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The Human Body in Asian Texts and Images



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Anatomical Structures and the Structure of Anatomy in Tibetan Medicine. The Fourth Chapter of the Explanatory Tantra in its Commentaries

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Abstract The focus on anatomical knowledge differentiates traditional Tibetan medicine and other East Asian medical traditions. Anatomy, defined as the study of the structure of living beings played an important role in early Tibetan medical literature. It was seen as a vital element in the physiological understanding of the body, and in the development of diagnostic skills and therapeutic interventions. The numbers of bodily components and their proportions are described in the texts, as well as the different kinds of channels, material or rather subtle, the vulnerable points of the body, and certain “pathways” connecting the interior with the exterior. Tibet’s most important medical text, the *Rgyud-bzhi* (also known as the *Four Tantras* or *Four Treatises*, a medieval text probably compiled in the twelfth century) includes substantial anatomical information, however, it often leaves room for interpretation. This poses lasting challenges for later commentators. Given the fact that many basic concepts of the *Four Tantras* remain unexplained within them, the major commentaries have interpreted certain anatomical structures differently over the course of time. For example, the sixteenth century physician *Zur-mkhar* Blo-gros-rgyal-po elaborated on subtle anatomical structures, which are difficult to palpate or clearly verifiable. At the other end of the spectrum, seventeenth century scholar *Dar-mo-sman-rams-pa* Blo-bzang-chos-grags examined the human corpse by dissection. Some of his findings were at odds with established opinion or resulted in certain inconsistencies with traditional locations for therapeutic intervention.

Keywords Tibetan medicine – anatomy – subtle channels – dissection – tendon – vascular structure

Anatomische Strukturen und die Struktur der Anatomie in der tibetischen Medizin.

Das vierte Kapitel des Erklärungstanzas in seinen Kommentaren

Zusammenfassung Die Ausrichtung auf anatomisches Wissen unterscheidet die traditionelle tibetische Medizin von anderen ostasiatischen Medizintemperaturen. Anatomie, definiert als das Studium der Struktur der Lebewesen, spielte bereits in der frühen tibetischen medizinischen Literatur eine wichtige Rolle. Sie wurde als wesentliches Element betrachtet, um den Körper physiologisch zu verstehen und diagnostische Fertigkeiten sowie therapeutische Interventionen zu entwickeln. Die Anzahl körperlicher Bestandteile und deren Proportionen sind in den Texten genauso beschrieben wie verschiedene Arten von Kanälen materieller oder mehr subtiler Natur sowie bestimmte „Passagewege“, welche das Innere mit dem Äußeren verbinden. Tibets bedeutendster medizinischer Text, das *Rgyud-bzhi* – bekannt unter dem Namen *Vier Tantras* oder *Vier Traktate*, ein mittelalterlicher Text, der wahrscheinlich im zwölften Jahrhundert kompiliert wurde –, beinhaltet substanzielle anatomische Informationen, obwohl es Raum für Interpretation offenlässt. Dies stellt spätere Kommentatoren vor beträchtliche Herausforderungen. Vor dem Hintergrund, dass viele grundlegende Konzepte der *Vier Tantras* darin unerklärt bleiben, haben die maßgeblichen Kommentare bestimmte anatomische Strukturen im Laufe der Zeit unterschiedlich interpretiert. Zum Beispiel befasste sich der im sechzehnten Jahrhundert tätige Arzt *Zur-mkhar* Blo-gros-rgyal-po mit subtilen anatomischen Strukturen, welche nicht palpabel und kaum zu verifizieren sind. Am anderen Ende des Spektrums untersuchte der im siebzehnten Jahrhundert lebende Gelehrte *Dar-mo-sman-rams-pa* Blo-bzang-chos-grags den menschlichen Körper durch Sektion. Manche seiner Feststellungen standen im Widerspruch zur etablierten Lehrmeinung oder resultierten in Ungereimtheiten mit traditionellen Lokalisationen für therapeutische Intervention.

Schlagwörter tibetische Medizin – Anatomie - subtile Kanäle – Sektion – Sehne – vaskuläre Struktur

French abstract, see p. 102

* This Article is based on preliminary presentations on different aspects of the subject given at conferences: The conference of the International Association of Tibetan Studies held in Ulan Bator in August 2013, in the panel on Medicine and Astrology between Tibet, Mongolia and China, late 17th to early 20th centuries (Organizer: Stacey Van Vleet, Chair: Janet Gyatso) and the symposium entitled “Transforming Tibetan Anatomy“ in Vienna in June 2014 organised by Katharina Sabernig. Due to in-depth study new aspects of different commentaries have been integrated in this article which was used as a working paper for the workshop “Comparative perspectives on body materiality and structure in the history of Sinitic and East Asian medicines,” October 2–4, 2015, University of Michigan, Ann Arbor. The subject is part of my recent research project supported by the Austrian Science Fund (P 26129-G21).

