

Article

The Disappearing Technology and Products of Traditional Tibetan Village Blacksmiths

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Abstract: Tibetans have a long history of iron mining, smelting, and forging. For centuries, craftsmen in major cities and large iron production centers made high-quality swords and suits of armor, as well as decorative iron ritual objects for monasteries and the elites, but blacksmithing workshops in small villages have always produced and repaired everyday objects for agricultural and home use. Modern political changes, along with greater availability of industrial objects in local markets, have greatly reduced the rank of the village blacksmith. Ethnographic fieldwork reported here from two Tibetan Bön villages in the Aba Tibetan and Qiang Autonomous Prefecture, China (once part of traditional Amdo area of Tibet), highlights some of the threats to the continued existence of village blacksmiths. Both a part-time blacksmith in one village and a full-time blacksmith in another make only a marginal living from their work. Their descendants are unlikely to continue the business. Many of the village blacksmiths in the area have already stopped production and closed their workshops. It is likely that the village blacksmith tradition might soon disappear altogether in this region of the world without support. Preservation of this tradition could benefit both cultural and environmental sustainability goals.

Keywords: iron; blacksmithing; Tibetan village; Tibetan craftsmen; Sichuan; Amdo; Bön; bellows; hearth; anvil



Citation: Reedy, C.L. The Disappearing Technology and Products of Traditional Tibetan Village Blacksmiths. *Heritage* 2024, 7, 965–982. <https://doi.org/10.3390/heritage7020046>

Academic Editor:
Giuseppina Padeletti

Received: 11 December 2023
Revised: 11 January 2024
Accepted: 22 January 2024
Published: 12 February 2024



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1. Introduction

In studies of Tibetan art and material culture, blacksmiths producing utilitarian iron objects have received relatively little attention compared with decorative and fine art craftsmen producing paintings, sculptures, or precious metal objects for the monasteries or elites. Also better known are the high-quality Tibetan swords and suits of armor made by both settled and itinerant blacksmiths since antiquity using locally mined and smelted iron ores. Some of these artisans also made spectacular gold- and silver-inlaid iron ritual objects, especially at great iron working centers located in eastern Tibet, mainly for monastery patrons [1–4]; Tibetan knifemaking skills were added to China’s list of intangible cultural heritage in 2008 [5]. In contrast, this paper focuses on local Tibetan village blacksmiths who produce and repair everyday objects for agricultural and home use. While their technological methods are simpler and their objects ordinary, these blacksmiths are important because, for generations, they held an important role in village life.

The ethnographic fieldwork reported here took place in the Aba and Qiang Tibetan Autonomous Prefecture of Sichuan Province, China, once part of the traditional Amdo eastern Tibetan region. Little has been reported previously about the Tibetan blacksmiths of this region. The findings are, therefore, compared with earlier reports of the traditional blacksmith families of south-central Tibet and their roles in Tibetan village life. While this fieldwork did indicate that some positive changes have evolved regarding the social status of blacksmiths, the two case studies explored herein reveal that the long-term survival of the village blacksmithing tradition in the Tibetan villages of Amdo is under threat. Some of the reasons underlying this situation emerged within the discussions of the two workshops that are the focus of the case studies.

This paper begins with an overview of iron production and village blacksmithing traditions in historical Tibet. A discussion of fieldwork at two surviving Tibetan village blacksmithing workshops in the Amdo region follows. After a description of the geographical and cultural setting and context of the two case study workshops that are the focus of this paper, each of the workshops is discussed in turn. The first workshop is that of a part-time blacksmith who is also a farmer, and the second is that of a blacksmith devoted full-time to his craft. The products of each are similar, but their day-to-day operations are quite different. The conclusions that emerge from observations and interviews at these two workshops support the argument that survival of the Tibetan village blacksmith tradition in this region is endangered.

