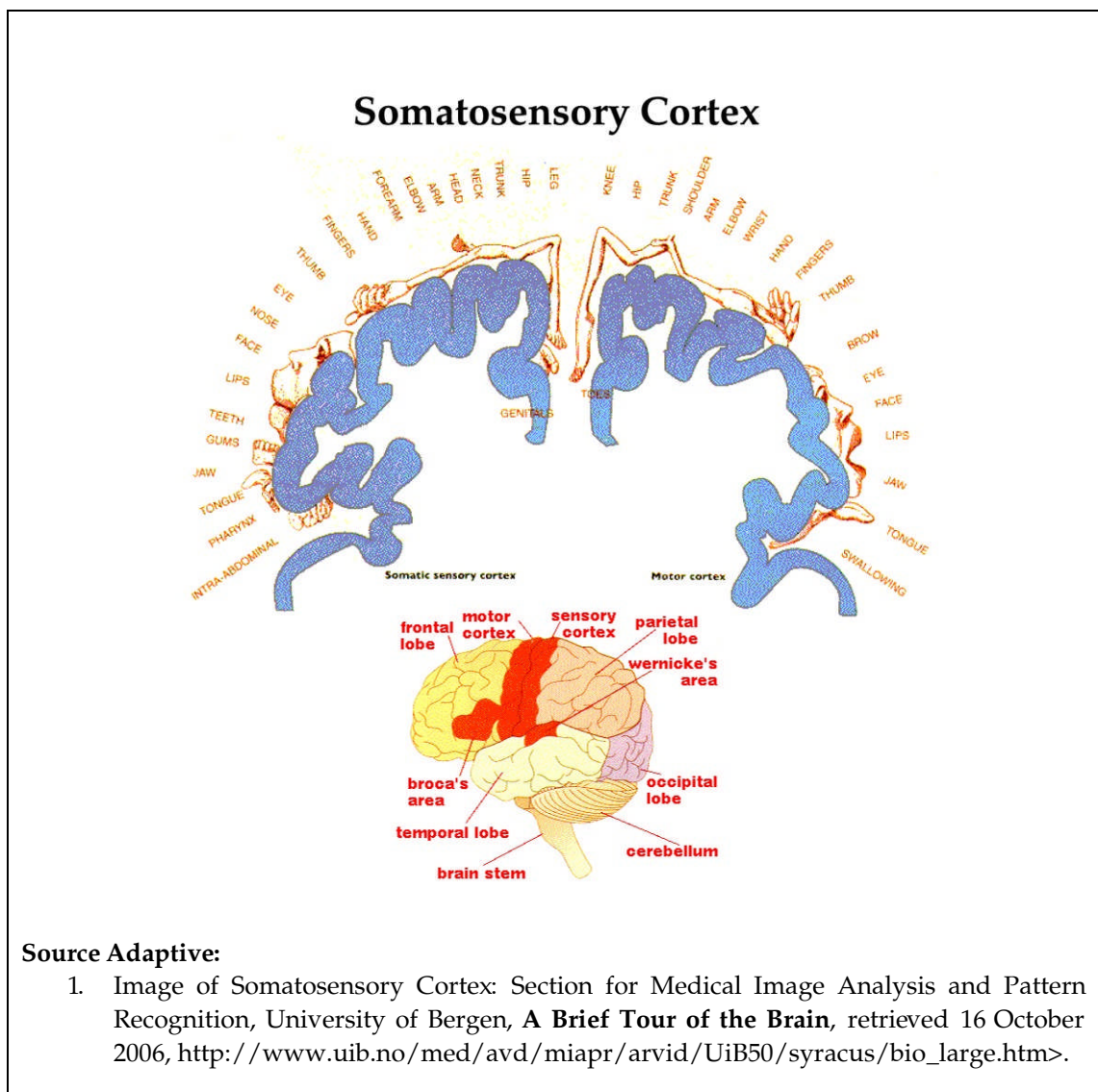
Sensory nerve messages from the skin arrive at a strip on the brain's surface known as the somatosensory cortex, or touch center. Messages from touch-sensitive parts of the body, like lips and fingers, are dealt with by a greater part of the strip than those from less sensitive areas, such as the nose.

#### Source Adaptive:

1. Image of Touch Receptors under the Skin: School of Biological Sciences and College of Education and Human Sciences, "Touch," **The Five Senses**, retrieved 13 October 2006, <<http://bsweb.unl.edu/handsonbiology/human%20biology/Senses/touch/homepage.htm>>.
2. The Human Body Explained, pp. 68-69.

Somatosensory cortex is the part of the brain that is responsible to deal with sensory nerve messages. Figure 54 shows the detailed map of the brain that deals with the whole body surface.

**Figure 54. The Detailed Map of Somatosensory Cortex.** Somatosensory cortex is the part of the brain that is responsible to deal with the contact from the whole body surface. When sensory nerve messages from the skin arrive at the somatosensory cortex, it figures out what is happening on the surface of the body from the pattern of the nerve signals.



### 3.2.1.6 The Mind

The role of the mind in modern science is unclear. Today the medical field starts to pay attention to the role of the mind; however, the study of the mind is still in its infancy. According to the *Dictionary of Psychology*, mind refers to mental process which may include both conscious and unconscious or subconscious phenomena.<sup>209</sup> There are many theories about the location of the mind from both Buddhist scholars and scientists. In this section, I will discuss three possible locations of the mind from modern scientific point of view. The three possible locations of the mind are the brain, the heart, and the whole body.

#### 1. The Brain as the Location of the Mind

This theory regards the brain as the seat of consciousness. An example of this theory can be seen from many scientists, such as Johnjoe MacFadden.

MacFadden believes that the brain is the center of conscious awareness. The idea behind his theory is that the human brain has the ability to generate an electromagnetic (*em*) field. The *em* field has an effect on the process of awareness and perception of human being. Therefore, the brain should be the physical foundation of conscious awareness

The notion that the brain is the seat of the mind is further supported by findings from the use of new equipments, like MRI (magnetic resonance imaging). MRI allows scientists to measure the activity inside the brain and nerves by locating

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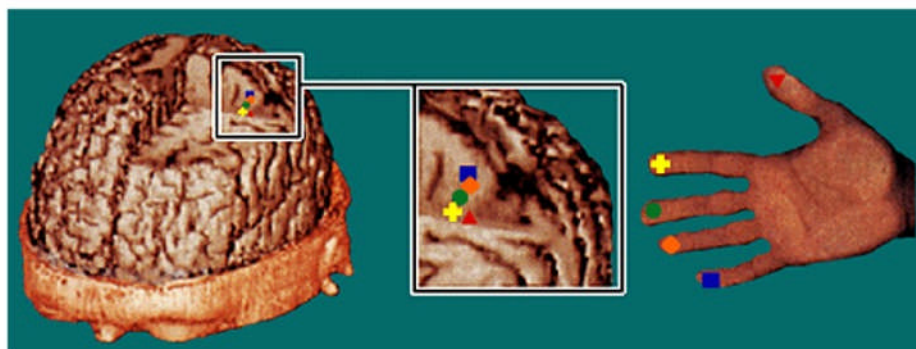
<sup>209</sup> DP, s.v. "mind."

the area of the brain where the blood increases.<sup>210</sup> Figure 55 shows a map area of the brain when it is stimulated by touching from the five fingers. This experiment confirms that the brain is active during the process of touching.

**Figure 55. The Brain Map Corresponding to the Touch from the Five Fingers.** The figure shows that there is a relationship between the human brain and human awareness by locating the activities inside the brain.

One of the first Experiments in which structural MRI was used jointly with MEG produced a three-dimensional map of the areas of the brain that are activated by touching the five fingers of one hand.

A New York University research team headed by Rodolfo Llinás found this map to be distorted in the brain of a patient who had two webbed fingers since birth. A few weeks after the man's fingers were separated by surgery, however, parts of his brain reorganized and the map became almost normal.



Each of the color-coded areas in this combined MRI/MEG image of the brain responds to the touch of a different finger of the right hand.

- Image by Rodolfo Llinás, New York University -

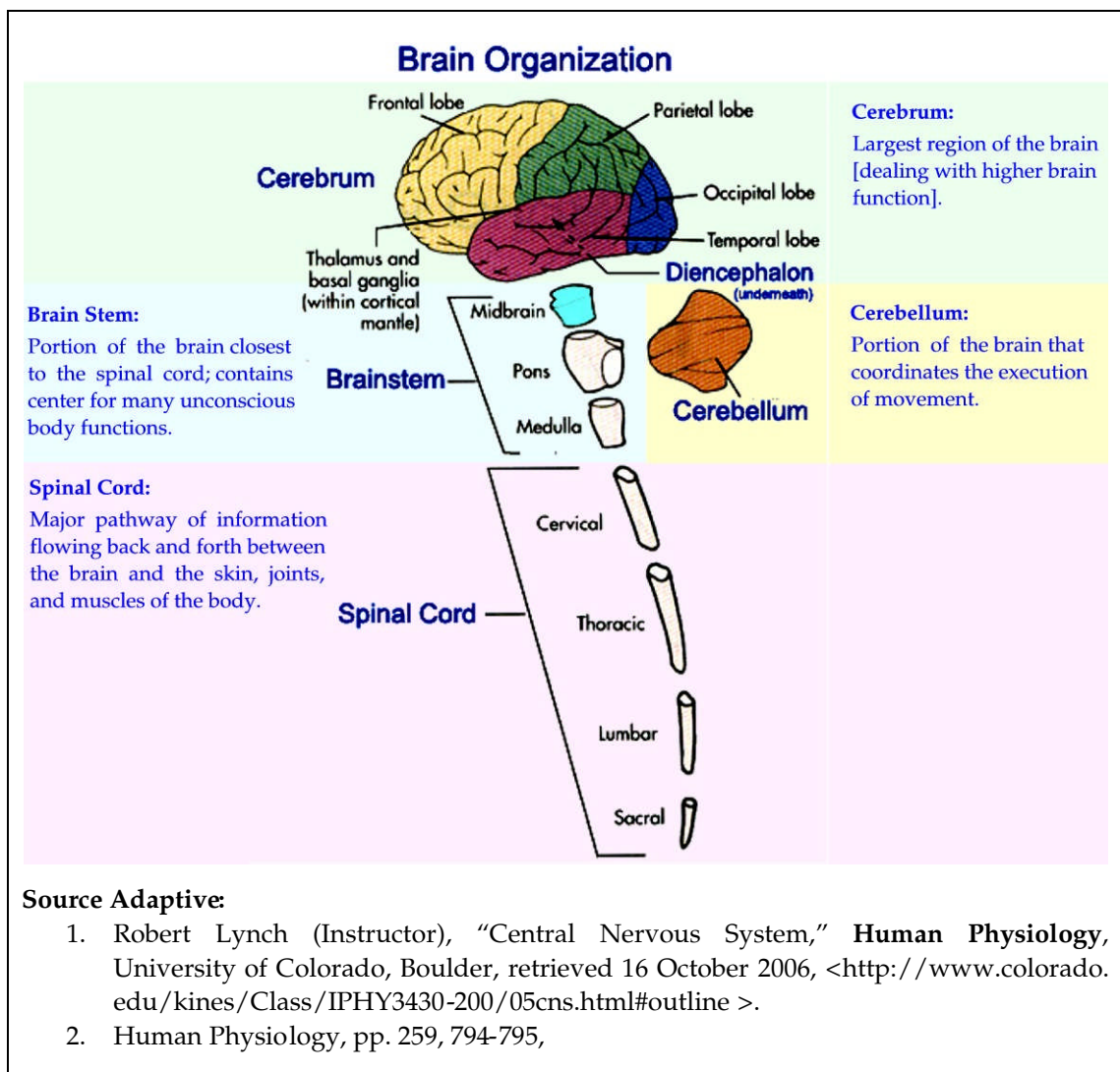
**Source Adaptive:**

1. A Report from the Howard Hughes Medical Institute: Seeing, Hearing, and Smelling the World, p. 59.

<sup>210</sup> Philip Whitfield, 1995, **op. cit.**, p. 75.

The brain consists of many regions, as shown in figure 56. Each region of the brain carries out different functions. The brain stem contains the centers for many involuntary functions, such as breathing. The cerebellum coordinates movement. The cerebrum deals with higher brain functions, such as perception, emotion, memory, and learning.

**Figure 56. The Brain Organization.** The figure shows the different regions of the brain. The brain of an adult can be grossly divided into the brain stem, the cerebellum, and the cerebrum.



The brain can work even in the absence of the external stimuli. Some studies indicate that visual imaging in the brain can increase the immune system of the body in a patient with cancer.<sup>211</sup> Modern scientists discovered that some mental illness, such as depression, may result from abnormalities of signals between neurons and other cells or chemical imbalances in the brain.<sup>212</sup>

All of these studies show that the brain plays a very important role in the aspect of intellect and consciousness. Increased knowledge of the function of the brain seems to point out that there are some similarities between the brain and the mind.

## 2. The Heart as the Location of the Mind

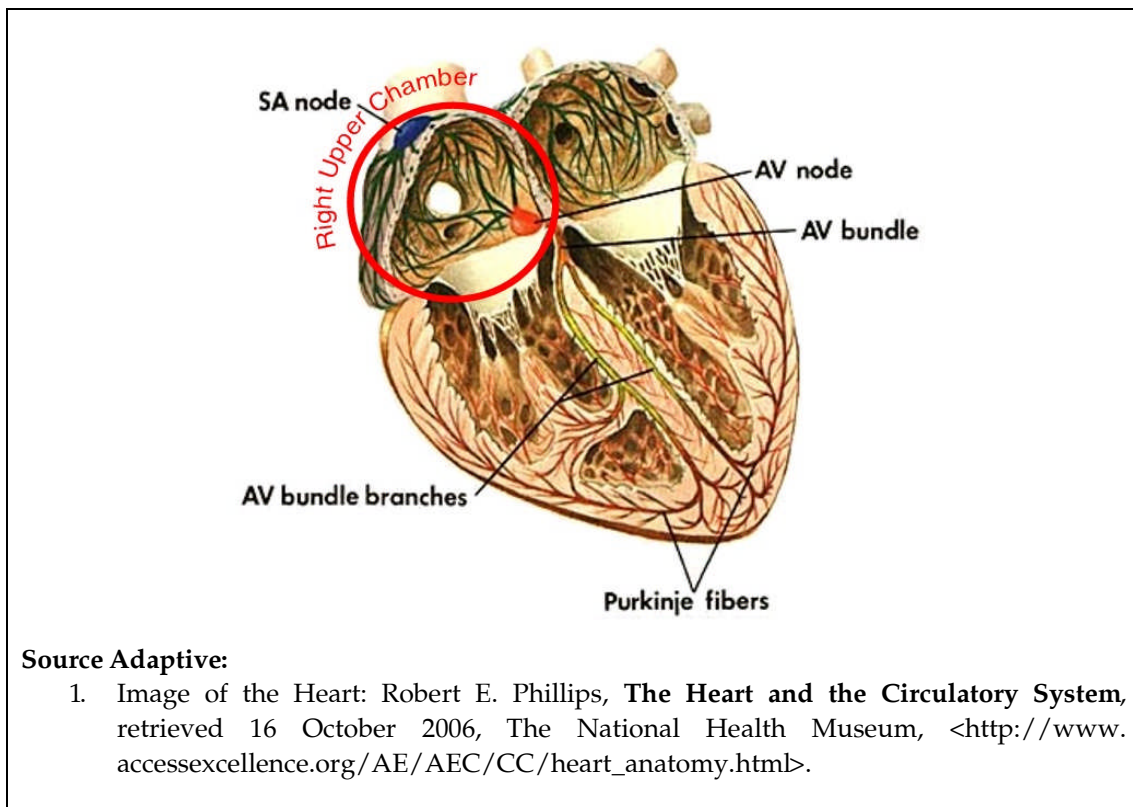
This theory regards the heart as the seat of consciousness. This theory is not popular in the West. However, an example of this theory can still be seen from a scientist, such as Rollin McCraty.

McCraty believes that the heart has an influence on conscious awareness, since the heart can produce an *em* field, which is much stronger than the *em* field that is produced by the brain. This *em* field is generated within the heart, in the tissues called SA node and AV nodes. Figure 57 shows the anatomy of the physical heart and the position of the SA and the AV nodes.

<sup>211</sup> Dee Unglaub Silverthorn, 2001, **op. cit.**, p. 266.

<sup>212</sup> **Ibid.**, p. 267.

**Figure 57. The Anatomy of the Physical Heart.** The heart has four chambers. The SA node and the AV node located in the right upper chamber of the heart can generate the *em* field which may have an influence on conscious awareness.



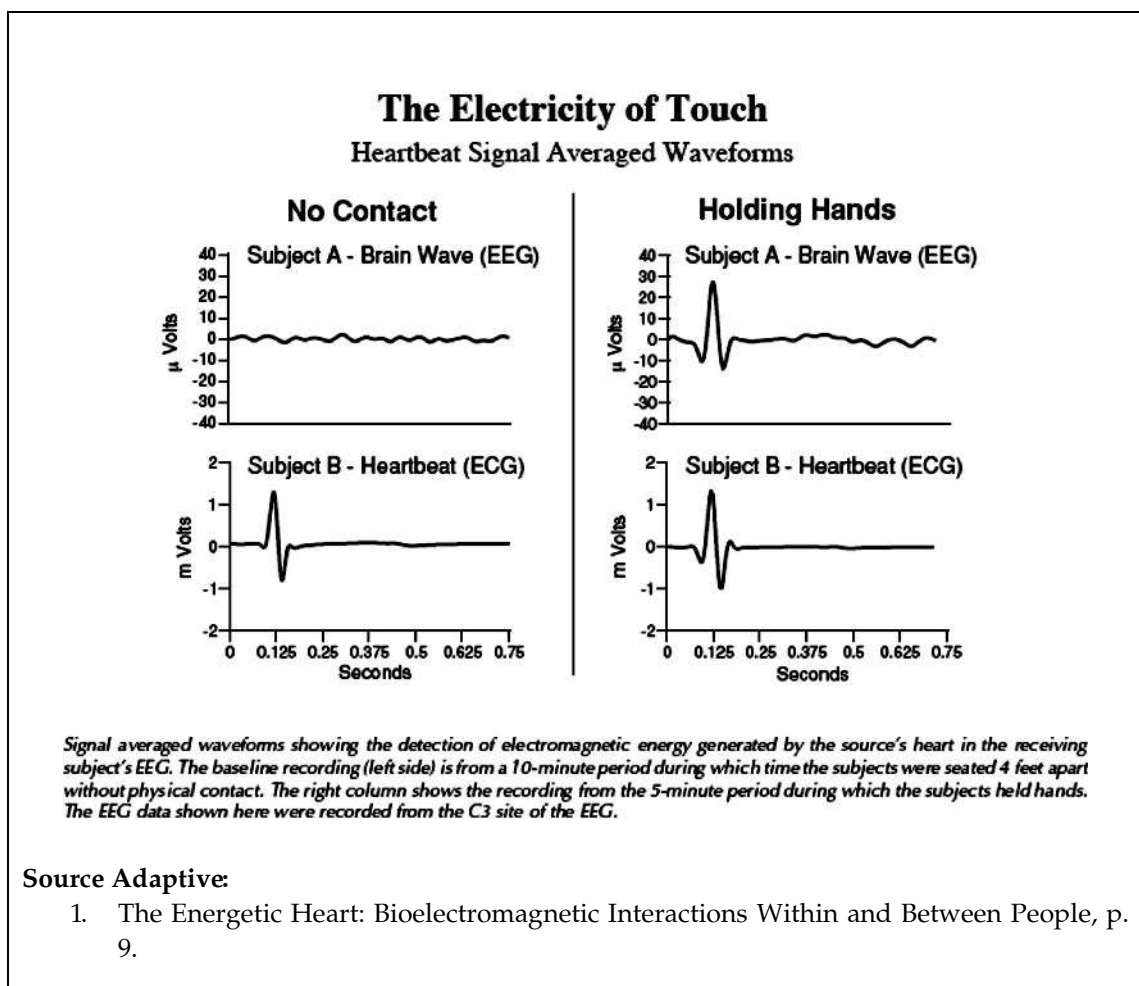
McCraty mentions in his research paper that:

... this energy [electromagnetic force produced by the heart] is not only transmitted internally to the brain but is also detectable by others within its range of communication. The heart generates the largest electromagnetic field in the body. The electrical field as measured in an electrocardiogram (ECG) is about 60 times greater in amplitude than the brain waves recorded in an electroencephalogram (EEG). The magnetic component of the heart's field, which is around 5000 times stronger than that produced by the brain, is not impeded by tissues and can be measured several feet away from the body with Superconducting Quantum Interference Device (SQUID)-base magnetometers.<sup>213</sup>

<sup>213</sup> Rollin McCraty, **The Energetic Heart: Bioelectromagnetic Communication Within and Between People** (California: Institute of HeartMath, 2003), p. 1.

From the above quotation, we can see that the *em* field generated from the heart is capable of being radiated outside the body and it is strong enough to have an effect on the brain of other people. Figure 58 shows the brainwave and heartbeat signals of two volunteers, first when they have no contact to each other and the second when they held each other's hands.

**Figure 58. The Relationship between the Brainwave and Heartbeat Signals through the Electricity of Touch.** The figure shows the relationship between the brainwave and heartbeat signals of two volunteers, first when they have no contact to each other and second when they held each other's hands.



The experiment shows that the form of the brainwave of subject A is similar to the waveform of the heartbeat of subject B during the time when the two volunteers are in contact. This experiment seems to confirm that the *em* field generated from the heart is stronger than the *em* field generated from the brain. Therefore, it has an effect on the waveform generated by the brain.

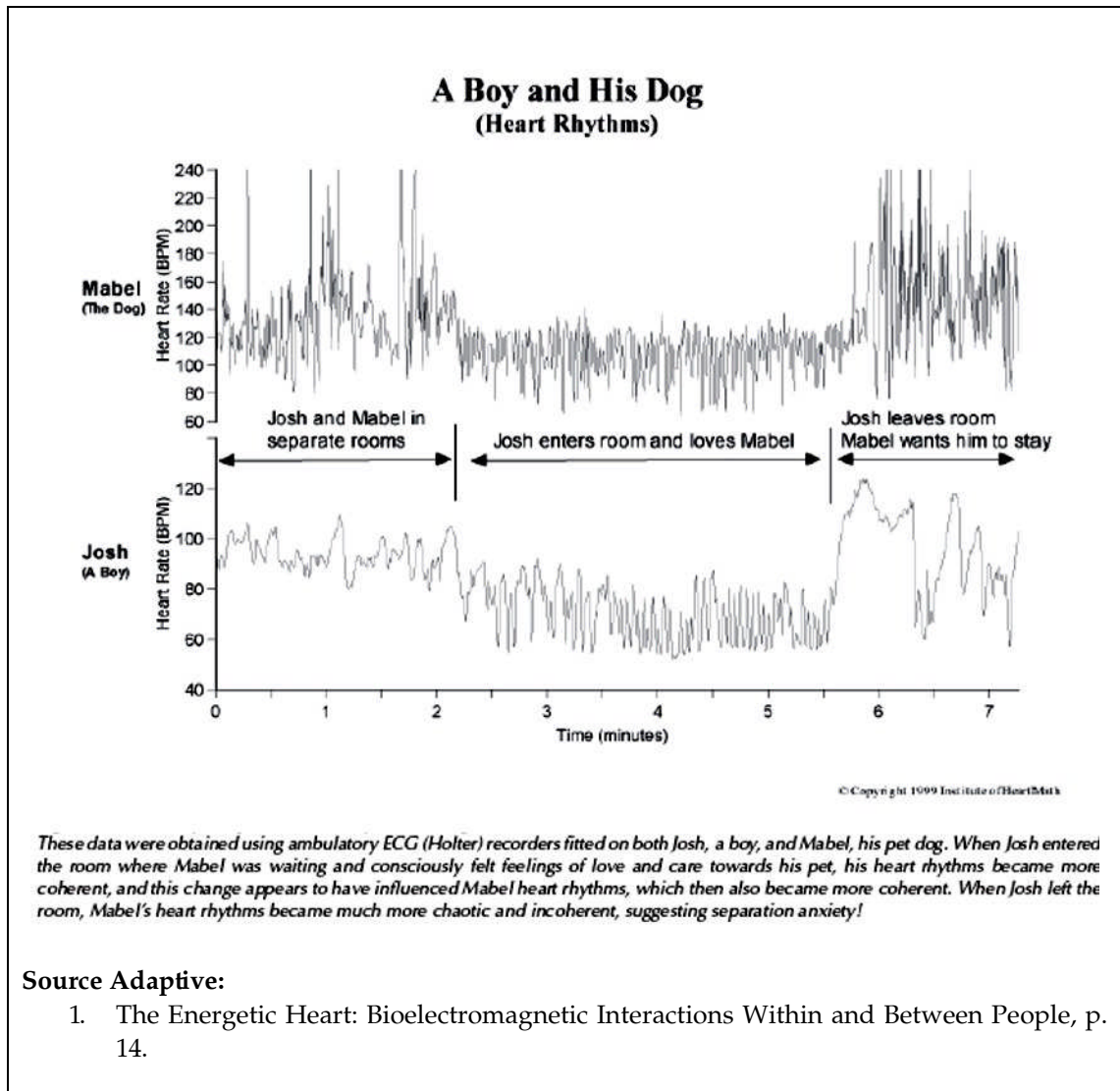
In addition, the *em* field from the heart of one person also has an influence on the *em* field of the heart of others. Figure 59 shows the heartbeats of a boy and his dog when they are separated and when they are together. This figure shows the influence of the boy on his dog.

McCraty has done many experiments which show how powerful the heart is. His experiments appear to confirm that the heart of one person can generate the *em* field strong enough to have an effect on oneself and others. Therefore, McCraty concluded his research that the heart has an influence on conscious awareness, not the brain.

### 3. The Whole Body as the Location of the Mind

The idea of the whole body as the location of the mind can be seen from the theory of Roy E. John and Deepak Chopra, who views the whole body as the seat of consciousness. John thinks that the seat of consciousness spreads throughout the whole body via the neuroskeletal system (the deep-seated parts of the vertebrate skeleton which are in relation with the nervous axis and locomotion), while Chopra has the idea that

**Figure 59. Heart Rhythmic Patterns of a Boy and His Dog.** The figure shows the heart rhythms of a boy and his dog when they are separated and when they are together.



consciousness resides in every DNA starting from the very first cell even before the embryo begins to divide.

These two theories speculate that the seat of consciousness may not be located in a specific location, neither in the heart nor in the brain. An evidence behind the two theories is that

the heart of an embryo begins to beat in the third week and the brain is formed in the forth week.<sup>214</sup> These two organs neither exist nor function at the time of conception. Therefore, human consciousness could not reside in either of these organs exclusively.

There are many theories what mind is, however, there is no conclusion about it. The topic of mind is still an open area for new researches.

### 3.2.2 The Sense Stimuli

A stimulus is “energy external to a receptor, which excites the receptor.”<sup>215</sup> It also includes an external or internal phenomenon that arouses a living organism. In this section, I will discuss five known types of stimuli, namely, visual stimulus, auditory stimulus, olfactory stimulus, gustatory stimulus, and bodily stimuli. In addition, a brief critique of mental stimuli will be given.

#### 3.2.2.1 Visual Stimulus

The physical stimulus for the eye is light.<sup>216</sup> The human eye can see an object from the reflection of light on the object surface. White light or ordinary light is a combination of different colors. According to physics, color is “the composition of electromagnetic radiation that is visible to the human eye (*i.e.*, light), in terms of a range of wavelengths and their relative

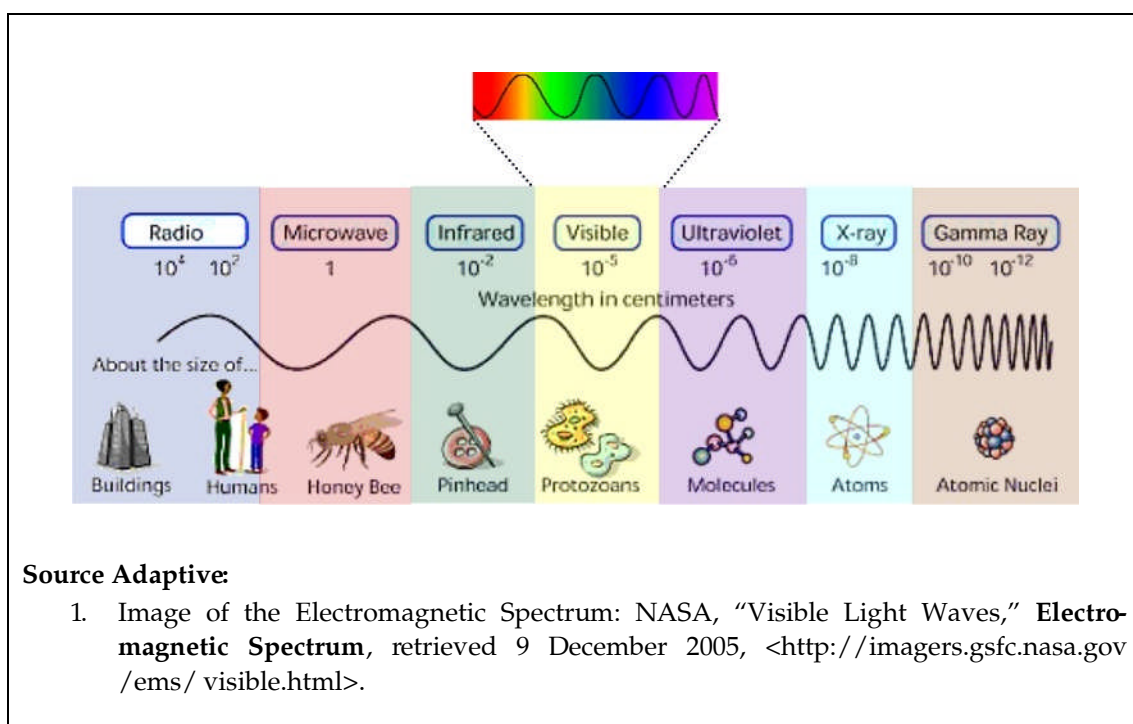
<sup>214</sup> The Medical Community of the University of California Medical Center, and Mouseworks, “Fetal Development,” **The Visible Embryo**, retrieved 7 December 2005, <<http://www.visembryo.com/>>; and S. Lynne Volkhardt, “The Embryo,” **First Journey: Human Development from Conception to Birth**, retrieved 7 December 2005, <<http://members.aol.com/SLV80/embryopage.html>>.

