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Armour and Weapons in Tibetan Culture An Introduction

Alice Travers

Centre de recherche sur les civilisations de l'Asie orientale;
Centre national de la recherche scientifique, Paris, France

Federica Venturi

Centre de recherche sur les civilisations de l'Asie orientale, Paris, France

This special issue of *Annali di Ca' Foscari. Serie orientale* collects the proceedings of the workshop entitled “Defence and Offence: Armour and Weapons in Tibetan Culture”, organised in the framework of the ERC-funded project *The Tibetan Army of the Dalai Lamas, 1642-1959* (‘TibArmy’, grant agreement 677952, 2016-23), that took place in Paris on 29 November 2018. Dedicated to the theme of arms and armour in Tibetan culture, the workshop aimed to gather scholars from various disciplines (history, art history, philology, Mongol studies and arms and armour specialists) in an attempt to spur research and dialogue on the development and history of Tibetan weapons in this pivotal historical era. In fact, if one considers the military origins of the Ganden Phodrang, it is rather astonishing that the study of weapons and warfare has not been the object of more dedicated research. As it is well known, the establishment of this government was rendered possible by the victories of Mongol and Tibetan armies fighting in support of the Gélukpa. However, the majority of the textual sources at our disposal do not focus on the military operations and battles that led to the unification of most of Tibet under a sole government. As a consequence, to this day little is known about the mil-



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itary history of Tibet. This is compounded by the fact that the 'Roof of the World' remains a place celebrated for its spiritual life, and as a result of this, research on the Tibetan civilisation has traditionally revolved around its religious aspects.

Only in 2006, when the pioneering exhibition *Warriors of the Himalaya* was inaugurated at the Metropolitan Museum of Art, the subject of weapons, armours and warfare in Tibet was openly and directly broached. The exhibition and the publication of its important catalogue,¹ which included four articles examining questions connected to arms and armour from different viewpoints,² represent a significant turning point and a source of inspiration for the 'TibArmy' Project in general³ and in particular for the present volume's endeavour to add new avenues of research on Tibetan weapons.

In other fields, the pursuit of military history, including research on strategies and tactics, logistics, and technological advances, has proven to be an extremely useful tool that allows to look at society, government, and state through a completely different set of lenses than the traditional ones of politics, economy and religion. Thus, to provide only the most obvious example here, a now old but still much debated theory, that of the 'military revolution', which for more than half a century has stimulated a reassessment of premodern and early modern European history, is still completely untested in the field of Tibetan studies. First introduced by Michael Roberts in 1955,⁴ and later developed and calibrated by his pupil Geoffrey Parker in 1988,⁵ this idea posits that military innovation in Europe in the fifteenth century, namely the development of mobile field artillery, immensely facilitated the storming of citadels and castles, and thus led to the

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1 La Rocca, *Warriors of the Himalayas*.

2 A general introduction on Tibetan arms and armour by Donald La Rocca; a short history of ironworking in Tibet, by the late John Clarke (whose untimely passing prevented his collaboration to this volume); a discussion of armour and weapons in the iconography of Tibetan Buddhist deities by Amy Heller; and an article on *gonkhang* temples by Lozang Jamspal.

3 So far, the 'TibArmy' Project has published two other edited volumes on the history of the military in Tibet during this period: Travers, Venturi, *Buddhism and the Military* and FitzHerbert, Travers, *Asian Influences*; another edited collection, on the wars of the Ganden Phodrang, is in preparation.

4 Roberts, "The Military Revolution. 1560-1660".

5 Parker, *The Military Revolution*. Other earlier, but still influential, theories on the effect of gunpowder on societies are briefly illustrated in Needham, *Science and Civilisation in China*, vol. V, part 7, 16-18.

evolution of fortifications, which became stronger in order to resist these assaults. In response to this, armies sent to lay a siege substantially increased in size, thus requiring the development of sophisticated and orderly structure both in the battlefield and within the administrations of the governments at war. These had to become better organised in order to raise revenue for and arrange all the logistical facets concerning equipment, provisions, soldiers' pay, military schools, barracks and on-the-move lodging, training, the manufacture or purchase of illustrated drill manuals, and so on. Such efforts contributed to the centralisation of state power, eventually leading to the demise of the administrations less successful in adapting to the new order, and the invigoration of states that innovated efficaciously. Ultimately, the countries with complex but efficient centralised administrations and in possession of superior military technology and organisation ended up dominating large parts of the rest of the world, and creating ever-larger global empires. The idea of the military revolution, then, has since become one of the possible explanations for the marked ascent of Western power over other civilisations.

