

## DE'U DMAR DGE BSHES'S METHOD OF COMPOUNDING GRAY COLORS:

--Ivory, Beige, Ash and their derivative colors--

The eighth chapter of *Kun gsal tshon gyi las rim* by De'u dmar dge bshe bstan 'dzin phun tshogs dpal bzang po focuses on the theories of color composition. The author De'u dmar dge bshes was one of the most influential art theorists of Tibet in the 18th century. He was also famous as a great medical theorist. His knowledge of color materials was exhaustively profound most likely because many of the color materials were in common with those of medicine. In this paper, a sequel to the previous article (of mine in *Art in Tibet* edited by E.F. Lo Bue, Brill 2011), I would like to continue to discuss on Tibetan knowledge of basic color materials and methods of color compounding.

De'u dmar dge bshes bsTan 'dzin phun tshogs was born in Khams at gSer dga' (or gSer khar) in northwest of Go 'jo area in the first half of the 1700s (1725 or 1727)<sup>1</sup>. He was from Bi ji family which was famous as for its great doctors' lineage. His father was a noted doctor rDo rje bkra shis. De'u dmar dge bshes became a great scholar of wide learning with knowledge covering medicine and pharmacognosy in his expertise, which was based on the traditional and extensive knowledge of herbs, animals and minerals.

In order to receive the Buddhist training, he entered the Buddhist priesthood at the age of twelve by his master bla ma Śākya lha dbang at rDzi dgar monastery. He learned drawing also from the same bla ma. One of his teachers in medicine was Nam mkha'i mtshan can, the author of the famous medical text *bShad pa'i rgyud kyi sbyor bas man gyi 'grel pa 'bru 'grel mun sel sgron me sman ngos 'dzin pa'i zab chen drang srong dgyes pa'i snying thig*.

His principal teachers were Karma bstan 'phel and Kun dga' bstan 'dzin (Khams sprul, 1680-1728). De'u dmar dge bshes also went central Tibet and had an experience in Basic Buddhist studies at Se ra monastery of dGe lugs pa school.

---

<sup>1</sup> For his personal history, see *gSo rig gces btus rin chen phren ba*, Mtsho sngon: Mtsho sngon mi rigs dpe skrun khan(青海民族出版社), 1993, pp.3-5; Jackson, D. 1996, p.45.

Afterwards, he learned astronomy at Tshul phu monastery of the Karma pa school until he returned to his home land, where he made his celebrated career as a medical doctor famed not only in home land but also in the areas of Yun-nan. After his teacher Kun dga' bstan 'dzin deceased he went on pilgrimage out to India, where he prayed for the repose of his master's soul and continued to stay there in order to learn on medicine. Having returned to Tibet, he traveled in the northern nomadic district of gNam mtso as a wandering doctor, helping many patients. He also wrote a large number of medical manuals in those years.

Near his birthplace, he managed a small hermitage temple called De'u dmar Zab rgyas chos gling, which later became a small monastery called mKho khyim dgon pa. Among his most outstanding students of medicine were Si tu Pañ chen (1700-1774), Kham sprul bsTan 'dzin chos kyi nyi ma and the famous artist rDza stod Lha chen pa Dharma manggalam (Chos bkra shis).

Of his medical manuals, we have information of the following eight texts today.<sup>2</sup>

- 1) *Lag len gces bsdus sman kun bcud du sgrub pa'i las kyi cho ga kun gsal snang mdzod*
- 2) *gZo rig skor gyi ming tshig nyer mkho'i don gsal*
- 3) *sNa tshogs man ngag nyer lnga brgya rtsa 'chi med bdud rtsi shel dkar phreng ba mkhas mang yongs kyi mgul rgyan*
- 4) *Rig pa bzo'i gnas kyi las tshogs phran tshig [tshegs] 'dod dgur bsgyur ba'i pra phab 'od kyi snang brnyan bi shwa ngal bso*
- 5) *Zhu rjes gsum gyi ngo sprod gsal ston me long*
- 6) *sMan gyi ro nus zhu rjes sbyar thabs kyi rdel 'grel rgyud don rab gsal*
- 7) *Bi sha bcod pa'i man ngag tsinta ma ni*
- 8) *bDud nad gzhom pa'I gnyen po rtsi sman gyi nus pa rkyang bshad gsal ston dri med shel gong*

He also wrote art manuals at this De'u dmar zab rgyas chos gling.<sup>3</sup> We have information of the two significant manuals as following:

- 9) *Kun gsal tshon gyi las rim me tog mdangs ster 'ja' 'od 'bum byin*
- 10) *Rab gnas kyi rgyas bshad 'jam mgon dgyes pa'i bzhad gad phun tshogs bkra shis cha*

---

<sup>2</sup> GBDJp.397.

<sup>3</sup> Jackson 1996, p.45.

*brgyad*

The eighth chapter of De'u dmar dge bshes's *Kun gsal tshon gyi las rim* (above no.9) explains the theories of compounding 159 colors in all. Some of the theories are agreeable-- some are incongruent-- with those by other Tibetan art theorists: Bo dong pañ chen Phyogs las rnam rgyal (1375–1451), Mi pham rgya mtsho (1846-1912), and Rong tha Blo bzang rgya mtsho (1863-1917). In the following chapters I will discuss those inconsistencies on comparison.

De'u dmar dge bshes's knowledge on the basic color materials

Before we discuss his method of color compounding, I would like to introduce his knowledge on the basic color materials. What he categorized as basic color materials are described in the chapter one to chapter three of his art manual, *Kun gsal tshon gyi las rim*.

The characteristics of his knowledge with taxonomical classification are apparent in the descriptions of chapter one. He classified color materials from the viewpoint of the substances' origins: earth origin (sa tshon), rock origin (rdo tshon), water origin (chu tshon), fire origin (me tshon), tree origin (shing tshon), grass origin (ldum tshon), flower origin (me tog tshon), bone origin (rus tshon) and jewel origin (rin chen tshon). In the original text:

*dang po mtshon gyi rgyu bstan pa// sa rdo chu me shing ldum dang// me tog rus pa rin po che// rigs dgur 'dus tshang ...//* [MS1:p.2-8; MS2:p.5-3]

First, the materials of colors are shown: earth, rock, water, fire, tree, grass, flower, bone and jewel. They can be classified in these nine categories.

De'u dmar dge bshes listed sample materials of each nine color classifications as following. [MS1:p.2-10 to p.3-6; MS2:p.5-4 to p.6-4]

[Please refer handout no.1]

Earth origin

*lho bun ka rag sra ne dang// bab la sdong rol mu ljang btsag//tshon ram lcags ram sa tshon yin//* Here I tried to translate, but I couldn't have reached satisfactory level. If there are anybody who knows well, please give me the

information.