<sup>215</sup> DP, s.v. “stimulus.”

<sup>216</sup> Andrew M. Colman, 1994, **op. cit.**, p. 157.

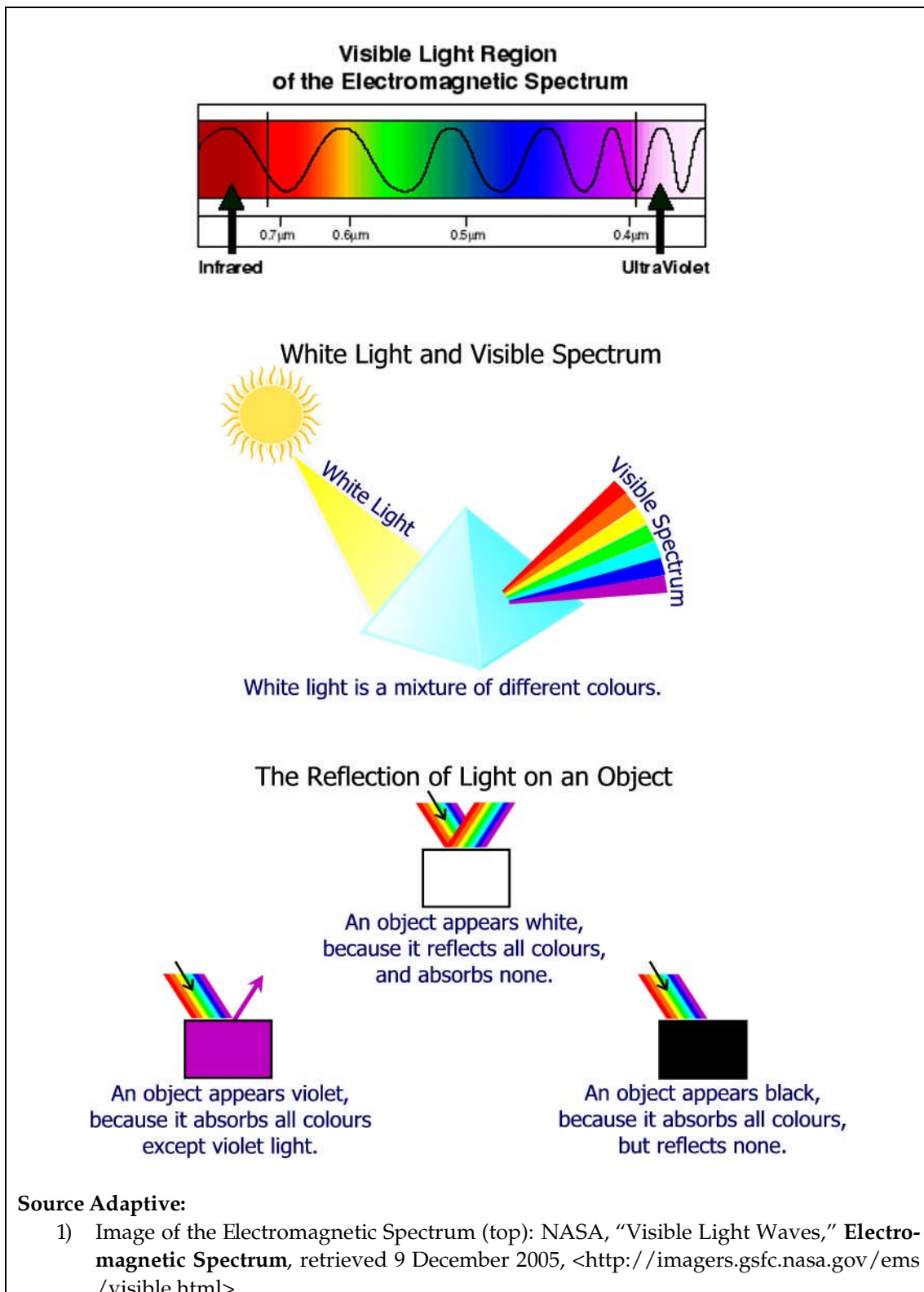
intensities.”<sup>217</sup> The combination of colors is called the light spectrum. In daily life, we can see the separation of light in the nature from the phenomena of rainbow after raining. Figure 60 shows that the human eye cannot see every color but only in some specific wavelengths, and figure 61 shows that the reflection of light causes the human eye to see an object.

**Figure 60. Electromagnetic Spectrum and Its Different Wavelengths.** Colors that we see are a part of the electromagnetic spectrum. As shown, the human eye does not have the capacity to differentiate all wavelengths of the electromagnetic spectrum. Typical human eye responses to wavelengths from 400 to 700 nm. The radio, the microwave, the infrared, the ultraviolet, the X-ray, and the Gamma-ray are invisible to the human eye.



<sup>217</sup> The New Encyclopædia Britannica, Micropædia, s.v. "colour."

**Figure 61. Electromagnetic Spectrum and the Reflection of Color.** The human eye can see only the visible spectrum. The infrared and the ultraviolet are invisible to the eye. Therefore, an object can be seen because it emits visible radiation.



Light plays a very important role in the process of seeing. Light stimulus causes electrical activities in the retina. The rods in the retina are responsible to detect light intensity (brightness and darkness), whereas, the cones are responsible to detect different light wavelengths (colors).<sup>218</sup>

### 3.2.2.2 Auditory Stimulus

The sense of hearing involves the transduction of sound waves into electrical signals. Therefore, the auditory stimulus is sound waves. Sound arises from changes in pressure which is a production of vibrations of an object.<sup>219</sup> It needs a medium for traveling,<sup>220</sup> in which gaps between molecules in the medium must exist in order to allow vibrations to arise. Figure 62 shows how sound travels from its origin to the human ear.

Sound moves from its origin through space. The human ear can hear sound from vibrations that are carried by molecules, such as molecules of air or water. These molecules do not move to the ear themselves, just only the energy of vibrations that is transferred to the human ear.

The sound stimulus causes electrical activities inside the cochlea in the human ear. The human ear cannot detect all sound in the world, just only a limited range of sound frequencies around 20 to 20,000 Hz.<sup>221</sup> Most sounds are the combination of pure tones. A pure tone of sound is a sound with a single frequency.

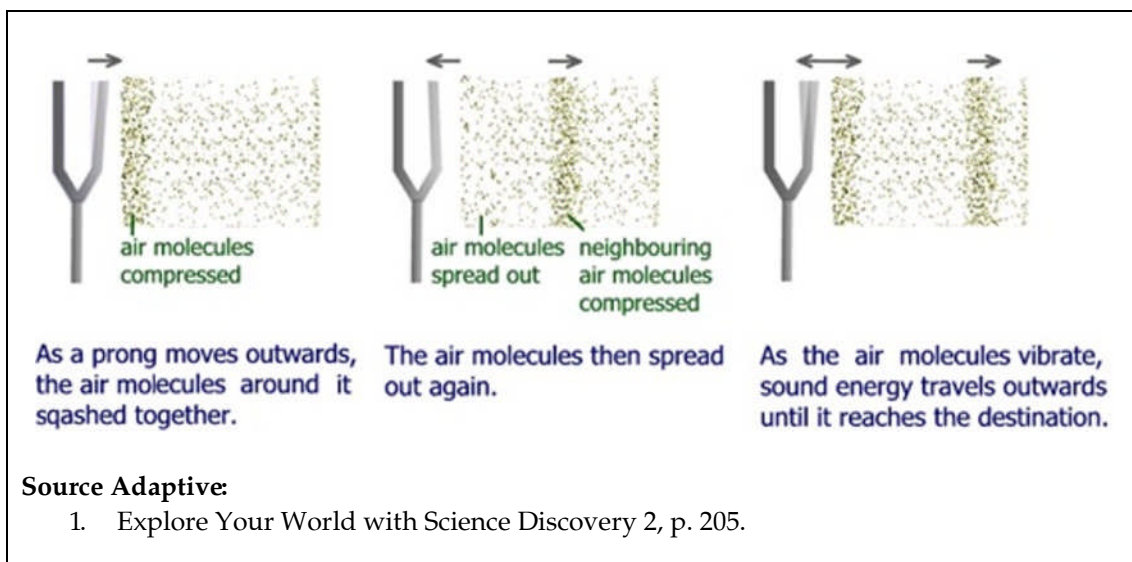
<sup>218</sup> Mark Pernarowski, **Complex Biological Systems (Introduction)**, Department of Mathematical Science, Montana state University, retrieved 17 October 2006, <<http://www.math.montana.edu/~pernarow/M611/>>.

<sup>219</sup> Andrew M. Colman, 1994, **op. cit.**, p. 203.

<sup>220</sup> Rex M Heyworth, **Explore Your World with Science Discovery 2**, 2<sup>nd</sup> ed. (Singapore: Pearson Education Asia Pte Ltd, 2003), p. 204.

<sup>221</sup> Linda S. Constanzo, 2002, **op. cit.**, p. 79.

**Figure 62. The Relationship between Sound and Gaps.** Sound is a production of vibrations. It moves from its source to the ear by sending its energy through the vibrations of molecules (in this case are the air molecules). The gaps between air molecules allow vibrations to arise. The air molecules themselves do not move to the ear, just only the energy that is passed through the movement of them.



### 3.2.2.3 Olfactory Stimulus

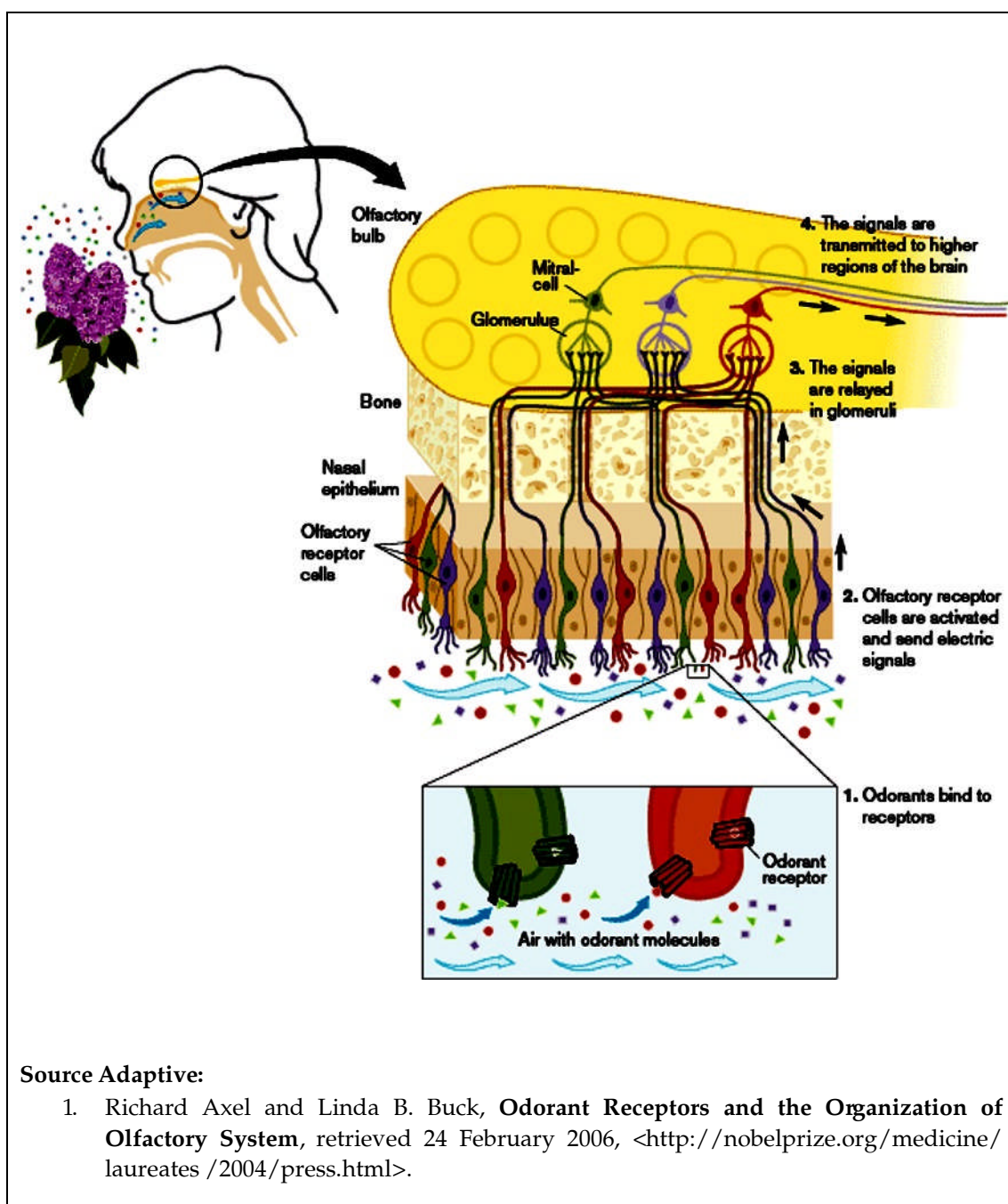
The olfactory stimulus is a type of chemical stimuli of odorant molecules, which is an airborne chemical.<sup>222</sup> Molecules of odor can be detected and identified by the sensory organ of the nose.<sup>223</sup> A smell starts as chemical molecules floating through the air.<sup>224</sup> It needs to be volatile to move it from its source to the human nose as shown in figure 63. After the odorant molecules are trapped inside the nose, they will be dissolved and processed by the olfactory receptors. Electrical signals will then be created and sent to the brain to complete the process.

<sup>222</sup> Andrew M. Colman, 1994, *op. cit.*, p. 243.

<sup>223</sup> *The New Encyclopædia Britannica*, Micropædia, s.v. "smell."

<sup>224</sup> Philip Whitfield, 1995, *op. cit.*, p. 64.

**Figure 63. The Relationship between Odor and Odorant Receptors.** Odor is an airborne chemical. It must be in a gaseous state in order to move from its source to the nose. Odor molecules bind themselves to the odorant receptors. After that, the odor molecules will be dissolved and come into contact with the olfactory sensory cells located inside the olfactory epithelium.



### 3.2.2.4 Gustatory Stimulus

Gustatory stimulus is a type of chemical stimulus, which is generally known as taste. The taste stimulus is detected and identified by the sensory receptors located in the taste buds. Taste is flavor molecules which are detectable in a form of solution.<sup>225</sup> These flavor molecules need to be dissolved in fluid. In human, this fluid is known as saliva. Figure 64 shows an image of flavor molecules taken through a microscope.

Taste is the mixtures of four basic qualities, which are salty, sweet, sour, and bitter. After the taste molecules are dissolved on the tongue, chemical signals will be created in the taste buds and sent to the brain to complete the process.

**Figure 64. Flavor Molecules under a Microscope.** The figure shows different images of flavor molecules taken under the microscope.



<sup>225</sup> Andrew M. Colman, 1994, **op. cit.**, p. 240.

### 3.2.2.5 Bodily Stimuli

The bodily stimuli are detected and identified by nerve signals under the surface of the skin.<sup>226</sup> They can be separated into two types, which are the stimuli of the skin sense and the stimuli of the body sense.

The stimuli of the skin sense are pressure, temperature, and pain.<sup>227</sup> Pressure and temperature can be detected when these two stimuli are in contact with the surface of the skin. However, painful stimuli are associated with potential biological harm, such as tissue damages or lethal thermal extremes.<sup>228</sup> This is the first type of the bodily stimuli.

The second type of the bodily stimuli is the stimuli of the body sense, which are related to the position and the movement of the body. This type of information about mobile part of the body is generated within the human body by the receptors in the joints, muscles, and tendons. These receptors are known as the kinaesthesia and the vestibular sense.<sup>229</sup> The kinaesthesia sense processes information about the position and body movement, while the vestibular sense provides relative information about location of the body part, such as the awareness of the angle of the wrist.

In sum, the bodily stimuli on the surface of the skin include pressure, temperature, and pain, while the bodily stimuli within the body are the location and the movement of the body.

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<sup>226</sup> Philip Whitfield, 1995, *op. cit.*, p. 68.

<sup>227</sup> Andrew M. Colman, 1994, *op. cit.*, p. 225.

<sup>228</sup> *Ibid.*, p. 233.

<sup>229</sup> *Ibid.*, pp. 236-237.

### 3.2.2.6 Mental Stimuli

As I already mentioned, the role of the mind in modern science is still unclear. Therefore, the description of the mental stimuli is ambiguous and controversial. In the last section, I mentioned three possible locations of the mind, which are the brain, the heart, and the whole body. Therefore, I would like to discuss possible stimuli for these three sense organs.

#### 1. The Brain Stimuli

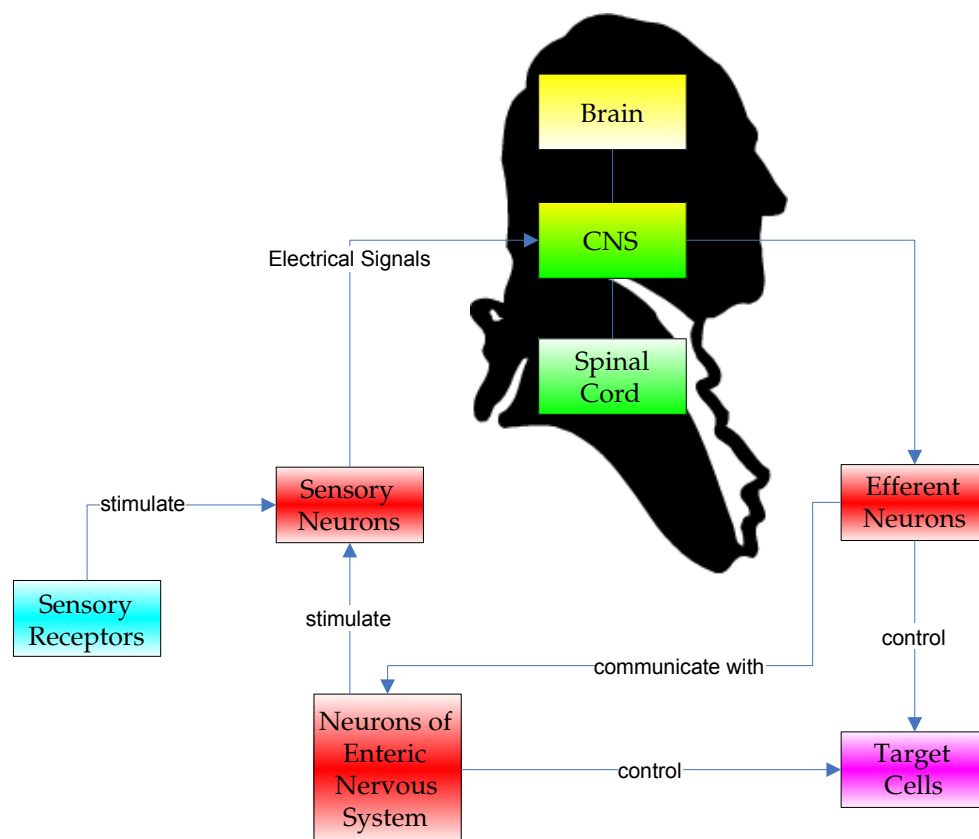
Normally, the human brain is stimulated by electrical signals generated by neurons. When a sensory receptor receives information from the environment (e.g. light, sound), a series of electrical signals are created and sent to the central nervous system, which relays the information to the brain.<sup>230</sup> The brain interprets the information it just received into different kinds of reactions. Figure 65 shows that information from the sensory receptors is transmitted to the brain via afferent neurons and back to the target cells via efferent neurons.

From the figure, it shows that the electrical signals generated by activities of neurons are one of the brain stimuli. In addition, if the theory about the influence of the heart electromagnetic field on the brain by McCraty is correct, then the electromagnetic force produced by the heart is also a kind of brain stimuli. The division of the brain stimuli is still ambiguous, since the role of the brain and how it works are still unclear and under study.

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<sup>230</sup> Linda S. Constanzo, 2002, **op. cit.**, pp. 61-63

**Figure 65. The Brain Stimulus and Its Pathway.** When a sensory receptor receives information from the environment (e.g. light, sound), a series of electrical signals are created and sent to the central nervous system and the brain via afferent neurons. The CNS then takes information from the brain to the target cells via efferent neurons. In addition, the enteric nervous system can act automatically or be controlled by the CNS.



- ☐ Central Nervous System (CNS): Brain and spinal cord.
- ☐ Efferent Neuron: A peripheral neuron that carries signals from the CNS to the target cells.
- ☐ Enteric Nervous System: Neurons in the wall of the gastrointestinal tract that are capable of sensing and integrating information and carrying out a response without input from the CNS.
- ☐ Sensory Neuron (Afferent Neuron): A neuron that transmits sensory information to the central nervous system.

**Source Adaptive:**

1. Human Physiology An Integrated Approach, pp. 216, 795, 798, 811.
2. Physiology, p. 62.

## 2. The Heart Stimuli

For a long time, many people have believed that the heart is the seat of the mind.<sup>231</sup> The heart is a special organ of the human body, since it can work without any external stimuli.<sup>232</sup> The heart can contract from the electrical signal provided by the SA node. The SA node is a group of authorhythmic cells that provides the electrical signals for the heart contraction. If the SA node is damage, the heart will use the signal that is provided by other groups of authorhythmic cells, such as the AV node.<sup>233</sup> The heart chooses the fastest signal to provide the pace of the heartbeat. Nowadays, a pacemaker sometimes is used to generate the electrical signal for the heart, in case that the SA node does not function properly.

## 3. The Whole Bodily Stimuli

In the last section, I mentioned two possible seats of mind which are the neuroskeletal system proposed by Roy E. John in 1976 and the DNA proposed by Deepak Chopra in 1989. The neuroskeletal system is the protector of the nervous system. Many researchers think that the nervous system plays a very important role in human mental life, as can be seen from the following passage by Colman:

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<sup>231</sup> Dee Unglaub Silverthorn, 2001, **op. cit.**, p. 411.

<sup>232</sup> **Ibid.**, p. 415.

<sup>233</sup> **Ibid.**, p. 426.

It is axiomatic among modern researchers that all of our observable behaviour, as well as all of our thoughts, emotions, and dreams – in short, all mental life – is generated by activity of neurons and glial cells [Different types of glial cells are known to serve to (1) provide structural support and possibly guidance for migrating neurons during embryonic development; (2) produce the insulating myelin sheath around axons of many neurons; and (3) remove debris and secrete neurotrophic factors following injury to the nervous system] in the nervous system.<sup>234</sup>

From figure 65, we can see that the afferent neurons are stimulated by either sensory receptors or neurons of the enteric nervous system, and the efferent neurons are stimulated by the central nervous system, which has interconnecting neurons located inside. In short, the neurons in the nervous system are excited or stimulated by other neurons' activities.

The stimuli of the DNA are different from the stimuli of the nervous system. The DNA keeps the human body functioning by the process of communication among cells. The cell in which DNA resides needs nutrition from external environment.<sup>235</sup> Therefore, nutrition is a stimulus of the DNA. In addition, Deepak Chopra believes that all human experiences, including the experience of human ancestors, animal ancestors and microbial ancestors, are recorded in the DNA.<sup>236</sup> From his idea, experiences could also be classified as a stimulus of the DNA.

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<sup>234</sup> Andrew M. Colman, 1994, *op. cit.*, p. 89.

<sup>235</sup> Dee Unglaub Silverthorn, 2001, *op. cit.*, pp. 44-45.

<sup>236</sup> Deepak Chopra, "Flaws of Perception," **Resurgence Issue 231**, retrieved 31 October 2006, <<http://www.resurgence.org/2005/chopra231.htm>>.

### 3.2.3 The Prerequisites for the Arising of the Sensation

According to psychology, sensation refers to “the acquisition of ‘raw’ information by the body’s external and internal sense organs.”<sup>237</sup> Regardless of their difference in anatomical form, all sensations share basic requirements for their arising, which are:<sup>238</sup>

1. Sensory receptors: The receptor cells of the sense organs must be functioning.
2. Sense stimulus: The corresponding stimulus of the sensory receptors must be present.
3. Medium: The stimulus must be able to instigate or travel to its corresponding receptor cells.

Hermann von Helmholtz, a physician and psychologist, further comments that the sensation can be interpreted if and only if the perceiver (human) is active.<sup>239</sup> Table 36 shows the prerequisite conditions that are necessary for the arising of the sensation.

### 3.2.4 The Sensory Receptors and the Fivefold Processes of Sensory Transduction

As mentioned in the above section, regardless of their specific anatomical form, all sensory receptors, excluding mind, have similar basic features. To complete the process of sensation, these five physical sensory receptors need to perform a process of signal transduction. Researchers now discover that the way a stimulus for each receptor travels to the brain and

<sup>237</sup> Andrew M. Colman, 1994, *op. cit.*, p. 153.

<sup>238</sup> *The New Encyclopædia Britannica*, Macropædia, s.v. “Sensory Reception, Human.”

<sup>239</sup> Andrew M. Colman, 1994, *op. cit.*, p. 156.

how it is coded share the same basic structure. Their processes of sensory transduction are as follows:

They [researchers] know that nearly all sensory signals go first to a relay station in the thalamus, a central structure in the brain [located in the central nervous system]. The messages then travel to primary sensory areas in the cortex (a different area for each sense), where they are modified and sent on to “higher” regions of the brain. Somewhere along the way, the brain figures out what the messages mean.<sup>240</sup>

**Table 36. The Prerequisites for the Arising of the Sensation.** Followings are the conditions that are necessary for the arising of the sensation, which are 1) sense receptors must be functioning, 2) there must be corresponding sense stimuli, and 3) the stimuli must be able to reach their receptors (by mean of a medium).

| Sensation | Sensory Receptors                                       | Sense Stimuli  | Medium   |
|-----------|---|--|--|
| Visual    | Retina  | Light intensity and light wavelengths  | Light  |
| Auditory  | Hair cells of the Organ of Corti                        | Sound  | Space (allowing vibration of sound to arise)               |
| Olfactory | Olfactory Bulbs   | Smell  | Air (moving chemical molecules from source to destination) |
| Gustatory | Taste buds  | Taste  | Liquid, saliva (dissolving flavor molecules)               |
| Bodily    | Nerve sensors   | Motion, pressure, temperature, pain  | Need direct contact to the skin surface or the body        |
| Mental    | Under study (e.g. the brain, the heart, and whole body) | Under study (e.g. <i>em</i> field by heart, neural signals, and experiences) | Under study  |

<sup>240</sup> Howard Hughes Medical Institute, **Seeing, Hearing, and Smelling the World** (Maryland: Howard Hughes Medical Institute, 1995), p. 11.

Generally, when a sense organ receives an adequate stimulus, the sensory receptor of that sense organ converts the stimulus to nerve signals and transmits them to the central nervous system (CNS). The CNS resides inside the brain and the spinal cord. The sensory information is relayed to the brain via special pathways. Figure 66 shows an example of the process of sensory transduction for visual, auditory, and olfactory transmissions.