This brief summary does not imply the project's full support of this theory; indeed, the idea of the military revolution has been critiqued, revised and nuanced in multiple ways during the last thirty years, and continues to be debated.⁶ However, recapping its original formulation here serves to illustrate the different ramifications that an analysis of the impact of war on society may bring, and more precisely of the possible historical stakes implied in a study of weapons in a given society. Indeed, while this theory seems at first sight wholly unrelated to the Tibetan case, its model, comprising research on the technological improvements in weapons, and the necessarily related studies of logistics, reconstruction of battles, perusal of state records pertaining to military expenses and taxation, etc., has already been applied to other societies, including India, Japan, Korea, the Ottoman empire and the Islamic states of the Maghreb,⁷ as well as to Asia as a whole.⁸ The point, then, is that at the moment the field of Tibetan studies still lacks an assessment of the impact of new weapon technologies on society, and this realisation has been among

6 Among the many publications devoted to this topic one may mention: Black, *A Military Revolution?*; Downing, *The Military Revolution and Political Change*; Jacob, Visoni-Alonzo, *The Military Revolution in Early Modern Europe*; Parrott, *The Business of War*; Rogers, *The Military Revolution Debate*.

7 See Ágoston, "Firearms and Military Adaptation"; Andrade, *The Gunpowder Age*; Andrade, Kang, Cooper, "A Korean Military Revolution?"; Börekçi, "A Contribution to the Military Revolution Debate"; Cook, *The Hundred Years War for Morocco*; Eaton, Wagoner, "Warfare on the Deccan Plateau 1450-1600"; Khan, *Gunpowder and Firearms*; Stavros, "Military Revolution in Early Modern Japan".

8 Lorge, *The Asian Military Revolution*.

the major reasons behind ‘TibArmy’'s determination to organise this workshop and publish its proceedings.

We thus decided to start from the first link of the chain, i.e. the study of weapons itself, partly because the whole idea of the military revolution proceeds from technological improvements in weaponry, and partly because we could ground our research on the above-mentioned prior scholarship by Donald La Rocca. It was also decided that this focus on Tibetan weapons needed to be chronologically extended to cover the historical periods prior to the Ganden Phodrang, to include all types of weapons even outside the scope of the military usage (and include hunting or private use), and, to extend to Tibetan areas beyond the territories of the Ganden Phodrang government. Therefore, the main questions that oriented the participants' research were: which weapons did the Tibetan use, where did they come from, when were they used, and in which circumstances?

Studying weapons in Tibetan culture presents several limits and difficult-to-solve puzzles. The first challenge is to establish a clear chronology of the existence and diffusion of weapons in Tibet. To determine the time when important, transformational technological advances occurred in Tibet would allow one to reflect on the model established by Geoffrey Parker, but this remains a somewhat hazardous venture, mainly because of enduring terminological ambiguities in Tibetan sources.⁹ Just to give an example, if one tries to find out when firearms of the type that spurred the military revolution in Europe, the matchlock musket, appeared in Tibet, one faces a singular problem: the generic word for it is *me mda'*, literally ‘fire-arrow’, but, this word does not change as time, and technological advances, progress.

The word *me mda'* is thus first found in texts much earlier than the introduction of firearms in Tibet such as, for instance, the *gsung 'bum* of Mar pa Chos kyi blo gros (1002/1012-1097/1100), the *gsung 'bum* of the five founding patriarchs of the Sa skya order (eleventh to thirteenth century) and the *gsung 'bum* of the third Karma pa Rang 'byung rdo rje (1284-1339). In these cases, the term may simply denote a true ‘fire-arrow’, that is, something similar to the Chinese-style fire lance,¹⁰ an early ancestor of the gun that appeared in China already in the tenth or eleventh century, and that although it did use

9 The central problem of terminology in the study of weapons in particular, and of new technology in general was already highlighted in Needham, which talked of “terminological confusion”: “when the thing fundamentally changed, while the name did not” (Needham, *Science and Civilisation in China*, vol. V, part 7, 11-12). In the case of Tibet, the question was addressed by La Rocca, who authored the first “Tibetan-English Glossary of Arms and Armor Terms” (La Rocca, *Warriors of the Himalayas*, 267-87).