*lho bun* trona (or natural soda)<sup>4</sup>, *ka rag* chalk<sup>5</sup>, *sra ne* moissanite (or silicon carbide)<sup>6</sup>, *bab la* orpiment (~~yellow arsenious anhydride~~), considered as female<sup>7</sup>, *sdong rol* realgar, considered as male, ~~the alter-gender of orpiment~~<sup>8</sup>, *mu ljang* green lapis lazuli<sup>9</sup>, *btsag* red ocher<sup>10</sup>, *tshon ram* lazulite, *lcags ram* scorzalite, and so forth are color materials of earth origin.

Rock origin

*so brag lha zho ra ga dang*// *lhang 'tsher mthing spang mtshal mdun rtse*//  
*sbal rgyab smug yugs rdo tshon yin*//  
*so brag I couldn't identified* "lit. teeth rock"<sup>11</sup>, *lha zho* anhydrite<sup>12</sup>, *ra ga* copper pyrite<sup>13</sup>, *lhang 'tsher* mica<sup>14</sup>, *mthing* azurite<sup>15</sup>, *spang* malachite<sup>16</sup>,

---

<sup>4</sup> *lho bun* : interpreted as *lho 'i bul tog* (bul tog of south area); for *bul tog* see GBDJ p.90; rGyud bZhi p.196; A kind of earth medicine.(Eng: trona)

<sup>5</sup> *ka rag* also called kar; (Eng: chalk) basically Calcium carbonate, classified into male (pho kar 雄白土) and female (mo kar 雌白土), see Jackson p.82. see also GBDJ, p.65: rdo thal (limestone 石灰岩).

<sup>6</sup> *sra ne*: Luo Bingfeng translates *sra ne* as 金剛土(moissanite) see Luo Bingfeng 1997, p.40; which can be identified as "silicon carbide."

<sup>7</sup> *ba bla*: classified as female arsenic; Auripimentum (Eng: orpiment) Trisulfide of Arsenic that shows intens yellow; see Jackson p.81; GBDJ p.70; rGyud bZhi p.192(112).

<sup>8</sup> *sdong ros* (ldong ros/rol) 鷄冠石土(Eng: realgar) is classified as male arsenic; see Jackson p.82; GBDJ p.67; rGyud bZhi p.192(111).

<sup>9</sup> *mu ljang*: Luo Bingfeng identifies *mu ljang* as 綠色青金石(green lapis lazuli) see Luo Bingfeng 1997, p.40; 138; about mu men (青金石) see GBDJ p.33; rGyud bZhi p.190(62).

<sup>10</sup> *btsag*(弃柄): also called 赤石脂(紅土)Laberitum (red ocher); Chemically, red ocher is identical to yellow ocher, except that the red lacks the hydrous content of the yellow; The name 弃柄(bengala) is derived from its producing district, Bengal. see Jackson p.82; GBDJ p.74; rGyud bZhi p.192(122).

<sup>11</sup> *so phag*: Luo Bingfeng translates this *so phag* literally as 齒(状)岩 see Luo Bingfeng 1997, p.41/149.

<sup>12</sup> *lha zho*: also known as *gangs thigs* (高山風化硬石膏 anhydrite). When dissolved in water, it appears like yogurt (zho), thus called "gods' yogurt". see GBDJ p.55.

<sup>13</sup> *ra ga* : interpreted as *ra gan* (also spelled *rag* in the section of jewel-origin material); *ra gan*: 黃銅 Aurichalcum (Eng: brass) is also classified into *pho rag* (male brass) and *mo rag* (female brass): GBDJ p.48.

<sup>14</sup> *lhang 'tsher*: Muscovitum (Eng: mica); Black mica (biotite) is called *lhang 'tsher*

*mtshal* cinnabar<sup>17</sup>, *mdun rtse* amethyst<sup>18</sup>, *sbal rgyab* hematite (*septarium*)<sup>19</sup>, *smug yugs* lavender jade<sup>20</sup>, and so forth are color materials of rock origin.

#### Water origin

*li khri sindhu ra mthing ram*// *chu yi tshon yin bla mas gsungs*//  
*li khri* minium<sup>21</sup>, *sindhu ra*”*sindhura*”<sup>22</sup>, *mthing ram* azurite, and so forth are said also to be color materials of water origin by my master.

#### Fire origin

*snag tsha bab sdong dud pa gsum*// *me las byung phyir me tshon zer*//  
*snag tsha* soot atramentum<sup>23</sup>, *bab sdong* male and female arsenic, *dud pa* paste of smoke soot<sup>24</sup>, these three color materials are of fire origin because

---

*nag po*, GBDJ p.83.

<sup>15</sup> *mthing* : (藍銅鈹 *rdo mthing*, Eng: azurite) blue basic copper carbonate. The particle sizes correspond to the color values: the smallest-granulated azurite shows lightest in color and is known as *sngo si*; the next, sky-blue as *sngo sang*; the third, medium blue as *mthing shul*; the coarsest, deep azure as *mthing 'bru*. see Jackson p.75; GBDJ p.62; rGyud bZhi p.228(18).

<sup>16</sup> *spang*: (孔雀石 *rdo spang*, Eng: malachite) green basic copper carbonate; malachite, like azurite, shows four value gradations of the color; from the lightest *spang si* (white green) to lighter *spang skya* (light verdigris), *spang* (standard verdigris) and the darkest *mthing smug* (dark verdigris). see Jackson p.78; GBDJ p.68; rGyud bZhi p.228(17).

<sup>17</sup> *mtshal*: natural mercury sulfide; 銀朱 (Eng: vermilion), Jackson p.80; GBDJ p.75; rGyud bZhi p.191(98).

<sup>18</sup> *mdun rste*: also called *smug po chig thub*; 針鉄砒 goethite, goethitum: GBDJ p.73; rGyud bZhi p.190(75).

<sup>19</sup> *sbal rgyab*: classified into *smug po sbal rgyab* 紫龜甲石 purple hematite, Hematitum (GBDJ p.74) and *dkar po sbal rgyab* 白龜甲石 white hematite (GBDJ p.54); The former is divided into male hematite (*pho sbal*) and female hematite: (*mo sbal*).

<sup>20</sup> *smug yugs*: 紫玉石 lavender jade, also considered as concretionary hematite (結核狀赤鉄砒) see GBDJ p.77.

<sup>21</sup> *li khri*: 鉛丹; Eng: minium; synthetic tetraoxide of lead, see Jackson p.81; GBDJ p.75.

<sup>22</sup> Tibetan *li khri* and Sanskrit *sindhura* actually are synonyms, but many Tibetan writer distinguish them. They explain *Sindhura*, formed on lake shores and in rock cavities, is a little darker than *li khri*. see Jackson p.81; In medical tradition it is called 禹余糧(cloy-iron-ore) as an earth medicine, rGyud bZhi p.196.