Introduction

The second part of the *Four Tantras*, Tibet's most important treatise, known as the *Explanatory Tantra* (*bshad rgyud*), forms the basis of fundamental pre-clinical knowledge in Tibetan medicine. Six chapters explain the physiological development of the human being from conception to death. The first three chapters following the introductory chapter deal more or less with anatomical knowledge: embryology (*lus kyi chags tshul*), body metaphors (*lus kyi dra dpe*) and the condition of the body (*lus gyi gnas lugs*). The final, fourth chapter, is the focus of this paper. It provides information on the types and quantities of different body structures, but in most cases it is unclear which body parts are actually meant. Four major "trunks" of anatomical textures are distinguished: firstly, countable body tissue such as bones, ligaments, organs or even more abstract parts such as hairs or pores; secondly, different kinds of channels, both visible and invisible; thirdly, vulnerable parts of the body, which should not be damaged, and fourthly, the knowledge of pathways. Although the *Four Tantras* were accepted as the main treatise by every medical school their commentaries focused on different aspects of this knowledge.

Generally the *Explanatory Tantra* provides an overview and orientation of anatomical knowledge, which can be understood only against the background of the interpreting commentaries. These commentaries reflect the zeitgeist and the existing official doctrine of certain medical schools and their institutional embedding. The author's aim is to analyse and compare these doctrines and the development of the content over the centuries rather than to describe the historical embedding on an institutional or political background, as these questions are already covered by Janet Gyatso's recent monography (GYATSO 2015). The following three time periods will be examined: (1) the period of *the arising of the main commentarial traditions and schools of interpretation* including anatomical contributions from two important proponents of the time *Zur-mkhar* Blo-gros-rgyal-po (1509–1579) and *Blo-gsal-dbang-po* Pad-ma-dkar-po (1527–1592?) characterised by a focus on tantric channels, ritual texts, ideal knowledge and, more empirical, vulnerable parts of the body; (2) a period called *the birth of classical orthodoxy* (see for both periods: the six

temporal key foci, BLEZER *et al.* 2007) with distinguished personalities such as Mi-pham-dge-legs (1618–1685), *Dar-mo-sman-rams-pa* Blo-bzang-chos-grags (1638–1712?) or the regent of the Fifth Dalai Lama, Sangs-rgyas-rgya-mtsho (1653–1705) featuring empirical anatomy and anatomical paintings drawn from dissected corpses; (3) the expansion of Tibetan medicine to the East considering important players of the time, scholars such as *Gtsang-sman* Ye-shes-bzang-po (1707–1785?), *Situ-pa-chen* Chos-kyi-vbyung-gnas (1699–1774), *Sum-pa-mkhan-po* Ye-shes-dpal-vbyor (1704–1788), or Vjam-dpal-Rdo-rje(?). As we will see, the third era of Tibetan medical history should be regarded rather as a period of consolidation of anatomical knowledge than further development. This paper takes a closer look at the emphasis on certain aspects of anatomy within the commentaries of respective scholars and surveys the reasons behind the lack of accuracy regarding other structures.

Arising main commentaries on Tibetan anatomy

Until the sixteenth century various major commentaries on the *Four Tantras* were written, each providing, detailed descriptive anatomical knowledge despite the fact that almost no medical depictions of the body were made at that time. There are some *Illustrations of Human Effigies in Tibetan Ritual Texts* (CUEVAS 2011) and there are simple early paintings found among the collection of Dunhuang-manuscripts (*cf.* MEYER 1996: 10) depicting points for external treatment, but they do not represent the existing described anatomical details. Although it was not a taboo to dissect the human body, it seems that it was not the aim of the authorities to gain insight into the physiology of the human being by examining dead corpses. In that period the main focus was on theories of circulation of different life forces, energies or humours, better known as *nyes pa*, and how they pervaded the human being and its subtle body. That kind of knowledge on vivid functional bodily structures able to be experienced through meditative practices can not be gained by dissection. Though blood circulation itself was probably not recognised at that time (*cf.* GERKE 2013: 83), vascular supply of the main inner organs by eight major vessels was already recognised in the *Explanatory Tantra* (*don snod nang vbrel sbas pavi rtsa chen brgyad*; G.YU-THOG-YON-TAN 1992: 21/16–22/2). We will see