10 An illustration of a fire lance can be seen in Needham, *Science and Civilisation in China*, vol. V, part 7, 238.

gunpowder, had a barrel made of bamboo or paper, and spewed out sparks or flames rather than projectiles.¹¹ In literature dating from the seventeenth century onward it is ascertained that the term *me mda'* may indicate muzzle-loading muskets, and more particularly a matchlock (as will be seen in this issue, it seems quite unlikely that flintlocks ever made their way to Tibet).¹² In the following centuries, and especially in the nineteenth and twentieth centuries, the same term may conceivably denote also more advanced imported breech-loading firearms and rifles. We also know for sure, as it is testified by numerous photographs, that matchlock technology remained commonly in use in Tibet well into the twentieth century, so that even in this period the term *me mda'* may still mean 'matchlock'.

However, the meanings (fire arrow or firearms) of the occurrences found in the intermediate period, i.e. the fifteenth to seventeenth century, are not always clear since the question of the precise date of introduction of firearms into Tibet remains a thorny one.

At present, as it is shown in Tashi Tsering Josayma's contribution to this volume, the earliest documented references to firearms in Tibet may be ascribed to the first half of the seventeenth century, with 1618-19 being the earliest date confirmed through historical sources. The episode in question, narrated in the biography of the first Panchen Lama, regards the clashes between the ruler of Tsang (Sde pa Gtsang pa) and the Mongols; on one of these occasions "a rain of arrows (*nyag phran*) and *me mda'* fell" (*me mda' dang nyag phran gyi char 'bab*).¹³ While some may doubt that in this case *me mda'* actually refers to firearms, and would argue that it may be interpreted as fire-arrows, not many years later, in 1634, we have definite certainty of the utilisation of gunpowder in a war context. During the second war between the ruler of Tsang and Bhutan, a stash of gunpowder explosives stored by the Bhutanese in a fortress at Sinmodoka (Srin mo dho kha) exploded unexpectedly, apparently killing all the Tibetans who were besieging it.¹⁴ It goes without saying that if the Tibetans were not yet aware of the power of firearms, they certainly became so at this point. To continue with our examples, one may refer to another source discussing the events of the seventeenth century, the *La dwags rgyal rabs*, which mentions that the skills with a matchlock of King Senge Namgyal (r. 1616-42) were excellent.¹⁵ Interestingly, the term found in the *La dwags rgyal rabs* and

11 See Andrade, *The Gunpowder Age*, 75.

12 See Travers' contribution in this issue.

13 See Tashi Tsering Josayma in this issue. A similar passage from the same source, but referring to 1621, is also identified in Ardussi, "Bhutan before the British", 262 fn. 79.

14 See Aris, *Bhutan*, 219; Ardussi, "Bhutan before the British", 220.

15 Francke, *Antiquities of Indian Tibet*, vol. 2, 39, ll. 20-1

translated by Francke as “matchlock” is *glog*,¹⁶ although already in the *Mi dbang rtogs brjod* the common term for a firearm is *me'i 'khrul 'khor*. While there is an obvious temporal gap between the two texts – the chronicles of Ladakh are ascribed to the seventeenth century,¹⁷ while the *Mi dbang rtogs brjod* was completed in 1733 – one might also surmise that the term *glog*, meaning literally ‘lightning’, with its focus on the sudden flash of light produced by the weapon, better describes an initial focus on the wondrous qualities of the matchlock, while the designation *me'i 'phrul 'khor* shows a certain understanding of the mechanism and automation that rendered possible the functioning of the firearm.