<sup>23</sup> *snag tsha*: general name for black ink (soot atramentum); carbonaceous materials made from burned larch or birch; for further description about the process for making ink from soot and glue by Mi pham rgya mtsho, see Jackson p.89.

<sup>24</sup> *dud pa* = *dud dreg* 烟膏; paste made of soots and black ash, also called 五行丹 (Chin. Wǔháng dān): GBDJ p.124.

they are created by fire.

#### Tree origin

*dmар shing gser shing sra shing gsum// rgya skyegs tshon ram shing tshon yin//*

*dmар shing* rosewood (or red sandalwood), *gser shing* Indian gooseberry (aamla), *sra shing* "lit. hardwood"; these three<sup>25</sup> as well as *rgya skyegs* lac dye<sup>26</sup> and *tshon ram* indigo<sup>27</sup>, and so forth are color materials of tree origin.

#### Grass origin

*skyes bu shing dang khrag rkang pa// rgya sne rnams ni ldum gyis tshon//*

*skyes bu shing* evening primrose, *khrag rkang pa* malabar nut plant (*Adhatoda vasica* Nees)<sup>28</sup>, *rgya sne* tampala<sup>29</sup>, and so forth are color materials of grass origin.

#### Flower origin

*gur gum gro ga utpala ser//shang dril la sogs me tog mangs//*

*gur gum* Tibetan red flower<sup>30</sup>, *gro ga* birch<sup>31</sup>, *utpala ser* poppy<sup>32</sup>, *shang dril* primrose<sup>33</sup>, and so forth are color materials of flower origin.

#### Bone origin

*dung dang 'brug rus rus pa'i tshon//*

---

<sup>25</sup> Details of these three woods are unknown; *dmар shing* might be rosewood (紫檀)/ red sandalwood; *gser shing* can be synonym of *skyu ru ra* 余甘子(楂) Indian gooseberry / aamla ; GBDJ p.116.

<sup>26</sup> *rgya skyeg*: *rgya tshos*; lac dye is a red dyestuff produced from resin secreted by the tiny lac insects (*laccifer lacca*), see Jackson p.113; GBDJ p.123.

<sup>27</sup> *tshon ram*: or simply *ram* (sometimes *rams*) Eng: indigo; it is a dark blue dyestuff obtained from the plant *indigofera*, see Jackson p.112; GBDJ p.77.

<sup>28</sup> *khrag rkang pa* is also known as *ba sha ka*, which is malabar nut plant 鴨嘴花草 (*Adhatoda vasica* Nees): GBDJ p.141; rGyud bZhi p.206(60/61).

<sup>29</sup> *rgya sne* is tampala (葉鷄頭), *Amaranthus caudatus*: GBDJ p.226.

<sup>30</sup> *gur gum*: a kind of saffron; also called Tibetan red flower 藏紅花; *Crocus sativus*: GBDJ p.100; rGyud bZhi p.197(37).

<sup>31</sup> *gro ga*: birch; its ash is used for medicine, rGyud bZhi p.236(76).

<sup>32</sup> *utpala* is poppy 芥子; GBDJ p.321 indicates three kinds: *utpala/ utpala dmar po / utpala ser po*; rGyud bZhi p.194 (44) shows four illustrations.

<sup>33</sup> *shang dril* is a kind of plant: himalayan cowslip / *Primula sikkimensis*: GBDJ p.297; there are such variations as *shang dril dmar po/ shang dril smug chen/ shang dril smug chung*.

*dung* conch shell<sup>34</sup>, *'brug rus* "lit.dragon bone" (or fossil bone), and so forth are color materials of bone origin.

#### Jewel origin

*gser dngul zangs rag gser 'gyur gsha'* [MS2:sha]//*dngul chu dang ni sa rtsi rnam*//*rin po che'i tshon yin no*//  
*gser* gold<sup>35</sup>, *dngul* silver<sup>36</sup>, *zangs* bronze<sup>37</sup>, *rag* brass<sup>38</sup>, *gser 'gyur gsha'* tin<sup>39</sup>, *dngul chu* mercury<sup>40</sup>, *sa rtsi* verdigris<sup>41</sup>, and so forth are color materials of jewel origin.

De'u dmar dge bshes regarded some of the above-mentioned as basic color materials with which any desired colors can be obtained by combining them.

*gnyis pa tshon gyi grangs bshad pa*// *rtsa ba yan lag gnyis* [MS2: *gnyis gnyis*] *yin te*// *rtsa ba dkar ser dmar sngo ljang*// *nag po dang ni drug yin te*// *'di las ma sbyar mdog med kyang*// *rang byung ngur smrig li khri dang*// *smug po dang bcas brgyad yod ces*// *'dod pa mang ba shes par mdzod*// *yan lag bye brag mang ba rnam*// *'khrul 'khor sdeb pa 'og tu gsal*// [MS1: p.3-6 to p.3-11; MS2:p.6-4 to p.7-1]

Let me explain the color classification, which can be divided in two groups: root color and branch color. The root colors consist of six: white, yellow, red, blue, green and black. Although there is no color that cannot be produced by compounding them, [in addition to these six] it is also said that minium and maroon that show naturally brownish hue[hju:] are counted in to make up eight root colors altogether. It is known, by compounding them, more of

---

<sup>34</sup> *dung*: one of various kinds of sea snails and often means gzi dung, conch.

Depending on the hue, it may be called dung dmar (red conch) or dung dkar (white conch), GBDJ p.21.

<sup>35</sup> *gser*: gold is used in the form of gold paint and the preparation is detailed in Jackson p.112; GBDJ p.21; rGyud bZhi p.191(91).

<sup>36</sup> *dngul*: silver see GBDJ p.40; rGyud bZhi p.191(92).

<sup>37</sup> *zangs*: bronze see GBDJ p.47; rGyud bZhi p.189(33).

<sup>38</sup> *rag* see note 13.

<sup>39</sup> *gser 'gyur gsha'*: (gsha' dkar) tin: GBDJ p.50; rGyud bZhi p.192(110).

<sup>40</sup> *dngul chu*: mercury: GBDJ p.21; rGyud bZhi p.236(67).

<sup>41</sup> *sa rtsi* is also spelled as sag rtsi; otherwise called sa ram rtsi and translated as "verdigris". Luo Bingfeng 1997, p.41; 148; rGyud bZhi p.228 (15).

desired colors can be produced.

The methods of compounding are explained later.