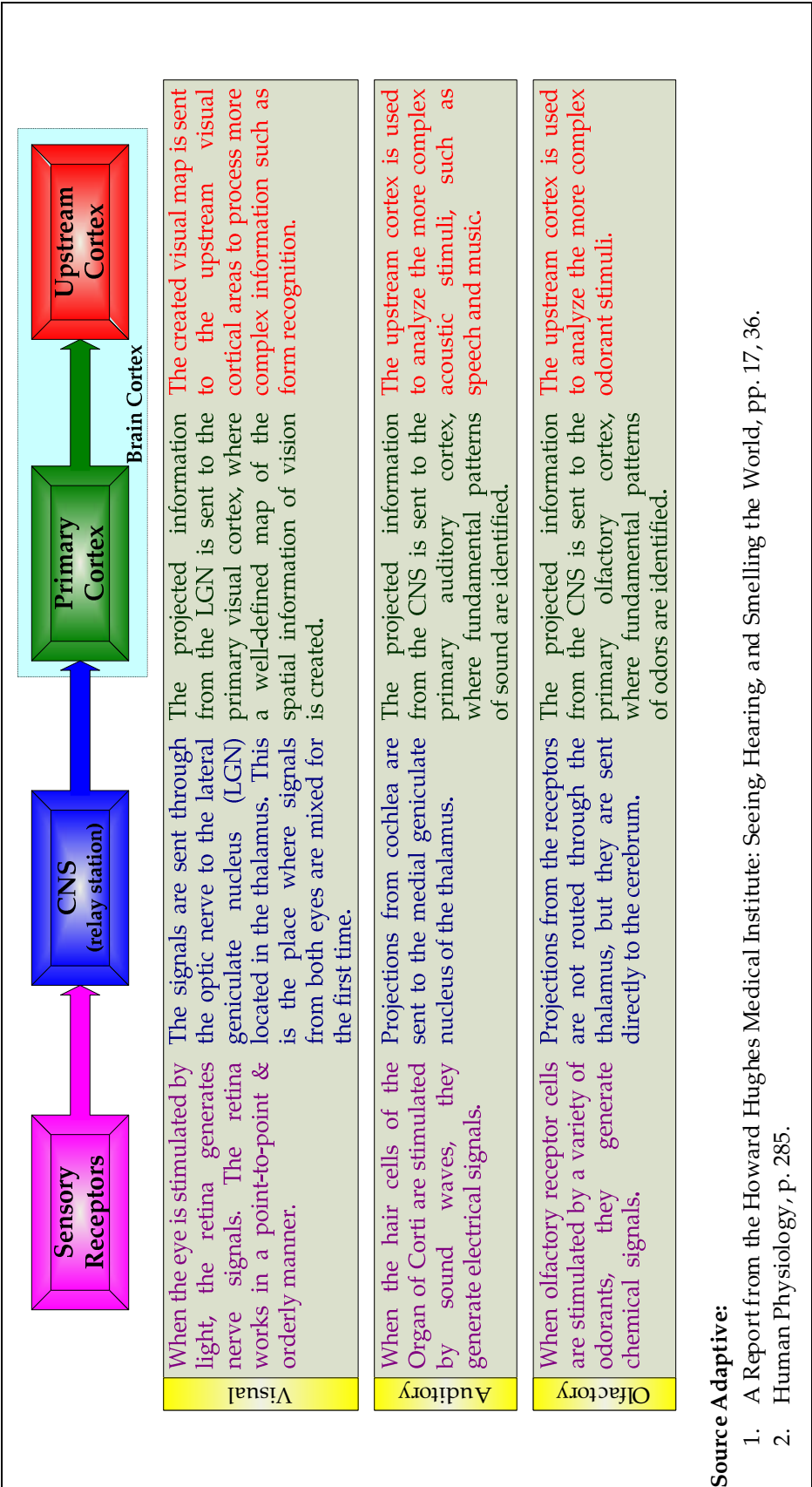
### 3.2.5 Particulate Models of Matter: Basic Models for Matter in Different States

In this section, I will discuss about the basic information of the particulate models of matter, since some characteristics of matter are similar to the elements of the *mahābhūtarūpa* in Buddhism.

Before we explore the information about the particulate models of matter, we should know what an atom and a molecule are first. An atom is the smallest particle, which is the basis for everything. It is the smallest particle that still maintains a characteristic of a chemical element. Each atom consists of three basic parts, which are electrons (having a negative charge), protons (having a positive charge), and neutrons (having no charge), as shown in figure 67. When there are more than two atoms forming a structure, a molecule is made up. A concept of the molecule is defined as a stable group of atoms held together by strong bonds.

The particulate models of matter are scientific models used to present a microscopic view of matter in different states, namely, solid, fluid, and gas. A particle is used to represent a small component such as an atom or a molecule in matter.

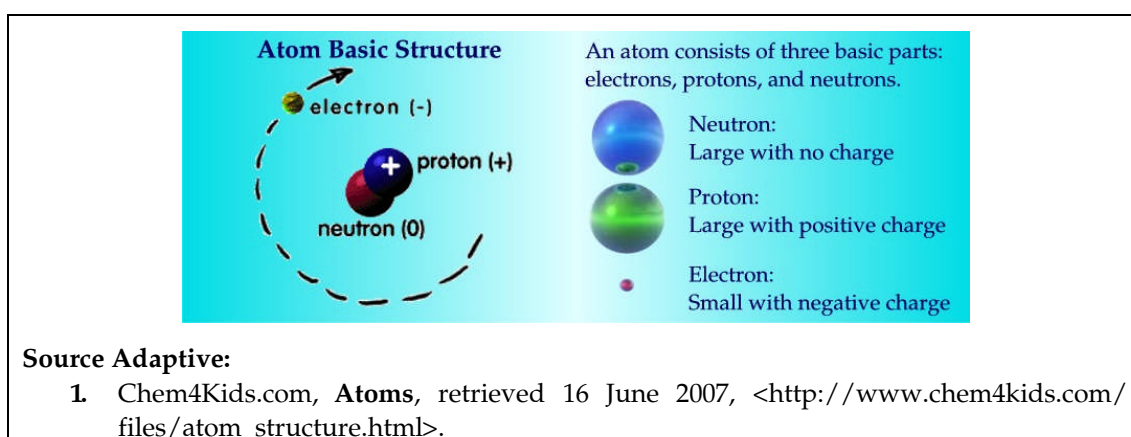
**Figure 66. The Examples of the Process of Sensory Transduction for Visual, Auditory, and Olfactory Senses.** Nearly all sensory signals go the thalamus where the sensory input is translated into a form that is readable by the cortex. The messages then travel to the primary sensory areas in the cortex, where they are modified and sent on to the “higher” regions of the brain to process complicated information, such as information about discrimination tasks and motor tasks.



The states of matter are determined by the distance between particles and the magnitude of forces between them.<sup>241</sup> The physical characteristics of various states of matter can be seen in table 37. The forces that occur between all atoms and molecules may be either attractive or repulsive in nature.<sup>242</sup>

The attractive force brings molecules together. It may arise from the attraction between different charges, positive and negative of the particles. The repulsive force causes the molecules to repel each other. It prevents identical electric charged particles, such as electrons, from occupying the same space at the same time. The repulsive force plays an important role in prohibiting the collapse of molecular structures. Figure 68 shows an example of the attractive force and the repulsive force.

**Figure 67. The Three Basic Parts of an Atom.** There are three basic parts of an atom, which are the electrons, protons, and neutrons. The neutrons have no charges, while the protons and the electrons consist of positive and negative charges, respectively.



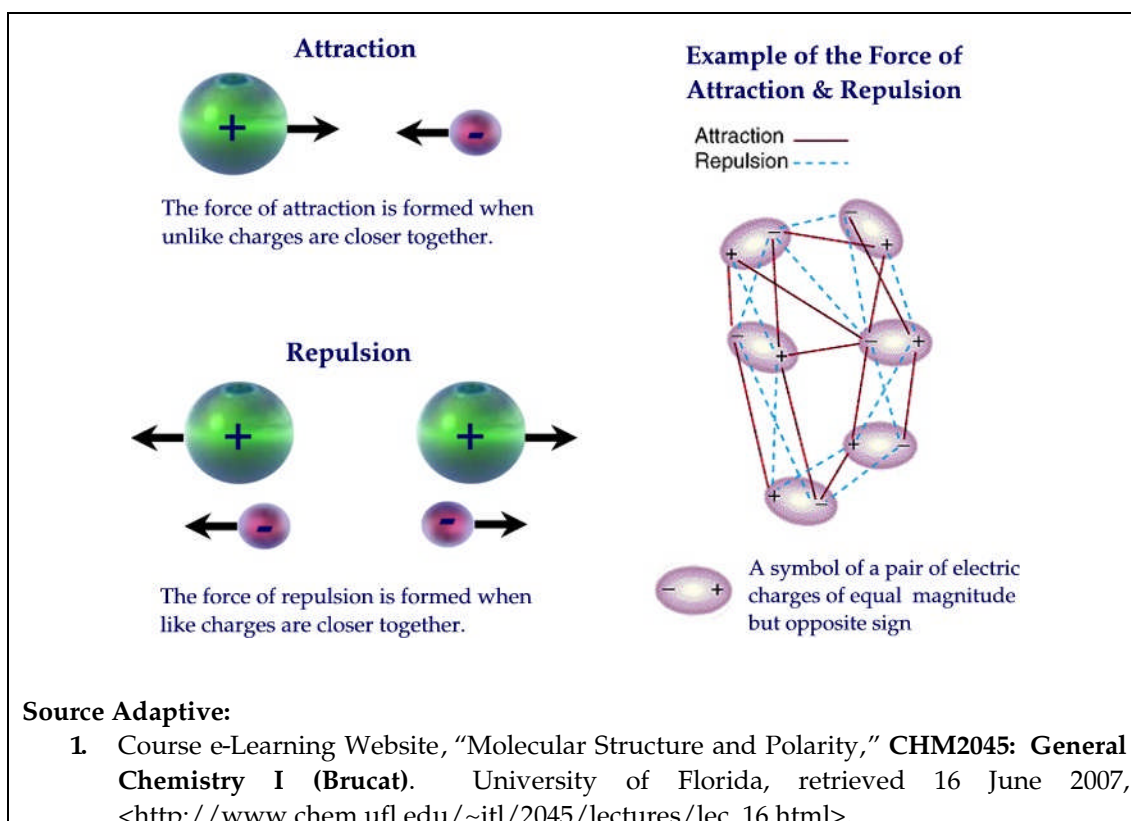
<sup>241</sup> Queen's University, **States of Matter Lecture 4-01**, retrieved 15 June 2007, <<http://www.chem.queensu.ca/programs/UG/2003/apsc131/Lectures/LectureSet4/Lect4-01.pdf>>.

<sup>242</sup> Answer.com, **Intermolecular Forces**, retrieved 15 June 2007, <<http://www.answers.com/topic/intermolecular-force>>.

**Table 37. Characteristics of Various States of Matter.** The figure shows the different level of energy of matter in the state of solid, fluid, and gas.

| State        | Energy Level   | Characteristics   |
|--------------|--|---|
| <b>Solid</b> | The repulsive force is less than the attractive force.         | Kinetic energy in each particle is less than the force of attraction among them. As a result, the particles vibrate and stay at their fixed position. |
| <b>Fluid</b> | The repulsive force is about the same as the attractive force. | There is enough kinetic energy in each particle to make them move around and enough attractive force to hold particles together.                      |
| <b>Gas</b>   | The kinetic energy is greater than the attractive force.       | Kinetic energy in each particle is greater than the attractive force among particles. As a result, the particles can move freely in all directions.   |

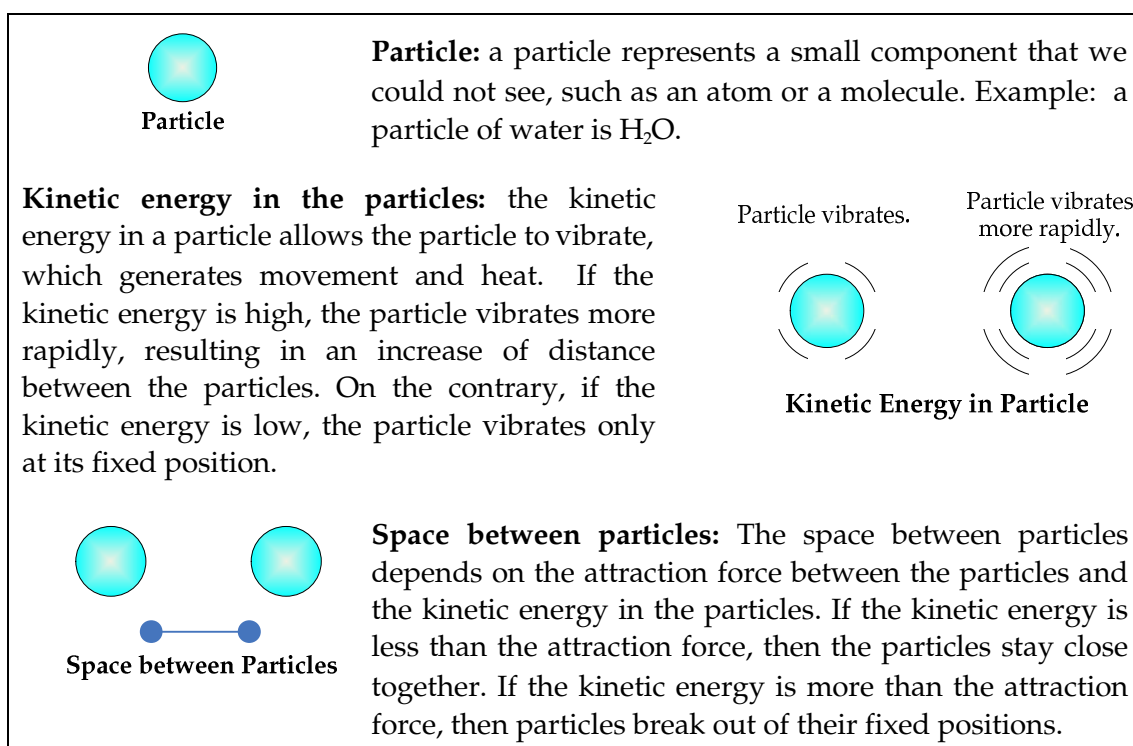
**Figure 68. The Forces of Attraction and Repulsion.** The forces can have either attractive or repulsive nature. In this figure, the nature of the force depends on whether like or unlike charges are closer together.



In addition, each particle possesses kinetic energy. The kinetic energy is a form of energy that a particle has due to its motion. The types of motion include any combination of movements, such as vibration or rotation.

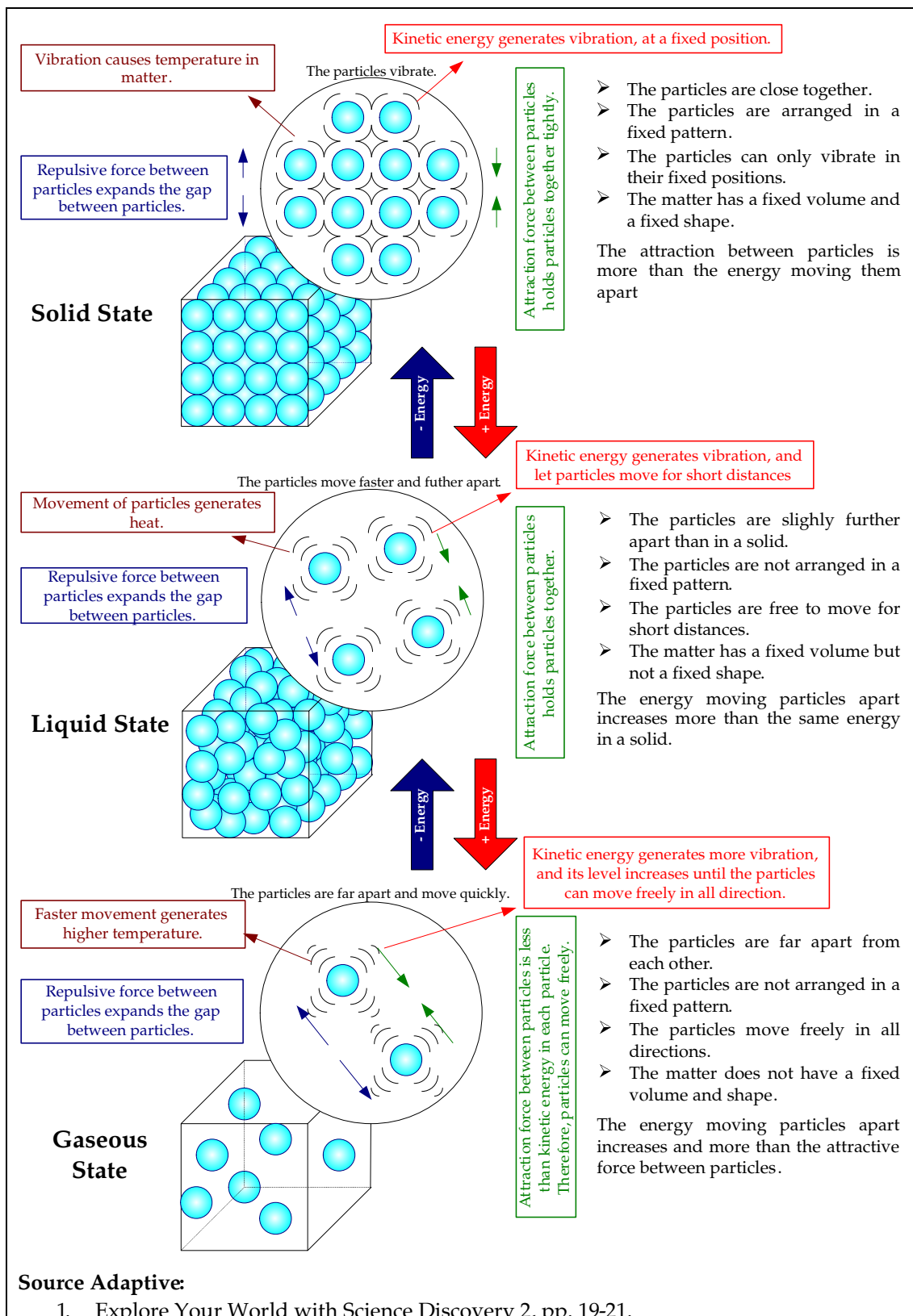
Table 37 shows that there is no heat state. Heat or thermal energy is not classified as a state of matter, but it is a product of kinetic energy in each particle. It is the product of the vibration and movement of particles.<sup>243</sup> Both hot and cold temperatures are a way to measure thermal energy. If the particles move fast, the temperature of matter is high, and vice versa. Figure 69 shows symbols that will be used in the discussion and figure 70 shows the particulate models of matter in different states.

**Figure 69. Symbols and Definition for the Particulate Models of Matter.** The figure shows symbols and definition that will be used in the discussion.



<sup>243</sup> Rex M. Heyworth, 2003, *op. cit.*, p.22.

**Figure 70. The Particulate Models of Matter.** This model helps us to understand properties of solid, fluid, and gaseous states.



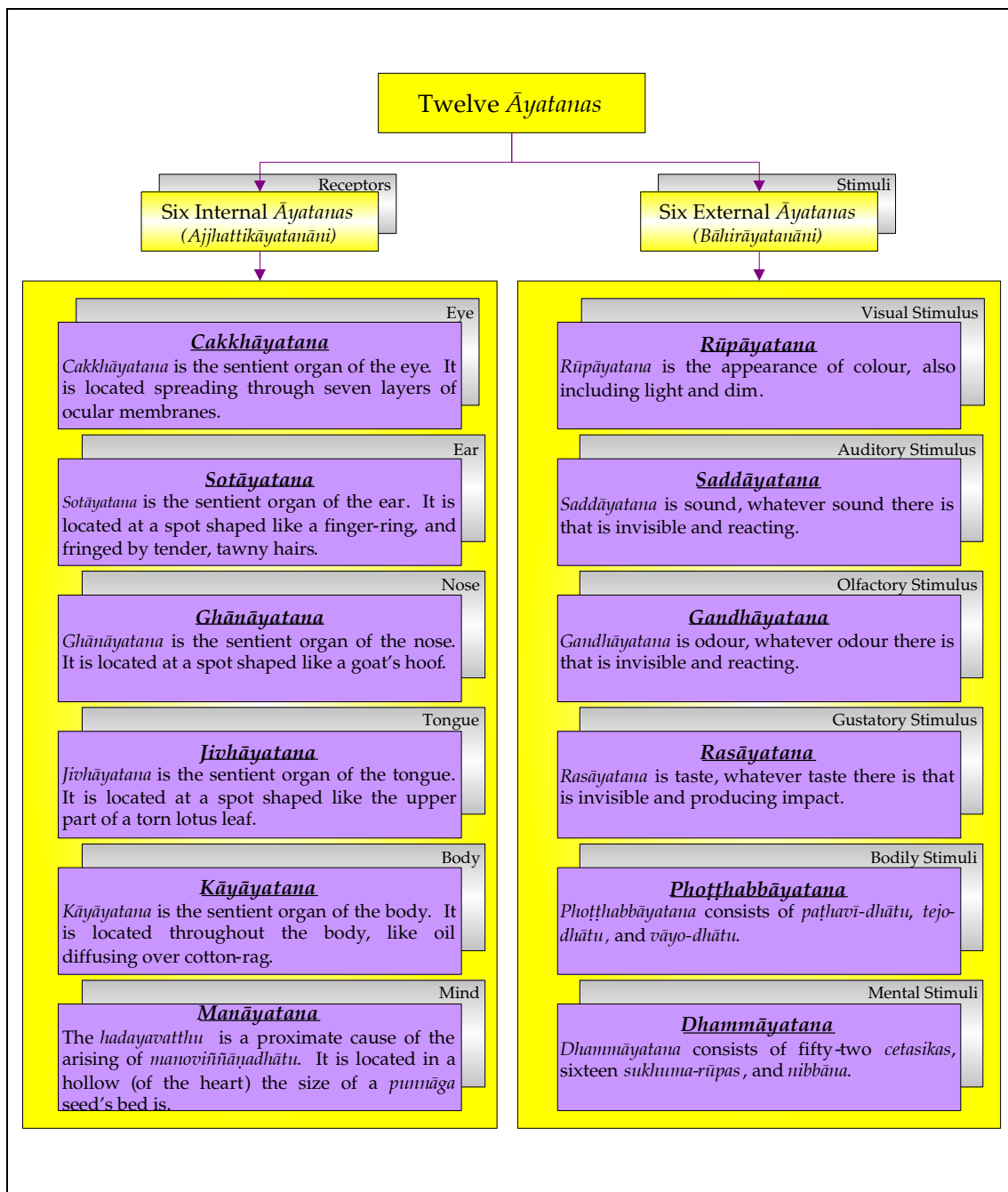
### 3.3 Summary of the Chapter

To sum up, this chapter is separated into two sections. The first section is about the detailed description of the twelve *āyatanas* as mentioned in the *Abhidhamma Piṭaka* and its Commentaries. In this section, the internal *āyatanas* are elaborated on their location and their shape. However, there is only little information about the external *āyatanas*. Another problem that I found out is the information about the *manāyatana* is quite ambiguous. The Buddha never specifies the location of the *manāyatana*. However, most commentators seem to agree that the *hadayavatthu* plays a very important role in the arising of *citta*, a synonym for the *manāyatana*.

The second section is about the parallels of the twelve *āyatanas* in the human anatomy as understood by modern science. This section covers the information about the sensory receptors and the sense stimuli. The sensory receptors, namely, the eye, the ear, the nose, the tongue, the body, and the mind, are that which will be compared to the internal *āyatanas* in the next chapter. The sense stimuli, namely, visual, auditory, olfactory, gustatory, bodily and mental stimuli, are that which will be compared to the external *āyatanas* in the next chapter.

It must be noted here that the role of the mind in science is unclear. There are many arguments against the location of the mind, where the mind is. As a result, the role of mental stimuli is also ambiguous. In this chapter, I proposed three locations where the mind should reside, which are the brain, the heart, and the whole body. Figure 71 shows the short description of the twelve *āyatanas* and their possible parallel information in science.

**Figure 71. The Twelve Āyatanas and Their Possible Parallel Information in Science.** The twelve āyatanas are separated into two groups, the internal sense bases and the external sense bases. Their possible parallel information is shown in gray boxes.



## CHAPTER IV

### THE COMPARISON BETWEEN THE TWELVE ĀYATANAS AND THEIR PARALLELS IN HUMAN ANATOMY

The present chapter is the comparative study of the twelve *āyatanas* and their counterpart in science, the sensory receptors and the sense stimuli. The result of the study will benefit Buddhism in many aspects, such as:

1. Reducing the communication problem between monks and laypeople, since the monks can find an alternative way to teach the twelve *āyatanas* of Buddhism by comparing with human anatomy that laypeople may be more familiar.
2. Identifying similarities and differences between Buddhist philosophy and science. Dividing the nature of Buddhist thought into the material and spiritual aspects.

I envision that *dhammadūtas* who propagate Buddhism in the West may get the most benefit from this chapter, since it provides information that is generally accepted by people who have a scientific background. I would like to borrow the word mentioned by Gerald Du Pré that by doing this “Buddhism will be able to have the standing and influence in the West which it deserves.”<sup>244</sup>

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<sup>244</sup> Gerald Du Pré, “Buddhism and Science,” **Buddhism and Science**, ed. Buddhadasa P. Kirthisinghe (Delhi: Mortilal Banarsidass Publishers, 1993), p. 92.

In addition, other readers who do not have a background in science will gain benefit from this chapter, since it generates a new scope of knowledge about Buddhism. For people who possess of faith, *saddhā*, this chapter provides facts that will help them to expand their own understanding. For people who possess of intelligence, *paññā*, this chapter proves that what was written in the Buddhist scriptures are not merely unfounded beliefs. Some information that the Buddha discovered more than two thousand and five hundred years ago is found to have support through scientific discoveries. In brief, this chapter provides information that will help to balance the differences between *saddhā* and *paññā*.

#### **4.1 The Comparison between the *Ajjhattikāyatana*s and the Sensory Receptors**

In this section, I based my research mainly on the work of a physician named Thongkam Sunthornthepvarakul.<sup>245</sup> Sunthornthepvarakul explored his interest in the area of the relationship between the *pasādarūpa*, sensitive material qualities, and the anatomy of human. He found some resemblances between human anatomy and the first five internal *āyatana*s mentioned in the Commentaries. In addition, the researches by Johnjoe McFadden and Rollin McCraty are brought into study since they give a very interesting aspect about the location of the mind in human anatomy.

##### **4.1.1 *Cakkhāyatana* and the Eye**

As we already know, the *cakkhāyatana* is the *cakkuhuppasāda*. Nārada mentions that the *cakkuhuppasāda* denotes the receptive reacting sense-agency

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<sup>245</sup> Thongkam Sunthornthepvarakul, **Pasāda-Rūpa 5**, Rajvithi Hospital (free distribution).

part of the eye, located at the center of the retina.<sup>246</sup> The Commentaries further indicate that the *cakkhuppasāda* is located spreading through seven layers of ocular membranes (*satta akkhipaṭalāni*),<sup>247</sup> where the sensation of vision is initiated. This is very interesting when Sunthornthepvarakul compared the *satta akkhipaṭalāni* with the layers of the retina. He explains that the retina consists roughly of seven layers of receptor cells located at the back of the eye. These retinal layers have a function to convert a visual image into neural signals.

As mentioned in chapter III, the human retina consists of ten layers. Of these ten layers, I found that only seven layers are directly involved in the signal transduction. Table 38 shows the relationship between the process of the signal transduction and the ten layers of the retina. From the table, we can see that three layers out of ten are not related to the process of signal transduction. They do not have a direct function concerning the process of seeing.

In addition, the Commentaries indicate that the size of the organ where visual sense is initiated is not bigger than the head of a louse. This information may refer to the ganglion cells which is the organ where the nerve transmitting visual information leaving the retina.

*The Path of Freedom* further elaborates the anatomy of the eye that the sensory matter depends on three small discs round the pupil.<sup>248</sup> The three small discs, which help focusing the light and let the light pass through, may refer to the cornea, the iris, and the lens, respectively.

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<sup>246</sup> Anuruddhācariya, 1987, **op. cit.**, p. 291.

<sup>247</sup> As 307.

<sup>248</sup> See details in N.R.M. Ehara, Soma, and Kheminda, 1995, **op. cit.**, pp. 238-239.

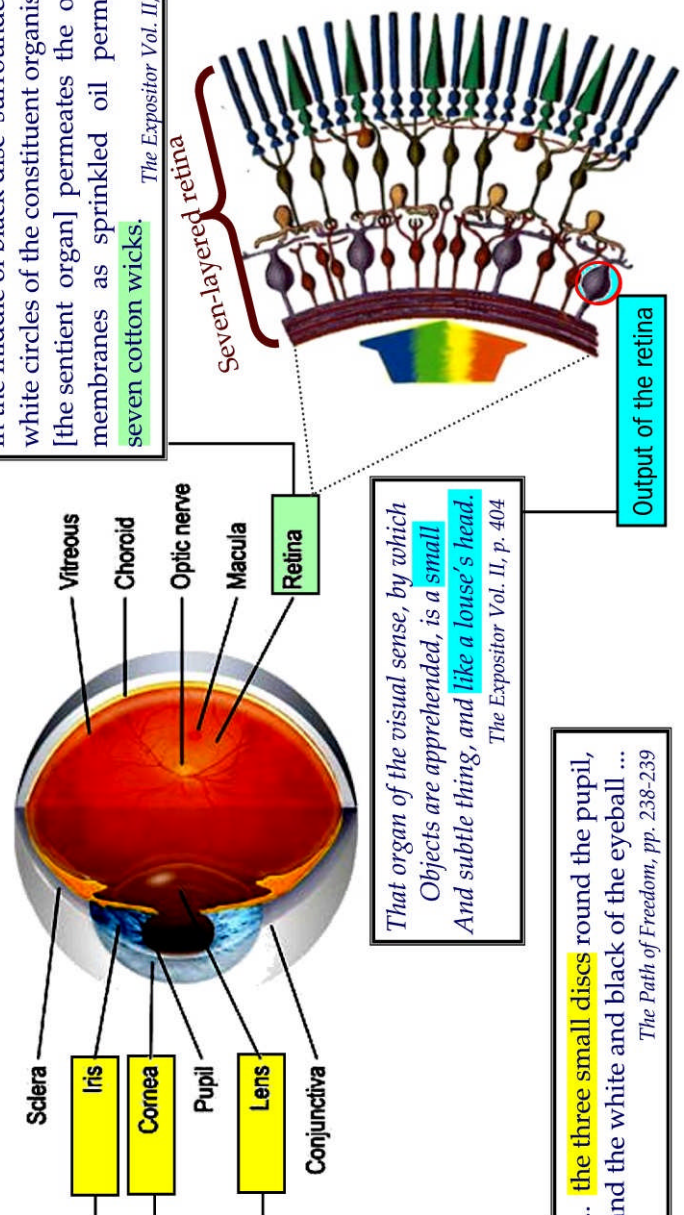
**Table 38. The Ten Layers of Human Retina and Their Role in Signal Transduction.**  
 The human retina consists of ten distinct layers. Only seven layers are directly related to the process of seeing.

| Layer of Retina            | Performing Signal Transduction?   |
|----------------------------|---|
| Retinal Pigment Epithelium | Yes – increasing acuity of vision   |
| Photoreceptor Layer        | Yes – layer of light-sensitive elements   |
| Outer Limiting Membrane    | No – this layer isolates inner layers from harmful materials  |
| Outer Nuclear Layer        | Yes – layer of nuclei of rods and cones   |
| Outer Plexiform layer      | Yes – synaptic layer  |
| Inner Nuclear Layer        | Yes – layer of cell bodies  |
| Inner Plexiform Layer      | Yes – synaptic layer  |
| Ganglion Cell Layer        | Yes – the last layer in the process of signal transduction, the layer of the output from the retina giving rise to the optic nerve fibers |
| Nerve Fiber Layer          | No – no light-sensitive elements in this layer, blind spot  |
| Inner Limiting membrane    | No – this layer seals of the retina from the vitreous chamber   |

Figure 72 shows that the anatomy of the retina is similar to the description of the *cakkuhappasāda* mentioned in the Commentaries, since the retina and the *cakkuhappasāda* require seven-layered structure in the process of seeing. From the figure, it shows that the *cakkuhappasāda* may be located somewhere in the seven-layered structure of the retina.