Iron Production and Village Blacksmith Traditions in Tibet

Archaeological work relevant to iron production or blacksmithing is scarce in the Amdo area itself. However, extensive archaeological research in the Chengdu Plain of Sichuan Province has demonstrated the importance of Sichuan in early iron smelting and production in Southwest China, with smelting to produce iron ingots dating back to 316 BCE and greatly increased iron object types and quantities having been produced through casting and blacksmithing by the Han Dynasty (202 BCE–220 CE) [6]. Ethnoarchaeological and ethnographic work relevant to blacksmithing is also scarce in Amdo, but work in other Tibetan regions can be drawn on for context. Nomads occupy large areas of Tibet, and those regions have never had settled village blacksmiths. Rockhill [7] mentioned that, in his visit to what is now Qinghai Province of China (formerly known as Kokonur, and located mostly on the Tibetan Plateau), all the ironware used by nomadic Tibetans was made by itinerant Chinese blacksmiths who periodically visited encampments. The customers would select from available patterns, and the Chinese blacksmiths would then make products such as knives, swords, stirrups, matchlocks, kettles, and ladles.

In other Tibetan areas, most metalworkers were settled rather than itinerant. Some were farmers who worked only part-time, at times of the year when there were few agricultural tasks [8]. Large and wealthy monasteries served as patrons to nearby settlements of metalworkers, including blacksmiths. For example, in the nineteenth century, at a craft-working village located one mile south of Tashilunpo (bkra shis lhun po) Monastery in south-central Tibet, the artisans received an allowance from the monastery in exchange for providing for their craft needs [2]. Far to the west, in Ladakh (now part of India), blacksmiths work both for Buddhist monasteries and for secular patrons [9]. They primarily forge and repair iron tools (such as agricultural implements) and stoves from sheet steel, but occasionally make silver or gold decorative objects by request.

In Lhasa (south-central Tibet), many of the most talented blacksmiths and iron casting craftsmen were once housed at the foot of the Potala, along with other types of craftsmen, to provide metalwork for the needs of it and other nearby monasteries and government ministries. They made items such as locks, keys, and architectural ironwork [8,10]. Elsewhere in the city of Lhasa, photographs taken in 1957 show a group of blacksmiths at their workshop in a small lane of the central Barkor Street [11]. Craftsmen of all types were organized into guilds by the local government (after 1642). Guild rules were apparently strict regarding the form and technology of various products; innovation was not encouraged. The status of the goldsmiths and silversmiths was higher than that of the blacksmiths, and they called themselves “whitesmiths” to distinguish themselves from the blacksmiths.

In many Tibetan areas, blacksmiths historically were among the occupations considered to be polluting or unclean, and therefore, other villagers minimized contact with them [12]. Their participation in village life was also restricted, relegating them to the fringes of society. In some Tibetan areas, metalworkers, especially blacksmiths, could not enter the clergy [8]. One explanation often given is that blacksmiths produce tools of violence, making weapons that kill people, knives used to kill animals, and agricultural implements that rip into the earth [13]. However, Fjeld [12] found that residents of Lhasa viewed the task of working with fire to be the polluting aspect of blacksmithing. The

larger iron factories of Lhasa employed Tibetans of all backgrounds for various tasks in the blacksmith shops, but only members of the hereditary blacksmith group handled the fire. In villages near Gyantse in south-central Tibet, blacksmiths were considered to practice a “despised” craft; if such a person exhibited good character, they would be viewed as equal to low-class people, but if not, they were considered to not belong to the village at all [14]. To the west, blacksmiths have traditionally been the lowest class in Ladakhi society [9]. This situation is not unusual, as blacksmiths in other parts of the world have been looked down on as inferior; for example, in the northern Mandara Mountains of Cameroon and Nigeria, blacksmiths are considered to be “dirty” and are differentiated from other members of their societies [15].