And in the third chapter of *Kun gsal tshon gyi las rim*, De'u dmar dge bshes classified basic color materials that were explained in the first chapter, regrouping them based on the categorization with eight root colors. [MS1: p.3-11 to p.4-8; MS2:p.7-2 to p.8-2]

*lho bun ska rag sra ne dang// so brag dung dang lha zho dang// lhang tsher  
dngul zil ra ga rnams// dkar po'i mtshon rigs yin par bshad//*

trona, chalk, moissanite (silicon carbide), “lit. teeth rock”, conch shell, anhydrite, mica, actinolite<sup>42</sup>, copper pyrite, and so forth are white color materials.

*bab la sdong ros skyes bu shing// khrag rkang gser shing gur gum dang//  
utpala ser dang hu ljang dang// gro ga ghi (MS1:ghing) wangs (MS1:om.) ser  
po'i mtshon//*

female and male arsenic, evening primrose, malabar nut plant (*Adhatoda vasica* Nees), Indian gooseberry / aamla, Tibetan red flower, poppy, “*hu ljang*”<sup>43</sup>, birch, bezoar<sup>44</sup>, and so forth are yellow color materials.

*mtshal rigs da chu lcog la ma (SRCT:mo)// lho mtshal shag mtshal phal  
mtshal dang// dmar shing rgya sne rgya skag rnams// dmar po'i rigs su bshad  
pa yin//*

vermilion family-- cinnabar<sup>45</sup>, and other mercury compounds: mercury vermillion, southern vermillion, sand vermillion, standard vermillion, etc

---

<sup>42</sup> *dngul zil*: actinolite(陽起石)/selenite(玄精石) is a kind of rock, consisting of calcium, magnesium and iron, mainly yielded in India. There is said to be an asbestiform variation (actinolite asbestius). GBDJ p.58; rGyud bZhi p.191(95).

<sup>43</sup> *hu ljang* is unclear. Luo Bingfeng interprets the “hu” as a Chinese word “湖(lake)”. Luo Bingfeng p.150.

<sup>44</sup> *ghi wangs*: bezoar. A calculus that is accumulated in animal's abdomen. Calculi are used as antipyretic medicines. Depending on the species of animal that yields, the color and the formula of prescription vary. rGyud bZhi p.197(29-31); There is also a classification method according to the colors. rGyud bZhi p.240(16-30) lists calculi with various colors as (detoxication) adjuvants; Luo Bingfeng, interpreting *gro ga ghi wangs* as one word, translates it as birch bark.

<sup>45</sup> *da chu*: sometimes called da chu or lcog la ma/mo, cinnabar is, like mercuric sulfide, which has been synthesized ever since early ages. Jackson p.80; GBDJ p.58; rGyud bZhi p.237(78).

(that are literal translations) -- and rosewood (red sandalwood), tampala, lac dye, and so forth are red color materials.

*mthing dang ram rigs sra shing rnams// sngon po'i rigs su shes par bya//*

azurite, indigo, "lit. hardwood" are known as blue color materials.

*spang dang mu ljang ljang gu'i tshon//*

malachite and green lapis lazuli are green color materials.

*me dreg sol rdo nag po'i rigs//*

char<sup>46</sup> and coal belong to black color materials.

*li khri sindhu ra ngur smrig//*

minium, *sindhura* are orange.

*sbal rgyab mdung rtse smug zil dang// yugs rnams smug po'i rigs su bshad//*

hematite, amethyst, purple ruddle, lavender jade, and so forth are maroon.

*rgya skyeg dang ni mar shing gnyis// dmar po'i nang nas smug por gtogs//*

lac dye and rosewood / red sandalwood, these two are considered to be somewhat maroonish among red colors.

Almost all color materials can be combined with each other; however, it is said that, in some cases of color combination, chemical reactions or imbalances in density occurs, which will lead to disappointing results<sup>47</sup>. Therefore, mixing mineral materials has been

---

<sup>46</sup> char with the general term *me dreg* is divided into categories such as *phru dreg* (pan-bottom black), *slang dreg* (weed-soot black) and *dud dreg* (paste of smoke soot). GBDJ p.124.

<sup>47</sup> For example, Mi pham rgya mtsho (1846-1912) explains:

*ljang gu dang ba bla 'dres na tshon rul ba ste mi legs/ gcig gi steng du gcig phog na yang nag por 'gro/ li khri mang po la mtshal nyung du btab kyang rul ba sogs shes par bya'o//*

[Mi pham: 86] If orpiment and malacite are mixed together, the color will chemically change and become dull. Adding one to the other results in darkening and spoiling the color. [You should know that] even though a very little vermilion is mixed into a large amount of *minium*, a darkening chemical reaction occurs and the color is spoiled.

First case, the chemical reaction when the colour material "spang ma (malachite green)" a basic carbonate of copper,  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$  (塩基性炭酸銅) and "ba bla" (orpiment yellow): a natural yellow trisulfide of arsenic,  $\text{As}_2\text{S}_3$  (三硫化砷素) can be analysed as following chemical formula:

carefully done by painters, who have been concerned about the theory of color compounding.

De'u dmar dge bshes' ivory and bage.

In the previous paper, I wrote about various kinds of brown colors and the colors derived from them. Among those are two fundamental brown colors that become the components of various derivations: "lac dye brown" which is produced by mixing *skag* (lac-dye) and *dkar* (=ka rag: chalk); and "vermilion brown" which is produced by mixing *mtshal* (vermilion) and *dkar*.

Now, I would like to discuss some kinds of gray colors and the colors derived from them. Kinds of gray colors taken up here are equivalent to ivory or beige in English (I think). Although these colors are repeatedly used for coloration of clouds and bone in Tibetan *thang ka* painting, without expertise and experience it is quite difficult to distinguish one from another at a glance. Please refer to the color charts handouts.

## Ivory (bone color) and its derivative colors

Let us look into De'u dmar dge bshes's explanation of bone colors (ivory).

(handout no.1 of page 2)

*dkar la bab la chung zad bsre/*

*dkar ser rus kha zhes bya 'byung/*

*'brug rus 'dul la'ang rus kha (MS1:ad. rig chig ; MS2:ad. rigs gcig) 'byung//*

---

$\text{CuCO}_3 \cdot \text{Cu(OH)}_2 + \text{As}_2\text{S}_3 \rightarrow \text{Cu}_2\text{S}$  (copper sulfide: 硫化銅 = 硫銅鉍 = 輝銅鉍)

The substance of this copper sulfide appears black color.

The case of when "li khri" (minium orange: the synthetic tetraoxide of lead,  $\text{Pb}_3\text{O}_4$  : 四三酸化鉛) is mixed with "mtshal" (vermilion red: mercury sulfide: 硫化水銀) can be analysed as following chemical reaction formula:

$\text{Pb}_3\text{O}_4 + \text{HgS} \rightarrow \text{PbS}$  (lead sulfide: 硫化鉛)

This substance also appears black colour. So we can possible to prove that Mi pham rgya mtsho's argument has a chemical rationality.