**Figure 72. Cakkhāyatana and the Anatomy of the Human Eye.** At the retina, the sensation of vision is initiated. The description of the retina resembles the description of the *cakkluppasāda* that is appeared in the *Aṭṭhasālinī*.

### *Cakkhāyatana vs. The Anatomy of the Eye*



**Source Adaptive:**

1. Eye Anatomy, St. Luke's Cataract and Laser Institution, retrieved 7 October 2006, <<http://www.stlukeseye.com/Anatomy.asp>>.
2. **The Retina**, Institute Of Physiology, Dept. Of Neurophysiology, Ruhr-University Bochum, retrieved 12 October 2006, <<http://www.neurop.ruhr-uni-bochum.de/CompNsci/BiophysModel/Retina/retina.html>>.

**Text boxes from the diagram:**

- Top Left:** In the circle of vision where arise images of the bodies of men standing, right in front, in the middle of black disc surrounded by white circles of the constituent organism, it [the sentient organ] permeates the ocular membranes as sprinkled oil permeates seven cotton wicks. *The Expositor Vol. II, p. 403*
- Bottom Left:** ... the three small discs round the pupil, and the white and black of the eyeball ... *The Path of Freedom, pp. 238-239*
- Bottom Center:** That organ of the visual sense, by which Objects are apprehended, is a small And subtle thing, and like a louse's head. *The Expositor Vol. II, p. 404*
- Bottom Right:** Output of the retina

#### 4.1.2 *Sotāyatana* and the Ear

The *sotāyatana* is the *sotappasāda*. It is described to have a shape like a finger-ring (*aṅguliveṭṭhanakasaṇṭhāne padese*) located in the interior of the ear, lined with delicate, tawny hair (*tanutambalomācite*) inside.<sup>249</sup> This description of the *sotappasāda* is similar to the structure of the cochlea of the ear. The cochlear is two and a half spiral turns like with hair cells inside. This description is also mentioned in *The Path of Freedom*. However, instead of the shape like a finger ring, the sensitive part of the ear is like the stem of the blue-green bean.<sup>250</sup> The cochlea has an important role to convert sound wave into electrical nerve signals. Figure 73 shows that the anatomy of the cochlea is similar to the description of the *sotappasāda*, since both of them depend on a coiled structure with hairs inside.

#### 4.1.3 *Ghānāyatana* and the Nose

According to the Commentaries, the *ghānappasāda* is to be found inside the nostril with its accessories in the place shaped like a goat's hoof (*ajapadasaṇṭhāne padese*),<sup>251</sup> where the three goat's hooves meet.<sup>252</sup> The goat's hoof that is described in the *Aṭṭhasālīnī* and *The Path of Freedom* has a shape like nasal conchae as shown in figure 74. In addition, Mehm Tin Mon confirms that the sensitive part of the nose spreads in the organ shaped like a leg of a goat.<sup>253</sup>

<sup>249</sup> As 310.

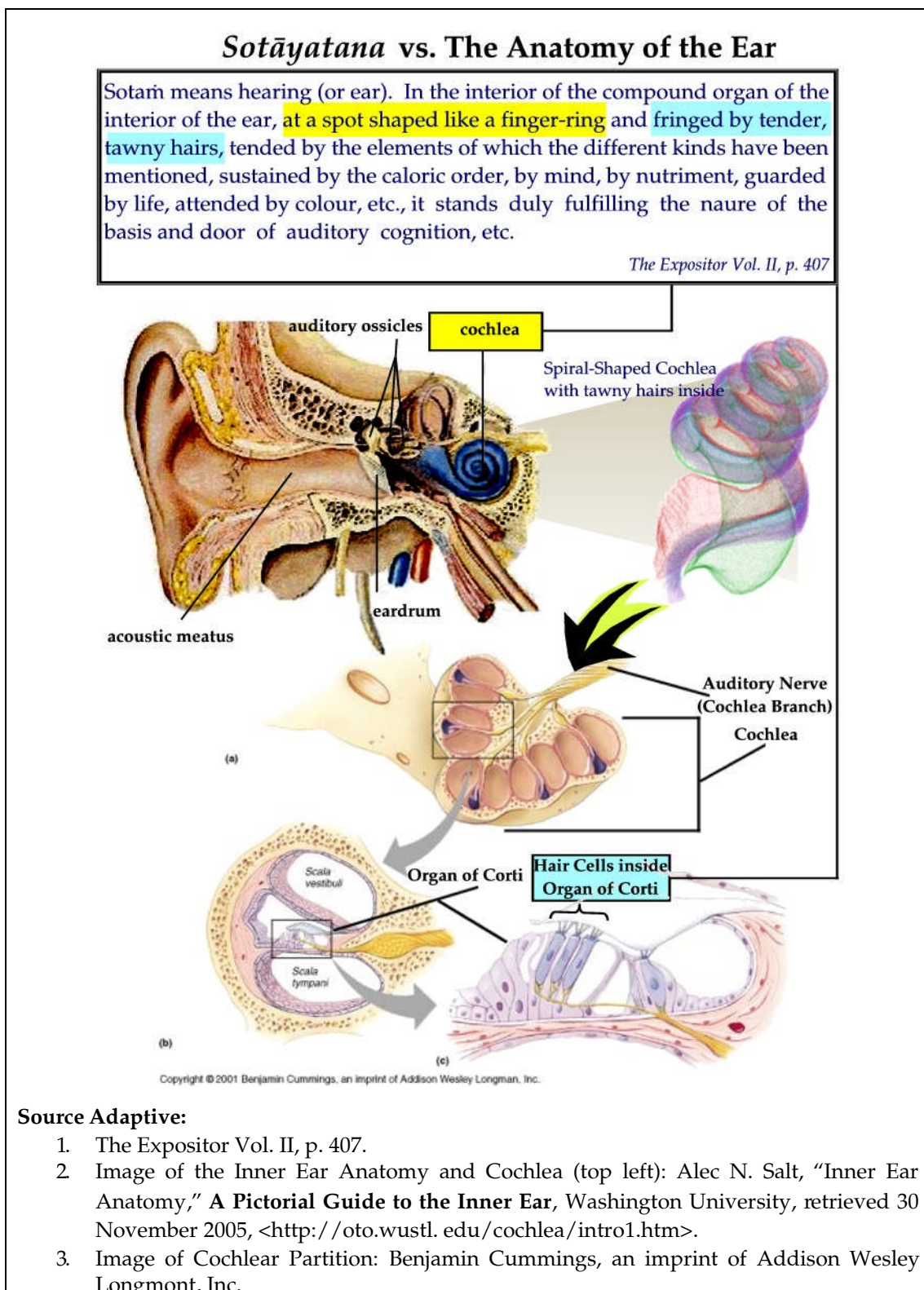
<sup>250</sup> N.R.M. Ehara, Soma, and Kheminda, 1995, *op. cit.*, p. 239.

<sup>251</sup> Buddhaghosa, 1956, *op. cit.*, p.494.

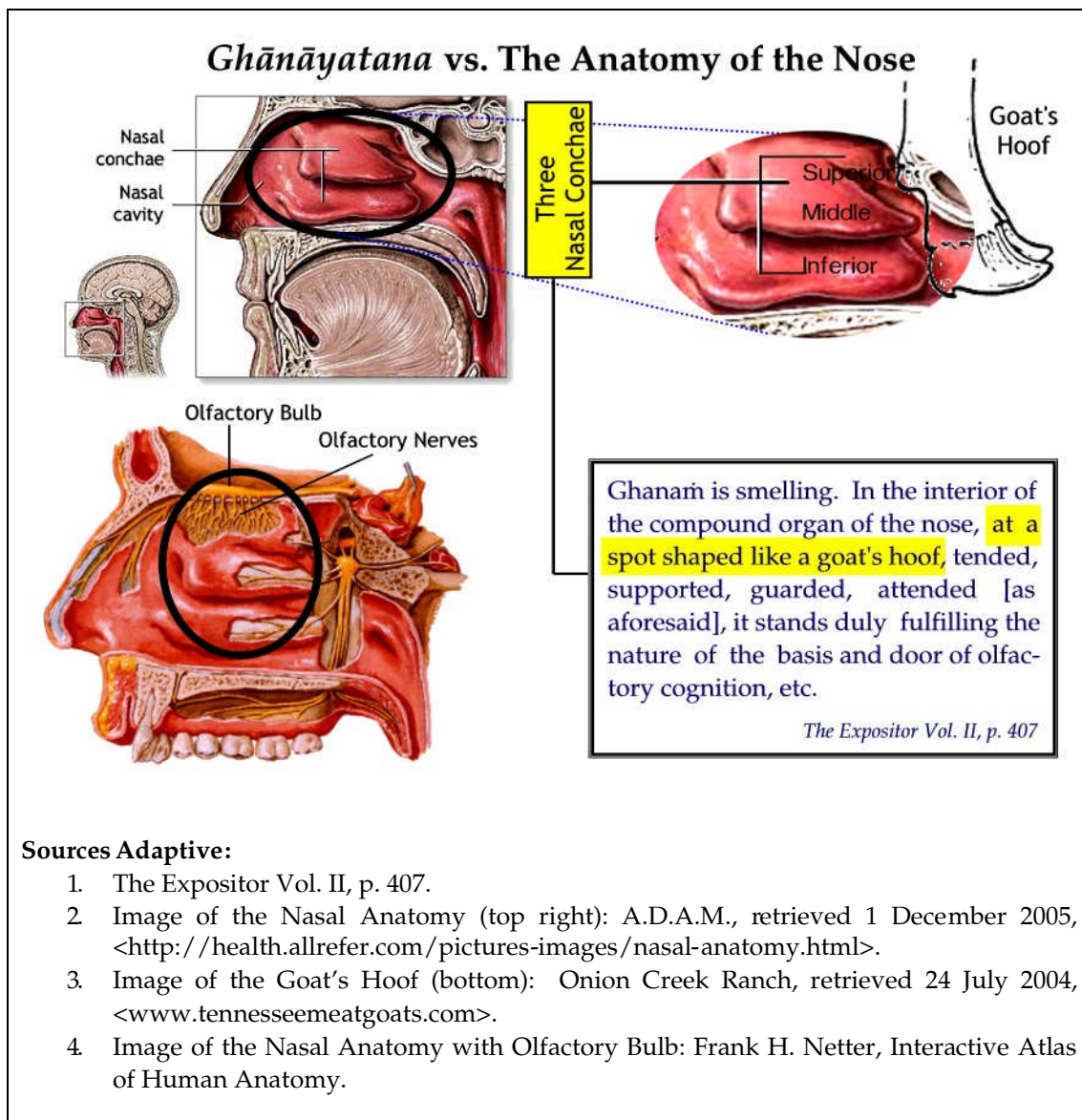
<sup>252</sup> N.R.M. Ehara, Soma, and Kheminda, 1995, *op. cit.*, p. 239.

<sup>253</sup> Mehm Tin Mon, 1995, *op. cit.*, p. 229.

**Figure 73. *Sotāyatana* and the Anatomy of the Ear.** The description of the cochlea located inside the ear resembles the description of the location of the *sotappasāda* appeared in the *Aṭṭhasālinī*.



**Figure 74. *Ghānāyatana* and the Anatomy of the Nose.** The figure shows the anatomy of the nose and the conchae. Beside and above the upper most concha is the olfactory region, where odor molecules are dissolved and come into contact with the olfactory sensory cells. The shape of the conchae resembles the description of the nearby location of the *ghānappasāda* (the three goat's hooves). Therefore, the *ghānappasāda* may permeate through the location of the olfactory nerves and the olfactory bulb in the upper part of the conchae (where the three goat's hooves meet).



If we take a look at figure 74 (bottom picture), we find that the olfactory nerves spread in the upper part of the conchae, known as superior

concha.<sup>254</sup> These nerves scatter in the area of the upper part of the nasal cavity and then go upwards entering the olfactory bulb. The function of these nerves is related to the sense of smell.

In my opinion, the place shaped like three goat's hooves may refer to the nasal conchae, and the place where the three goat's hooves meet may refer to the olfactory bulb. What spreading inside the organ of the nasal conchae and the olfactory bulb is the olfactory nerves. Therefore, the *ghānappasāda* may permeate through the area of the olfactory nerves and the olfactory bulb, in the upper part of the conchae.

#### 4.1.4 *Jivhāyatana* and the Tongue

The *jivhāppasāda* of *jivhāyatana* is located at a spot shaped like the upper part of a lotus leaf (*uppaladalaggasaṇṭhāṇe padese*)<sup>255</sup> and spreading in the upper surface of the tongue.<sup>256</sup> The upper surface of the tongue contains numerous papillae. On the sides and around the base of the papillae are taste buds. The cells in each taste bud have a function to detect flavors and generate nerve signals sent to the taste center in the brain.<sup>257</sup> From the description, the *jivhāppasāda* mentioned in the Commentaries may reside in the area of the papillae on the dorsum surface of the tongue. Figure 75 shows that the anatomy of the tongue is similar to the description of the *jivhāppasāda*, since the papillae spread on the upper surface of the tongue and have a shape like a torn lotus leaf.

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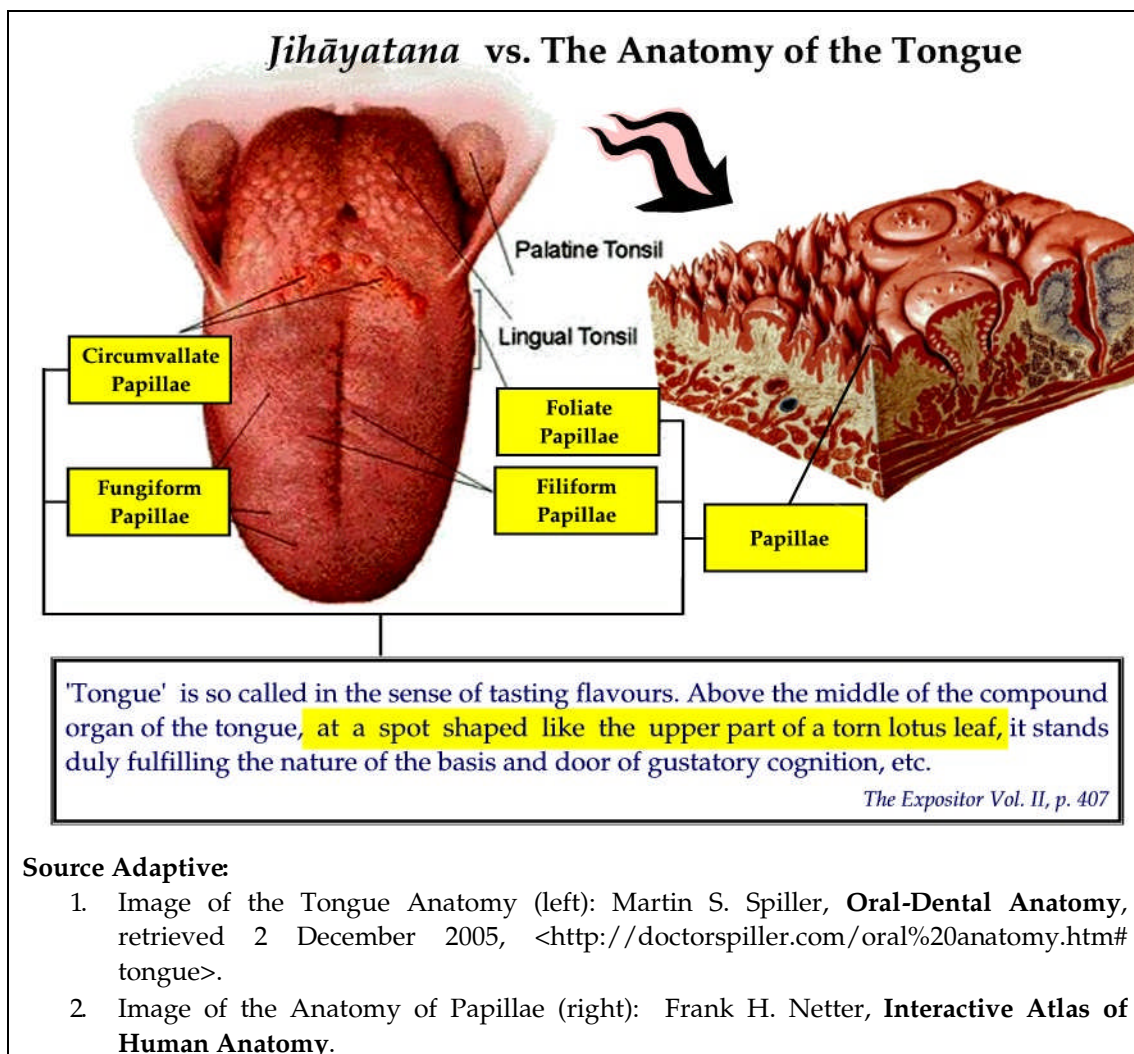
<sup>254</sup> Anne LeMaistre, **Respiratory System**, retrieved 1 December 2005, <<http://medic.med.uth.tmc.edu/lecture/main/tool4.htm>>.

<sup>255</sup> As 311.

<sup>256</sup> Mehm Tin Mon, 1995, **op. cit.**, p. 229. See also N.R.M. Ehara, Soma, and Kheminda, 1995, **op. cit.**, p. 239.

<sup>257</sup> See details in Philip Whitfield, 1995, **op. cit.**, pp. 66-67.

**Figure 75. *Jihāyatana* and the Anatomy of the Tongue.** The figure shows that on the upper surface of the tongue, there are numerous papillae. The papillae have a shape look like a torn lotus leaf/petal, which resembles the description of the *jivhāppasāda* appeared in the *Aṭṭhasālinī*.



#### 4.1.5 *Kāyāyatana* and the Body

The *kāyāyatana* in the *Tipiṭaka* refers to the *kāyappasāda*. The *kāyappasāda* is described as spreading throughout the whole body like oil diffusing over the cotton-rag (*kappāsapaṭalasineho*).<sup>258</sup> *The Path of Freedom* notes

<sup>258</sup> As 311.

that the *kāyappasāda* is a sensory matter that is sensitive to touch located, throughout the body, except the insensitive parts such as hair, nails, and hard dried skin.<sup>259</sup>

As mentioned in chapter III, in our body there are millions of small sensors buried under the surface of the skin. These nerve sensors are interwoven spreading throughout the whole body. The location of the *kāyappasāda* may diffuse throughout these nerve sensors. Figure 76 shows that the interwoven nerve sensors spreading throughout the whole body is similar to the description of the *kāyāyatana* in the Commentaries.

#### 4.1.6 *Manāyatana* and the Mind

Even though the *manāyatana* has a very important role in Buddhism, the Buddha never specified a specific location of the *manāyatana*. The *manāyatana* is the resort of *manodhātu* and *manoviññāṇadhātu*. Ñānamoli indicates that the arising of *manodhātu* and *manoviññāṇadhātu* depends on a location inside the heart,<sup>260</sup> called *hadayavatthu*. It must be noted here that this term does not exist in the *Tipiṭaka*. It only appears in the Commentaries.

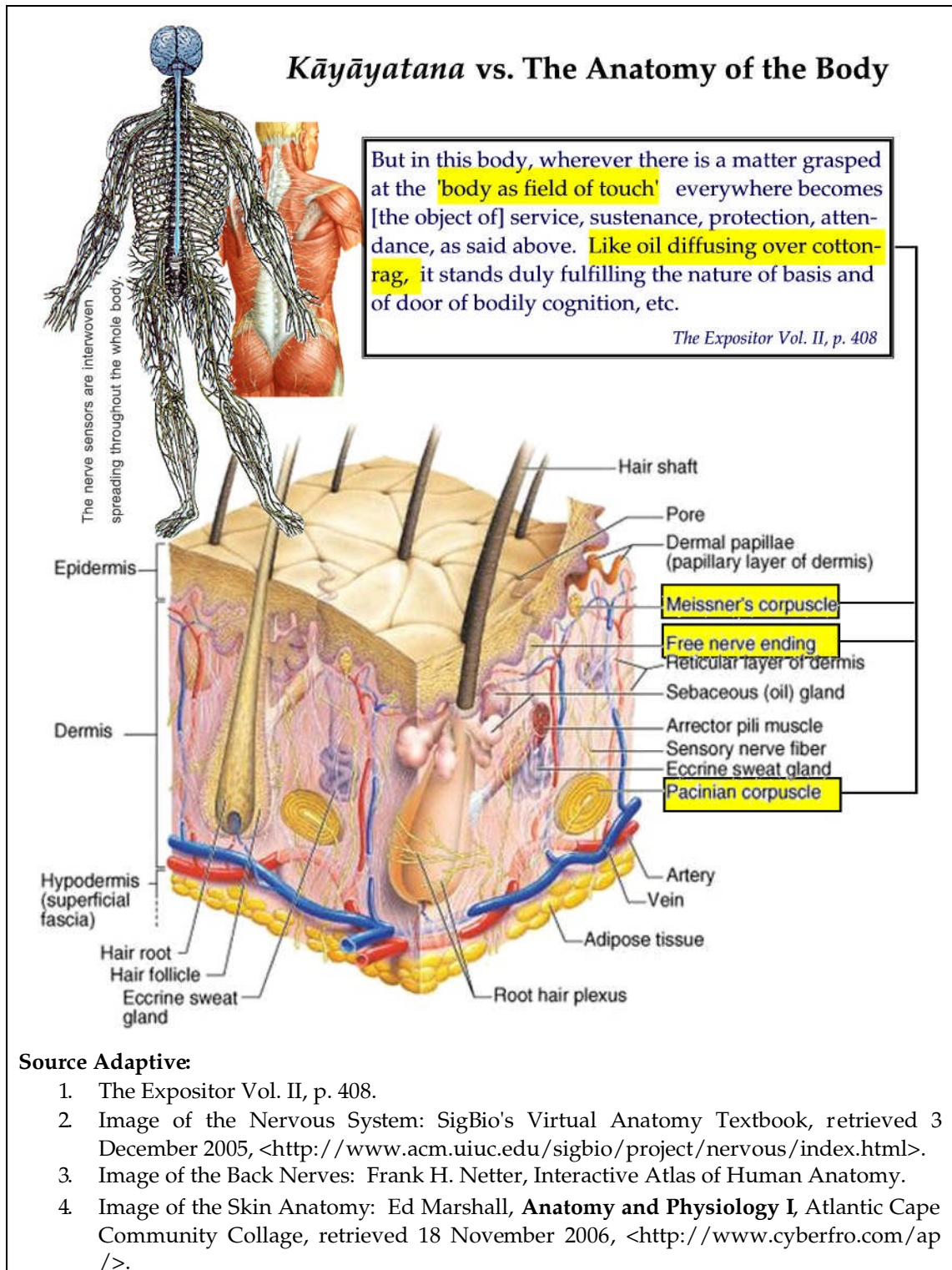
There are many theories about the location of the *manāyatana*, the mind, from both Buddhist scholars and scientists. These theories sometimes conflict with each other. The concept of the mind as a physical entity existed before the Buddha's time.<sup>261</sup> Many Buddhist scholars have attempted to develop theories about the location of the mind. The most three popular locations of the mind as mentioned earlier are the brain, the heart, and the whole body.

<sup>259</sup> N.R.M. Ehara, Soma, and Kheminda, 1995, *op. cit.*, p. 240.

<sup>260</sup> See details in Ñānamoli, 1987, *op. cit.*, pp. 297-298.

<sup>261</sup> See details in Sarasvati Chennakesavan, *Concept of Mind in Indian Philosophy*, 2<sup>nd</sup> ed. and Reprinted (Delhi: Motilal Banarsidass Publishers, 1991), pp. 1-2.

**Figure 76. *Kāyāyatana* and the Anatomy of the Body.** The figure shows the anatomy of the body and the sensory nerves under the skin. The sensory nerves are interwoven spreading throughout the whole body. It is possible that the *kāyappasāda* may diffuse in these nerve sensors.



### 1. The Brain as the Location of the Mind

As mentioned in chapter III, many modern scientists and philosophers argue that the brain should be the seat of consciousness or the location of the mind. A theory related to the brain-base is proposed by Johnjoe McFadden.

McFadden postulates that an electromagnetic field exists in the brain is related to the physical location of consciousness.<sup>262</sup>

The electromagnetic force is one of the four fundamental forces from which other forces are derived. The other three fundamental forces are the strong nuclear force (holding atomic nuclei together), the weak nuclear force (causing some form of radioactive decay), and the gravitational force.

C.L.A. De Silva comments on the brain-base theory that:

The Scientists and western Philosophers, of course, would say that consciousness arises in the brain and not in the heart. With due deference to Scientists and Physiologists, it must be stated that, although their investigations and researches more or less definitely have located different centres in the brain as controlling certain phenomena, and though the functions of the brain, which constitute the cerebrum and cerebellum, medulla oblongata and spinal cord, sensory and motor nerves and so on have been understood, which are incontrovertible facts, they have not reached the climax nor would they ever, as their knowledge is not perfect and that knowledge too is with regard to only physical matter. Even in the event of Scientists and Physiologists arriving at the ultimate truth with regard to their findings, they could do so with matter only, but not with immaterial qualities such as consciousness and their mental concomitants, which could be discerned only by an Omniscient.<sup>263</sup>

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<sup>262</sup> See details in Johnjoe McFadden, *op. cit.*, pp. 23-50.

<sup>263</sup> C.L.A. De Silva, **A Treatise on Buddhist Philosophy of Abhidhamma** (Delhi: Sri Satguru Publications, 1997), pp. 189-190.

The theory of the brain-base does not exist in Buddhism, since the first consciousness arises at the time of the conception. However, the brain is formed and starts functioning after fertilization. Nevertheless, the theory about the relationship between the electromagnetic force and consciousness is still very interesting and shows that the brain has some influences on the arising of consciousness.

## 2. The Heart as the Location of the Mind

In the Buddhist tradition, the concept of the mind is bound together with the concept of the *hadayavatthu*. This concept is created by the commentators, not by the Buddha himself. In the Commentaries, the *hadayavatthu* seems to be located somewhere inside the flesh of the heart.<sup>264</sup>

Sunthornthepvarakul gives his opinion about the location of the *hadayavatthu* that it may be located somewhere in the upper right chamber of the physical heart. This is based on the idea that the amount of blood in the upper right chamber of the heart should be about a handful (*pasata*) as same as what mentioned in the Commentaries. He also indicates the importance of this area as the electrical conduction system of the heart.