In Tibetan areas, as in the rest of China, de-collectivization in the early 1980s resulted in the division of communal lands among all member households [16]. As all villagers then had land to cultivate, people who, in the past, had been restricted to continuing the occupations of their parents had more choices over the following decades. Fjeld notes [12] that only very few people engage in blacksmithing today, and most of the younger generation of traditional blacksmith families have never learned the skills, especially in urban centers. She also points out that, in modern Tibetan literature and film, a blacksmith often illustrates the type of person previously suppressed in the old Tibetan feudal system and now touted as liberated from discrimination by socialism and the modern Chinese communist party. For example, in the past, those with general occupations could not marry those with “low class” occupations, including blacksmiths [17]. Ma [11] relays the story of an aristocrat from Lhasa in the early 1950s who fell in love with the daughter of a blacksmith. They had to flee into the mountains and their family and friends shunned them. It was said that only after the political reforms of 1959 in Tibet did they dare to return to Lhasa.

Fjeld [12] conducted extensive fieldwork in three villages historically renowned in Lhasa for having many traditional blacksmiths. Local terms that were commonly used to refer to the blacksmiths were derogatory, including rigs btsog pa, unclean or filthy kind; smad rigs, inferior kind or type; and mgar ba, which means blacksmith, but was used in a stigmatizing way to refer to all low occupations. The term lcags zo ba is a non-derogatory one sometimes used that literally means “iron makers.” She found that the blacksmiths were all located in a single village and could trace their tradition back three generations. In one case, a blacksmith’s parents had taken advantage of the land reform opportunity to leave the profession, so he himself did not receive training in the craft. However, when he became a widower with a small child, to supplement his farming income, he learned basic blacksmithing skills to make objects part-time for additional income. His commissions were everyday utilitarian objects needed by local people, such as nails, chains, and horseshoes. Interestingly, villagers perceived him and other part-time blacksmiths/farmers as having a higher rank than former blacksmiths who became full-time farmers. One explanation was that it was a waste of economic potential for a blacksmith to completely abandon a traditional occupation, and the low rank stigma continued to follow such a person anyway for several generations. Some individuals from social groups of even lower rank (beggars) shifted to blacksmithing when many of the blacksmiths shifted to the higher-ranked occupation of farming. However, villagers reported a decrease in the number of traditional blacksmiths overall, attributing it at least in part to the increased number of inexpensive, factory-made iron products now available in the county market.

Blacksmithing workshops often have shrines to the protector of smiths, Garwa Nagpo (mgar ba nag po) [18]. He is depicted seated on a goat, holding a hammer in his upraised right hand and a tiger-skin bellows in the left. Since this blacksmith image also serves the function of a Tibetan Buddhist protector deity, it has been proposed that the blacksmith families (mgar tshang) may have enjoyed a higher social standing in ancient Tibet than eventually became the case [19]. Additional evidence given is that another Tibetan protector deity in the form of a blacksmith is found in Tibetan Bön traditions, dbal gyi mgar ba; there are stories within the ancient Ge sar epic of Tibet in which blacksmiths play important

roles. Scholars have pointed out that, in many ancient societies, smiths were perceived to have divine or alchemical powers, which is in contrast to the later “unclean” designation of blacksmiths and the blacksmithing trade in Tibet [19–21]. It is possible that the classification of blacksmiths to a very low class and the association with being “unclean” stems from the low caste status of blacksmiths in India and Nepal, with whom Tibet had frequent interactions after the introduction of Buddhism in the seventh century [21,22].

Further evidence that blacksmiths likely did not always have low status is the fact that one of the most famous uses of iron in Tibet revolves around a fifteenth century master of Tibetan Buddhism named Tangtong Gyalpo (thang strong rgyal po). He identified large deposits of iron ore in Tibet; organized their mining, smelting, forging, and casting; and used the iron to construct many chain-link iron suspension bridges [23]. For this reason, he is also sometimes called the Ironsmith (lcags bzo pa) [19] or the Iron-Bridge Man, although he is perhaps better known for his religious writings and the monasteries and temples that he designed in spite of being responsible for an astonishing 58 iron bridges in Tibet and Bhutan [4].