later on, that the details and exact locations of these vessels differ considerably in the commentaries. The most valuable anatomical contribution in this period is the respective chapter of the *Transmission of the Elders* (*mes povi zhal lung*) composed by the erudite scholar *Zur-mkhar* Blo-gros-rgyal-po, one of the most authoritative proponents of the medical school *Zur-lugs*, founded in the fifteenth century by *Zur-mkhar* Mnyam-nyid-do-rje (1439–1475). Obviously *Zur-mkhar* Blo-gros-rgyal-po did not much pay attention to the condition of the extremities or the locomotor system in general, as he does not provide information regarding these aspects beyond the *Explanatory Tantra* but he does elaborate in great detail on the visible and invisible channels of the trunk. This non-materialistic approach and the disregard for the extremities can regularly be found in medieval Asian medicine (see also: CHA WUNG SEOK *et al.* in this issue, p. 75). *Zur-mkhar* Blo-gros-rgyal-po not only provides full information on the channels, which are only marginally mentioned in the *Explanatory Tantra*, he also connects channels used in tantric yoga-meditation called *ro-ma* and *rkyang-ma* (see for more details: GARRETT & ADAMS *et al.* 2008, GYATSO 2015). Further on in his commentary he combines a detailed description of the lunatic cycle with the lifetime channels (*tshé rtsa*) by using Sanskrit numbering to locate the principle of lifetime (*tshé*) on certain parts of the body. It is not obvious if this knowledge was his own creation or if he referred to another textual tradition, but it did play a significant role in his school of interpretation. It is hard to believe that it was simply a coincidence that Thangka number twelve of the *Atlas of Tibetan Medicine* (PARFIONOVITCH *et al.* 1992: 40) depicts respective locations of the circulating principle of lifetime together with positions for bloodletting according to the tradition of the *Zur-lugs* school. The same thangka also presents deities associated with the main ritual text of this school called *Yuthog Heart Essence* (*g.yu thog snying thig*).

Yet another contemporary, *Blo-gsal-dbang-po* Pad-ma-dkar-po, who is known more for his contributions on the history of Buddhism (*cf.* SMITH 2001: 81–86) rather than for his practice as a physician, wrote a text in which he organized the first, second and almost the whole of the third part of the *Four Tantras* with the help of the metaphor of an “unfolded tree” (*sdong vgrems*). In general the text deals with the content of the original in a rela-

tively cursory manner but the anatomical chapter goes far beyond the content of the fourth chapter of the *Explanatory Tantra*. Like *Zur-mkhar* Blo-gros-rgyal-po he does not pay attention to the anatomy of the locomotor system but he also does not delineate on invisible channels, his main focus is on palpable black and white connecting vessels (*vbrel bavi rtsa la dkar nag gnyis*; also called *srog-rtsa*: life channels) which are generally associated with neuro- and vascular tissue (respectively), and on vulnerable points of the body (*gnyan pa gnad*). Surprisingly the knowledge of vulnerable body parts seems to have already been consolidated at that time and apart from orthographical variations this part of anatomy does not undergo major further transformation.

Empirical anatomy at the eve of modernity

The seventeenth century is regarded as the “golden century” (MEYER 2003) of Tibetan medicine. Under the reign of the “great” Fifth Dalai Lama Blo-bzang-rgya-mtsho (1617–1682), and even more so in the case of his eminent Regent Sangs-rgyas-rgya-mtsho, medicine was promoted at various levels. It is at this time that the most famous commentary to the *Rgyud bzhi*, the *Vaidūrya sngon po*, also known as the *Blue Beryl* was compiled under the supervision of SANGS-RGYAS-RGYA-MTSHO (1973a) and the institutionalised medical college at the Iron Hill (*lcags po ri*) was established (for more details on this period, see GYATSO 2014, 2015 or HOFER 2012). The content of the *Blue Beryl* is known in parts through an illustrated treasure of Tibetan medicine made in this period, known as the *Atlas of Tibetan Medicine* (PARFIONOVITCH *et al.* 1992, also known as *Tibetan medical paintings*). The *Blue Beryl* incorporates large parts of the *Transmission of the Elders*, with similar key foci as its precursor, but the revised text appears much clearer and more comprehensible. One edition of the *Atlas of Tibetan Medicine*, known as the “Ulan-Ude set” includes ten Thangkas depicting anatomical knowledge of the *Explanatory Tantra* and several other paintings illustrating aspects of the third and fourth part of the *Four Tantras* demonstrating body parts for therapeutic intervention such as bloodletting or moxibustion. Some of the paintings show ideal knowledge, which would be difficult to verify by dissection, in other paintings we find remarks, that they have been painted

by observing a human corpse (cf. PARFIONOVITCH *et al.* 1992: Thangka No. 47, painted by Bstan-vdzin-nor-bu-can).