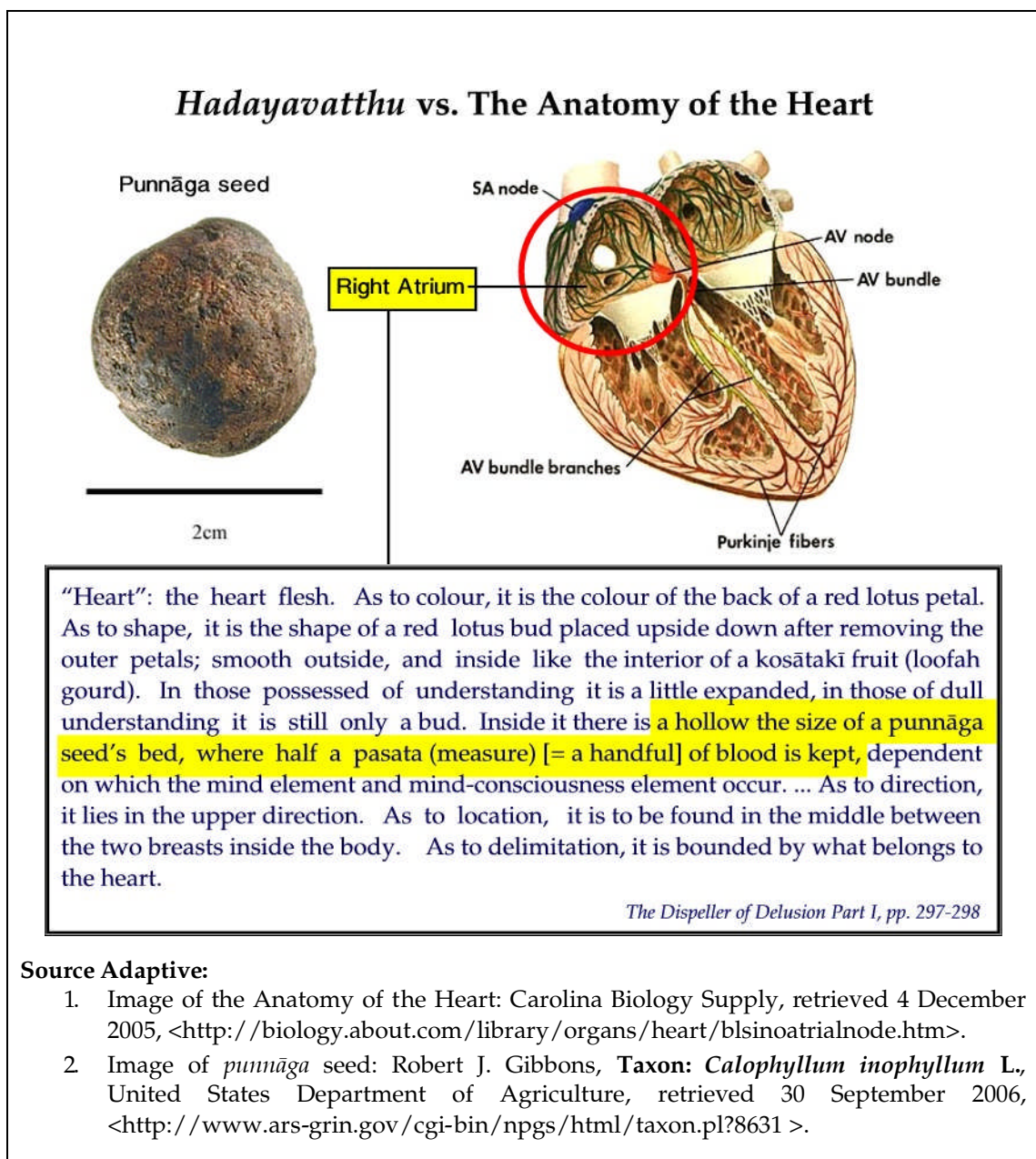
Since the arising of *manodhātu* and *manoviññāḍhātu* depends on the *hadayavatthu* as their material support and they also have the *manāyatana* as their resort, the *manāyatana* may be located at the same location as the *hadayavatthu*. Figure 77

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<sup>264</sup> See details in Ñānamoli, 1987, *op. cit.*, pp. 297-298.

expresses the anatomy of the physical heart and the possible location of the *hadayavatthu* in the upper right chamber of the heart, according to Sunthornthepvarakul's opinion.

**Figure 77. *Hadayavatthu* and the Anatomy of the Heart.** The figure shows the anatomy of the heart and the potential location of the *hadayavatthu* in the upper right chamber of the heart.



Mehm Tin Mon further elaborates the concept of the *hadayavatthu* that the *hadayavatthu* is located spreading throughout the blood inside the heart.<sup>265</sup> Therefore, in a moment there are billions of *hadayavatthus*, not just only one *hadayavatthu* exists at one moment.

Another interesting idea related to the *hadayavatthu* is from Egerton C. Baptist. Baptist says that “this heart-base (*hadayavatthu*) is present in that purest of pure blood, in quantity about half a handful (or, cupful) found in a small type of receptacle (resembling a cavity) of the heart.”<sup>266</sup> His opinion does not support the idea of the *hadayavatthu* located around the upper right chamber of the heart, since the blood in the right side of the heart is deoxygenated. The location of the *hadayavatthu* from Baptist should be located either in the upper left chamber of the heart where oxygenated blood is collected or the bone marrow where blood cells are produced.

*The Dispeller of Delusion* elaborates the location of the *hadayavatthu* that its delimitation is bounded to what belongs to the heart. In this case, the blood also belongs to the heart. If the blood is a carrier of the *hadayavatthu*, then the *hadayavatthu* should be able to experience the whole body through the circulation of the blood. However, since we do not involve in sharing sensation outside the body when the blood spills out, then the blood may not be a carrier of the *hadayavatthu*.

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<sup>265</sup> Mehm Tin Mon, 1995, *op. cit.*, p. 230.

<sup>266</sup> Egerton C. Baptist, *Abhidhamma for the Beginner* (Colombo: The Colombo Apothecaries' Co., Ltd., 1959), p. 122.

Rollin McCraty mentions about the electromagnetic force produced by the heart that it is much stronger than the electromagnetic force produced by the brain. From McCraty's idea, we can see that the electromagnetic field produced by the heart has an effect on every cell in the body, including the human brain. McCraty's research shows that the heart should be the base of the mind, not the brain.

There is an argument that the heart is not the seat of consciousness, since the heart of an embryo does not beat at the time of conception, but in the third week of its life. In addition, with an advancement of new technologies the heart transplantation can be done in a patient with a heart disease. Another argument is raised whether our consciousness is removed along with the old heart after performing the heart transplantation or not. Will we have other person's consciousness accompanied the new heart in our body?

### 3. The Whole Body as the Location of the Mind

Another interesting theory about the location of the mind is that the whole body is the seat of consciousness. The idea of the whole body as the location of the mind can be seen from the theories of Roy E. John and Deepak Chopra. John thinks that the seat of consciousness spreads throughout the whole body via its neuroskeletal system. However, Chopra has the idea that the seat of consciousness resides in every DNA starting from the very first DNA molecule before the embryo begins to divide. Latter, the embryo forms itself a heart, a brain, and a nervous system.

From chapter III, we see that the delimitation of the *hadayavatthu* is bounded to what belongs to the heart. Therefore, the location of the *hadavavatthu* should cover the whole body. Even though the boundary of the neuroskeletal system and the DNA cover the whole body, but the relationship between them and the heart is still ambiguous. There is another problem in this idea that the location of the *hadayavatthu* may be overlapped with the location of the *kāyāyatana*. Therefore, we do not know whether the neuroskeletal system and the DNA belong to the heart or not.

From the analysis of three possible locations of the mind above, the heart seems to have a prominent characteristic of the mind, because of the following reasons:

1. The whole body as the location of the mind: This idea seems to be the least possible option, since when a man lost his body part, such as a hand, his mind is still in perfect function.
2. The brain as the location of the mind: Most scientists believe that the brain is the seat of consciousness, since the brain involves in many important functions that are vital to human life. However, in case of a patient with brain death, his heart still operates. Therefore, the brain should not be the location of the mind.
3. The heart as the location of the mind: Many physicians believe that the heart is the seat of consciousness. If the heart stops functioning, human life certainly becomes to an end.

In order to support this idea, I would like to explore information about *citta*, a synonym of the term *manāyatana*. The *Tipiṭaka* mentions that:

- *Citta* resides in a cave (*guhāsayanī*): this description is similar to the appearance of chambers of the heart. The brain and the body do not have an appearance of a cave.
- *Citta* is formless (*asarīraṇī*): this description is similar to the appearance of the electromagnetic force that can be generated from either the heart or the brain.
- *Citta* goes far from its origin (*dūraṇigamanī*): this description is similar to both the circulation of blood and the radiation of the electromagnetic force that can go far from their origin.
- *Citta* can wander wherever it desires (*yathākamanipātino*): this is similar to the characteristic of the electromagnetic force, which can radiate and not limited by the human body.

Therefore, in a grown human being, the location of the *manāyatana* may permeate throughout the whole body, where the right upper chamber of the heart is the center of the *manāyatana*. We may think that in the absence of the physical heart, there may be no *manāyatana*. This concept is not correct, because we bind the concept of the mind to a physical gross form of material phenomena. Followings are the support that the heart is the seat of the mind:

- The delimitation of the *hadayavatthu* is bounded by what belongs to the heart: From this sentence, it shows that the heart has a close relationship to the *hadayavatthu*.
- The *hadayavatthu* is a *sukhumarūpa*: The physical heart is a gross form of material phenomena. Even though the

whole physical heart is removed, the subtle material quality of the *hadayavatthu* can not just simply be removed by the process of surgery. In addition, we cannot remove everything that belongs to the heart all at once from the human body and still keep that human alive.

- The *hadayavatthu* is *kammajarūpa*: Everything that happens to the *hadayavatthu* is due to the law of *kamma*.

A question is raised, where is the *hadayavatthu*, when there is no heart? In my opinion, the center of the *hadayavatthu* should reside at the location where the heart is. In a patient whose heart is removed, the center of the *hadayavatthu* should be at the same location of his old heart. In an embryo whose heart is not formed, the center of the *hadayavatthu* should be at the location where the heart will be formed. Dr. Disayavanish supports this idea by expressing his opinion about the location of the mind that:

The heart should be the seat of the mind. Clinically, there are many patients who are diagnosed as suffering from brain death but their heart are still functioning, without nerve impulse from the brain. The Sinoatrial (SA) node is considered as the major pacemaker of the heart. After the brain is death, the SA node can act automatically to control the functions of the heart. Therefore, it can be said that the heart is the seat of the mind, while the brain is its office. However, this opinion does not deny the theory that the mind exists in the whole body.<sup>267</sup>

What mentioned earlier about the location of the mind, including the brain, the heart, the whole body, and the electromagnetic force, is all in the material level. The knowledge of scientists and philosophers limits only to the level of material phenomena and could not break through mental phenomena. This is an important issue where science lags behind Buddhism.

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<sup>267</sup> Commented by Dr. Chamlong Disayavanish on December 14, 2007.

## 4.2 The Comparison between the *Bāhirāyatana*s and the Sense Stimuli

In chapter II, we already know that the external *āyatana*s are compared to village-raiding robbers, since they harass the internal sense bases by agreeable and disagreeable forms. These external *āyatana*s turn to be *ārammaṇas* when they become objects of the internal sense bases. In this section, I will make a comparison between the external *āyatana*s in the Buddhist scriptures and the sense stimuli in science.

### 4.2.1 *Rūpāyatana* and Visual Stimulus

According to the *Abhidhamma Piṭaka*, the *rūpāyatana* is the appearance of color. The Commentaries indicate that the appearance of color has a quality of brightness, which is known as *vaṇṇanibhā* (*Rūpāyatanaṇiddeśe vaṇṇo va vaṇṇanibhā*).<sup>268</sup> In order to cover all range of visibility, the Buddha also includes dim light (*andhakāro*) in the *rūpāyatana*.<sup>269</sup> This is very interesting, since there are coincidences between the information in the *Abhidhamma Piṭaka* and the information discovered by modern scientists.

In science, the physical stimulus for the eye is light. Table 39 compares information of the sense object of seeing between in the Buddhist scriptures and in science. The similarities between the sense object of seeing in the Buddhist scriptures and in science are as follows:

1. Bright light and dim light are the objects of seeing

In Buddhism, the Commentaries explain that not only *vaṇṇanibhā*, but also *andhakāro* are parts of the *rūpāyatana*.

<sup>268</sup> As 316.

<sup>269</sup> Dhs 139.

**Table 39. The Comparison of the Sense Object of the Eye between *Rūpāyatana* in the Buddhist Scriptures and the Visual Stimulus in Modern Science.** This table shows the information about the object of seeing appeared in the Buddhist scriptures and what is discovered by scientists.

|  | <b>Buddhist Scriptures</b>                                 | <b>Modern Science</b>  |
|--|--|--|
| <b>Object of the Eye</b>                             | <i>Vaiṣṇanibhā</i><br><i>Andhakāro</i>                     | Light & color from reflection of light<br>Dim light  |
| <b>Medium</b>  | <i>Āloka</i>   | Light  |
| <b>The Ability of the Object in Reaching the Eye</b> | <i>Asampatta</i><br>(not reaching the object)              | In the process of seeing, the eye does not directly touch the object. However, it just only absorbs the reflection of light.                     |
| <b>Type of Material Phenomena</b>                    | <i>Avinibbhogarūpa</i><br>(inseparable material phenomena) | The arising of color depends on the ability of each object to absorb and reflect light. Therefore, color could not be separated from the object. |

If we reinvestigate the human retina, then we find that it consists of two types of photoreceptors, which are rods and cones. The cones have the ability to detect bright light, while the rods have the ability to detect dim light. The existence of these two photoreceptors may be known by the Buddha, since he covers two types of light, bright light and dim light, in his teaching. This is the first similarity on the object of seeing between Buddhism and science.

## 2. Light is an important factor in the sense object of seeing

In physics, color is a reflection of light on an object. Therefore, light and color could not be separated. Light

(*āloka*) is also mentioned by the commentators as an important factor of the arising of *cakkhudvāravīthi*. This is the second similarity.

3. The eye does not directly contact the object of seeing

In both Buddhism and science, the eye does not directly touch the object of seeing (*asampatta*).<sup>270</sup> Only the reflection of light on the object in science or the appearance of color in Buddhism is absorbed by the eye. This is the third similarity.

4. The object of seeing is an inseparable material phenomenon of an object

In Buddhism, the appearance of color is an inseparable material phenomenon of an object.<sup>271</sup> This can be explained in scientific language that color is a property of each individual object to absorb and reflect light; therefore, color cannot be separated from the object. This is the forth similarity.

From the comparison, we can see that there are some similarities between the object of seeing in Buddhism and in science. However, the Buddha never systematizes the object of seeing in physical detail, unlike scientists do. The scientists explore the object of seeing in more and more detail, such as they try to find out how fast the light travels, and what frequencies of the electromagnetic wave the eye can see. In Buddhism, this type of information is not important to the process of Enlightenment. That is why the Buddha never teaches the object of seeing in more physical detail.

<sup>270</sup> Anurudhācariya, 1993, **op. cit.**, p. 245.

<sup>271</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

#### 4.2.2 *Saddāyatana* and Auditory Stimulus

The *saddāyatana* is sound. The Commentaries do not have much explanation about what the *saddāyatana* is. However, the commentators indicate that *ākāsa* is a very important factor of the arising of *sotadvāravithi*.

In science, the physical stimulus of the ear is sound waves. We already know from chapter III that sound needs a medium for traveling from its origin to the destination. This medium is a gap between molecules that allow vibration to arise. Table 40 compares information of the sense object of the ear between in the Buddhist scriptures and in science. The similarities between the sense object of hearing in the Buddhist scriptures and in science are as follows:

1. Sound is the object of hearing

In Buddhism, any sound that human can hear is the *saddāyatana*. Therefore, not all sound is the *saddāyatana*. This is also the same in science. Scientists classify the range of sound wave that human can hear into a range of frequencies between 20 and 20,000 Hz. This is the first similarity.

2. Space is an important factor in the sense object of hearing

In science, sound needs a gap between molecules to allow vibration to arise in order to transmit its energy from its source to its destination. The gap between molecules in science is also known as *ākāsa* in the Buddhist scriptures. This is the second similarity.

3. The object of hearing is not directly contacted by the ear

The Commentaries indicate that the *saddāyatana* is not directly touched by the ear (*asampatta*).<sup>272</sup> This is similar to the way sound waves traveling from its source to its destination. Only the energy of vibration is transmitted to the ear, not the source of the sound or the vibrated molecules. This is the third similarity.

Like the object of seeing, the Buddha does not systematize the object of hearing into more physical detail. He emphasizes his teachings on the direct path to the Enlightenment. This is how Buddhism is different from science. Scientists pay more attention to find out how sound travel, how fast it can travel, and etc.

**Table 40. The Comparison of the Sense Object of the Ear between *Saddāyatana* in the Buddhist Scriptures and Auditory Stimulus in Modern Science.** This table shows the information about the object of hearing that appears in Buddhism and in modern science.

|  | Buddhism             | Modern Science  |
|--|----------------------|---|
| <b>Object of Hearing</b>                             | <i>Sadda</i> (sound) | Sound   |
| <b>Medium</b>  | <i>Ākāsa</i>         | Space/Gap allows vibration to arise.  |
| <b>The Ability of the Object in Reaching the Ear</b> | <i>Asampatta</i>     | In the process of hearing, the human ear can hear sounds because the energy of the sounds is transmitted by the vibrations of molecules. These molecules do not move to the ear themselves and are not perceived by the ear, only the energy of vibrations is perceived by the ear. |

<sup>272</sup> Anurudhācariya, 1993, *op. cit.*, p. 245.

### 4.2.3 *Gandhāyatana* and Olfactory Stimulus

The *gandhāyatana* is the odor. The Buddhist scriptures do not contain much information about what the *gandhāyatana* is. However, they indicate that *vāyo* is a very important factor of the arising of *ghānadvāravīthi*.

In science, the olfactory stimulus is an airborne chemical, which starts as chemical molecules floating in the air. The olfactory stimulus needs to be volatile to be able to move its molecules from its source to the human nose. Table 41 compares information of the sense object of the nose between in the Buddhist scriptures and in science. The similarities between the sense object of smell in the Buddhist scriptures and in science are as follows:

1. Odor is the object of smell

Both Buddhism and science have odor as the object of the nose. This is the first similarity.

**Table 41. The Comparison of the Sense Object of the Nose between *Gandhāyatana* in the Buddhist Scriptures and Olfactory Stimulus in Modern Science.** This table shows the information about the object of smelling in Buddhism and in science.

|  | Buddhism                              | Modern Science   |
|--|---------------------------------------|--|
| <b>Object of Smelling</b>                          | <i>Gandha</i> (odor)                  | Odor   |
| <b>Medium</b>                                      | <i>Vāyo</i>                           | Air element; odor needs to be volatile.  |
| <b>The Ability of the Object to Reach the Nose</b> | <i>Sampatta</i> (reaching the object) | The odorant molecules must bind to the sensory receptors in the process of smelling.                           |
| <b>Type of Material Phenomena</b>                  | <i>Avinibbhogarūpa</i>                | Molecules in each substance have a specific chemical property which could not be separated from the substance. |

2. Movement is an important factor in the sense object of smell

In science, odor needs to be volatile to be able to move its molecules from its source to the human nose. This can be done by the help of the element of air or wind. The air element in science can be compared to the *vāyodhātu* in the Buddhist scriptures, since the *vāyodhātu* is the element of vibration which causes motion in substances. This is the second similarity.

3. The object of smell directly contacts the nose

In Buddhism, the Commentaries indicate that the *gandhāyatana* directly touches the nose (*sampatta*).<sup>273</sup> This is similar to knowledge in science that human can smell an odor only when the molecules of odor are trapped inside the nose. This is the third similarity.

4. The object of smell is an inseparable material phenomenon of an object

In Buddhism, *gandha* is an inseparable material phenomenon of an object.<sup>274</sup> This can be explained in scientific language that the odor is chemical molecules. Each molecule has a specific chemical property, which could not be separated from the element. Therefore, odor cannot be separated from the object. This is the forth similarity.

<sup>273</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

<sup>274</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

#### 4.2.4 *Rasāyatana* and Gustatory Stimulus

The *rasāyatana* is the taste that produces an impact on the tongue. In the Buddhist scriptures, they indicate that the *āpodhātu* is a very important factor of the arising of *jīṇhādvāravīthi*.

In science, the gustatory stimulus is a flavor that is detectable in a form of solution. These flavor molecules need fluid element to be the medium of tasting. In human, this fluid is known as saliva. Table 42 compares information of the sense object of the tongue between in the Buddhist scriptures and in modern science.

The similarities between the sense object of taste in the Buddhist scriptures and in science are as follows:

**Table 42 The Comparison of the Sense Object of the Tongue between *Rasāyatana* in the Buddhist Scriptures and Gustatory Stimulus in Modern Science.** This table shows the information about the object of taste that appears in Buddhism and in modern science.

|   | Buddhism               | Modern Science  |
|---|------------------------|---|
| <b>Object of Tasting</b>                                | <i>Rasa</i>            | Flavor molecules  |
| <b>Medium</b>   | <i>Āpodhātu</i>        | Fluid   |
| <b>The Ability of the Tongue in Reaching the Object</b> | <i>Samṛatta</i>        | The flavored molecules have to come into contact with the sensitive part of the tongue in the process of tasting.               |
| <b>Type of Material</b>                                 | <i>Avinibbhogarūpa</i> | Flavored molecules are a specific chemical property of each substance. Therefore, it could not be separated from the substance. |

1. Taste is the object of the tongue

Both Buddhism and science have taste as the object of the tongue. This is the first similarity.

2. Fluid is an important factor in the sense object of taste

In science, taste can be detected in a form of solution. This can be done by the help of the element of fluid or saliva. The fluid element in science can be compared to the *āpodhātu* in the Buddhist scriptures, since fluidity is the prominent characteristic of the *āpodhātu*. This is the second similarity.

3. The object of taste directly contacts the tongue

In Buddhism, the Commentaries indicate that the *rāsāyatana* directly touch the tongue (*sampatta*).<sup>275</sup> This is similar to knowledge in science that flavored molecules have to come into contact with the sensitive part of the tongue in the process of tasting. This is the third similarity.

4. The object of taste is an inseparable material phenomenon of an object

In Buddhism, *rasa* is an inseparable material phenomenon of an object.<sup>276</sup> This can be explained in scientific language that the flavor is a specific chemical property of each molecule; therefore, flavor cannot be separated from the object. This is the forth similarity.

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<sup>275</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

<sup>276</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

#### 4.2.5 *Phoṭṭhabbāyatana* and Bodily Stimuli

According to the *Abhidhamma Piṭaka*, the *phoṭṭhabbāyatana* consists of the three primary elements of the *mahābhūtarūpa*. The three primary elements are *paṭhavīdhātu*, *tejodhātu*, and *vāyodhātu*, excluding *āpodhātu*. In science, the bodily stimuli are detected and identified by nerve signals, which respond to pressure, temperature, vibration, and pain.

The similarities between the sense object of touch in the Buddhist scriptures and in science are as follows:

1. Pressure, temperature, and vibration are the objects of the body

Pressure is the force applied on the surface of the skin, including in the deeper areas of the body such as the muscles, joints, and internal organs. This force creates the perception of softness and hardness which are the characteristics of the *paṭhavīdhātu* in Buddhism.

Pressure, in physiology, is also a form of high frequency vibrations,<sup>277</sup> which arises when there is a series of impingements on the skin.<sup>278</sup> A continuous series of impingements cause movement or vibration in the body. In Buddhism, movement and vibration are the result of the presence of the *vāyodhātu* in the object of touch.

Temperature is a characteristic of the *tejodhātu* in Buddhism. Temperature receptors, in physiology, are of two types,

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<sup>277</sup> Dee Unglaub Silverthorn, 2001, **op. cit.**, p. 291; and **DP**, s.v. “pressure pattern.”

<sup>278</sup> **DP**, s.v. “mind.”

namely, cold receptors and warm receptors. The cold receptors are sensitive to the temperature that is lower than the body temperature, while the warm receptors are sensitive to the temperature that is equal to the body temperature and above. In Buddhism, both cold and warm are resulted from the presence of the *tejodhātu* in the object of touch.

Therefore, pressure, temperature and vibration are the objects of the body both in Buddhism and in science. This is the first similarity. It must be noted here that even though pain is the object of touch in science, it is not the object of touch in Buddhism. Silverthorn explains that “pain is a perceived sensation rather than a stimulus.”<sup>279</sup> This may be why the Buddha does not classify pain as one of the objects of touch.

## 2. The object of touch directly contacts the body

In Buddhism, the Commentaries indicate that the *phoṭṭhabbāyatana* directly touch the body (*sampatta*).<sup>280</sup> This is similar to knowledge in science that the receptors for pressure, temperature, vibration, and pain are all buried under the layers of the skin and in the body. Therefore, the skin can sense the objects of touch only when these sensors are instigated by the objects of touch through the skin or inside the body. This is the second similarity.

In sum, only pressure, temperature and vibration are classified as the *phoṭṭhabbāyatana*. Table 43 compares information of the sense objects of

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<sup>279</sup> Dee Unglaub Silverthorn, 2001, **op. cit.**, p. 291.

<sup>280</sup> Anurudhācariya, 1993, **op. cit.**, p. 246.

**Table 43. The Comparison of the Sense Objects of the Body between *Phoṭṭhabbāyatana* in the Buddhist Scriptures and Bodily Stimuli in Modern Science.** This table shows the information about the objects of touch that appears in Buddhism and in modern science.

|   | Buddhism   | Modern Science   |
|---|--|--|
| <b>Objects of Touch</b>                               | <i>Paṭhavīdhātu</i>  | Pressure that creates the perception of soft-hardness  |
|   | <i>Tejodhātu</i>   | Temperature  |
|   | <i>Vāyodhātu</i>   | Movement and pressure in a form of high frequency vibrations   |
|   | Not a tangible object, but a type of feeling ( <i>dukkhavedanā</i> ) | Pain   |
| <b>The Ability of the Body in Reaching the Object</b> | <i>Samṃpatta</i>   | Pressure, temperature, motion, and pain can be detected when the nerve sensors are instigated by these objects |

the body between in the Buddhist scripture and in modern science. I will discuss the different perspective of the relationship between these three objects of touch and *mahābhūtarūpa* at the end of this chapter.

#### 4.2.6 *Dhammāyatana* and Mental Stimuli

Mental Stimuli are one of the subtlest topics in science. Scientists cannot comprehensively study and explore the human mind. Tentative mental stimuli in science include nerve signals, electromagnetic force produced by heart, nutrition, and experiences.

Nerve signals are always active. They are bombarded from human senses every second. These nerve signals are generally accepted by scientists

that they have an influence on the brain, which has the ability to process functions about perception, emotion, memory, and learning. Therefore, the nerve signals may take a role as mental stimuli.

Electromagnetic force produced by the heart is believed by a few people that it has an influence on the brain. There is no concrete evidence about how it works and what its influence on the brain is. In addition, a human heart can be removed during a heart surgical process; therefore, there is a strong objection about this theory.

Nutrition and experiences are the last two tentative mental stimuli that I mentioned in chapter III. Human needs nutrition to nurture the whole body. If the body lacks of nutrition, then it may have an effect on how human thinks and works. Therefore, nutrition is a tentative mental stimulus.

Experiences are another tentative mental stimulus. However, there is no concrete evidence about its effect on the mind. Nevertheless, experiences are one of the most important factors in human life.

We learn from the *Abhidhamma Piṭaka* that the *dhammāyatana* embraces both physical and mental phenomena. Modern scientists do not have knowledge to cover all of those areas, since science is based only on the experiments that can be tested by the five physical sense organs. Table 44 is an attempt to compare between the *dhammāyatana* in the Buddhist scriptures and equivalent information in science.

It should be noted here that while the goal of Buddhism is *nibbāna*, the goal of science is to produce a reliable model of reality.<sup>281</sup> Therefore, the

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<sup>281</sup> "Science," **Wikipedia, The Free Encyclopedia**, Wikimedia Foundation, Inc., retrieved 24 June 2006, <<http://en.wikipedia.org/w/index.php?title=Science&oldid=60316792>>.

concept of the *dhammāyatana* in Buddhism and mental stimuli in science are different.