[MS1:p.23-12; MS2:p.32-4; SRCT:113-25]

If a small amount of *bab la* (orpiment) is mixed into *dkar* (chalk), then what is called yellowish-white *rus kha* (bone color) is produced.

The bone color can also be obtained from ground fossil bones. *'brug rus sounds like dinosaur!*

*rus kha snga mar myong*(MS1/SRCT:myang) *rtsi sprad/*  
*cung bsres dkar ser dar ba'i mar/*  
*gser* (MS2:gsar) *'dra mar gsar mdog ces 'byung/*

If *myang rtsi sprad* ( or goldthread, coptis teeta / coptis teetoides)<sup>48</sup> is added a little to the above-mentioned *rus kha* (bone color), what is called “golden and newly-made” *mar* [butter] color is obtained.

*mar mdog de la rgya tshos mdog/*  
*gyur*(MS1/SRCT: 'gyur) *tsam bsres pa ba so kha/*  
*mar gsar kha la ram*(MS1/SRCT:rams) *cung zad/*  
*bsres pa dkar ljang sa lu kha/*

When lac-dye is added a little to the *mar* color, then *Ba so kha* (ivory color) [is produced].

If indigo is added a little to the *mar* color, then white-green *Sa lu kha* (chaff color) [is produced].

*dkar la mtshal skya*(MS1&2:skya 'i kha bun dang/  
*mu zi ser po) cung zad bsnan/*  
*de dang ser po cha mnyam par/*  
*se mi kha zhes*(SRCT:ces) *gser mdog 'byung*(SRCT: 'gyur)/  
*ming gzhan ngang pa gser ldan zhes/*

Compounding chalk and a small amount of light vermilion (*mtshal skya*) [MS1&2: and sulphur<sup>49</sup>], then adding the same amount of realgar, the color

---

<sup>48</sup> *myang rtsi sprad* (myang rtsi spras): Coptis teetoides C.Y.cheng (goldthread 黃蓮) classified into 味蓮, 雅蓮 and 野蓮 see GBDJ p.264; In Tibetan medicine, it is used to treat hemal maladies. rGyud bZhi p.250(18).

<sup>49</sup> *mu zi ser po*: Sulphur nativum (硫黃); Depending on the color, it is classified into

called *se mi kha* is produced. This color is also called by another name, yellowish *ngang pa* (goose color)

Rong tha Blo bzang dam chos rgya mtsho (1863-1917) adopted this name, *ngang pa* (goose color), describing almost the same compounding method as De'u dmar dge bshes':

*dkar la mtshal skya bsres pa dang//*

*ser po cha mnyam ngang pa 'byung//* [Rong tha; 183]

Adding a small amount of light vermilion (*mtshal skya*) to chalk, then putting the same amount of yellow (=realgar?), *ngang pa* (goose color) is produced.

Let us see De'u dmar dge bshes's explanation about *se mi kha*. De'u dmar dge bshes continues as following:

*de la li khri cung zad bsnan/*

*dmar ser gu lang gser 'dra 'byung/*

When a small amount of minium is added to it (= *se mi kha*), reddish-yellow, gold-like *gu lang* (Indra color) is produced.

According to Rong tha's explanation, this color corresponds to the color called *gser 'dra* (color similar to gold).

*ngang pa de la li bsnan gser 'dra//*

If minium is added to *ngang pa*,

*gser 'dra* (color similar to gold) [is produced].

De'u dmar dge bshes, using *mu zi ser po* (sulphur), produces a color called elephant color:

---

four: white sulphur (*mu zi dkar po* 白硫黃), yellow sulphur (*mu zi ser po* 黃硫黃), green sulphur (*mu zi ljang gu* 綠硫黃) and black sulphur (*mu zi nag po* 黑硫黃); GBDJ p.72; rGyud bZhi p.196(7)(8)(9).

*dkar la mthing skya 'i kha bun dang/*

*mu zi ser po cung zad bsre/*

*de la glang chen kha dog zer/*

If a small amount of light azulite (*mthing skya*) is added to chalk and a little *mu zi ser po* (sulphur) is mixed, it is called *glang chen kha dog* (elephant color).

## Milk colors and Cloud colors

White made of chalk with a hint of blue-- mixed with a very small quantity of two different substances (mineral azurite and dye indigo)-- is sometimes called milk color. According to De'u dmar dge bshes: (handout no.2)

*dkar dang mtshon(MS1&2/SRCT:mdangs tshon) ram(SRCT:rams) sbyar mang nyung/ khyad las(MS1/SRCT:par sa) sbyar mthing (MS2:ad. mthing) nag dang/*

*mthing skya 'o ma kha gsum 'byung/*

Depending on the proportion of indigo added to chalk, three kinds of color are produced: *sbyar mthing nag* (dark blend blue), *sbyar mthing skya* (light blend blue) and *'o ma kha* (milk color).

*de bzhin dkar la mthing skya bsre/*

*'o kha 'o sngon 'o shang kha/*

*chu yi rlong(MS1/SRCT:rlangs) smug sprin kha zer/*

Mixing light azurite to chalk in the same manner makes *'o kha* (milky color), *'o sngon* (blue milky color) and *'o shang kha* (meaning unclear; I couldn't identified.) [that is] called hazy cloud color.

*dkar la spang skya bsres pa na/*

*dkar ljang sprin chen kha zhes zer/*

If light malachite is added to chalk,  
It is called *sprin chen kha* (great cloud color).

*de la sngo skya 'o kha bsnan/  
g-yu sprin kha zhes bya ba 'byung/  
To that, if light azurite 'o kha* (milky color) is added,  
then *g-yu sprin kha* (jade cloud color) is produced.

*sprin chen kha la bab la bsnan/  
de la sprin ser 'byung ba dang/  
yang na li khri bsnan ser bsnun(SRCT:snun)/  
To *sprin chen kha* (great cloud color), if orpiment is added,  
then *sprin ser* (yellow cloud color) is produced, and then if minium is added,  
*ser bsnun* (double yellow color) is produced.*

Rong tha Blo bzang dam chos rgya mtsho (1863-1917) explained these milk colors in slightly different way from De'u dmar dge bshes's color mixing methods,  
[Rong tha:183]

*dkar la mthing chu bsres 'o dkar/  
de las cher bsres 'o sngon zer//  
If, to chalk, a small amount of diluted azurite (*mthing chu*) is added, 'o dkar  
(white milky color) is produced.  
If more amount [of diluted azurite] is added, then it is called 'o sngon (blue  
milky color).*

*dkar la spang chu bsres 'o kha//  
de las cher bsres 'o ljang yin//  
If, to chalk, a small amount of diluted malachite (*spang chu*) is added, 'o kha  
(milky color) is produced.  
If more amount [of deluted malachite] is added, then it is called 'o ljang  
(green milky color).*

The materials used by Rong tha for 'o kha (milky color) are malachite and chalk, which are clearly different from De'u dmar dge bshes's method using azurite and chalk.