Some of these bridges still survive, and there are numerous historical observations and references to others. For example, an iron suspension bridge built by Tangtong Gyalpo near Lhasa is described by Waddell [24], who noted that, in 1904, it was still in good condition after centuries, although it was no longer in use (he mentioned a survey visit of 1878 which found the bridge still in regular use). It was constructed of iron double-chain cables made of one-inch-thick iron links measuring a foot long. The cables were fastened at each side of the river to large beams built into a tall masonry pier, and to the rocks beyond the piers. Loops of yak-hair rope suspenders hung between the cables at intervals of about a yard. The footway comprised wooden planks one foot wide and lashed end to end. Other bridges were repaired or rebuilt over the last several hundred years and can still be experienced today [4]. Tangtong Gyalpo enlisted local blacksmiths at the bridge sites to help in forging the many thousands of chain links that were required [2].

The stories of iron mining and smelting operations overseen by Tangton Gyalpo to provide large quantities of iron chain links for his many suspension bridges throughout Tibet overturn an enduring myth about Tibet: that Tibetans avoided mining because of religious prohibition against disturbing the earth. Tibetan scholars have pointed out that this is incorrect, and that in spite of the presence of folk superstitions, there are in fact many references to mining in traditional Tibetan texts, as well as many references to direct observation of mining by European travelers and other early visitors to Tibet [1,2,23]. For example, Rockhill [7,25] observed the mining of iron ore near Lhasa in the late nineteenth century. Smelting and casting occurred nearby to make cast-iron kettles and other small objects. Nonetheless, historical texts note that, while Tangtong Gyalpo oversaw large-scale iron mining operations, the essential prelude to that mining in any new area was to request the invitation of the earth spirits and local protective spirits; locals believed that removing soil and wealth from an area without the spirits’ permission was disrespectful and could even be dangerous [4].

Major iron-smelting operations also occurred in the traditional eastern Tibetan cultural areas of Sichuan and Gansu provinces [26]. Iron smelting in the Derge county of Sichuan’s Garzê Tibetan Autonomous Prefecture (on the western border of Aba Tibetan and Qiang Autonomous Prefecture) was documented by the Chinese photojournalist Sun Mingjing in photographs of his 1939 journey along the ancient tea horse road (an important trade route for tea from Yunnan and Sichuan and horses and medicinal herbs from Tibet) [27,28]. In the Muli Tibetan Autonomous County in the southwestern corner of Sichuan Province, the iron-mining industry was very important to the local economy until recently. Iron was smelted with charcoal and a hand-held bellows in a bloomery forge to produce crude iron that was later heated in a finery and hammered to separate it from dross; iron bars were a popular currency used for purchasing goods in regional markets [29]. Iron mining, smelting, and forging thus have a long history in Tibet, with significant variations within the extensive regions comprising the cultural Tibetan area.

2. Materials and Methods

I conducted ethnographic fieldwork in two Tibetan villages, Zhang ngu khog and Lha yul, in Sichuan Province, China (Figure 1). Located north of Sichuan's capitol of Chengdu, in Songpan District, this region is part of the Aba Tibetan and Qiang Autonomous Prefecture of Sichuan, but locals refer to themselves as being in the traditional eastern Tibetan region of Amdo (which has borders that vary on historical maps) and call their local Tibetan dialect Amdokhe. Both villages are near the Tibetan Bön monastery of Serling (gser gling dgon pa, or alternative spellings of gsas ling dgon pa or sa dmar gser gling dgon pa) [30]. This fieldwork was part of a larger study of local craft workshops, which involved observation and photography of tools and processes, commissioning objects to see a wider variety of craft techniques, conducting interviews with both craftspeople and clients, and acquiring objects and raw materials for later technical studies back in the laboratory. Some of the other types of objects studied were Bön ritual crafts made by the local monks, such as tsa-tsas (small unfired clay votive tablets, tsha tsha) and tormas (barley dough offering objects, gtor ma) [31]; others were utilitarian objects made by villagers in the home (weaving and dyeing by village women) or by specialized craftsmen at commercial workshops located further out in Songpan (silversmithing) [32].