**Table 44. *Dhammāyatana* in the Buddhist Scriptures and Equivalent Information in Modern Science.** This table shows the information about the *dhammāyatana* in the Buddhist scriptures comparing to the equivalent information in science.

| Buddhism                | Tentative Equivalent Information in Science  | Similarities and Differences   |
|-------------------------|--|--|
| <i>Vedanākkhandha</i>   | <b>Hedonic tone, sensation, feeling, perception, and volition:</b> Hedonic tone, sensation, feeling, perception, and volition are extensively studied in psychology and other areas of science in connection with the study of the brain function. The study includes the study of how the brain and the nervous system work, the influence of hormones and chemical substances on the function of organs and behaviors, and the influence of mental phenomena on individual, etc. | <i>Vedanākkhandha</i> , <i>saññākkhandha</i> , and <i>saikhārakkhandha</i> are mental phenomena ( <i>nāma</i> ) in Buddhism. However, scientists mostly emphasize their studies in material phenomena ( <i>rūpa</i> ) with an attempt to control mental phenomena by using material; such example can be seen from a doctor using drugs to control human behavior. |
| <i>Saññākkhandha</i>    |  |  |
| <i>Saikhārakkhandha</i> |  |  |
| <i>Itthindriya</i>      | <b>Sex quality:</b> One of the most popular sex determinations in science is the XX/XY sex-determination system. This system determines sex of human beings by judging from the combination of the chromosome X and chromosome Y in human DNA.   | <i>Itthindriya</i> and <i>purisindriya</i> are classified as <i>sukhumārūpa</i> . They are the material qualities that impart femininity and masculinity and spread all over the human body. In the same way, the chromosome X and Y are also material phenomena that spread throughout the whole body in every DNA.   |
| <i>Purisindriya</i>     |  |  |

Continued

**Table 44, continued. Dhammāyatana in the Buddhist Scriptures and Equivalent Information in Modern Science.** This table shows the information about the *dhammāyatana* in the Buddhist scriptures comparing to the equivalent information in science.

| Buddhism            | Tentative Equivalent Information in Science  | Similarities and Differences   |
|---------------------|--|--|
| <i>Hadayavatthu</i> | <b>Heart:</b> Even though, scientists have studied heart for a long time. However, the human heart still keeps its mystery.  | Many scholars have a debate upon the location of the <i>hadayavatthu</i> , whether it is located in the heart, the brain, or in the whole body. According to Buddhism, <i>hadayavatthu</i> is a <i>kammaja-rūpa</i> , which is unknown to scientists.  |
| <i>Jīvitindriya</i> | <b>Life:</b> There is no universal concept of life in modern science. However, it is generally accepted that life is a manifestation of a living being, which include the ability to reproduce, to grow, etc.  | <i>Jīvitindriya</i> is the vital force of life which spreads throughout the body. It is vitality in both mind and matter aspects. Mehm Tin Mon mentions that it may be regarded as psychic life, which is still under studied by scientists.   |
| <i>Kāyaviññatti</i> | <b>Bodily and verbal intimation:</b> There are some studies about verbal and non-verbal communication in science. The first scientific non-verbal communication was done by Charles Darwin in 1872. This study covers many scientific areas, such as kinesics, linguistics, semiotics, and social psychology. Before, Charles Darwin, John Bulwer (1644) also published a book about the study of gesture. | Scientists try to interpret verbal and non-verbal communication in many different ways. However, in Buddhism the commentators explain how <i>kāyaviññatti</i> (the alteration of the air element) and <i>vacīviññatti</i> (the alteration of the earth element) arise in relation to <i>citta</i> and <i>mahābhūtarūpa</i> . |
| <i>Vacīviññatti</i> |  |  |

Continued

**Table 44, continued. Dhammāyatana in the Buddhist Scriptures and Equivalent Information in Modern Science.** This table shows the information about the *dhammāyatana* in the Buddhist scriptures comparing to the equivalent information in science.

| Buddhism  | Tentative Equivalent Information in Science   | Similarities and Differences  |
|---|---|---|
| <i>Ākāśadhātu</i>                                   | <b>Space:</b> Space is interested by scientists and philosophers. The definition of space is varied dependent on the fields of study. Some refers to space as a fundamental structure of the universe (philosophy) which objects are separated and located. Some refers to it as a set (in mathematics). Some refers to it as a three-dimensional unit (physics). | The element of space in Buddhism has some similarities to the concept of space in philosophy and physics. In Buddhism, the element of space indicates limitation and separation of the material groups. |
| <i>Āpodhātu</i>                                     | <b>The element of cohesion:</b> There is no concept of <i>āpodhātu</i> in science.  | See the last section of this chapter for more information.  |
| <i>Lahutā</i><br><i>Mudutā</i><br><i>Kammaññātā</i> | <b>Agility, elasticity, and adaptability:</b> These three abilities of the body are not mentioned much in science. They are always referred in the subject of sport performance and healthy body.   | In Buddhism, <i>lahutā</i> , <i>mudutā</i> , and <i>kanmanññātā</i> are the characteristics of matter. They are conditions and changeability of <i>rūpa</i> , unlike in science.                        |

Continued

**Table 44, continued. Dhammāyatana in the Buddhist Scriptures and Equivalent Information in Modern Science.** This table shows the information about the *dhammāyatana* in the Buddhist scriptures comparing to the equivalent information in science.

| Buddhism  | Tentative Equivalent Information in Science   | Similarities and Differences  |
|---|---|---|
| <p><i>Upacaya</i></p> <p><i>Santati</i></p> <p><i>Jaratā</i></p> <p><i>Aniccatā</i></p> | <p><b>Growth, continuity, and decay, impermanence:</b> Growth (biological development) and decay (decomposition) are the topics that are extensively studied in Biology. Continuity is the state that is identified with growth. Impermanence is not the state that mentioned in science.</p> | <p>In Buddhism, <i>upacaya</i>, <i>santati</i>, <i>jaratā</i>, and <i>aniccatā</i> are one of the subtlest topics. However, some Buddhist scriptures explain that <i>upacaya</i> refers to the growth of the embryo till the sense organs are completely developed. <i>Santati</i> refers to the continuity of the body from the completion of the sense organs till the body starts to decay. <i>Jaratā</i> refers to the state of the body when the bones starts breaking, the hair turns into grey, etc.<sup>282</sup> This explanation may not be accurate, but it may give some ideas about the four phases of matter. Even though, scientists study about the development and decomposition of the body, the concept is still different from the concept that exists in Buddhism, especially, <i>aniccatā</i> which is a very unique concept in Buddhism.</p> |
| <p><i>Kavalīṇikārāhāra</i></p>  | <p><b>Nutritive essence:</b> Nutritive essence is also studied in science.</p>  | <p>Even though scientists study nutritive essence, however, they emphasize their study in different areas from Buddhism.</p>  |

<sup>282</sup> Y. Karunadasa, **Buddhist Analysis of Matter** (Colombo: The Department of Cultural Affairs, 1967), p. 80.

### 4.3 The Comparison between the Conditions for the Arising of the Thought Process in Buddhism and the Prerequisites for the Arising of the Sensation in Modern Science

The conditions for the arising of the thought process in Buddhism are similar to the conditions of the arising of the sensation in modern science. One of the major differences between them is that *manasikāra* plays an important role in the arising of the thought process in Buddhism. However, in science, the brain seems to play this role instead, as the place to receive and interpret sensations. Even though, the role of the *manasikāra* may not be prominent, however, according to psychology ‘attention’ is a state of consciousness which seems to lie behind all actions, either involuntary or voluntary.<sup>283</sup> Table 45 shows the comparison between the conditions for the arising of the thought process in Buddhism and normal sensation in science.

As shown in chapter III, Helmholtz comments that “all sensory stimulation is inherent ambiguous, and true perception required the active participation of the perceiver in order to succeed.”<sup>284</sup> What he talks about may refer to the *manasikāra*. In addition, Mehm Tin Mon gives an opinion about the *manasikāra* that:

Of the four causes which are required for the arising of each type of *vīthi*, the first three more or less parallel the requirements known by science. The fourth cause, i.e., *manasikāra*, is unknown in science. But many instances may be quoted that this cause is indispensable for the awareness of a sense-object.<sup>285</sup>

<sup>283</sup> DP, s.v. “attention.”

<sup>284</sup> Andrew M. Colman, 1994, *op. cit.*, p. 156.

<sup>285</sup> Mehm Tin Mon, 1995, *op. cit.*, p. 135.

The concept of the *manasikāra* is still mysterious to scientists. Scientists prefer to believe that the brain plays this role instead.

**Table 45. The Comparison between the Conditions for the Arising of the Thought Process in Buddhism and Sensation in Modern Science.** There are six classes of conditions classified according to the six sense doors. Followings are the comparison between the conditions for the arising of the thought process in Buddhism and the arising of perception in modern science.

| Door | Conditions for the Arising of Thought Process in Buddhism                                | Conditions for the Arising of Perception Science  |
|------|--|---|
| Eye  | <ul style="list-style-type: none"> <li>• <i>Cakkhu</i> must be good.</li> </ul>          | <ul style="list-style-type: none"> <li>• Retina inside the eye must be functioning.</li> </ul>  |
|      | <ul style="list-style-type: none"> <li>• <i>Rūpārammaṇa</i> must be present.</li> </ul>  | <ul style="list-style-type: none"> <li>• Electromagnetic spectrum that is visible to human allows the eye to see objects.</li> </ul>                                  |
|      | <ul style="list-style-type: none"> <li>• <i>Āloka</i> must be present.</li> </ul>        | <ul style="list-style-type: none"> <li>• Light allows human to see objects from its reflection on the object surface.</li> </ul>                                      |
|      | <ul style="list-style-type: none"> <li>• <i>Manasikāra</i> must be present.</li> </ul>   | <ul style="list-style-type: none"> <li>• The role of attention is ambiguous; however, the brain plays an active function in the process of perception. (*)</li> </ul> |
| Ear  | <ul style="list-style-type: none"> <li>• <i>Sotappasāda</i> must be good.</li> </ul>     | <ul style="list-style-type: none"> <li>• Cochlea inside the ear must be functioning.</li> </ul>   |
|      | <ul style="list-style-type: none"> <li>• <i>Saddārammaṇa</i> must be present.</li> </ul> | <ul style="list-style-type: none"> <li>• Sound waves must be present.</li> </ul>  |
|      | <ul style="list-style-type: none"> <li>• <i>Ākāsa</i> must be present.</li> </ul>        | <ul style="list-style-type: none"> <li>• Space between molecules allows sound waves to travel to the ear.</li> </ul>  |
|      | <ul style="list-style-type: none"> <li>• <i>Manasikāra</i> must be present.</li> </ul>   | <ul style="list-style-type: none"> <li>• Same as (*) above.</li> </ul>  |

Continued

**Table 45, continued. The Comparison between the Conditions for the Arising of the Thought Process in Buddhism and Sensation in Modern Science.** There are six classes of conditions classified according to the six sense doors. Followings are the comparison between the conditions for the arising of the thought process in Buddhism and the arising of perception in modern science.

| Door   | Conditions for the Arising of Thought Process in Buddhism | Conditions for the Arising of Perception Science  |
|--------|---|---|
| Nose   | • <i>Ghānappasāda</i> must be good.                       | • Olfactory bulbs must be functioning.  |
|        | • <i>Gandhārammaṇa</i> must be present.                   | • Chemical molecules must be present.   |
|        | • <i>Vāyo</i> must be present.                            | • The chemical molecules must be volatile to be able to move from its source to the human nose. |
|        | • <i>Manasikāra</i> must be present.                      | • Same as (*) above.  |
| Tongue | • <i>Jivhāppasāda</i> must be good.                       | • Taste buds located in papillae must be functioning.   |
|        | • <i>Rasārammaṇa</i> must be present.                     | • Chemical molecules must be present.   |
|        | • <i>Āpo</i> must be present.                             | • The chemical molecules must be in a form of solution.   |
|        | • <i>Manasikāra</i> must be present.                      | • Same as (*) above.  |
| Body   | • <i>Kāyappasāda</i> must be good.                        | • Nerve sensors must be functioning.  |
|        | • <i>Phoṭṭhabbārammaṇa</i> must be present.               | • Pressure, temperature, and motion must be present.  |
|        | • <i>Thaddhapaṭhavī</i> must be present.                  | • The stimuli have to be in contact with the area that the sensors are located.                 |
|        | • <i>Manasikāra</i> must be present.                      | • Same as (*) above.  |

Continued

**Table 45, continued. The Comparison between the Conditions for the Arising of the Thought Process in Buddhism and Sensation in Modern Science.** There are six classes of conditions classified according to the six sense doors. Followings are the comparison between the conditions for the arising of the thought process in Buddhism and the arising of perception in modern science.

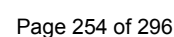
| Door | Conditions for the Arising of Thought Process in Buddhism                               | Conditions for the Arising of Perception Science   |
|------|---|--|
| Mind | <ul style="list-style-type: none"> <li><i>Manodvāra</i> must be present.</li> </ul>     | <ul style="list-style-type: none"> <li>Mind is still under studied in science, such as in the area of psychology.</li> </ul>   |
|      | <ul style="list-style-type: none"> <li><i>Dhammārammaṇa</i> must be present.</li> </ul> | <ul style="list-style-type: none"> <li>Mental Stimuli are still under studied. There is no agreement what mental stimuli are. However, some scientists proposed the followings phenomena to be mental stimuli, which are the <i>em</i> field produced by the heart, neural signals, the activity of glial cells, and experiences.</li> </ul> |
|      | <ul style="list-style-type: none"> <li><i>Hadayavatthu</i> must be present.</li> </ul>  | <ul style="list-style-type: none"> <li>The location of consciousness is still under studied. There is no agreement where the location of consciousness is. However, some scientists proposed the brain, the heart, the nervous system, and the DNA to be the location of consciousness.</li> </ul>   |
|      | <ul style="list-style-type: none"> <li><i>Manasikāra</i> must be present.</li> </ul>    | <ul style="list-style-type: none"> <li>Same as (*) above.</li> </ul>   |

#### 4.4 The Comparison between the Fivefold Consequent Processes in Buddhism and the Fivefold Processes of Sensory Transduction in Modern Science

In this section, I would like to discuss about the fivefold consequent processes in Buddhism comparing to the fivefold processes of sensory transduction in modern science. The fivefold consequent processes are the processes that arise in the mind door after one of the first five physical internal sense bases is impinged by an object. After the processes finish, human will be able to recognize the object that has been impinged the sense door. The processes of perception via the first five internal *āyatanas* are still not completely understood by modern scientists. However, the scientists have some broad theories about how the processes work.

In Buddhism, the consequent processes are the processes of recognition that occur in a uniform order through a series of discrete cognitive events. After one of the five physical sense bases is impinged by an object, a series of mind-door processes (*tadanuvattikā manodvāravīthi*) arises. This series of mind-door processes reproduces the object perceived by one of the five physical sense bases in the mind-door, which will then interpret the meaning of the object.

In science, when the five physical organs come into contact with their external objects, nerve signals are produced and sent to the brain. The brain has a function to translate what we see, hear, smell, taste, and touch. This is why many scientists believe that the brain is the seat of consciousness. The process of sensory transduction in science is also known as the process of perception. Figure 78 shows the comparison between the process of recognition in Buddhism and the process of perception in modern science.



The comparison is based on a hypothesis that the *pasāda* is located somewhere in the sensory receptors of a sense organ, and the delimitation of the *hadayavatthū* is bounded by what belongs to the flesh of the heart. Therefore, the brain which depends on the blood from the heart also is considered to be influenced by the *hadayavatthū* and may play an important role as a proximate cause of the arising of *manoviññāṇadhātu*. Figure 78 shows the possibilities that:

1. The *dvāravāṭhī* may arise in the area of sensory receptors.

The *dvāravāṭhī* may arise in the area of the sensory receptors, such as the retina, where the visual sensation is first initiated.

2. The *atītaggaṇavāṭhī* may arise in the area of the CNS.

When a sense organ receives an adequate stimulus, the sensory receptors transform the stimulus to nerve signals and transmit them to the CNS. Therefore, the *atītaggaṇavāṭhī* should arise in this area. It should be noted here that there is more than one nerve signal sent to the CNS. An example can be seen from nerve signals that are sent from the retina to the CNS. The retina works in a point-to-point, and orderly manner. Therefore, when a given spot of the retina is stimulated, the information will be recorded on a small part of the CNS corresponding to that particular retinal spot.

3. The *saṃuṅgaṇavāṭhī* may arise in the area of the CNS.

The *saṃuṅgaṇavāṭhī* may arise in the area of the CNS where a map of the object is created. In case of a visual object, when the whole retinal field is stimulated and all nerve signals are

sent to the CNS, then the visual part of the CNS will be plotted. The plotted map then is sent to the primary cortex.

4. The *atthaggaṇavīthi* may arise in the area of the primary cortex.

The *atthaggaṇavīthi* may arise in the area of the primary cortex, where the fundamental pattern of the object is identified. In case of the visual object, the spatial information of vision is created.

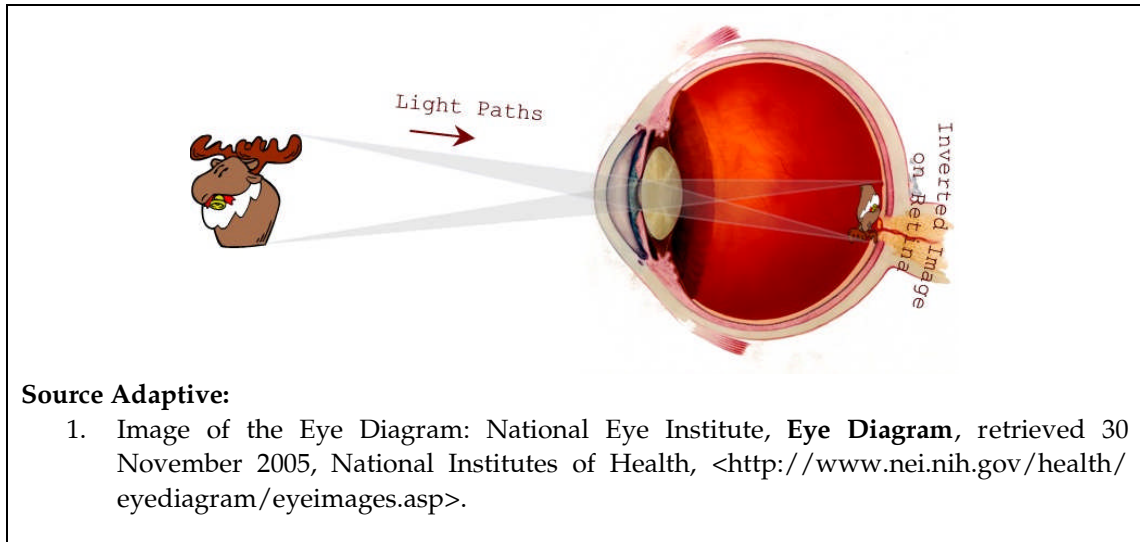
5. The *nāmaggaṇavīthi* may arise in the area of the upstream cortex.

The *nāmaggaṇavīthi* may arise in the area of the upstream cortex, where the more complex information is created. In case of the visual object, information such as form recognition and perception are processed.

There are some exceptions. In case of the *sotadvāravīthi*, the *nāmaggaṇavīthi* arises prior to the *atthaggaṇavīthi* since *manodvāravīthi* knows the designation of the object before the concept of the object. Therefore, the *nāmaggaṇavīthi* would arise in the area of the primary cortex and the *atthaggaṇavīthi* would arise in the area of the upstream cortex instead.

Since the process of perception is similar among the five physical organs, I will explore only visual perception in this case. According to science, when the eye sees an object, light from the object passes through the eye to form a two-dimensional reversed and inverted image of the object on the retina as in figure 79.

**Figure 79. Inverted Image on the Retina.** When light passes through the eye, an inverted and reversed image of an object will appear on the retina.



The retina translates light into nerve signals which then are transmitted to the brain. The brain then will process all information and identify the object.<sup>286</sup> Table 46 shows the parallels between the process of visual recognition in Buddhism and the process of visual perception in science and an example of the process of recognition of the *cakkhudvāravīthi* is shown in figure 80.

I would like to note that the image that appears on the retina is inverted and two-dimensions. However, our mind takes that illusion and creates more accurate picture that is upright and three-dimensions. There was an experiment where a candidate was requested to wear a pair of inverted-glasses. He sees objects upside-down at first. After a while, his ability of seeing gets back to normal. This proves that our mind and brain have ability to create illusion that makes sense to each individual.

<sup>286</sup> Philip Whitfield, 1995, **op. cit.**, pp. 56-57.

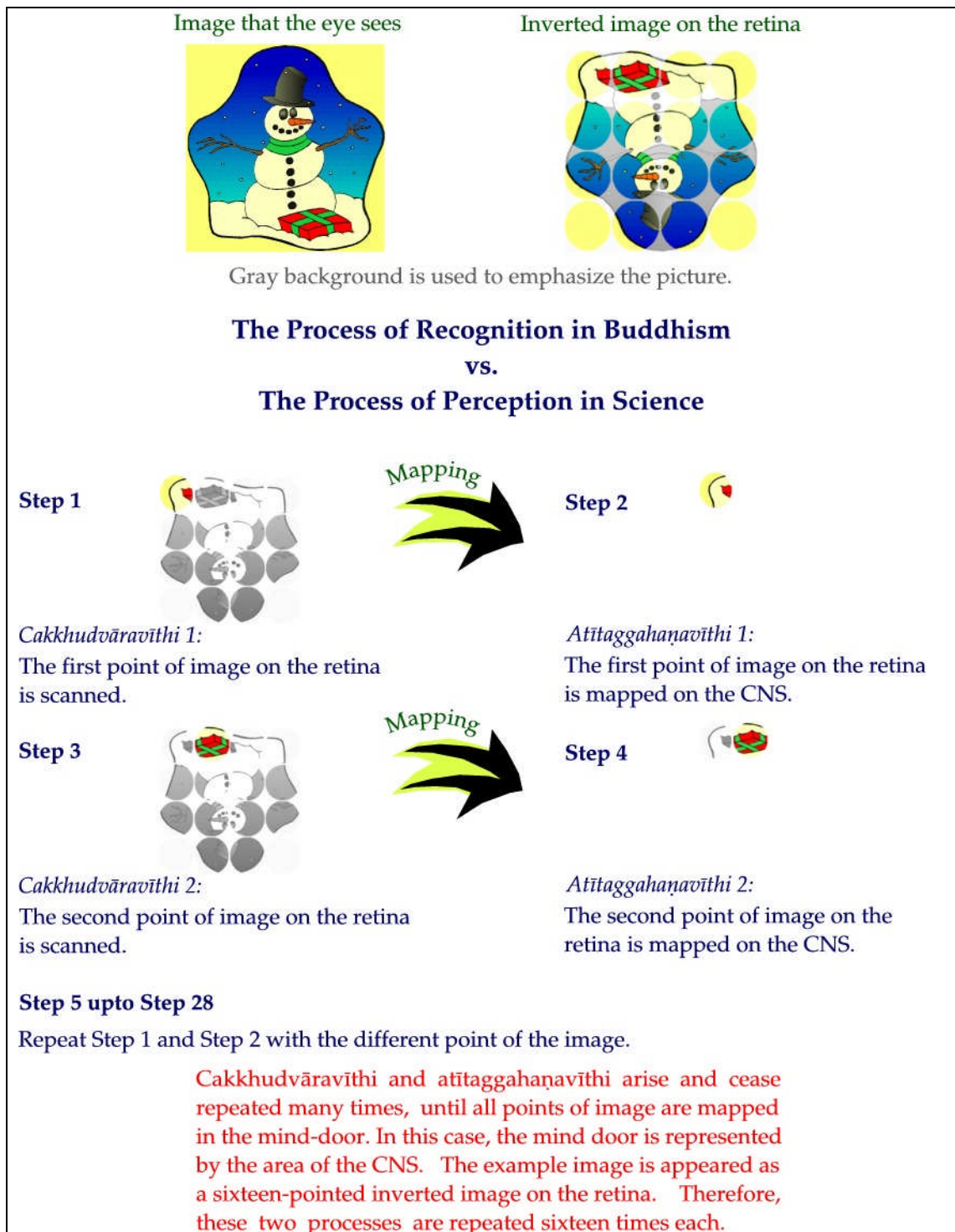
**Table 46. The Parallels Between the Process of Visual Recognition in Buddhism and the Process of Visual Perception in Modern Science.** The table shows the similarities between the process of visual recognition in Buddhism and in science.

| Buddhism                 | Modern Science   | Comment   |
|--------------------------|--|---|
| <i>Cakkhudvāravīthi</i>  | When the eye sees an object, light from the object passes through the eye to form a two-dimensional inverted image of the object on the retina.  | If the <i>cakkuhuppasāda</i> is located somewhere on the retina, then <i>cakkhudvāravīthi</i> may arise during this process.  |
| <i>Atitaggahaṇavīthi</i> | The retina translates light into nerve signals. These nerve signals then are transmitted to the CNS. This process copies the image from the retina to the CNS.                                       | There are more than one nerve signals that are transmitted from the retina to the brain. The retina works in a point-to-point, and orderly manner. This may explain why <i>cakkhudvāravīthi</i> and <i>atitaggahaṇavīthi</i> arise and cease repeated many times. |
| <i>Samūggahaṇavīthi</i>  | The CNS assembles the various aspects of information from nerve signals. This process creates a rough map of the image in the brain. The map will be sent to the primary cortex for further process. | <i>Samūggahaṇavīthi</i> may arise during this process in order to gather scattered information receiving from <i>cakkhudvāravīthi</i> and <i>atitaggahaṇavīthi</i> .  |
| <i>Atthagahaṇavīthi</i>  | The visual center of the brain draws on memories and experiences to create fundamental pattern of the object.  | The image that appears on the retina is inverted and two-dimensions. <i>Atthagahaṇavīthi</i> may arise during this process to provide meaningful information for us to understand what we see.  |
| <i>Nāmagahaṇavīthi</i>   | The upstream visual center of the brain identifies the object in detail. The more complex information is processed.  | After we have fundamental pattern of the object, then we can identify the object. <i>Nāmagahaṇavīthi</i> may arise during this process.   |

**Source Adaptive:**

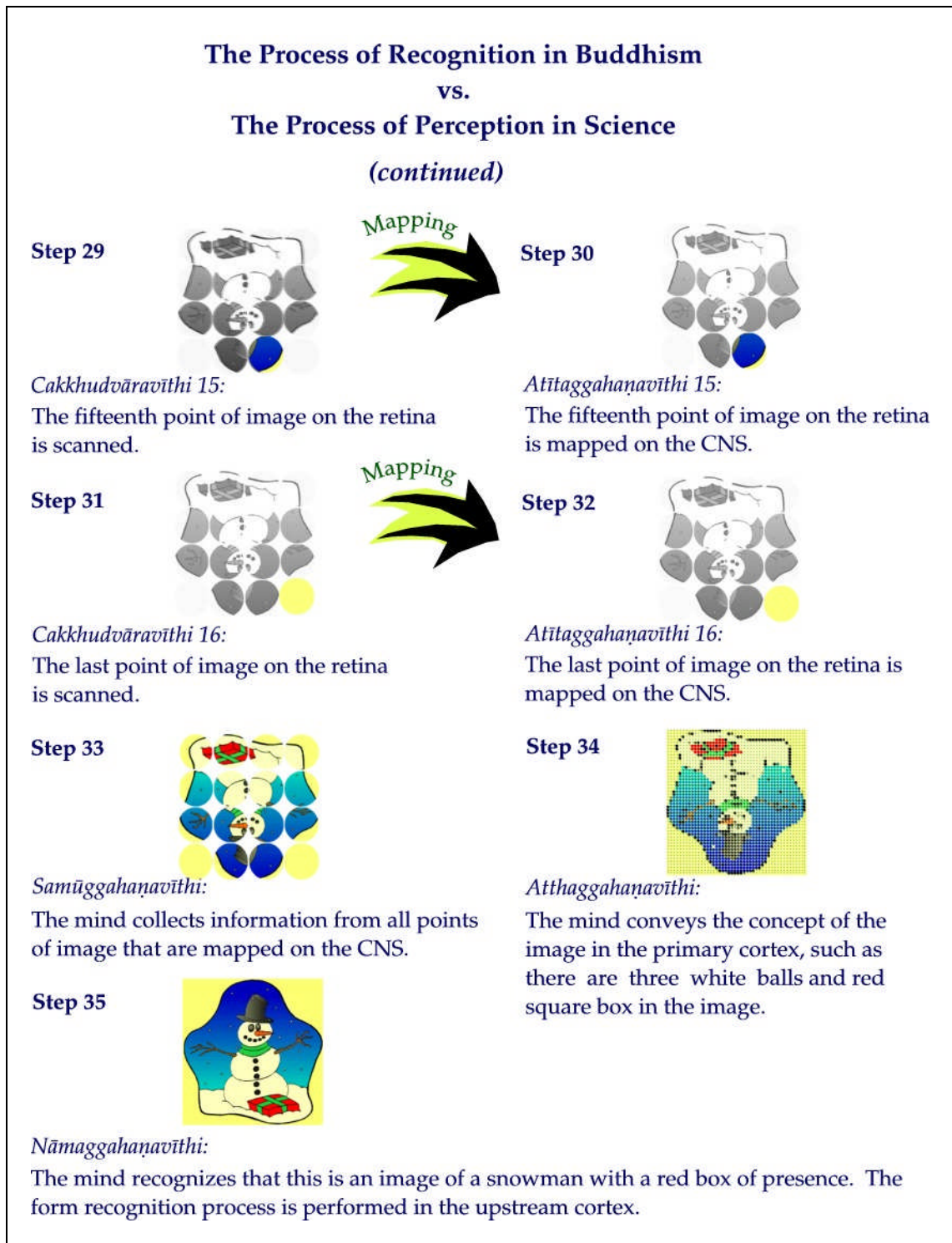
1. Human Body Explained, pp. 56-59.
2. Reader's Digest: ABC's of the Human Body, p. 196.

**Figure 80. An Example of the Process of Recognition of the *Cakkhudvāravīthi*.** An example of the process of recognition of the *cakkhudvāravīthi* with the comparison to the process of perception in science. The example image is represented by a sixteen-pointed inverted image on the retina.



Continued

Figure 80, *continued*. An Example of the Process of Recognition of the *Cakkhudvāravīthi*. An example of the process of recognition of the *cakkhudvāravīthi* with the comparison to the process of perception in science. The example image is represented by a sixteen-pointed inverted image on the retina.



#### 4.5 Reviewing the *Mahābhūtarūpa* through the Particulate Models of Matter

In this section, I would like to review the *mahābhūtarūpa* through the particulate models of matter. The idea of presenting the *mahābhūtarūpa* through an energy model is because the root of the term and the characteristic of the elements in the *mahābhūtarūpa* show some similarities to the nature of forces in matter.

The four main characters of the *mahābhūtarūpa* that are used in this review are as follows:

1. The character of expansion and foundation in the *paṭhavīdhātu*: The *paṭhavīdhātu* is the element of extension. The root of the term shows the quality of expansion. The function of this particular element is to act as a foundation for material phenomena.
2. The character of cohesion and holding together in the *āpodhātu*: The *āpodhātu* is the element of cohesion. It is manifested as holding material phenomena together.
3. The character of heat in the *tejodhātu*: The *tejodhātu* is the element of heat. The quantity of temperature is the characteristic of this particular element.
4. The character of vibration and causing motion in the *vāyodhātu*: The *vāyodhātu* is the element of vibration. The function of this particular element is causing motion in material phenomena.

The four qualities of matter that are used in this review are as follows:

1. The force of repulsion: The repulsive force performs a very important function in preventing a molecular structure to collapse. This force maintains the whole structure of an element. It acts like a foundation of matter.
2. The force of attraction: The attractive force has a function to hold particles together.
3. The kinetic energy: The kinetic energy is the energy that a particle possesses due to its motion.
4. The thermal energy or heat: Heat is a form of energy transfer. Sometimes, it is called thermal energy. It is a product associated to different types of motions. In another word, heat is a product of the kinetic energy. Both hot and cold temperatures are a way to measure heat.

Table 47 shows the prominent characteristic of primary element in each type of energy force in the particles. Figure 81 depicts the prominent *dhiātus* in each type of energy force in three states of matter.