However that may be, by the time the *Mi dbang rtogs brjod* was composed, certain technological advances had probably made their way into Tibet. Moreover, some of these may have been introduced by the Zunghars during the occupation of Lhasa between 1717 and 1720. It is well known, in fact, that in 1716 a Zunghar (Kalmyk) raid against a Russian convoy of prisoners of war being transported to Siberia captured, among others, Johan Gustaf Renat,¹⁸ an expert Swedish artillery lieutenant. Renat remained a captive of the Zunghars for seventeen years and soon became respected for his knowledge of military matters. We know this from several sources. One is his own petition to the Swedish government to receive a pension, that he penned after his return to Sweden in 1734. Here he stated that he made guns and mortars for the Kalmyks, organised their artillery, and taught two hundred of them the use of those arms, “all out of love for his country”.¹⁹ In addition, the funerary eulogy written for his wife Brigitta Scherzenfeldt, another Swede who had been imprisoned by the Kalmyks and whom he married while in captivity, mentions that, on their return to Sweden, Renat had been arrested in Moscow because

the Russians had taken up great hate for him inasmuch as he had helped their enemy the Kalmyks by some artillery and other things, such as the usual European military sciences and drills, tolerably put in place to defend themselves against a forthcoming enemy assault.²⁰

16 Note, however, that the term *me mda'* appears in the *La dwags rgyal rabs* in a list of offerings donated to Stag tshang ras pa; see Tashi Tsering Josayma's contribution in this issue.

17 Petech, *The Kingdom of Ladakh*, 1.

18 See Petech, *China and Tibet in the Early 18th Century*, 39.

19 See Baddeley, *Russia, Mongolia, China*, vol. 1, clxxxv-clxxxvi. He also mentioned that he “made a campaign with the Kalmuks against the Chinese” (vol. 1, clxxxvi), but he dates this to 1733, which seems unlikely, since he departed from the Khan's court on 22 March of that year (see Jarring, “Brigitta Scherzenfeldt”, 117).

20 English translation of the original Swedish eulogy, as reproduced in Jarring, “Brigitta Scherzenfeldt”, 117. We are grateful to Dr. Thomas L. Markey for his translation

Even more importantly, we learn from the statement of a Major Ugrimoff, who had also been prisoner of the Zunghars, that Renat manufactured for them “fourteen 4-pounder cannons; five small cannons and twenty 10-pounder mortars”.²¹ These certainly contributed to introduce the latest western technologies in Central Asia, and notice of these new war machines may have well arrived to Lhasa during the Zunghar occupation.²²

As the reader will understand by reading this volume, when seeking to establish such a chronology of firearms, the historian of Tibet copes with a scarcity of traditional historical sources (in particular a limited number of archival sources available on military history) and thus needs to make use of whatever other historical and literary material is at his/her disposal. The critical analysis and interpretation of the meaning of what is found and not found in these sources is often arduous and leaves room for much uncertainty. The *Treatise on Worldly Traditions* (*Jig rten lugs kyi bstan bcos las dpyad don gsal ba'i sgron me zhes grags pa bzhugs so*), dated 1524 by his colophon, is a good illustration of some sources' limits for earlier times. It is a volume on craftsmanship composed by Jamyang Tashi Namgyel ('Jam dbyangs bkra shis rnam rgyal). It includes sections on 1) the craft of swords (*ral gri*) and the assessment of their qualities, which often depended on the choice of materials and the technique of fabrication, such as the tempering of the iron, particular forging technique, and so on; 2) armour (*khrab*); and 3) helmets (*rmog*). Two other parts, on saddles and stirrups, concern corollary equipment.

It is noticeable that the treatise itself does not include a section on firearms. While this might be interpreted to signify that they were completely unknown in Tibet, this seems quite unlikely, since it is widely believed that the Mongols, under whose rule Tibet had been from the mid-thirteenth to the mid-fourteenth century, were responsible for the diffusion, from the mid-thirteenth century onwards, of the earliest types of gunpowder weapons from East Asia all the way

of this important text.