Another set remaining in Lhasa (BYAMS-PA-VPHRIN-LAS & WANG LEI 1994) includes two more thangkas depicting the human body in a crouched position. The squatting body pose can be found in several oriental illustrations or Tibetan ritual texts (cf. WUJASTYK 2009; CUEVAS 2011). The additional Tibetan anatomical thangka can supposedly be traced back to the family tradition of the remarkable scholar born in the late sixteenth century: *Lhun-sding* RNAM-RGYAL-RDO-RJE (MEYER 1992: 6). He is regarded as a connoisseur of Tibetan anatomy in *Khog-vbugs*, which is a *Historical Introduction to Tibetan Medicine*, written by Regent SANGS-RGYAS-RGYA-MTSHO and translated into English by KILTY (2010, SANGS-RGYAS-RGYA-MTSHO 1973b). The Regent mentions another scholar living at the beginning of the sixteenth century, Mi-pham-dge-legs who was a famous poet at the time, and who wrote “Anatomy of the Torso” (*byang khog yul thig*, KILTY 2010: 328). Unfortunately this text was not available to me to examine the contents, but in *Khog vbugs* the Regent states that he had written a text “[...] to refute the errors in medicine and astronomy made by Tibetan scholar Mipam Gelek (MI-PHAM-DGE-LEGS), who composed some reliable works on poetry, and who appeared to be someone who lived up to his title in the field of general knowledge, but who composed a few works only because he knew how to read, write, and string words together [...]” (KILTY 2010: 328).

Dar-mo-sman-rams-pa BLO-BZANG-CHOS-GRAGS

An exceptional follower of the development of the sixteenth century was another intellectual of the time, a teacher, anatomist, surgeon, and personal physician of the Fifth Dalai Lama: *Dar-mo-sman-rams-pa* BLO-BZANG-CHOS-GRAGS, who completed the commentary *Transmission of the Elders* commenced by *Zur-mkhar* BLO-GROS-RGYAL-PO, which contained detailed descriptions on the treatment of wounds, chapters 82-86 of third Tantra, called *Instructional Tantra* (*man ngag rgyud*). He wrote, edited and compiled numerous other medical texts, one of which is a text structuring the *Explanatory Tantra* through a tree metaphor, similar to the one made by *Blo-gsal-dbang-po* PAD-MA-DKAR-PO. It is

far more comprehensive than its precursor in terms of details. In this text called *Unfolded Trees of the Explanatory Tantra*, which later served as a guideline for the murals in the medical faculty at Labrang Monastery (BLO-BZANG-CHOS-GRAGS 2005; see also SABERNIG 2012, 2013), he describes visible macro-anatomical aspects in great detail. However, he neither elaborates on invisible structures or tantric channels nor are they negated.

On tendons and the locomotor system

His examination of the locomotor system is especially remarkable: for example, in the *Explanatory Tantra* we find remarks stretching over five verses that the body consists of twenty-three general types of bone, twenty-eight vertebrae, twenty-four ribs, thirty-two teeth and 360 smaller parts. Only the number of twelve major joints and 210 links is mentioned (see G.YU-THOG-YON-TAN 1992: 21/16–22/2). Both the *Blue Beryl* as well as the *Transmission of the Elders* give detailed macro-anatomical information beyond the *Explanatory Tantra*, such as the information that a vertebra consists of four fractions but in comparison to BLO-BZANG-CHOS-GRAGS’ treatise they remain incomplete especially in regards to small joints and ligaments (cf. BB 146–148; MZ 200/23–202/9; PARFIONOVITCH *et al.* 1992: Thangka No. 8; BLO-BZANG-CHOS-GRAGS 2005: 16/16–17).

With regard to major joints at the extremities such as knee, hip or elbow his view is similar to the main texts, but the smaller, less obvious connections are stated more precisely in his texts. In particular the joints of the hands and feet, the syndesmosis in the head or anterior or posterior connections of the ribs are counted differently. In the *Blue Beryl* the minor joints in the trunk and extremities are counted as follows: 60 small joints in the toes and fingers (15 for one hand or foot respectively) 8 joints in the lower legs, 26 joints in the ribcage, 28 vertebral joints 4 joints in the shoulders (in total 126, SANGS-RGYAS-RGYA-MTSHO 1973a: 148/3–149/1) BLO-BZANG-CHOS-GRAGS counts 25 small joints in each hand or foot (in sum 100) because he includes the tiny connections between the carpal and tarsal bones, 8 small joints of the lower legs, 52 joints of the ribcage, 5 of the sacrum (in total 165, BLO-BZANG-CHOS-GRAGS 2005: 15/2–15/13). With regards to the head, both texts count 32 connections of the teeth with their respective sockets but the remaining tight connections of

the head are perceived quite differently. While the *Blue Beryl* concentrates more on the *viscerocranium* (facial bones) BLO-BZANG-CHOS-GRAGS described the joints of the *neurocranium* (braincase) including conjunctions of the fontanelle and suture in more detail and with new wording. (BLO-BZANG-CHOS-GRAGS 2005: 15/13–16/1)