## Ash colors and Beige colors

Let us return to the explanations in the eighth chapter of De'u dmar dge bshes's *Kun gsal tshon gyi las rim*. De'u dmar dge bshes explains ash colors as following: [MS1: p.25-10; MS2:p.34-6; SRCT:p.114-17] (handout no.3 of page 3)

*dkar por snag tsha'i g-ya' bsres la(SRCT:pas)/*  
*thal ka(MS1/SRCT:kha) zhes bya de la 'byung/*  
When a drop of carbon black ink in chalk,  
there is a color called *thal kha* (ash color) produced.

*dkar shas che ba thal dkar te(MS2: ste)/*  
*'di(SRCT:'dir) yang glang chen kha zhes grags/*  
*nag che thal nag ser thal ser/*  
*mtshal bun bsnan na thal dmar zer(SRCT:ser)/*  
*sngo skya bsnan na thal sngon 'byung/*  
The color with prevailing chalk [in the above mixture] is *thal dkar* (white ash).  
This color is also called elephant color.  
With prevailing black ink, it is *thal nag* (black ash / gray).  
If yellow (orpiment) [is prominent, it] is *thal ser* (yellow ash).  
If vermilion is added a little, the color is called *thal dmar* (red ash).  
When light azurite is mixed, it is *thal sngon* (blue ash).

Rong tha wrote similar explanations:

*dkar la snag bsres thal ka 'byung//*  
*dkar shas che ba thal dkar dang//*  
*de la mthing skya bsres thal sngon//* [Rong tha:183]  
If black ink is added to chalk, *thal kha* (ash color) is produced.  
If chalk predominates, the color is *thal dkar* (white ash).  
If light azurite is added to it, the color is *thal sngon* (blue ash).

De'u dmar dge bshes explains brown color (lit. tea color) as following: [MS1:p.27-3; MS2: p.36-7; SRCT: p.115-5]

*mtshal(MS1&2:tshal) skya rgya snag(MS1&2:nag) cha mnyam la/  
bab la cung zad bsnan pa la/  
ja kha zhes bya de gsum po/  
cha la dpag nas de gsum po(SRCT:mo)/  
cha la dpag nas(SRCT: de gsum po/cha la dpag nas om.)ja dmar dang/  
ja nag ja ser gsum du bya/*

Compounding a small amount of Chinese black ink (*rgya snag*) with light vermilion and then adding a little orpiment to it, the color becomes *ja kha* (brown / tea color). Depending on the proportion of materials, there are three kinds called *ja dmar* (red brown), *ja nag* (dark brown) and *ja ser* (yellow brown).

*ja mkhar(SRCT:khar) skag mnan(SRCT:bsnan)  
ja smug dang(SRCT: 'byung)/  
sbyar ljang bsnan na ja ljang 'byung/*

If lac maroon is added to *ja kha*,  
*ja smug* (maroonish brown) is produced.  
If *sbyar ljang* (blend green) is mixed in,  
*ja ljang* (green brown) is produced.

*ja khar smug pos(SRCT:po) sbal rgyab bsnan/  
de la'ang ja smug rigs(MS2:rig) gcig 'byung/*

Adding hematite to *ja kha* also produces another kind of *ja smug* (maroonish brown) .

Rong tha's explanation is almost same:

*dkar steng mtshal skya ba bla dang//  
snag gsum bsnan pas ja kha zer//*

*dmар shas che ba ja dmar zer*// [Rong tha:183]

Adding the three colors of light vermilion, orpiment and black ink to chalk makes *ja kha* (brown).

If vermilion is prevailing, it is called *ja dmar* (red brown).

## Smoke colors and Terracotta colors

The English word “beige” in some case includes brownish dark gray: something called “french beige”. In De’u dmar dge bshes’s explanation, we find the color similar to this “french beige”. The name of this color is *rdza kha* (lit. terracotta color). (handout no.4)

*sdong ros nang du dmar skya dang*/

*snag tsha zhad tsam re*(SRCT:re om.) *bsnan*(SRCT:bsnan byas) *pas*/

*rdza kha zhes bya de la yang*/

*dkar po cung bsnan rdza skya yin*/

*rdza kha dmar shas che ba’i nang*/

*snag tsha cung zad shed*(SRCT:shas) *bskyed dar*(MS2:par SRCT:pas)/

*dud kha zhes zer*(SRCT:bya) *de la yang*/

*sngo skya bsnan na dud*(SRCT:du) *sngon ‘byung*/

If a small amount of light vermilion and black ink are added to realgar, then the color called *rdza kha* (terracotta color) is produced.

If a small amount of chalk is added to it,

The color is *rdza skya* (light terracotta color).

If, to *rdza kha* with slightly prevailing vermilion, a little more ink is added, then it produces the color called *dud kha* (smoke color). If light azurite is further added to it, *dud sngon* (blue smoke color) is obtained.

Rong tha makes smoke color with quite different materials,

*ja dmar snag bsres dud kha ‘ong*// [Rong tha: 183]

If black ink is added to *ja dmar* (red brown), smoke color is created.

This indicates that Rong tha’s smoke color contains orpiment as its materials but

realgar.

tried to avoid the possibility of chemical reactions

## Notes

<sup>1</sup> For his personal history, see *gSo rig gces btus rin chen phren ba*, Mtsho sngon: Mtsho sngon mi rigs dpe skrun khan(青海民族出版社), 1993, pp.3-5; Jackson, D. 1996, p.45.

<sup>2</sup> GBDJp.397.

<sup>3</sup> Jackson 1996, p.45.

<sup>4</sup> *lho bun* = *lho'i bul tog* (bul tog of south area); for *bul tog* see GBDJ p.90; rGyud bZhi p.196; A kind of earth medicine.(Eng: trona)

<sup>5</sup> *ka rag* also called kar; (Eng: chalk) basically Calcium carbonate, classified into male (pho kar 雄白土) and female (mo kar 雌白土), see Jackson p.82. see also GBDJ, p.65: rdo thal (limestone 石灰岩).

<sup>6</sup> *sra ne*: Luo Bingfeng translates *sra ne* as 金剛土(moissanite) see Luo Bingfeng 1997, p.40; also called “silicon carbide.”

<sup>7</sup> *ba bla*: classified as female arsenic; Auripigmentum (Eng: orpiment) Trisulfide of Arsenic that shows intense yellow; see Jackson p.81; GBDJ p.70; rGyud bZhi p.192(112).

<sup>8</sup> *sdong ros* (ldong ros/rol) 鷄冠石土(Eng: realgar) is classified as male arsenic; see Jackson p.82; GBDJ p.67; rGyud bZhi p.192(111).