21 See Baddeley, *Russia, Mongolia and China*, vol. 1, clxxx.

22 However, Petech doubts that these innovations could have been already operational at the time of the Zunghar conquest (Petech, *China and Tibet in the Early 18th Century*, 41). About this point, see the contribution by Travers in this issue, as well as Shim, “The Zunghar Conquest”.

to Europe.²³ While there are still a few critics of this theory,²⁴ it is certain that the Mongols used projectile-propelling firearms, as the oldest unquestionably datable gun has been recovered among the ruins of Xanadu (Shangdu), Qubilai Khan's military headquarters from 1260 onward. It is known as the 'Xanadu gun', and its date, inscribed on it, corresponds to the year 1298.

Another weapon that cannot be found in this treatise allows one to confirm that the author's particular viewpoint alone (and not the historical state of the development of weapons in Tibet at that time) can explain its exclusion from this work. Bows and arrows, likely the most widespread, one might say ubiquitous, weapons used in Tibet, are also completely absent, and nobody would surmise that their absence indicates that they were unknown - on the contrary, they have represented the traditional war and hunting equipment of all Tibetans since at least imperial times.

However, since the *Treatise on Worldly Traditions* is mainly a manual of connoisseurship, its focus on craftsmanship (including chapters on the making of porcelain, cloth, tea, leather, and musical instruments such as cymbals and bells), explains why it would not include sections on either bows and arrows or firearms. In fact, the former were mostly produced at home, with readily available material, and the skills to make them were passed on in the family from one generation to the next. As a consequence, there was no need to turn to a skilled artisan. On the contrary, in order to acquire a sword, it was necessary to turn to the services of an ironsmith, who possessed the required technical knowledge to temper the iron and craft it in the proper way.

Concerning firearms, instead, we could hypothesise that gun-making was not contemplated in the *Treatise* because at this point in time - again, the date is 1524 - there were either very few or no autochthonous Tibetan craftsmen with the knowledge necessary to produce a functioning gun. Hence, Jamyang Tashi Namgyel had no need to include advice on the craftsmanship of guns. Rather, it may be surmised that the absence of a section on firearms in this manual indicates that the guns existing in Tibet at this time were more than likely all imported from nearby countries, such as China, India and Persia.

23 See for example Andrade, *The Gunpowder Age*, and Haw, "The Mongol Empire"; both propose that the Mongol empire largely employed gunpowder throughout all its vast territories. Needham, *Science and Civilisation in China*, vol. V, part 7, 3 simply proposes that from about the year 1300, China was the origin of "the transmission of the bombard, gun and cannon to the rest of the world". Related questions concerning the introduction of advanced firearms in Asia from the West and the military revolution in Asia are discussed in Di Cosmo, "Did Guns Matter?", 121-66.

24 See May, *The Mongol Conquests*, and Raphael, "Mongol Siege Warfare".

This being said, this volume also shows that the historians of Tibet still have at their disposal a wealth of visual and textual (historiographical, biographical and autobiographical) sources that can be mined in search of weapons' mentions and descriptions, as well as a number of archives on the Tibetan manufacturing and import of weapons for the twentieth century period (see Travers in this issue), and a very significant amount of material evidence of the Tibetan weapon culture, stored in museums and private collections.²⁵ These sources allow to build a new understanding of the diversity of Tibetan weapons and of their development in history and to focus, whenever possible, on the questions of nomenclature, dating, and provenance of new technology.

In an effort to disentangle these issues, in order to even begin to approach the wider investigation of the 'military revolution', which would open significant avenues of enquiry that have so far been neglected in the world of Tibetan studies, we have collected in this issue five path-breaking studies, organically structured in two sections preceded by a preface. The brief preface ("Some Reflections on the Question of Military Innovation in Tibet"), by a specialist of Mongolian history, Johan Elverskog of Southern Methodist University (Dallas, Texas) – whom we thank for having accepted to take on the delicate task of providing an external point of view –, presents his reflections on the possible reasons behind what he sees as a historically long-developing military weakness of the Tibetans, resulting in their ultimate mid-twentieth century defeat at the hand of People's Republic of China's army. He contextualises the Tibetan situation within the larger Asian context and what Andrade has called "Great Military Divergence", when Europe came to dominate Asia in the course of the nineteenth century. He then proposes as a hypothesis that the Tibetan divergence from military innovation that happened at some point during the Ganden Phodrang period might find its first roots in an even earlier period, after the fall of the Mongol empire (1350-1550), when the Tibetan army would have embarked on a period of stagnation, leaving little space to innovation and showing slight or no interest in financial investment on weapons, new technology, etc. His final considerations on possible reasons for the continuation of this phenomenon in the next centuries may be provocative to some, and are in certain regards contradicted by the research found in this issue, but are certainly worth raising to stimulate the debate and hopefully foster further historical research on why, how and when exactly the Tibetans started to accumulate a technological setback in weapons development, one that proved to be difficult to recover in the first half of the twentieth century.