A similar situation can be found in the case of 16 *chu-ba* and 900 *rgyus-pa* generally translated as 16 “ligaments” and 900 “tendons.” To avoid misinterpretation it must be stated that in the context of traditional anatomy the translation of *chu-ba* as “ligament” and *rgyus-pa* as “tendon” must be considered rather loosely, a discussion on a circum-spect identification of anatomical terms is not in the scope of this paper (see SABERNIG forthcoming or PLOBERGER in this issue, p. 33). In the *Explanatory Tantra* these further specifications of 16 *chu-ba* cannot actually be found but they can be found in the *Blue Beryl* (1973: 149/1–4). The commentary, however does not explain the 900 “tendons.” These are characterised in far more detail by BLO-BZANG-CHOS-GRAGS, who differentiated various fascia, ligaments and tendons in the head, trunk and extremities. After a thorough analysis he states critically that he could not find all the 900 pieces, as mentioned in the *Transmission of the Elders*. Although his detailed numbers are not always comprehensible he states that 580 *rgyus-pa* did not come to light. (*zhes gsungs kyang vdir lnga brgya dang brgyad cu las ma byung bas btag*; BLO-BZANG-CHOS-GRAGS 2005: 16/16–17). The given number 900 should be regarded rather symbolically as out of them 300 are considered to be above the clavicle, 300 at the trunk and 300 at the extremities.

BLO-BZANG-CHOS-GRAGS’ text does not expand on the invisible channels, but instead expounds on the palpable “life channels” (*srog rtsa*) mentioned above. Traditionally they are divided in “white life channels” (*srog rtsa dkar po*) and in “black life channels” (*srog rtsa nag po*). The white channels are generally associated with neurological tissue or less frequently with tendons and the black channels correspond to blood vessels. The white channels are generally known as nineteen “water channels” (*chu rtsa*) “dropping like silk ropes from the brain.” Among them twelve *chu-rtsa* and a super-ordinated one relates to the three *nyes-pa* (concept of Tibetan “humoral pathology”) and inner organs. Their anatomical correlate remains unclear up to now, but

their theory could be discussed in context of the twelve meridians, which can be found in various Asian medical concepts or as a distorted integration of the knowledge of the twelve cranial nerves which might have been transferred to Tibet. In this case further research would be necessary. Out of the nineteen *chu-rtsa*, six peripheral *water channels* are described as peripheral nerves, which indeed look similar to tendons and could be confused easily while performing dissection. The sixteen “thin water channels” (*chu rtsa phran bu*) branch off these six remaining peripheral *chu-rtsa*. The *Explanatory Tantra* does not explain the *chu-rtsa phran-bu* but some translations associate them with tendons. An examination of different commentaries sheds light on this lack of clarity. BLO-BZANG-CHOS-GRAGS did not scrutinise the somewhat ideal knowledge of the nineteen *chu-rtsa* but found different explanations to the *chu-rtsa phran-bu*. While the *Transmission of the Elders* and the *Blue Beryl* explicitly associate the sixteen major tendons (*chu ba*) with the sixteen “thin water channels” (BB 1973: 166/4–169/2; MZ 226/1–4) BLO-BZANG-CHOS-GRAGS describes some of them according to their neuromuscular function and reveals neurological understanding (2005: 16/16–17). Therefore, to my opinion, the term *chu-rtsa* should not be translated as “water channel” but as “tendon channel” (a portmanteau of *chu-ba rtsa-ba*), or as a channel associated with a certain tendon. It is possible that these associations are connected with observed symptoms such as weak tendon reflexes in the case of certain neurological lesions. Later on BLO-BZANG-CHOS-GRAGS’ findings on *chu-rtsa phran-bu* were integrated in GTSANG-SMAN YESHES-BZANG-PO’S work on *The Fourth chapter of the Explanatory Tantra* (2007: 167/5–169/14).

For some reason he reformed the method of counting vertebrae. Most texts count twenty main vertebrae. According to general tradition, five additional “cervical” vertebrae are located above these twenty main ones, and another three “sacro-coccygal” vertebrae (*gzhus chung*) can be found below the main vertebrae (in all making twenty-eight vertebrae). BLO-BZANG-CHOS-GRAGS suggests that one should count four “cervical” and four “sacro-coccygal” vertebrae. With this system he would be in accordance with established modern anatomy, counting the promontory of the sacral bone as the first within the sacro-coccygal unit (seven cervical, twelve thoracic and five lumbar vertebrae make

twenty-four vertebrae). It is possible that his careful analysis through dissection encouraged him to leave the orthodox path of counting bones but he definitely came into conflict with well-established locations for external treatment such as moxibustion. Here, the location of specific points of treatment for particular diseases is defined in terms of the height of certain vertebrae. It may be that the incompatibility of his statement and the existing therapeutic charts could have been the reason that his approach did not become successful and was not adopted in later commentaries.