<sup>9</sup> *mu ljang*: Luo Bingfeng identifies *mu ljang* as 綠色青金石(green lapis lazuli) see Luo Bingfeng 1997, p.40; 138; about mu men (青金石) see GBDJ p.33; rGyud bZhi p.190(62).

<sup>10</sup> *btsag*(弁柄): also called 赤石脂(紅土) Laberitum (red ocher); Chemically, red ocher is identical to yellow ocher, except that the red lacks the hydrous content of the yellow; The name 弁柄(bengala) is derived from its producing district, Bengal. see Jackson p.82; GBDJ p.74; rGyud bZhi p.192(122).

<sup>11</sup> *so phag*: Luo Bingfeng translates this *so phag* literally as 齒(狀)岩 see Luo Bingfeng 1997, p.41/149.

<sup>12</sup> *lha zho*: also known as *gangs thigs* (高山風化硬石膏 anhydrite). When dissolved in water, it appears like yogurt (zho), thus called “gods' yogurt”. see GBDJ p.55.

<sup>13</sup> *ra ga* : interpreted as *ra gan* (also spelled *rag* in the section of jewel-origin material); *ra gan*: 黃銅 Aurichalcum (Eng: brass) is also classified into *pho rag* (male brass) and *mo rag* (female brass): GBDJ p.48.

<sup>14</sup> *lhang 'tsher*: Muscovitum (Eng: mica); Black mica (biotite) is called *lhang 'tsher nag po*, GBDJ p.83.

<sup>15</sup> *mthing* :(藍銅鈷 *rdo mthing*, Eng: azurite) blue basic copper carbonate. The particle sizes correspond to the color values: the smallest-granulated azurite shows lightest in color and is known as *sngo si*; the next, sky-blue as *sngo sang*; the third, medium blue as *mthing shul*; the coarsest, deep azure as *mthing 'bru*. see Jackson p.75; GBDJ p.62; rGyud bZhi p.228(18).

<sup>16</sup> *spang*: (孔雀石 *rdo spang*, Eng: malachite) green basic copper carbonate; malachite, like azurite, shows four value gradations of the color; from the lightest *spang si* (white green) to lighter *spang skya* (light verdigris), *spang* (standard verdigris) and the darkest *mthing smug* (dark verdigris). see Jackson p.78; GBDJ p.68; rGyud bZhi p.228(17).

<sup>17</sup> *mtshal*: natural mercury sulfide; 銀朱 (Eng: vermilion), Jackson p.80; GBDJ p.75; rGyud bZhi p.191(98).

<sup>18</sup> *mdun rste*: also called *smug po chig thub*; 針鉄砒 goethite, goethitum: GBDJ p.73; rGyud bZhi p.190(75).

<sup>19</sup> *sbal rgyab*: classified into *smug po sbal rgyab* 紫龜甲石 purple hematite, Hematitum (GBDJ p.74) and *dkar po sbal rgyab* 白龜甲石 white hematite (GBDJ p.54); The former is divided into male hematite (*pho sbal*) and female hematite: (*mo sbal*).

<sup>20</sup> *smug yugs*: 紫玉石 lavender jade, also considered as concretionary hematite (結核狀赤鉄砒) see GBDJ p.77.

<sup>21</sup> *li khri*: 鉛丹; Eng: minium; synthetic tetraoxide of lead, see Jackson p.81; GBDJ p.75.

<sup>22</sup> Tibetan *li khri* and Sanskrit *sindhura* actually are synonyms, but many Tibetan writer distinguish them. They explain *Sindhura*, formed on lake shores and in rock cavities, is a little darker than *li khri*. see Jackson p.81; In medical tradition it is called 禹余糧 (cloy-iron-ore) as an earth medicine, rGyud bZhi p.196.

<sup>23</sup> *snag tsha*: general name for black ink (soot atramentum); carbonaceous materials made from burned larch or birch; for further description about the process for making ink from soot and glue by Mi pham rgya mtsho, see Jackson p.89.

<sup>24</sup> *dud pa* = dud dreg 烟膏; paste made of soots and black ash, also called 五行丹 (Chin. Wüháng dān): GBDJ p.124.

<sup>25</sup> Details of these three woods are unknown; *dmar shing* might be rosewood (紫檀)/ red sandalwood; *gser shing* can be synonym of *skyu ru ra* 余甘子(楮) Indian gooseberry / aamla ; GBDJ p.116.

<sup>26</sup> *rgya skyeg*: *rgya tshos*; lac dye is a red dyestuff produced from resin secreted by the tiny lac insects (*laccifer lacca*), see Jackson p.113; GBDJ p.123.

<sup>27</sup> *tshon ram*: or simply *ram* (sometimes *rams*) Eng: indigo; it is a dark blue dyestuff obtained from the plant *indigofera*, see Jackson p.112; GBDJ p.77.

<sup>28</sup> *khrag rkang pa* is also known as *ba sha ka*, which is malabar nut plant 鴨嘴花草 (*Adhatoda vasica* Nees): GBDJ p.141; rGyud bZhi p.206(60/61).

<sup>29</sup> *rgya sne* is *tampala* (葉鷄頭), *Amaranthus caudatus*: GBDJ p.226.

<sup>30</sup> *gur gum*: a kind of saffron; also called Tibetan red flower 藏紅花; *Crocus sativus*: GBDJ p.100; rGyud bZhi p.197(37).

<sup>31</sup> *gro ga*: birch; its ash is used for medicine, rGyud bZhi p.236(76).

<sup>32</sup> *utpala* is poppy 芥子; GBDJ p.321 indicates three kinds: *utpala*/ *utpala dmar po* / *utpala ser po*; rGyud bZhi p.194 (44) shows four illustrations.

<sup>33</sup> *shang dril* is a kind of plant: himalayan cowslip / *Primula sikkimensis*: GBDJ p.297; there are such variations as *shang dril dmar po*/ *shang dril smug chen*/ *shang dril smug chung*.

<sup>34</sup> *dung*: one of various kinds of sea snails and often means *gzi dung*, conch. Depending on the hue, it may be called *dung dmar*(red conch) or *dung dkar* (white conch), GBDJ p.21.

<sup>35</sup> *gser*: gold is used in the form of gold paint and the preparation is detailed in Jackson p.112; GBDJ p.21; rGyud bZhi p.191(91).

<sup>36</sup> *dngul*: silver see GBDJ p.40; rGyud bZhi p.191(92).

<sup>37</sup> *zangs*: bronze see GBDJ p.47; rGyud bZhi p.189(33).

<sup>38</sup> *rag* see note 13.

<sup>39</sup> *gser 'gyur gsha'*: (gsha' dkar) tin: GBDJ p.50; rGyud bZhi p.192(110).