25 See La Rocca, *Warriors of the Himalayas*, and his article in this issue.

Following this preface, the initial section of this volume focuses on three general questions that we think are instrumental to approach this topic: the state of the art in connoisseurship of Tibetan arms and armour, the understanding of the terminology and its evolution, and the identification of the historical sources. In the first article, entitled “Armour and Weapons in Tibet from Yongle to Young-husband. Learning from Object-Driven Research”, Donald La Rocca, relying on his longstanding expertise as Curator of the Arms and Armor Department of the Metropolitan Museum of Art (New York), illustrates the state of the art in research on Tibetan arms and armour from the fifteenth to the twentieth century. In a concise and clearly structured piece, he sums the extent of our knowledge in this field, one that he himself pioneered back in 1999. His article lucidly illustrates the various types of armour (for men and horses), helmets, shields, swords, spears, firearms and archery equipment, detailing their material, fabrication techniques, and cultural influences from other neighbouring (or not so neighbouring) countries. In addition, it highlights some of the most recent discoveries, including an extremely rare defence for the neck and shoulders, the use of which is evident after comparison with an early fifteenth century Chinese scroll.

Complemented by a number of beautiful illustrations, Donald La Rocca's article is also propaedeutic reading for all other articles, but especially for the one entitled “Arms and Armour in Ancient and Medieval Tibetan Literature. A Lexicographical Approach” by Petra Maurer (Ludwig-Maximilians Universität, Munich), who examines in great detail the historical development of terms and expressions for arms and armour through a lexicographical approach by studying sources ranging from the eighth to the nineteenth century. Assimilable to the article by Tashi Tsering Josayma for its breadth of scope, the research presented here is supported by Maurer's profound knowledge of the Tibetan language after her longstanding work for the *Wörterbuch der Tibetischen Schriftsprache*. In brief, here she examines for the first time all the terms relating to arms and armour collected in the above-mentioned *Wörterbuch*, and analyses their meanings in different textual contexts and time periods in order to reconstruct as much as possible how the language relating to weapons and warfare changed, what different connotations could be applied to these words including outside the military domain, and whether their values evolved, expanded or contracted. Her work in collecting and collating all this material, as well as analysing it, will prove extremely useful not only for scholars of philology, but also for historians and scholars of religious studies, as it transpires that many of the words used for weapons also often had metaphorical uses, especially in religious contexts.

The contribution entitled “*Khra ring bog gi bshad pa* and Other Material on the Matchlock” by Tashi Tsering Josayma of the Amnye

Machen Institute (Dharamsala, Himachal Pradesh), is a veritable bibliographic tour de force. By gathering in one place data scattered in almost eighty different primary sources, ranging from the eleventh to the twentieth century, this article is in itself a small encyclopaedia on the topic of matchlock in Tibet. Moreover, it renders accessible to the wider public a mine of information that, when explored in further depth and detail, will certainly lead to new discoveries and greater understanding. Among its many immediate contributions are an attempt at finding out when the matchlock was introduced in Tibet, a discussion of the different regional names for the word 'matchlock', including (where possible) their etymologies, and the reproduction, for the first time, of a hand-drawn sketch of a matchlock indicating the names for all its parts, as well as other sketches related to the Tibetan matchlock. Very importantly, the paper provides translations of eight songs (of the *khram glu* genre) on the *bog* (matchlock) by nomads, of seven praises to the matchlock (*bog gi bshad pa*) from Eastern and Northern Tibet, as well as two ritual texts of "summons of the war god onto the matchlock" (*me mdar dgra lha bkod pa*). There are no doubts that this article will continue to stimulate further research for many years to come.