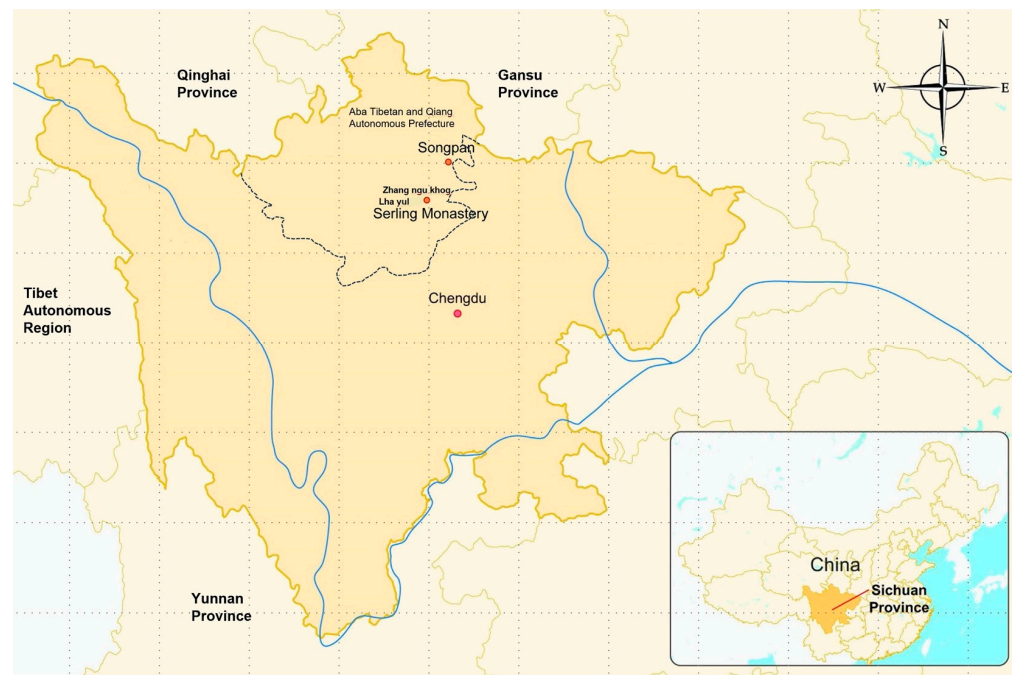


Figure 1. Map of Sichuan Province, China, showing locations of the fieldwork sites.

The village blacksmith workshops (known locally as *lcag sgal*) are the focus of this paper, based on fieldnotes from workshop observations and interviews and photographs that documented tools and processes. The local people report that, in the past, most villages surrounding Serling Monastery had a blacksmith. Today, however, most locals instead purchase tools from a small group of full-time specialist blacksmiths in Songpan or buy factory-made objects in Songpan or Chengdu. For this reason, most of the village blacksmiths in this area have disappeared, and only two remain (one additional metalworker engaging in small casting and repoussé work in copper and copper alloys is located in another village nearby, but he does no blacksmithing). The blacksmithing workshops that are the focus of these case studies appear to be the last two surviving ones in the cluster of villages connected to Serling Monastery. One workshop is in a village close to the monastery, Lha yul (also known as La yas) [29], and one is in the village of Zhang ngu khog, with the monastery located on its outskirts.

In most Tibetan regions, the number of Bön adherents (original spiritual practices of the Tibetans) is now much fewer than the number of Buddhists. However, in the study region, most of the villages are Bön. The Bön practitioners in this area preserve strong ties to nature and nature spirits, maintaining a close relationship to their environment (recognizing mountain and water gods, for example) while also conducting ritual and meditation practices that are very similar to those of Tibetan Buddhism [31–35]. All the villagers, including those who patronize the two blacksmithing workshops discussed here, are Bön practitioners, and there are many other Bön monasteries and villages throughout the wider Aba Tibetan and Qiang Autonomous Prefecture [36].