<sup>40</sup> *dngul chu*: mercury: GBDJ p.21; rGyud bZhi p.236(67).

<sup>41</sup> *sa rtsi* is also spelled as *sag rtsi*; otherwise called *sa ram rtsi* and translated as "verdigris". Luo Bingfeng 1997, p.41; 148; rGyud bZhi p.228 (15).

<sup>42</sup> *dngul zil*: actinolite(陽起石)/selenite(玄精石) is a kind of rock, consisting of calcium, magnesium and iron, mainly yielded in India. There is said to be an asbestiform variation (actinolite asbestius). GBDJ p.58; rGyud bZhi p.191(95).

<sup>43</sup> *hu ljang* is unclear. Luo Bingfeng interprets the "hu" as a Chinese word "湖(lake)". Luo Bingfeng p.150.

<sup>44</sup> *ghi wangs*: bezoar. A calculus that is accumulated in animal's abdomen. Calculi are used as antipyretic medicines. Depending on the species of animal that yields, the color and the formula of prescription vary. rGyud bZhi p.197(29-31); There is also a classification method according to the colors. rGyud bZhi p.240(16-30) lists calculi with various colors as (detoxication) adjuvants; Luo Bingfeng, interpreting *gro ga ghi wangs* as one word, translates it as birch bark.

<sup>45</sup> *da chu*: sometimes called *da chu* or *lcog la ma/mo*, cinnabar is, like mercuric sulfide, which has been synthesized ever since early ages. Jackson p.80; GBDJ p.58; rGyud bZhi p.237(78).

<sup>46</sup> *char* with the general term *me dreg* is divided into categories such as *phru dreg* (pan-bottom black), *slang dreg* (weed-soot black) and *dud dreg* (paste of smoke soot). GBDJ p.124.

<sup>47</sup> For example, Mi pham rgya mtsho (1846-1912) explains:

*ljang gu dang ba bla 'dres na tshon rul ba ste mi legs/ gcig gi steng du gcig phog na yang nag por 'gro/ li khri mang po la mtshal nyung du btab kyang rul ba sogs shes par bya'o//*

[Mi pham: 86] If orpiment and malacite are mixed together, the color will chemically change and become dull. Adding one to the other results in darkening and spoiling the color. [You should know that] even though a very little vermilion is mixed into a large amount of *minium*, a darkening chemical reaction occurs and the color is spoiled.

<sup>48</sup> *myang rtsi sprad* (*myang rtsi spras*): *Coptis teetoides* C.Y.cheng (goldthread 黃蓮) classified into 味蓮, 雅蓮 and 野蓮 see GBDJ p.264; In Tibetan medicine, it is used to treat hemal maladies. rGyud bZhi p.250(18).

<sup>49</sup> *mu zi ser po*: Sulphur nativum (硫黃); Depending on the color, it is classified into four: white sulphur (*mu zi dkar po* 白硫黃), yellow sulphur (*mu zi ser po* 黃硫黃), green sulphur (*mu zi ljang gu* 綠硫黃) and black sulphur (*mu zi nag po* 黑硫黃); GBDJ p.72; rGyud bZhi p.196(7)(8)(9).

## Abbreviation

(MS1) = De'u dmar dge bshes bstan 'dzin Phun tshogs. *Kun gsal tshon gyi las rim me tog mdangs ster ja' 'od 'bum byin*. pp.1-139 (Manuscript personally provided by Luo Bingfeng (羅秉芬) the author of Chinese version of *Kun gsal tshon gyi las rim*, hand writing copied in 1981.)

(MS2) = De'u dmar dge bshes bstan 'dzin Phun tshogs. *Kun gsal tshon gyi las rim me tog mdangs ster ja' 'od 'bum 'byin*. pp.1-182. (Manuscript personally provided by Dr. Gene Smith; Pecha style with dbu can scripts, no data of publication.)

(SRCT) = De'u dmar dge bshes bstan 'dzin Phun tshogs. *gSo rig gces btus rin chen phren ba*. (including same passage of eighth chapter of *Kun gsal tshon gyi las rim*)

(GBDJ) = dGa' ba'i rdo rje, 藏藥晶鏡本草 *'khrungs dpe dri med shel gyi me long* (in Tibetan) 民族出版社, 北京, 1995.

(rGyud bZhi) = 王鐸 (池上正治訳) 『四部医典タンカ全集』 平河出版社, Tokyo, 1992.

## Tibetan Sources

De'u dmar dge bshes bstan 'dzin Phun tshogs, *Kun gsal tshon gyi las rim me tog mdzngs ster ja' 'od 'bum byin* (MS1 and MS2) NDP.

-----, *gSo rig gces btus rin chen phren ba*, Mtsho sngon: Mtsho sngon mi rigs dpe skrun khan (青海民族出版社), Qinghai, 1993.

Bo dong Pan chen Phyogs las rnam rgyal (1375-1451), *Mkhas pa 'jug pa'i [sgo] bzo rig sku gsung thugs kyi rten bzhengs thsul bshad pa*. In his Collected Works. New Delhi: Tibet House, 1969, vol.2, 215-65. See also, vol. 9, 461-501.

Mi pham rgya mtsho (1846-1912), *Bzo gnas nyer mkho za ma tog*. In his Collected Writings. Gangtok: ed. Sonam Topgay Kazi, 1975, vol. 9, 71-138.

Rong tha Blo bzang dam chos rgya mtsho (1863-1917), *Thig gi lag len du ma gsal bar bshad pa bzo rig mdzes pa'i kha rgyan*. New Delhi: Byams-pa-chos-rgyal, n.d.

## Secondary Sources

Jackson, D. and J. Jackson, *Tibetan Thangka Painting*. London: Serindia, 1984.

Jackson, D. 1996. *A History of Tibetan Painting, The Great Tibetan Painters and Their*

- Traditions*. Vien: Verlag Der Osterreichischen Akademie Der Wissenschaften, 1996.
- Luo Bingfeng (羅秉芬), 西藏佛教彩繪彩塑藝術, 中国藏學出版社, 北京, 1997.
- Shunzo Onoda, "Some Inconsistencies of color Composition Techniques in Tibet." In *Impressions of Bhutan and Tibetan Art*, Tibetan Studies III. ed. John Ardussi & Henk Blezer, Brill, 133-38, 2002.
- dGa' ba'i rdo rje, 藏藥晶鏡本草 *'khrungs dpe dri med shel gyi me long* (in Tibetan) 民族出版社, 北京, 1995.
- Wang Li 王鐳 (Tr. by Shouji Ikegami 池上正治) *Shibuiten Tanka Zenshu* 四部医典タンカ全集, Hirakawa Pub. Co., Tokyo, 1992.