In contrast with the more general overview of the first part, which is not tied to a specific chronology or time-frame, the second half of this volume addresses more historically situated concerns, in this case two specific analyses of the Ganden Phodrang government armaments toward the beginning and the end of the Ganden Phodrang period (1642-1959), echoing one of the ideas in the volume's preface in the sense that they clearly illustrate the sheer interest of the Tibetan state in its armament, at least in its founding and final phases. In an article entitled "The Dorjéling Armoury in the Potala According to the Fifth Dalai Lama's *gsung 'bum*", focused on the second half of the seventeenth century, Federica Venturi (CRCAO, Paris) translates and analyses a poetic preamble written by the Fifth Dalai Lama on the occasion of the inauguration of the armoury located at the Potala, the palace, fortress and administrative centre where he resided. The text reveals that although the Fifth Dalai Lama seems to have had only a superficial knowledge of weapons, he was well aware of the importance of creating a safe storehouse for arms and armour. In addition, the text provides us with a partial list of the military equipment stored there, crucially giving us a picture of the type of arms and armour that were used at the time. Unfortunately, though, the preamble gives no idea as to the quantities of material stored.

Shifting the focus to the end of the period under examination, the last article of this collection entitled "From Matchlock to Machine guns. The Modernisation of the Tibetan Army's Firearms between Local Production and Import (1895-1950)" by Alice Travers (CRCAO, Paris) demonstrates the intensity of the efforts displayed by

the Ganden Phodrang government to catch up on firearms from 1895 onwards, and particularly showing that Tibet engaged in an arms-building enterprise just a few decades behind Qing China. The paper examines the supply of arms for the Ganden Phodrang army in the first half of the twentieth century and how the Tibetan government progressively succeeded in drastically modernising its firepower over a strikingly short period of time. In a detailed study, she relates the halting efforts of the government from the end of the nineteenth century until 1950, in part attempting to gather foreign expertise in order to establish autonomous factories for the production of modern firearms, and in part seeking agreements with other countries in order to purchase and import arms and munitions that were likely to be up-to-date and efficient, while also ensuring the transmission of knowledge around these new weapons across the troops. This article's reconstruction of the back and forth of the Tibetan government and its allies and of the endeavours that were often beset by political and technological challenges, provides a more nuanced view of the Ganden Phodrang's approach toward its military preparation.

Before we conclude, it should be mentioned here that all of the contributors to this volume are not personally expert in the use of weapons, and thus many technical points, especially concerning firearms, but also on armour, shields, etc. could not be understood without expert help, which was very generously provided all along the research and editing process by Donald La Rocca, Curator emeritus of the Arms and Armor Department at the Metropolitan Museum of Art, New York, as well as by a number of other specialists, in particular Jonathan Ferguson, curator of modern small arms at the Royal Armouries Museum, Leeds, in addition to numerous readers who gave input on our papers (we cannot name them all here but their help is acknowledged in each paper), and the anonymous reviewers, whom we all wish to thank heartily. For their contribution in translation work, we would also like to thank Thomas L. Markey, retired, University of Michigan, who translated from Swedish the important account of Brigitta Scherzenfeldt's life, and Sonam Tsering Ngulphu who translated various textual sources related to the Tibetan matchlock. Last but not least, the editors would like to thank those people who employed much care and patience in helping us with the more technical aspects of the publication. In Paris, Estelle Car took care of all the logistics concerning the reproduction of a number of photographs and images in this issue and Tenpa Nyima helped to proof-read the Tibetan. In Venice, Mariateresa Sala of Edizioni Ca' Foscari answered a myriad of questions on the details of the publishing process. Finally, we would like to thank Antonio Rigopoulos for his enthusiastic acceptance of this project within the authoritative fold of *Annali di Ca' Foscari. Serie orientale*.

We believe that the study of arms and armour can provide a meas-

ure of the significant impact of warfare on Tibetan society. Despite the fact that, at the end of this volume's reading, more questions will undoubtedly have been raised than answered, we hope that with this publication we can begin to bring to light data and analysis that will allow us to look at Tibet from a different, broader, viewpoint.

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