3. Results

3.1. Workshop 1, Lha Yul

This workshop is located in Lha yul Village and is operated by a single blacksmith. He works only part-time as a blacksmith and spends the remainder of his time as a farmer working in his agricultural fields. The workshop is housed in a small wooden shed which the blacksmith built to house his hearth, anvils, and tools. It is located adjacent to his home and fields and incorporates a small fenced-in courtyard where he carries out some of his tasks. He does not smelt iron, but uses iron ingots purchased in Songpan, or recycles scrap iron to produce and repair everyday tools used by villagers (knives, hoes, rakes, plows, cutting tools, etc.). He does not operate a shop with iron items for sale; instead, when someone needs an item, they commission it from him. Most of the time they barter (trade something) for the work, but sometimes will pay him money instead. He learned the trade when he was a young boy, but not from his father, who was not a blacksmith. Instead, he apprenticed with blacksmiths in another village. His son helps him part-time in the workshop when not in school.

The workshop shed is small, as it only needs to accommodate his own activities, and sometimes his son as an assistant. A narrow wooden bench along the side of the shed provides a place to sit and to set tools and supplies (Figure 2). There is no organized tool storage area; instead, tools are stored in several places near the hearth that are convenient for quick access during work. He only needs to move slightly with the hot iron to position himself at an anvil, and all tools are located within easy reach so he does not need to step away from his position directly in front of the hearth.



Figure 2. The Lha yul blacksmithing shed. Two anvils are located very close to the hearth. The blacksmith is using a forging hammer.

The blacksmith made many of his own tools, although he purchased his two anvils (Figure 2). Many small tools hang or lean on the walls inside the shed. Along with housing the hearth and bellows, storing the tools, and serving as a workspace for blacksmithing, the shed also serves as a place to dry meat for his household (villagers in Lha yul dry their meat because few own refrigerators). As a result, along with the stored tools, dead birds hang near the hearth to accelerate their drying.

The hearth itself (Figures 3 and 4) takes up a large portion of the shed. The blacksmith built it himself, constructing it mainly out of stone, with some gaps filled with brick and clay. He pours fresh coals into the top and removes coal ash and clinker through an opening on the lower side of the hearth. He brings charred wood from his home's wood-burning stove to serve as a starter rather than keeping the hearth lit continuously, since he forges iron only when he has a commission. A large, flat rock placed on the front of the hearth provides a workspace; below it is a small rock shelf used to store small tools. A box on top of the bellows stores other small tools, as does the stone ledge in front of the hearth; larger tools are placed on the right side of the hearth and lean against the box bellows or hang from the wall (Figure 4).



Figure 3. The blacksmith uses a piercing tool mounted on an anvil to help work the hot iron. This work takes place very close to the hearth.



Figure 4. The Lha yul blacksmith heats iron on the coals at the stone hearth with his left hand and operates the box bellows with his right one, delivering a constant supply of oxygen to the coals and raising the combustion rate and temperature output. He made both the hearth and the bellows himself.

To the right of the hearth is a hand-operated box bellows he built himself (Figure 4). He constructed the bellows in the form of a rectangular wooden box, with a hammer forming the piston handle. As he pushes and pulls the piston in and out, air is drawn into the chamber and moved from one side of the box to the other and down a clay tube that bridges the gap between the bellows and hearth, where it is directed to the working area of the coals. When the piston is manually pushed and pulled, it directs a strong blast of air to the coals at the top front center of the hearth, elevating the temperature of the coals when he needs to heat iron to a high enough temperature to make it malleable.