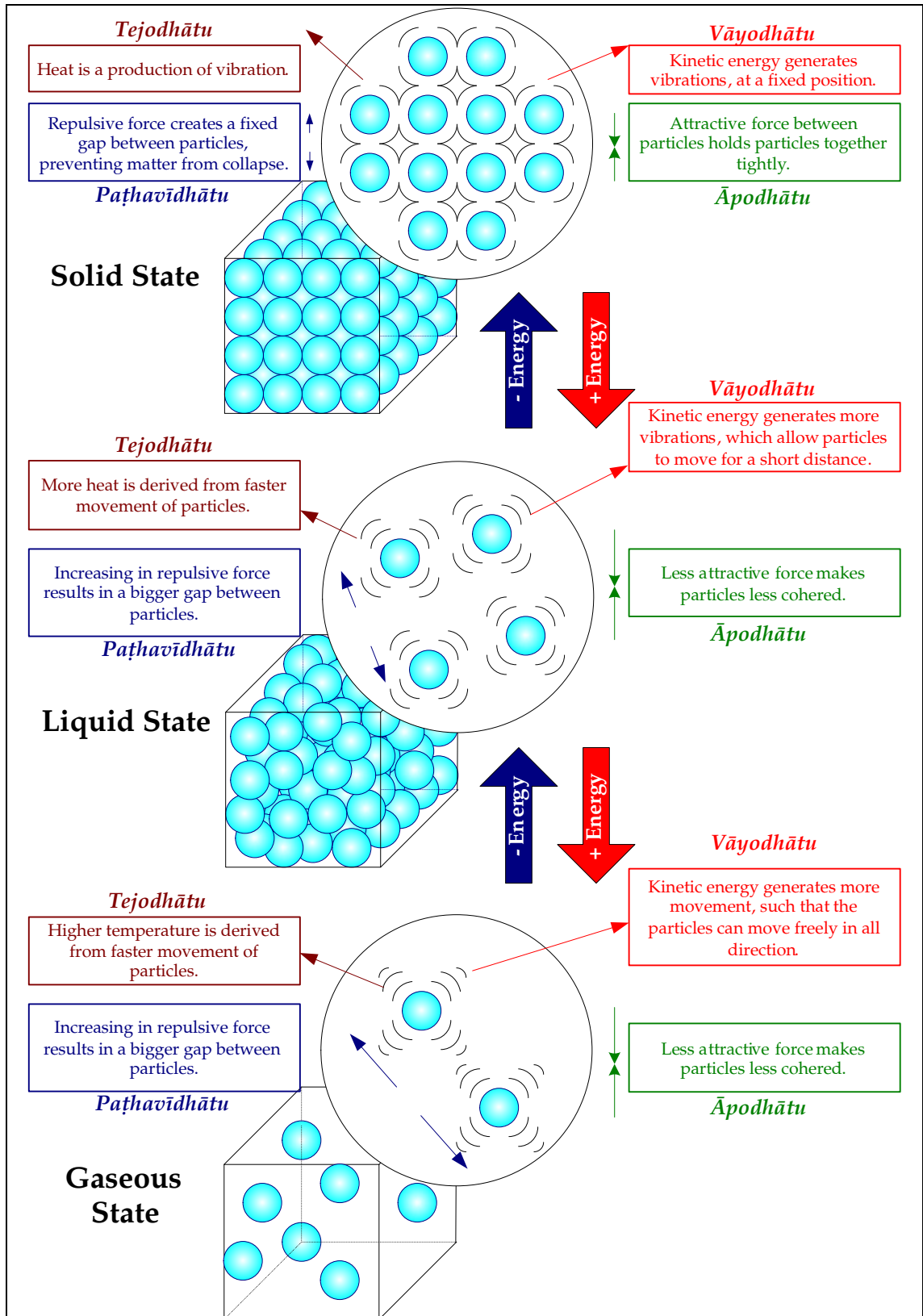
The attractive force, the repulsive force, the kinetic energy and the thermal energy of particles exist in matter at all the times. These characters of matter are inseparable. Similarly, material phenomena in Buddhism always have characters of expansion, cohesion, heat and movement. These are basic structures of elements that are inseparable.<sup>287</sup> From figure 81, we can see that:

<sup>287</sup> Anuruddhācariya, 1987, **op. cit.**, p. 290.

**Table 47. The Prominent Characteristic of Primary Elements in Each Type of Energy Forces in the Particles.** The table shows that each type of energy force of particles in the particulate models of matter has a prominent characteristic that is similar to the characteristic of the primary elements in the *mahābhūtarūpa*.

| Energy Type             | Character                               | Prominent Characteristic in | Reason  |
|-------------------------|---|-----------------------------|---|
| <b>Repulsive Force</b>  | Expansion and foundation                | <i>Paṭhavīdhātu</i>         | The <i>paṭhavīdhātu</i> is the prominent characteristic in the repulsive force, since the repulsive force causes expansion between particles. It also prevents the structure of matter from collapse. Without this force, there is no foundation for the structure of matter. |
| <b>Attractive Force</b> | Cohesion and holding particles together | <i>Āpodhātu</i>             | The <i>āpodhātu</i> is the prominent characteristic in the attractive force. The force of attraction between particles makes scattered particles cohered. It holds particles together.  |
| <b>Thermal Energy</b>   | Heat, hot and cold temperature          | <i>Tejodhātu</i>            | The <i>tejodhātu</i> is the prominent characteristic in the thermal energy. Heat of matter results from the speed of movement of particles, which are caused by the kinetic energy.   |
| <b>Kinetic Energy</b>   | Vibration and causing motion            | <i>Vāyodhātu</i>            | The <i>vāyodhātu</i> is the prominent characteristic in the kinetic energy, since particles are in constant motion due to the kinetic energy.   |

Figure 81. Reviewing the *Mahābhūtarūpa* through the Particulate Models of Matter. The figure depicts the prominent elements in each type of energy force.

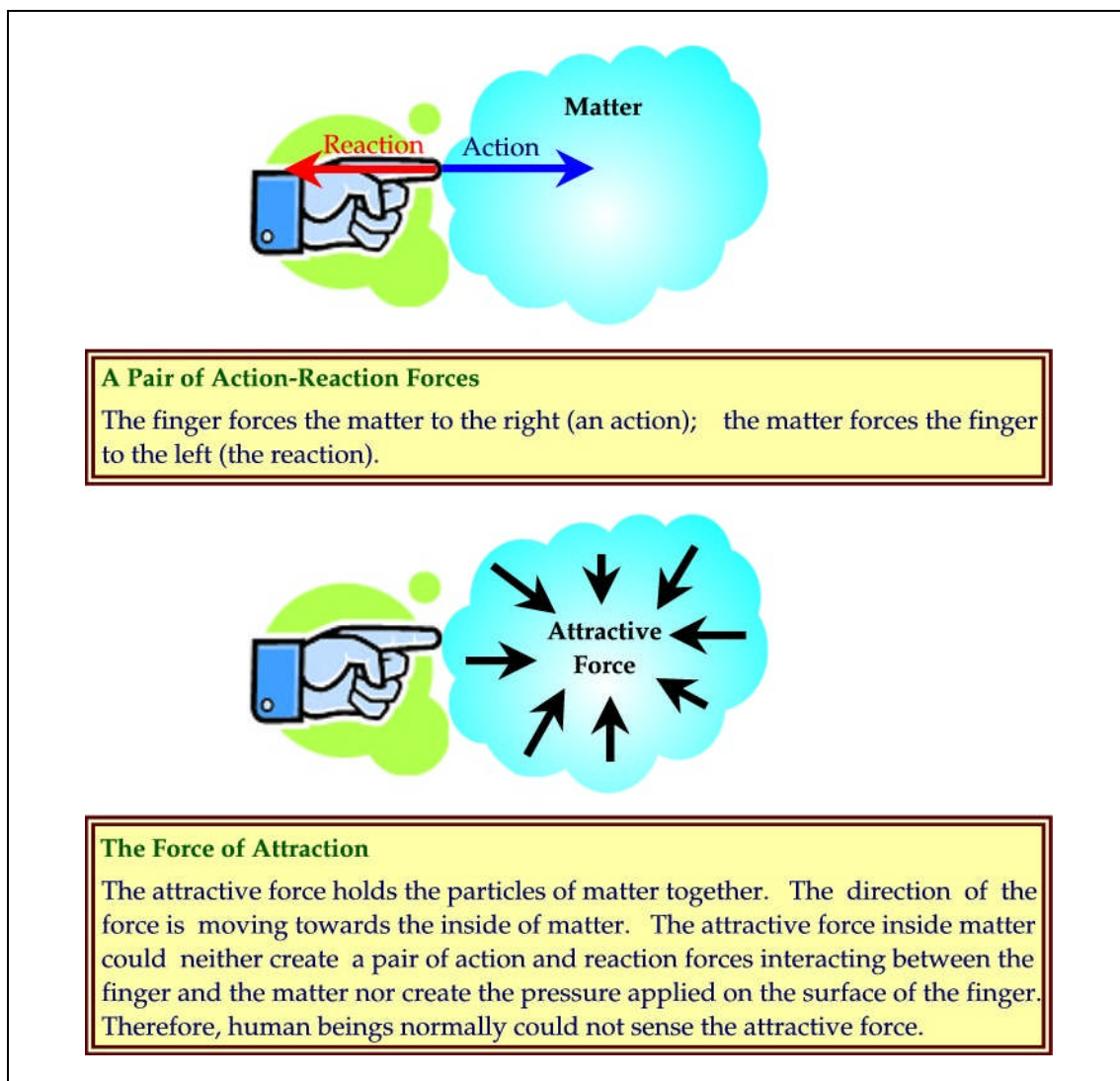


1. *Paṭhavīdhātu* is the prominent characteristic seen in the force of repulsion, since both of them create expansion.
2. *Āpodhātu* is the prominent characteristic seen in the force of attraction, since both of them have an ability to hold things together.
3. *Tejodhātu* is the prominent characteristic seen in the thermal energy that is derived from the motions of particles.
4. *Vāyodhātu* is the prominent characteristic seen in the kinetic energy, since both of them are related to the movement of matter.

From the above information, we see that the force of attraction is the force that acts between the particles of matter. It has a function to holds the particles together. The direction of the force is moving towards the inside of matter. The attractive force inside matter could neither create a pair of action-reaction forces interacting between two objects nor create the pressure applied on the surface of the human skin as shown in figure 82. Therefore, human beings could not sense the attractive force. The *āpodhātu* also has the characteristic of cohesion. This may be the reason why it is not a part of the *phoṭṭhabbāyatana*.

We now see that the characteristics of the *mahābhūtarūpa* exist in the forces and the energies in the relationship between the atoms and the molecules. Do these characteristics exist inside an atom or something that is smaller than the atom?

**Figure 82. The Relationship between the Sense of Touch and the Direction of Forces.** The figure represents the relationship between the direction of the forces and the sense of touch. If the *āpodhātu* is the prominent character of the attractive force, then the sense of touch could not normally detect the *āpodhātu* since the direction of the force moves outward from the human body. In sum, the attractive force could not normally create the pressure on the skin of the body.



A quark, an elementary particle smaller than the atom not known to have substructures right now, is a particle with spin and magnetic moment. The spin of the quark tells us that the quark consists of the *vāyodhātu* (the movement of spinning) and the *tejodhātu* (heat derived from the movement).

The magnetic moment of the quark shows that the quark has the nature of attraction or repulsion on other magnetic materials, which means that the quark consists of the *paṭhavīdhātu* and the *āpodhātu*. Then the characteristics of the *mahābhūtarūpa* also exist in the elementary particles known in science. However unlike the atom, the quark does not have chemical properties, such as tastes and odors. Even though the quark carries a color, the color of the quark has nothing to do with the perception of light. The color of the quark is just a naming convention. Therefore, the *Avinibbhogarūpa* in Buddhism could be compare to only the atomic level of matter, since if we further divide the atom into smaller particles, the chemical properties of the atom could not be maintained.

#### 4.6 Summary of the Chapter

This chapter shows that there exist some similarities between the twelve *āyatanas* in Buddhism and the sensory receptors and the sense stimuli in human anatomy in science. However, the comparison between the twelve *āyatanas* and their parallels shows that they may not imply the same thing.

Table 48 shows the similarities and the differences between the internal *āyatanas* and the sensory receptors. Table 49 shows the result of the comparison between the external *āyatanas* and the sense stimuli.

**Table 48. The Correlation between the Internal *Āyatanas* and the Sensory Receptors.** The table compares and contrasts the information between the internal *āyatanas* in Buddhism and the sensory receptors in science.

| Internal <i>Āyatanas</i><br>vs. Sensory<br>Receptors                         | Similarities   | Dissimilarities  |
|--|--|--|
| <i>Chakkhāyatana</i> vs. Eye<br>( <i>Cakkhuppasāda</i> vs.<br>Retina)        | The location of the <i>cakkhuppasāda</i> permeates through the seven layers of ocular membrane and is not bigger than the head of a louse. This description is similar to the structure of the retinal layers of the eye.  | The retina is actually consists of ten layers, not seven layers. However, three layers of them are not related to the light transduction process.  |
| <i>Sotāyatana</i> vs. Ear<br>( <i>Sotappasāda</i> vs.<br>Cochlea)            | The location of the <i>sotappasāda</i> has a shape like a finger-ring, fringed by hairs. This description is similar to the description of the cochlea and the Organ of Corti located inside the ear.  | The cochlea actually has a shape like a snail with two and a half spiral turns like.   |
| <i>Ghānāyatana</i> vs. Nose<br>( <i>Ghānappasāda</i> vs.<br>Olfactory bulbs) | The <i>ghānappasāda</i> is located in the area shaped like a goat's hoof, which is similar to the description of the nasal conchae. However, <i>The Path of Freedom</i> further indicates that the <i>ghānappasāda</i> is located at the place where the three goat's hooves meet. This area may refer to the olfactory bulbs located above the upper most concha. | The nasal conchae have a function to deflect air up to the upper part of the nose. Therefore, the sentient part of the nose should not be located here. However, what spread inside and above the superior concha is the olfactory nerves. This should be the place where the three goat's hooves meet mentioned in <i>The Path of Freedom</i> . |

Continued

**Table 48, continued. The Correlation between the Internal *Āyatanas* and the Sensory Receptors.** The table compares and contrasts the information between the internal *āyatanas* in Buddhism and the sensory receptors in science.

| Internal <i>Āyatanas</i> vs. Sensory Receptors                         | Similarities   | Dissimilarities  |
|--|--|--|
| <i>Jivhāyatana</i> vs. Tongue<br>( <i>Jivhāppasāda</i> vs. Taste buds) | The <i>jivhāppasāda</i> is located in the area shaped like the upper part of a torn lotus leaf. This description is similar to the papillae on the tongue. Inside them are the locations of taste buds where flavors are detected.                             | -  |
| <i>Kāyāyatana</i> vs. Body<br>( <i>Kāyappasāda</i> vs. Nerve sensors)  | The <i>kāyappasāda</i> is described as spreading throughout the whole body like oil diffusing over cotton-rag. The description of the <i>kāyappasāda</i> is similar to the description of nerve sensors located throughout the whole body.                     | In Buddhism, firm solid element ( <i>thaddhāpathavi</i> ) must be present in the process of touching. This factor is not known in science. However, the nerve sensors must be instigated by the objects in the process of touching. This may imply the same thing. |
| <i>Manāyatana</i> vs. Mind<br>( <i>Manodvāra</i> vs. mind)             | Controversial issue and under studied. Most physicians believe that the upper right chamber of the heart around the SA node is where the mind is located. However, many scientists believe that the brain plays an important part as the location of the mind. |  |

**Table 49. The Correlation between the External *Āyatanas* and the Sense Stimuli.**  
The table compares and contrasts the information between the external *āyatanas* in Buddhism and the sense stimuli in science.

| External <i>Āyatanas</i> vs. Sense Stimuli | Similarities  | Dissimilarities  |
|--|---|--|
| <i>Rūpāyatana</i> vs. Visual Stimulus      | The object of seeing in Buddhism is <i>rūpāyatana</i> . It is also known as <i>vaṇṇa-nibhā</i> , which can be compared to color in science. Both Buddhism and science indicates that light is a very important factor in the process of seeing. | Scientists further study the visual stimulus, color, and identify it as electromagnetic spectrum of light in different wavelengths.  |
| <i>Saddāyatana</i> vs. Auditory Stimulus   | <i>Saddāyatana</i> is sound. Both Buddhism and science indicates that space is an important factor in the process of hearing.   | Scientists further study and identify auditory stimulus, sound, that it is in a form of wave arising from changes in pressure which is a product of vibrations of an object.   |
| <i>Gandhāyatana</i> vs. Olfactory Stimulus | <i>Gandhāyatana</i> is odor. Scientists indicate that the olfactory stimulus is chemical molecules.   | Buddhism indicates the <i>vāyodhātu</i> as a factor of smelling. Scientists indicate that olfactory stimulus needs to be volatile. The <i>vāyodhātu</i> is the prominent characteristic seen in volatile substances. However, they are not the same thing. |

Continued

**Table 49, continued. The Correlation between the External *Āyatanas* and the Sense Stimuli.** The table compares and contrasts the information between the external *āyatanas* in Buddhism and the sense stimuli in science.

| External <i>Āyatanas</i> vs. Sense Stimuli | Similarities   | Dissimilarities  |
|--|--|--|
| <i>Rasāyatana</i> vs. Gustatory Stimulus   | <i>Rasāyatana</i> is flavor. Scientists indicate that the gustatory stimulus is a type of chemical molecules.                    | Buddhism indicates the <i>āpodhātu</i> as a factor of tasting. Scientists indicate that the gustatory stimulus needs to be in a form of solution. The <i>āpodhātu</i> is not fluid, however, it is the prominent characteristic seen in the solution. The concepts between the <i>āpodhātu</i> and the solution are quite different. |
| <i>Phoṭṭhabbāyatana</i> vs. Bodily Stimuli | Pressure, temperature and motion are included in both the <i>phoṭṭhabbāyatana</i> in Buddhism and the bodily stimuli in science. | Scientists also include pain as a stimulus of the body.  |
| <i>Dhammāyatana</i> vs. Mental Stimuli     | Science does not have much information about the mental stimuli. This is where science lags behind Buddhism.                     |  |

## CHAPTER V

### CONCLUSION AND SUGGESTION

#### 5.1 Result of the Study

The objectives of this thesis are to study, compare and contrast the twelve *āyatanas* in the context of science, which is as described in the first chapter. The second chapter discussed the background and significance of the twelve *āyatanas* as the gateways that allow us to experience and perceive the world. In order to have a deeper understanding of the twelve *āyatanas*, the overall concept of the term *āyatana* is explored, both in *Sanskrit* and *Pāli* languages. The result of the study shows that the concept of the twelve *āyatanas* did not exist in the *Vedic* tradition. Instead, the concept was developed by the Buddha into a central Buddhist teaching. These contents can be found in many teachings of the Buddha, including the four types of relations mentioned in chapter II and the *Paṭiccasamuppāda*. The twelve *āyatanas* are a cause of *dukkha* and are *dukkha* themselves, since they are under the law of the *Tilakkhaṇa*. However with proper trainings, the twelve *āyatanas* become the powerful and necessary tools to reach the Enlightenment.

The third chapter is the exposition of the twelve *āyatanas* in the Buddhist scriptures. As we already know that the twelve *āyatanas* are separated into the internal and the external *āyatanas*. In order to find their parallels in science, the sensory receptors and the sense stimuli are also discussed here. In addition, the primary element of the twelve *āyatanas*, the *mahābhūtarūpa*, is studied in the aspect of its etymology.

In the fourth chapter, the internal and the external *āyatana*s are compared and contrasted with the sensory receptors and the sense stimuli, respectively. The result of the study shows that there are some parallels between the description of the twelve *āyatana*s in the Buddhist scriptures and the information of the sensory receptors and the sense stimuli in science.

There are some points that should be noted here that:

1. In Buddhism, the teaching of the Buddha, including the concept of the twelve *āyatana*s, had been developed by the commentators over time. An example can be seen from the concept of the *cakkhāyatana* that is developed to be the seven-layered structure of the *cakkuhuppasāda* by the commentators.
2. The goal of the Buddha and the goal of the scientists are different. The Buddha emphasizes on the importance of the cessation of the *dukkha*. He teaches his followers only what benefits to pave a way to *nibbāna*. However, the scientists emphasize on the exploration of knowledge in depth, which does not benefit the way of the holy life. The goal of Buddhism is to realize *nibbāna*. In contrary, the goal of science is to categorize and classify the physical world. An example can be seen from the information of the *saddāyatana* and sound.
  - a. In Buddhism, *saddāyatana* is taught, so human beings would realize its benefit as a tool to experience the world and its danger as a cause of the arising of a fetter.

- b. In science, sound is studied and analyzed in physical detail. The scientists pay their attention to study how sound arises, how fast it can travel, the effect of sound on living beings, etc. In addition, sound is used in the treatment of physical and mental conditions as an alternative medicine.

The scientists study with passion and are struggle for more knowledge. The knowledge in science seems to grow and change everyday with new discoveries; however, this type of knowledge will never lead us to the real purpose of our lives, which in Buddhism is known as *nibbāna*. *Nibbāna* is the state where all defilements are extinct. The knowledge in science could not lead humans to the state of *nibbāna*. The scientists can be compared to *Māluṅkyāputta* in the *Cūḷamāluṅkya Sutta*, who does not satisfy with the Buddha's teaching and would like to learn more what does not lead to the Enlightenment.

3. The Buddha emphasizes the importance of both the material phenomena (*rūpa*) and the mental phenomena (*nāma*). However, the scientists emphasize their study mostly on the material phenomena. Even though, some scientists may try to study the mental phenomena, however, the result of the study may not be widely accepted since it can not be proved by the scientific instruments. As a result, the role of the mind and mental stimuli are still ambiguous in science. This is where science lags behind Buddhism.

In addition, this thesis reflects the facts that

1. The mind can perceive an artificial object through the stimulation of the electrical signals and the chemical substances, without sensing the object through the first five internal *āyatanas*. This is a method that the scientists use to make people feel happy and peaceful by using some sorts of electrical devices or drugs. The happiness that is acquired by this method is dependent on the external stimuli. However, the Buddha teaches his followers to find happiness and peaceful in oneself, without depending on the external stimuli.
2. With the advancement of new technologies, the transplantation of physical organs is possible. The process of the transplantation does not have an effect on human personality. Even a person has his heart transplanted; his personality is still unaffected by the new heart.

In Buddhism, a human consists of the five Aggregates. From the facts above, it shows that the *rūpakkhanda* is just only a congregation of organs, which are transplantable. In addition, these facts remind me of what was spoken by bhikkhunī Vajirā in the *Vajirā Sutta* that:

Just as, with an assemblage of parts,  
The word 'chariot' is used,  
So, when the aggregates exist,  
There is the convention 'a being.'

*Bodhi (trans.)*

The five aggregates exist in both mundane people and arahants who have the substratum of life remaining. What makes them different is the arahants do not cling to the five aggregates, while the mundane people still do cling to the five aggregates. Mahāsi Sayādaw mentions in the book of

*Fundamentals of Vipassana Meditation* that the clinging to the five aggregates arises from the manifestation of the interaction between the six internal sense bases and their corresponding external sense bases. He states that *viññāṇa*, *vedanā*, *saññā*, and *saṅkhāra* perceived at the moment of the interaction are merely of the mental group. They are neither a living entity nor self. By correctly attending the twelve *āyatana*s as they really are, insight knowledge will be developed, and the cycle of rebirths will be destroyed.

## 5.2 Benefits of the Study

The result of the study of this thesis answers all questions that I set up in the first chapter and obtain the advantages as I expected, which are:

1. Gaining a deeper understanding of the term *āyatana* both in its general and in its particular aspects.
2. Gaining a clearer understanding of the twelve *āyatana*s in the Buddhist scriptures and the sensory receptors and the sense stimuli in science.
3. Establishing an awareness of the correlation between Buddhism and science.

This thesis confirms that Buddhism is the religion that copes with modern scientific needs, as Einstein said. Buddhism is neither a mystic experience nor a psychic thrill. It is a religion with profound teachings taught by a man whom we respect him as the Buddha. The world of Buddhism and the world of science can be harmonized, even though they seem so different. See Appendix for the benefit that is derived from the study of the twelve *āyatana*s in relation to the *Paṭiccasamuppāda*.

### 5.3 Suggestions for Further Research

An interesting area in the exposition of the twelve *āyatanas* is to compare and contrast the concept of the twelve *āyatanas* among different schools of Buddhism. All schools of Buddhism do not recognize the same concept of the twelve *āyatanas*, which is one of the central *Theravādin* Buddhist teachings. An example can be seen from the different concept of the *dhammāyatana* between the *Theravāda* tradition and the *Vaibhāṣika* tradition. The *dhammāyatana* in the *Theravādin Abhidhammic* innovation consists of fifty-two *cetasikas*, sixteen *sukhumārūpas*, and *nibbāna*. However, the *Vaibhāṣika* recognizes only one *dhammāyatana-rūpa*, which is known as *avijñapti-rūpa*. Other schools, such as the *Sarvāstivāda*, also appear to have a slightly different view of the twelve *āyatanas*. The *Sarvāstivādins* combine the concept of the twelve *āyatanas* under the term *rūpa-dhamma*. The different concepts of the twelve *āyatanas* of each school spawn different ideas about the material and mental phenomena. The result of the study would lead us to understand:

1. the early concept of the Buddhist thought;
2. the development of the Buddhist teachings after the Buddha's *parinibbāna*;
3. the different concepts of *nāma-rūpa* among different schools.

I hope that this thesis would create a good dialogue between Buddhists and scientists and among Buddhists of different schools themselves.

## BIBLIOGRAPHY

### 1. Primary Sources

#### 1.1 Texts

Andersen, Dines, and Helmer Smith, eds. **The Sutta-Nipāta**. Oxford: PTS, 1997.

Bose, M.m., ed. **Paramattha-Dīpanī (Iti-Vuttakaṭṭhakathā)**. London: PTS, 1977.

Buddhadatta, A.P., ed. **Sammohavinodanī (Vibhaṅgaṭṭhakathā)**. 1 vol. London: PTS, 1980.

Davids, C.A.F. Rhys, ed. **Tikapaṭṭhāna of the Abhidhamma Piṭaka**. 1 vol. Oxford: PTS, 1996.

———, ed. **Vibhaṅga**. 1 vol. London: PTS, 1978.

———, ed. **Visuddhimagga of Buddhaghosa**. London: PTS, 1975.

———, ed. **Yamaka**. Vol I. Oxford: PTS, 1995.

Davids, T.W. Rhys, and J.E. Carpenter, eds. **Dīgha Nikāya**. 3 vols. London: PTS, 1992-1995.

Feer, M. Léon, ed. **Saṃyutta Nikāya**. 6 vols. London: PTS, 1990-1999.

Hinuuber, O. von, and K.R. Norman, ed. **Dhammapada**. 1 vol. Oxford: PTS, 1995.

Morris, R., and E. Hardy, eds. **Aṅguttara Nikāya**. 6 vols. London: PTS, 1989-1994.

Müller, Edward, ed. **Aṭṭhasālinī (Buddhaghosa's Commentary on the Dhammasaṅgaṇi)**. London: PTS, 1979.

———, ed. **Dhammasaṅgaṇi**. London: PTS, 1978.

Oldenberg, H., ed. **Vinaya Piṭaka**. Vol. 3. Oxford: PTS, 1969-1995.

Trenckner, V., and R. Chalmers, eds. **Majjhima Nikāya**. 6 vols. Oxford: PTS, 1991-1994.

## 1.2 Translations

Bodhi, trans. **The Connected Discourses of the Buddha**. 2 vols. Boston: Wisdom Publications, 2000.

Buddhaghosa. **The Path of Purification (Visuddhimagga)**. Trans. Ñānamoli. Taiwan: The Corporate Body of the Buddha Educational Foundation, 1956.

Davids, C.A.F. Rhys, ed. **Compendium of Philosophy**. 5<sup>th</sup> ed. London: PTS, 1972.

———, trans. **A Buddhist Manual of Psychological Ethics**. 3<sup>rd</sup> ed. London: PTS, 1974.

Gandhasarabhiwansa, trans. **Abhidhammāvatāra**. Bangkok: Thairaiwan-kanphim Ltd., B.E. 2549.

Hare, E. M., trans. **The Book of the Gradual Sayings**. Vol. III - IV. Oxford: PTS, 1995.

Horner, I. B., trans. **The Book of the Discipline**. Vol I. London: PTS, 1992.

Maung, U Hla. **Salāyatana Samyutta**. Myanmar: The Department for the Promotion and Propagation of the Sāsana, 1998.

Nanamoli, and Bodhi, trans. **The Middle Length Discourses of the Buddha**. Vol. 1. Kandy: BPS, 1995a.

Ñānamoli, trans. **The Dispeller of Delusion (Sammohavinodanī)**. London: PTS. 1987-1991.

Nārada, U. **Conditional Relations**. London: PTS, 1969.

Thittila, Paṭhamakyaw Ashin (Setṭhila), trans. **The Book of Analysis (Vibhaṅga)**. London: PTS, 1969.

Tin, Pe Muang, trans. **The Expositor (Atthasālinī)**. 2 vols. London: PTS,

1958.

Walshe, Maurice, trans. **The Long Discourses of the Buddha**. Kandy: BPS, 1996.

## 2. Secondary Sources

### 2.1 Articles

McFadden, Johnjoe. "Synchronous Firing and Its Influence on the Brain's Electromagnetic Field." **Journal of Consciousness Studies** 9, no. 4 (2002): 23-50.