The *thangka* illustrations that accompany the *Blue Beryl* provide more information than the *Explanatory Tantra* but do not reflect the entire contents of the *Blue Beryl* commentary (see. MEYER 1992: 12, GYATSO 2015: 60f). However, some of the information mentioned in the commentaries about the chapter on anatomy can be found in *thangkas* depicting locations for external treatments such as venesection or moxibustion associated with the third (Thangka 38, 39, 47–50) or the fourth Tantra (Thangka 70, 73; for more details on these chapters see PLOBERGER in this issue, p. 33). BLO-BZANG-CHOS-GRAGS added no new information regarding the identification of “vulnerable body parts” (*gnyan pa gnad*), as knowledge on these locations already existed, however he arranged the knowledge in a much clearer manner and with a more understandable counting system. Not every detail in his text is a new discovery but it seems that BLO-BZANG-CHOS-GRAGS looked at the human body from a different perspective than his contemporaries and predecessors. He viewed it from perspective of someone who examined the anatomical structures with his eyes and hands and with the help of a knife for dissection and he wanted to find proof for the statements given in classical Tibetan texts (for more about the conflict between empirical and ideal knowledge, see GYATSO 2015: part two).

The vascular triple in the mediastinum

The following example raises questions about what he may have seen and the conflicts he may have encountered. The topographical relationship of the above mentioned eight major internal vessels to certain vertebrae for the vascular supply of the main inner organs is explained in both commentaries as well as in *Blo-gsal-dbang-po* Pad-ma-dkar-po’s

text. With the exception of Blo-bzang-chos-grags’ text all other commentaries state that one of the top-most three channels connects to the heart and the other two channels to the lungs, but the topographical details differ. As these vessels are very big it is almost impossible to ignore them, most commentaries locate the vascular triple at the height of the third vertebra, which is in line with the Tibetan conservative style of counting. Literally it is stated that the three channels come out of the third vertebra (*tshigs pa gsum pavi thad nas byung bavi rtsa gsum*). From a biomedical perspective this would be at the height of the first breast vertebra. Pad-ma-dkar-po locates the vascular triple one vertebra below. Blo-bzang-chos-grags way of counting however locates the channels one vertebrae above the written standard, at the height of the seventh cervical vertebra. At this location there are no blood vessels to be found, which connect to the chest organs and conspicuously Blo-bzang-chos-grags does not associate the vessels with certain organs. We will never know what he had in his hands during his examinations, as after all there are manifold variations in human anatomy but let us try to imagine what he could have seen once the thoracic cavity had been opened. Considering his given location it is possible that after removal of the sternum he found the venous system of the upper body and just below the prominent aortic arch with its three major vessels (*Truncus brachiocephalicus*, *A. carotis communis sinistra* and *A. Subclavia sinistra*), but these vessels do not supply inner organs, they are the main bloodstreams to the upper extremities and the head. Yet, there is another aspect, which should be taken into consideration. Topographical relations differ depending on the position of the body. As dissection is usually performed in a horizontal position the topographical relation of the corpse’s organs and vessels to certain vertebrae differ from those in a live human being in an upright position.

However, the vascular connection between the heart and the lungs is rather complicated and was not fully understood at that time anywhere else either. In regards to the history of blood circulation it is worth noting that although Galenus of Pergamon (129–217?), the Byzantine anatomist, physician and surgeon discriminated between arteries and veins, blood circulation itself was described for the first time by Ibn an-Nafis, an Arabic physician and anatomist (1210/1213–1288) and was fully understood

in Europe only by William Harvey (1578–1657). In modern anatomy the vascular connection between the heart and the lungs consists of two systems: a “private” vascular supply to nourish the lungs with the help of small and unspectacular blood vessels deriving directly from the Aorta and of another “public” vascular connection of two major vessels carrying de-oxygenated blood from the heart to the lungs and four major vessels from the lungs to the heart carrying oxygenated blood. The public system forms the basis of the systemic supply of oxygen. Considering the fact that the direction of the blood stream was not fully understood at the time the description should not be read from the perspective of modern functional anatomy. Most likely in orthodox Tibetan texts the three topmost vessels for vascular supply of the main inner organs were regarded as the aorta connecting to the heart and the two “public” pulmonary “arteries” from the heart to the lungs although these vessels do not nourish a specific organ but are essential for oxygen supply of the whole body.