As soon as the bellows start to pump, a high flame is visible in the hearth, and as it dies down, the coals just behind the flat stone ledge/working area become very hot. He works the bellows pump with his right hand while his left hand operates another tool, such as tongs for holding a piece of iron in the hottest coals (Figure 4). Fumes vent outside because the shed walls include large gaps between boards, and there is a gap between the roof and sides, leaving plenty of room for gases to escape.

The two small anvils (Figures 2 and 3) provide much flexibility for working. Both have a short flat table and short horn, with holes for inserting cutting and piercing tools on both the flat table and on the sides (including square hardie holes and round pritchel holes). The top of the anvil also serves as a working surface when a slightly rounded shape is desired. The blacksmith often turns an anvil upside down to provide a larger flat working surface.

While he has various forging hammers of different sizes and weights, the ones he uses most often are one-person cross or straight peen hammers with round flat faces and wedge shapes opposite them, attached to wooden handles. He also frequently uses long tongs for holding onto small objects as he places them onto the hot coals and while working them with a forging hammer. Other tools include small hand-held chisels, a drift punch (tapered rod used to enlarge a hole by displacing metal), and other hand-held punches and chisels.

One of his recent commissions was to make a repair piece for a loom. This required working a thin, flat sheet of metal that needed to be cut lengthwise. For this task, he used an iron chisel, hammering and pressing down on the hot metal to cut partway through in a lengthwise seam (Figure 5). After reheating the metal, he then cut partway through the other side. After repeatedly heating and then chiseling, bending along the seam with the tongs, and hammering the bent sides, he eventually succeeded in cutting the flat piece to the desired shape. Hammering the cut edges with an iron mallet smoothed out the jagged edge.



Figure 5. The Lha yul blacksmith uses a chisel and hammer to cut a hot metal piece lengthwise to form a repair piece for a loom.

During the working process, the blacksmith repeatedly places an iron piece onto the coals at the front center of the hearth to reheat it and make it malleable enough for further working. Smaller pieces are held in a pair of tongs, both for placing into the coals and then for holding onto the anvil while working. The blacksmith can hold the working ends of long pieces onto the coals directly, without tongs, as the end not on the coals will stay cool. Working requires numerous reheating and forging sessions. The iron is white- to yellow-hot when pulled out of the coals; work continues as it cools to orange- and then red-hot. Once the metal becomes cold and unmovable, then it is time for reheating.

The tools he made himself include a hand-pumped drill for drilling holes in metal objects (Figure 6). A central wooden rod with a conical drill bit mounted into the bottom has an upper apparatus incorporating a wooden crosspiece that turns and wraps textile strips around the central rod for tension, growing tighter and tighter as it turns; a lower piece of wood serves to add additional pressure (Figure 6a). As he presses down and turns the pump, the drill bit turns and creates a hole in the iron object (Figure 6b). For example, when he is making a hoe, one of his most frequent requests, he uses this hand-pumped drilling tool to start the hole where the wooden handle will go. He then uses that initial hole to mount the hoe piece onto an anvil using an appropriate hardie or pritchel tool as a boring tool. He then finishes expanding and shaping the handle hole on the anvil (Figure 3).