Sugunasiri, Suwands H. J. "The Whole Body, Not heart, As 'Seat of Consciousness': The Buddha's View." **Philosophy East and West** 45, no. 3 (1995): 409-430.

### 2.2 Books

Anālayo. **Satipaṭṭhāna The Direct Path to Realization**. Asian ed. Kandy: BPS, 2003.

Anuruddhācariya. **A Comprehensive Manual of Abhidhamma**. Trans. Bodhi. Kandy: BPS, 1993.

———. **A Manual of Abhidhamma**. 5<sup>th</sup> rev. ed. Trans. Nārada. Malaysia: The Buddhist Missionary Society, 1987.

Aphithammachotika Vidyalyaya. **Khumue Kan Sueksa Laksut Chula-Aphithammika Tho**. 2<sup>nd</sup> ed. Bangkok: Mulanithi Sathammachotika, n.d.

Asabhathera, Bhaddanta. **Paṭiccasamuppādasāṅkhepakathā**. Chon Buri: Wat Bhaddanta Asabharam, n.d.

Baptist, Egerton C. **Abhidhamma for the Beginner**. Colombo: The Colombo Apothecaries' Co., Ltd., 1959.

Chennakesavan, Sarasvati. **Concept of Mind in Indian Philosophy**. 2<sup>nd</sup> ed.

- and Reprinted. Delhi: Motilal Banarsidass Publishers, 1991.
- Constanzo, Linda S. **Physiology**. 2<sup>nd</sup> ed. CA: Saunders, 2002.
- Disayavanish, Chamlong. **Chitawitthaya Khong Khwamdapthuk**, 1<sup>st</sup> ed. Chiang Mai: Klang Wiang Kanpim Ltd., B.E. 2544.
- Ehara, N.R.M., Soma, and Kheminda. **The Path of Freedom (Vimuttimagga)**. BPS ed. Kandy: BPS, 1995.
- Gonda, J. **Sanskrit Word Studies, Selected Studies**. Vol II. Netherlands: E. J. Brill, 1975.
- Guinness, Alma E., et al. **ABC's of the Human Body (Thai Version)**. Trans. Preeya Kulawanich. Bangkok: Amarin Printing and Publishing P.C.L, B.E. 2541.
- Heyworth, Rex M. **Explore Your World with Science Discovery 2**. Singapore: Pearson Education Asia Pte ltd, 2003.
- Howard Hughes Medical Institute. **Seeing, Hearing, and Smelling the World**. Maryland: Howard Hughes Medical Institute, 1995.
- Karunadasa, Y. **Buddhist Analysis of Matter**. Colombo: The Department of Cultural Affairs, 1967.
- Kirthisinghe, Buddhadasa P., ed. **Buddhism and Science**. Delhi: Mortilal Banarsidass Publishers, 1993.
- Macquitty, William. **Buddha**. New York: The Viking Press, 1969.
- McCraty, Rollin. **The Energetic Heart: Bioelectromagnetic Interactions Within and Between People**. California: Institute of HeartMath, 2003.
- Methangkun, Bunmi, and Butsakon Methangkun. **Khumue Kan Sueksa Phra Aphithammatthasangkhaha**. 9 vols. Nakhon Pathom: Abhidhamma Foundation, B.E. 2545.
- Mon, Mehm Tin. **The Essence of Buddha Abhidhamma**. 1<sup>st</sup> ed. Myanmar: Mya Mon Yadanar Publication, 1995.
- Nyanaponika. **Abhidhamma Studies**. 4<sup>th</sup> ed. Kandy: BPS, 1985.

- . **The Heart of Buddhist Meditation.** Kandy: BPS, 1996.
- Payutto, P.A. **Buddhadhamma.** 1<sup>st</sup> rev. and enl. ed. Bangkok: Mahachulalongkornrajavidyalaya University, 2005.
- . **Thai Buddhism in the Buddhist World.** 10<sup>th</sup> ed. Bangkok: Mahachulalongkornrajavidyalaya University, 2005.
- Sayādaw, Mahāsi. **Fundamentals of Vipassana Meditation.** 2<sup>nd</sup> ed. Bangkok: Buddhadhamma Foundation, 2002.
- . **Purpose of Practising Kammaṭṭhāna Meditation.** Burma: Sarpaypaungku Press, 1980.
- Silva, C.L.A. De. **A Treatise on Buddhist Philosophy of Abhidhamma.** Delhi: Sri Satguru Publications, 1997.
- Silva, Padmasiri De. **An Introduction to Buddhist Psychology.** 2<sup>nd</sup> ed. Hampshire: Macmillan Academic and Professional Ltd, 1991.
- Silverthorn, Dee Unglaub. **Human Physiology An Integrated Approach.** 2<sup>nd</sup> ed. CA: Benjamin Cummings, 2001.
- Sitthithammachotika, Phra. **Paramatthachotika: Paritchet 3 and Paritchet 7 Laksut Chula-Aphithammika Tho.** 6<sup>th</sup> ed. Bangkok: Mulanithi Satthammachotika, B.E. 2544.
- Soma. **The Way of Mindfulness.** 5<sup>th</sup> rev. ed. Kandy: BPS, 1981.
- Thepsophon, Phra. **A Buddhist Worldview.** Bangkok: Mahachulalongkornrajavidyalaya University, 2003.
- Thomson, Garry. **The Sceptical Buddhist.** 1<sup>st</sup> ed. Thailand: Amarin Printing, 2000.
- Ussivakul, Vinai. **An Introduction to Buddhist Meditation for Results.** Bangkok: Buddhist Study and Development Center, 1996.
- Whitfield, Philip, ed. **The Human Body Explained.** 1<sup>st</sup> ed. New York: Henry Holt And Company, 1995.

### 2.3 References and Dictionaries

- Apte, Vaman Shivaram. **The Practical Sanskrit-English Dictionary**. Rev. and enl., 1<sup>st</sup> compact ed. Delhi: Motilal Banarsidass Publishers, 1998.
- Childers, R. C. **A Dictionary of the Pali Language**. London: Kegan Paul, Trench, Trubner & Co. Ltd., 1874.
- Colman, Andrew M., ed. **Companion Encyclopedia of Psychology**. 2 vols. London and New York: Routledge, 1994.
- Cone, Margaret. **A Dictionary of Pāli**. Part I. Oxford: PTS, 2001.
- Davids, T.W. Rhys, and William Stede. **Pali-English Dictionary**. 1<sup>st</sup> Indian ed. Delhi: Motilal Banarsidass Publishers, 1993.
- Macdonell, A.A., and A.B. Keith. **Vedic Index of Names and Subjects**. Vol. 1. India: Motilal Banarsidass, 1958.
- Malalasekera, G.P., ed. **Encyclopaedia of Buddhism**. Vol. II. Ceylon: The Government Press, 1966.
- Nyanatiloka. **Buddhist Dictionary**. 3<sup>rd</sup> rev. and enl. ed. Edited by Nyanaponika. Colombo: Frewin & Co. Ltd., 1972.
- . **Pali-Anthologie und Wörterbuch**. München-Neubiberg: Oskar Schloss Verlag, 1928.
- Payutto, P.A. **Dictionary of Buddhism (Dictionary of Numerical Dhammas)**. 9<sup>th</sup> ed. Bangkok: Mahachulalongkornrajavidyalaya University, B.E. 2543.
- Thepdarunanusit, Luang, comp. **Dhātuppadīpikā**. 7<sup>th</sup> ed. Bangkok: Mahamakuta Rajavidyalaya Press, B.E. 2540.
- Trenckner, V., ed. **A Critical Pāli Dictionary**. Vol. II. Copenhagen: The Royal Danish Academy of Sciences and Letters, 1960.
- Warren, Howard C., ed. **Dictionary of Psychology**. Cambridge: The Riverside Press, 1934.
- Weise, Erwin, and Erich Weise. **Schöffler-Weise Deutsch-Englisch Taschenwörterbuch**. Stuttgart: Ernst Klett Verlag, n.d.

## 2.4 CD-Rom

MUCC. **Budsir/TT V.2 for Windows.** Bangkok: Mahidol University Computing Center, n.d. CD-Rom.

———. **Budsir/TT V.3 for Windows.** Bangkok: Mahidol University Computing Center, n.d. CD-Rom.

Netter, Frank H. **Interactive Atlas of Human Anatomy.** Carbondale: DxR Development Group, 1995. CD-Rom.

Sunthornthepvarakul, Thongkam. **Pasādarūpa 5.** n.p., n.d. VCD.

Vipassana Research Institute. **Chattha Sangayana CD-Rom.** India: VRI, n.d. CD-Rom.

## 2.5 Online Material Sources

A.D.A.M. **Nasal Anatomy.** Retrieved 1 December 2005. <<http://health.allrefer.com/pictures-images/nasal-anatomy.html>>.

Answer.com. **Intermolecular Forces.** Retrieved 15 June 2007. <<http://www.answers.com/topic/intermolecular-force>>.

Axel, Richard, and Linda B. Buck. **Odorant Receptors and the Organization of Olfactory System.** Retrieved 24 February 2006. <<http://nobelprize.org/medicine/laureates/2004/press.html>>.

Brandis, Dietrich. “Pterospermum acerifolium.” **Illustrations of the Forest Flora of North-West and Central India.** Retrieved 30 September 2006. <[http://caliban.mpizkoeln.mpg.de/~stueber/brandis/tafel\\_11\\_m.jpg](http://caliban.mpizkoeln.mpg.de/~stueber/brandis/tafel_11_m.jpg)>.

Caceci, Thomas. “The Retinal Tunic.” **Anatomy and Physiology of the Eye.** Virginia Polytechnic Institute & State University. Retrieved 29 November 2005. <<http://education.vetmed.vt.edu/Curriculum/VM8054/EYE/RETINA.HTM>>.

Carolina Biology Supply. **Sinoatrial Node.** Retrieved 4 December 2005. <<http://biology.about.com/library/organs/heart/blsinoatrialnode.htm>>.

Chem4Kids.com. **Atoms.** Retrieved 16 June 2007. <<http://www.chem4kids.com>>.

com/files/atom\_structure.html>.

Chopra, Deepak. "Flaws of Perception." **Resurgence Issue 231**. Retrieved 31 October 2006. <<http://www.resurgence.org/2005/chopra231.htm>>.

Course e-Learning Website. "Molecular Structure and Polarity." **CHM 2045: General Chemistry I (Brucat)**. University of Florida. Retrieved 16 June 2007. <[http://www.chem.ufl.edu/~itl/2045/lectures/lec\\_16.html](http://www.chem.ufl.edu/~itl/2045/lectures/lec_16.html)>.

Davidson, Michael W. "The Flavor Collection." **Molecular Expressions Photo Gallery**. Florida State University. Retrieved 24 February 2006. <<http://micro.magnet.fsu.edu/micro/gallery/flavors/flavor.html>>.

Envis Centre on Conservation of Ecological Heritage and Sacred Sites of India. **List of Sacred Trees**. Retrieved 30 September 2006. <[http://ecoheritage.cpreec.org/04\\_topics/01\\_sacred\\_trees/01\\_sacred\\_trees\\_datas.html](http://ecoheritage.cpreec.org/04_topics/01_sacred_trees/01_sacred_trees_datas.html)>

Gibbons, Robert J. **Taxon: *Calophyllum inophyllum* L.** United States Department of Agriculture. Retrieved 30 September 2006. <<http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?8631>>.

Gorkom, Nina Van. "Ch. 8: Decisive Support-Condition (upanissaya-paccaya) Part II." **Conditions**. Dhamma Study e-Books. Retrieved 20 October 2005. <<http://www.dhammastudy.com>>.

Gray, Henry. "The Tunics of the Eye." **Anatomy of the Human Body**. Philadelphia: Lea & Febiger, 1918; Bartleby.com, 2000. Retrieved 29 November 2005. <<http://www.bartleby.com/107/225.html>>.

Institute Of Physiology. Department Of Neurophysiology. **A Biophysically Realistic Simulation of Vertebrate Retina**. Ruhr-University Bochum. Retrieved 12 October 2006. <<http://www.neurop.ruhr-uni-bochum.de/CompNsci/BiophysModel/Retina/retina.html>>.

Jarvis, Beth R. **Growing Luffa Gourd**. Information from the Yard & Garden Clinic. University of Minnesota. Retrieved 30 September 2006. <<http://www.extension.umn.edu/projects/yardandgarden/>>.

Kibiuk, Lydia. "Smell and Olfactory System." **Brain Briefing**. Retrieved on 23 February 2006. <<http://www.sfn.org/content/Publications/>>

BrainBriefings/smell.html>.

Kolb, Helga, et al. **Simple Anatomy of the Retina**. John Moran Eye Center. University of Utah. Retrieved 8 October 2006. <<http://webvision.med.utah.edu/sretina.html>>.

LeMaistre, Anne. **Respiratory System**. Retrieved 1 December 2005. <<http://medic.med.uth.tmc.edu/lecture/main/tool4.htm>>.

Lynch, Robert. "Central Nervous System." **Human Physiology**. University of Colorado, Boulder. Retrieved 16 October 2006. <<http://www.colorado.edu/kines/Class/IPHY3430-200/05cns.html#outline>>.

Marshall, Ed. **Anatomy and Physiology I**. Atlantic Cape Community Collage. Retrieved 18 November 2006. <<http://www.cyberfro.com/ap/>>.

NASA. "Visible Light Waves." **Electromagnetic Spectrum**. Retrieved 9 December 2005. <<http://imagers.gsfc.nasa.gov/ems/visible.html>>.

National Eye Institute. **Eye Diagram**. Retrieved 30 November 2005. National Institutes of Health. <<http://www.nei.nih.gov/health/eyediagram/eyeimages.asp>>.

Oghalai, John S. **Hearing and Hair Cells**. Bobby R. Alford Department of Otolaryngology-Head and Neck Surgery. Retrieved 23 February 2006. <<http://www.bcm.edu/oto/research/cochlea/Hearing/>>.

Onion Creek Ranch. **Tennessee Meat Goats™ & TexMaster™ Meat Goats!** Retrieved 24 July 2004. <[www.tennesseemeatgoats.com](http://www.tennesseemeatgoats.com)>.

Pernarowski, Mark. **Complex Biological Systems (Introduction)**. Department of Mathematical Science, Montana state University. Retrieved 17 October 2006. <<http://www.math.montana.edu/~pernarow/M611/>>.

Phillips, Robert E. "The Anatomy of the Heart." **The Heart and the Circulatory System**. Retrieved 16 October 2006. The National Health Museum. <[http://www.accessexcellence.org/AE/AEC/CC/heart\\_anatomy.html](http://www.accessexcellence.org/AE/AEC/CC/heart_anatomy.html)>.

Pittsburgh Bujinkan. **The Nervous System**. Retrieved 13 October 2006. <[http://www.pittsburghbujinkan.com/pbd\\_082.htm](http://www.pittsburghbujinkan.com/pbd_082.htm)>.

Queen's University. "Lecture 4-01: Intermolecular Forces in Gases, Liquids,

and Solids.” **States of Matter Lecture 4-01**. Retrieved 15 June 2007. <<http://www.chem.queensu.ca/programs/UG/2003/apsc131/Lectures/LectureSet4/Lect4-01.pdf>>.

Salt, Alec N. “Inner Ear Anatomy.” **A Pictorial Guide to the Inner Ear**. Washington University. Retrieved 30 November 2005. <<http://oto.wustl.edu/cochlea/intro1.htm>>.

School of Biological Sciences and College of Education and Human Sciences. “Touch.” **The Five Senses**. Retrieved 13 October 2006. <<http://bsweb.unl.edu/handsonbiology/human%20biology/Senses/touchhomepage.htm>>.

Section for Medical Image Analysis and Pattern Recognition, University of Bergen. “Large Scale Features.” **A Brief Tour of the Brain**. Retrieved 16 October 2006. <[http://www.uib.no/med/avd/miapr/arvid/UiB50/syracus/bio\\_large.htm](http://www.uib.no/med/avd/miapr/arvid/UiB50/syracus/bio_large.htm)>.

SigBio's Virtual Anatomy Textbook. **The Nervous System**. Retrieved 3 December 2005. <<http://www.acm.uiuc.edu/sigbio/project/nervous/index.html>>.

Spiller, Martin S. **Oral-Dental Anatomy**. Retrieved 2 December 2005. <<http://doctorspiller.com/oral%20anatomy.htm#tongue>>.

St. Luke's Cataract and Laser Institution. “A guide to the many parts of the human eye and how they function.” **Eye Anatomy**. Retrieved 7 October 2006. <<http://www.stlukeseye.com/Anatomy.asp>>.

Thanissaro Bhikkhu, trans. “Bahiya Sutta.” **The Pali Canon**. Retrieved 29 June 2007, <<http://www.vipassana.com/canon/khuddaka/udana/ud1-10.php>>.

The Dental Venue Multi Specialty Hospital. “Tongue Anatomy.” **Dental Conditions**. Retrieved 2 December 2005. <<http://www.dentalvenue.com/tongueanatomy.html>>.

The Medical Community of the University of California Medical Center, and Mouseworks. “Fetal Development.” **The Visible Embryo**. Retrieved 7 December 2005. <<http://www.visembryo.com/>>.

Volkhardt, S. Lynne. “The Embryo.” **First Journey: Human Development from Conception to Birth**. Retrieved 7 December 2005.

<<http://members.aol.com/SLV80/embryopage.html>>.

Westland, Stephen. "How does the eye work?" **State of Connecticut Board of Education and Services for the Blind**. Retrieved 23 December 2005. <[http://www.besb.state.ct.us/\\_\\_INFORMATION\\_ABOUT\\_BLINDNESS/How\\_does\\_the\\_eye\\_work.htm](http://www.besb.state.ct.us/__INFORMATION_ABOUT_BLINDNESS/How_does_the_eye_work.htm)>.

Wikipedia contributors, **Wikipedia The Free Encyclopedia**. <<http://en.wikipedia.org>>.

## APPENDIX

### THE *PAṬICCASAMUPPĀDA* AND THE TWELVE *ĀYATANAS*

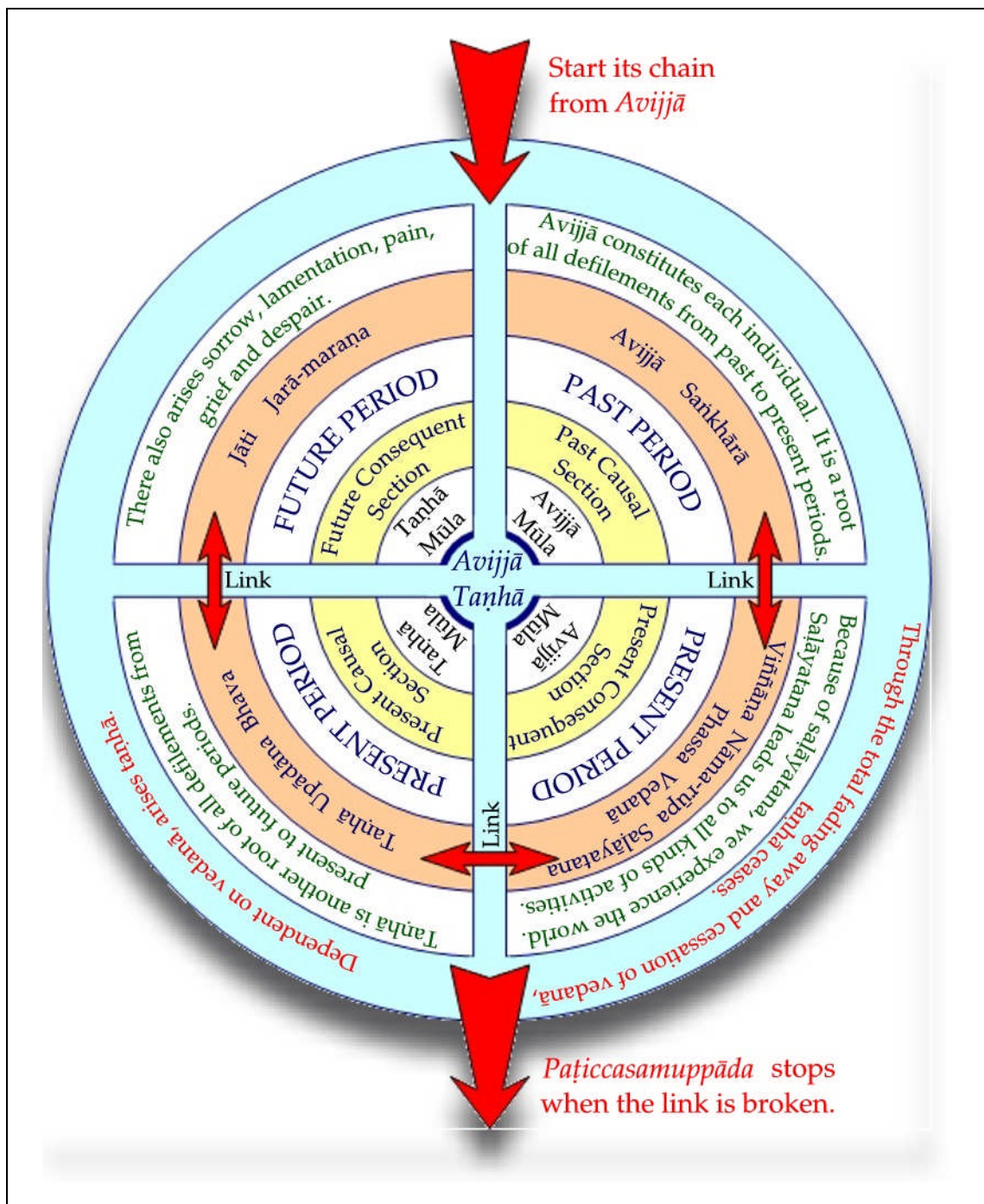
Since the actual instructions of the Buddhist trainings are mostly published in *pāli* terminologies, the knowledge derived from this thesis can be used to simplify the terminologies related to the twelve *āyatana*s into simple words. Having a deeper understanding about the twelve *āyatana*s leads us to the knowledge how to cease the cycle of rebirth by destroying the chain of conditions in the *Paṭiccasamuppāda*.

As mentioned in chapter II, the internal *āyatana*s are a condition in the *Paṭiccasamuppāda* which is the teaching about a conditional phenomena leading to the cycle of rebirth as shown in figure 83. The true knowledge about the twelve *āyatana*s will help us to destroy the chain of conditions in the *Paṭiccasamuppāda*, since the internal *āyatana*s are one of its factors. As shown in the second chapter, the process of experiencing in psychology starts from the arising of *phassa*, which is the product of the congregation of a sense base, its object, and consciousness. Bhaddanta Āsabhamahāthera suggests that the *phassa* has to be ceased in order to destroy the cycle of the *Paṭiccasamuppāda*.<sup>1</sup> This is one of the teachings that the Buddha taught Bāhiya about the proper training regarding all sense experiences in the *Bāhiya Sutta* as follows:

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<sup>1</sup> Bhaddanta Asabhathera, *Paṭiccasamuppādasāṅkhepakathā* (Chon Buri: Wat Bhaddanta Asabharam, n.d.), p.23. See also Chamlong Disayavanish, *Chitawitthaya Khong Khwamdapthuk*, 1<sup>st</sup> ed. (Chiang Mai: Klang Wiang Kanpim Ltd., 2544 B.E.) p. 113.

**Figure 83. The Paṭiccasamuppāda.** The Paṭiccasamuppāda consists of 12 factors, which are 1-*avijjā* (ignorance), 2-*saṅkhāra* (mental formation), 3-*viññāṇa* (consciousness), 4-*nāma-rūpa* (mind and matter), 5-*saḷāyatana* (six sense bases), 6-*phassa* (contact), 7-*vedanā* (feeling), 8-*taṇhā* (craving), 9-*upādāna* (clinging), 10-*bhava* (becoming), 11-*jāti* (birth), and 12-*jarā-maraṇa* (decay and death). Each factor is conditioned by the preceding factor, and in turns, conditions the following factor. The Paṭiccasamuppāda is separated into three periods; namely, past, present, and future. When a condition is ceased, the Paṭiccasamuppāda stops.



Then, Bahiya, you should train yourself thus: In reference to the seen, there will be only the seen. In reference to the heard, only the heard. In reference to the sensed, only the sensed. In reference to the cognized, only the cognized. That is how you should train yourself. When for you there will be only the seen in reference to the seen, only the heard in reference to the heard, only the sensed in reference to the sensed, only the cognized in reference to the cognized, then, Bahiya, there is no you in terms of that. When there is no you in terms of that, there is no you there. When there is no you there, you are neither here nor yonder nor between the two. This, just this, is the end of stress [*dukkha*].<sup>11</sup>

When a person knows the seen, the heard, etc. as they really are, the *phassa* stops. There are no more conditions for the arising of the *vedanā*. The cycle of the *Paṭiccasamuppāda* is broken. In order to achieve this, the person has to cultivate his wisdom by practicing the insight meditation. He should develop his mindfulness to guard the doors of sense experiences.

The *Mahāsatipaṭṭhāna Sutta* offers four main exercises to build up a basis of mindfulness. With the methods taught in this *sutta*, we have many exercises to practice in order to observe the various states of mind and matter. Examples of the exercises are shown in figure 84.

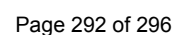
From the figure, it shows that a person can build up a basis of mindfulness during the present period of the *Paṭiccasamuppāda*, starting from *viññāṇa* factor to *bhava* factor. Examples of the practices are as follows:

# 1. *Viññāṇa*

## a. *Cittānupassanā*:

One can observe the states of mind by contemplating *vipāka-cittas*. The prominent states that people can observe are *akusalavipāka* and *kusalavipāka-cittas*.

<sup>11</sup> Ud 6ff: Thanissaro Bhikkhu, trans., “Bahiya Sutta,” **The Pali Canon**, retrieved 29 June 2007, <<http://www.vipassana.com/canon/khuddaka/udana/ud1-10.php>>.



## 2. *Nāma-Rūpa*

### a. *Kāyānupassanā*:

One can observe the body either in term of the analysis of the elements (*mahābhūtarūpa*) or the analysis of the derivative materiality (*upādārūpa*).

### b. *Cittānupassanā*:

One can observe mental states by contemplating *cetasikas*. The prominent *cetasikas* that can be observed are when *rāga*, *dosa*, and *moha* arise.

## 3. *Salāyatana*

### a. *Kāyānupassanā*:

One can focus his mind on the six internal *āyatanas*.

## 4. *Phassa*

### a. *Cittānupassanā*:

One can emphasize only on the mental state of sense impression. Bhaddanta Āsabhamahāthera suggests that the *phassa* should be observed in order to make it faded away and finally ceased in order to destroy the cycle of the *Paṭiccasamuppāda*.

## 5. *Vedanā*

### a. *Vedanānupassanā*:

One can observe one's feeling arisen from *phassa*, which includes pleasurable, painful, or neutral feelings whether they are accompanied by material thing or not.

### b. *Cittānupassanā*:

*Vedanā* is also a mental state, which can be observed.

## 6. *Taṇhā*

a. *Cittānupassanā*:

A person can observe his craving in term of a mental state.

b. *Dhammānupassanā*:

A person also can observe his craving in term of a factor of hindrances (*nīvaraṇa*) or a factor of fetters (*samyojana*).

7. *Upādāna*

a. *Dhammānupassanā*:

*Upādāna* can be observed in four ways; namely, clinging to sensuality, clinging to views, clinging to mere rule and ritual, and clinging to the ego-belief.

8. *Bhava*

a. *Cittānupassanā*:

A person can observe his volition in term of a mental state.

What mentioned above are only a few examples that one can follow as a guideline to build up one's mindfulness. When the mind is well-trained, the manifestation arising from the interaction between the internal sense bases and the external sense bases will do no harm to that person. However, a beginner of this practice may be not able to contemplate of all occurrences of the material and the mental phenomena. A solution suggested by Mahāsi Sayādaw is to contemplate or be mindful only on the most outstanding manifestation of either the material or the mental phenomena in the body first.<sup>III</sup>

<sup>III</sup> Mahāsi Sayādaw, 1980, **op. cit.**, p. 32.

This thesis shows that what we see is only electromagnetic spectrum of light, what we hear is only the energy of vibration of molecules, what we smell and taste are only chemical substances, and what we touch is the feeling that arises because of the nerve signals inside our body. The pleasure and displeasure that arise is not because of these matters, but because of the clinging that we create by ourselves.

In conclusion, this thesis demonstrates that there is no permanent and unchanging substance can be found in the twelve *āyatana*s and the elements related to them, both the material and the mental phenomena. Any elements related to the twelve *āyatana*s, including the process of cognition, are subject to impermanence and suffering and devoid of self.

## BIOGRAPHY

I was born in 1973 in Thailand. My name is Apiramon Damrongsiri. I am a qualified computer engineer graduated with a Master's Degree in computer science from the University of Colorado at Boulder in the United States, received my Bachelor of computer engineering from King Mongkut's Institute of Technology Ladkrabang in Thailand. I lived in the United States for about five years. When I studied and worked as a computer engineer in the States, I had a chance to experience other religious traditions, especially Hinduism and Christianity, and learned how these religions are different and similar to Buddhism. Once in a while, I joined a Buddhist meditation group with Westerners. This opportunity allowed me to experience a different perspective of thought on Buddhism.

When returning back to Thailand, I had a chance to join *vipassana* classes. Lacking a strong background in Buddhism caused me some difficulties in communicating with my meditation master. The thesis is a product of my struggle to find a better way to express *āyatanas* in better English, since it plays a very important role in the practice of insight meditation. I hope it may help other practitioners who have a background in science to understand how to communicate better with monks whose foundation of thought and belief are Buddhist tradition and religious texts.