Interestingly, historical depictions of three blood vessels connecting to the heart can be found frequently across Asia. When it comes to the identification of the first three of the eight inner main channels mentioned in the commentaries to the *Explanatory Tantra* it is not clear which biomedical structures would be worth considering. The situation must have been tricky to solve for a meticulous explorer such as BLO-BZANG-CHOS-GRAGS when being confronted with the complicated network of different channels. Additionally, in Tibetan medicine is the heart with its numerous subtle channels at the centre of Buddhist spirituality and according to the Tibetan system of body metaphors the heart as a central organ is associated with the king. (for more on bodily metaphors see HSU in this issue) There was a vigorous debate among Tibetan scholars on the anatomy of the heart and the location of its tip in regards to gender, triggered by the discourse of tantric and empirical epistemology (for a longer discussion: GYATSO 2015: 251f).

Criticising classical texts and the introduction of empirical knowledge was not always greeted with delight by political authorities. It might have been observed suspiciously as the societal impact could have had incalculable consequences, as the documented case of the *Manchu Anatomy* demonstrates. The seventeenth century anatomical achievements

of Pierre Dionys and the paintings of Caspar Bartholinus were compiled and translated into Manchu script (WALRAVENS 1996: 364; JOHNSON 1928). The beginning of the translation work dates back to the activities of the Jesuit Pater Joachim Bouvet whose activities ended when he left Beijing in 1692. They were completed by Dominique Parrenin at the beginning of the eighteenth century and ended up in “poison cabinet” as it was considered too dangerous for publication by the Kangxi Court (WALRAVENS 1996: 362; HANSON 2006, 2007). There is still no evidence whether *Dar-mo-sman-rams-pa* Blo-bzang-chos-grags was aware of the Jesuits’ anatomical translation project or if he had contact to another Jesuit, Johann Grueber, who arrived after an adventurous trip in Lhasa in 1661 from Beijing. In the Chinese capital anatomical descriptions of Vesalius, translated into Chinese by another Jesuit, Johannes Schreck, were already circulated (They also inspired the Chinese eccentric eighteenth century painter Luo Ping who painted skeletons holding the same poses as in the Vesalius templates surrounded by trees, in some cases in company of Chinese ghosts; cf. KARLSON *et al.* 2009 182–198). It is possible that the Tibetan anatomical debate took place independently from other anatomical achievements of the time. Although Blo-bzang-chos-grags was one of the major players in the “golden century of Tibetan medicine” his empirical approach to examining anatomical knowledge at the eve of modernity was perhaps a little too advanced to be fully integrated. Considerable aspects of his work were not incorporated into later commentaries, which generally follow the orthodox view as written in the *Blue Beryl*.

Expansion of Tibetan medicine to the East

With the establishment of the Iron Hill Medical college and the publication of the *Blue Beryl* commentary the *classical orthodoxy of Tibetan medicine* was born and major concepts were consolidated. After the violent death of the Regent and a period of political instability the development of Tibetan medicine stagnated in Central Tibet whereas in Eastern Tibet (Kham and Amdo, today part of Sichuan, Gansu and Qinghai provinces) numerous Tibetan Buddhist monasteries such as Labrang Monastery (tib. *Bla brang Bkra shis vkhyil*) Kumbum Monastery (tib. *sku vbum byams pa gling*) or Palpung

Monastery (tib. *Dpal spungs chos vkhor gling*) were established including their medical faculties (for the general history of this period see SAGASTER 1967; GRUSCHKE 2001; TSYREMPILOV 2003, 2006, 2008; NIETUPSKI 2002, 2011).

Similar to the role of Blo-bzang-chos-grags as the main proponent of empirical anatomy at the eve of modernity, Gtsang-sman Ye-shes-bzang-po played a significant role in the period of Tibetan medicine's expansion to the East. As the personal physician of the late Seventh Dalai Lama he left Lhasa in order to teach Tibetan medicine in Amdo. The medical faculty at Labrang Monastery was established under his guidance (cf. YONTEN GYATSO 1987, YONTEN GYATSO & BUFFETRILLE 1987, BYAMS-PA-PHRIN-LAS 2000: 362/14, SABERNIG 2012). Some of his works were republished recently. Herein commentaries on different medical questions such as pharmaceutical production with mercury, and also vulnerable body parts such as wounds as mentioned in chapters 82-86 of the *Instructional Tantra*, and external therapeutic applications such as bloodletting or moxibustion are compiled. The collection includes another anatomical text, which can be regarded as a remarkable critical review of different commentaries to the fourth chapter of the *Explanatory Tantra* (GTSANG-SMAN YE-SHES-BZANG-PO 2007). In most cases the text follows the knowledge of the *Blue Beryl*, it also refers to the *Transmission of the Elders*, but the text also includes various notes on the diverging statements of Blo-bzang-chos-grags. His deviating opinions discussed above on "tendons" different aspects of the white and black "life channels" but also minor deviations with regard to vulnerable body parts are amended. The text provides a clear analysis on previous anatomical knowledge found in different commentaries but does not provide new insights into the body. It mainly emphasises the orthodox opinion of the *Blue Beryl*.

Nevertheless fruitful major developments in the eighteenth century can mainly be observed in the field of Tibetan pharmacology. The publication of the very valuable pharmacopoeia *Crystal Globe [and] Chrystal Rosary* (*Shel gong shel phreng*) by Bstan-vdzin-phun-tshogs (1673–1743) (BSTAN-VDZIN-PHUN-TSHOGS 1994) who resided near Derge Monastery (*Sde dge dgon chen lhun grub steng*) was a milestone in the development of Tibetan pharmacognosy. The text is seminal and had great influence on later pharmacological works. Another

contemporary of the time was *Si-tu-pan-chen* Chos-kyi-vbyung-gnas (1699–1774) who founded a new monastery near Derge, the monastery of Palpung (*Dpal spungs chos vkhor gling*), which became famous for its medical teachings in general (cf. MEYER 1997: 120, EHRHARD 2000: 28f), and where he taught students how to recognize medical plants (CHOS-KYI-VBYUNG-GNAS 1986). According to the information of Stacey Van Vleet he was also known for his anatomical teachings but I did not have access to any anatomical text associated with this renowned scholar of Tibetan Buddhism.

In the field of Tibetan medicine Vjam-dpal-rdo-rje (life data uncertain), a student of *Sum-pa-mkhan-po* Ye-shes-dpal-vbyor contributed an illustrated xylograph considered a masterpiece of ethnopharmacology. The xylograph is an *illustration of Tibeto-Mongolian Materia Medica of Ayurveda* (Vjam-dpal-rdo-rje 1971 [18th cent. ?]) based on pharmacological knowledge as it is written in the *Blue Beryl*, the *Transmission of the Elders*, the *Crystal Globe [and] Chrystal Rosary* and another text by *Dar-mo-sman-rams-pa* BLO-BZANG-CHOS-GRAGS (2007). The main language is Tibetan and additionally, the medical substances are named in Mongolian, Chinese and Manchu (for more details HOFER 2014, SABERNIG 2014, SMITH 1971). The tree metaphor of the first or *Root Tantra* is also depicted. Less well-known is his attachment to the materia medica which contains explanations on topographical lines (*yul thig*) and the number of main locations (*gnad grangs*) mentioned in the *Instructional Tantra*. He focuses on the content of chapters 82–86, dealing with wounds and vulnerable points in the body. His representation of the content of these chapters can be regarded as rough copies with varying details from thangkas number 49 and 50. The xylograph also deals with locations for venesection (*gtar*: chapter 20), moxibustion (*bsreg* chapter 21) and external treatments with surgical "spoons" (*thur ma*: chapter 25) as described in fourth Tantra, the *Subsequent Tantra* (*phyi ma rgyud*). These are variations on thangkas number 72 and 73. The main difference is the position of the arms which are extended horizontally to the sides of the body within the Thangkas and are carved so that they are close to body in Vjam-dpal-rdo-rje's xylograph, most probably because of its printing format. A very similar depiction is included in Vol. 7 of the collected works of Sum-pa-mkhan po 1979 (18th Cent.). Until

the beginning of the twentieth century the doctrine mainly follows the orthodox manner of classical descriptions but with the encounter of traditional medical knowledge with biomedical knowledge reforms started in Tibet, as well as in ethnic Buryatia (see BOLSOKHOEVA in this issue, p. 6) With the turn of the millennium a “revolution” of Tibetan medical terminology took place as some quite recent publications impressively demonstrate (see SABERNIG forthcoming).

Conclusion

Different kinds of anatomical structures are mentioned in the *Four Tantras* but their meaning and significance has been described and weighted differently in varying commentaries over the course of time. The historical and intellectual background behind the development of bodily perception has been delineated in JANET GYATSO'S *Being Human in a Buddhist World* (2015). In the western world the knowledge of anatomical structures is predominantly associated with invisible and subtle aspects of the body. The aim of this paper however was to question anatomical particularities described by Tibetan medical thinkers who performed physical dissections or who compared anatomical writings critically. The examinations of the seventeenth century physician *Dar-mo-sman-rams-pa* Blo-bzang-chos-grags on diverse kinds of body materiality are characterised by a meticulous study of the human corpse. Although this fruitful development underwent stagnation in the eighteenth and nineteenth century when established opinions were repeated excessively, major medical works reveal comprehensive empirical anatomical knowledge for the management of wound care.

Abbreviations

BB, see: Sangs-rgyas-rgya-mtsho [sde-srid] 1973a. *Bai dūr snon po*.

MZ, see: Blo-gros-rgyal-po [zur-mkhar] 2005. *Rgyud bzhivi vgreḷ pa mes povi zhal lung*.

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