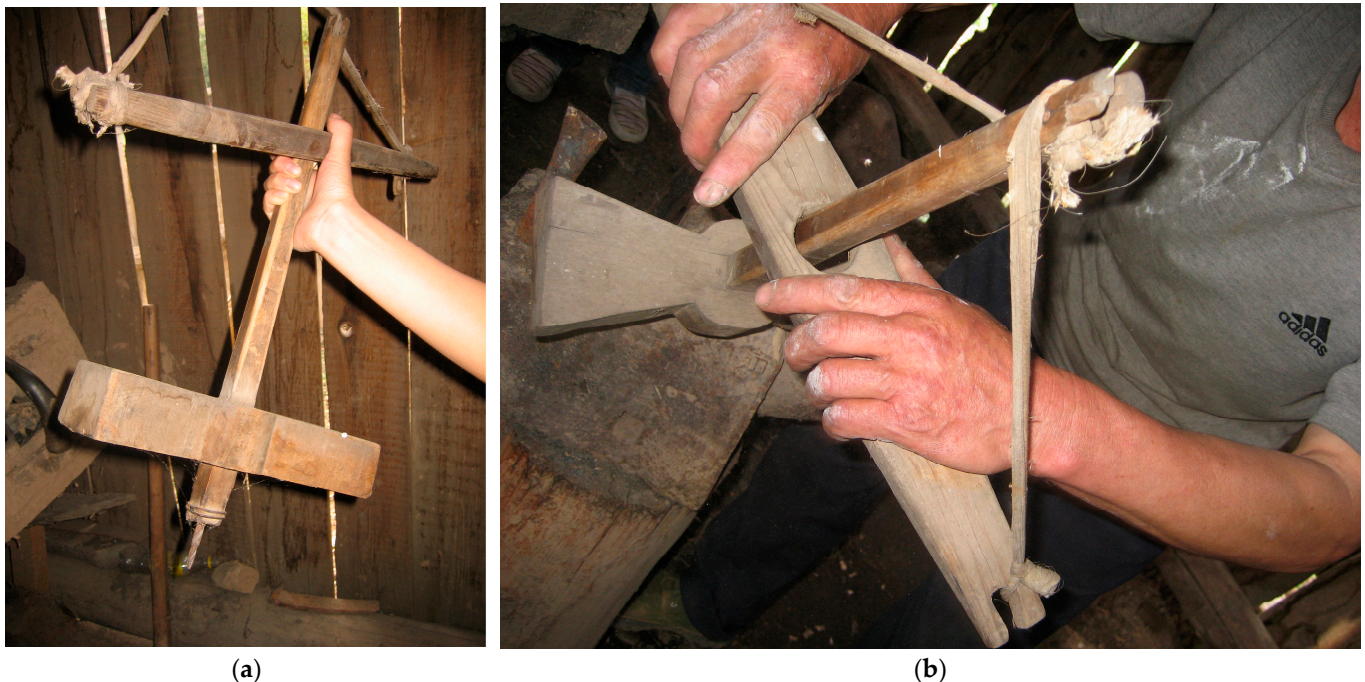


Figure 6. (a) A hand pumped drilling tool made by the Lha yul blacksmith to drill holes in iron; (b) textile strips wrapped around the central rod provide tension for drilling into the metal.

When an object is completed, he cools it quickly (quenches it) in a bowl of water that is kept on the floor near the forge in order to harden the metal (Figure 7). Prior to quenching, the blacksmith heats the metal one final time to medium red-hot. He then immediately immerses it in the bowl of water mixed with fine clay, which slightly slows down the cooling process to prevent cracks from appearing.

A working courtyard is located between his workshop shed and his nearby home. Piles of wood define the sides, and it has a combination of dirt and cobblestone flooring (Figures 8 and 9). It overlooks his fields; his pigs wander through the courtyard at will while work is going on. One area is set aside for knife blade sharpening, which he also offers as a bartered service to villagers. For this task, a sharpening stone is set into a groove he carved in the center of a log. An adjacent bowl of water provides coolant during the

sharpening process. He sharpens knives and other tools by rubbing them quickly over the surface of the wet sharpening stone.



Figure 7. The Lha yul blacksmith quenches a finished piece of forged iron, rapidly cooling it in a bowl of water mixed with fine clay.



Figure 8. Some of the tools the Lha yul blacksmith makes, repairs, and assembles in his courtyard include a rake with iron tines, a rake with wooden tines attached to the head with iron rivets, and a sheathed knife used for cutting roof tiles.



Figure 9. The Lha yul blacksmith forged an iron plow bit and attached it to a complex wooden plow that he constructed in his courtyard.

A variety of timber pieces used in his blacksmithing work lean against the wood piles that define the courtyard sides. These timber pieces can be formed into handles or other wooden fittings; he himself handles all the woodworking required for any of the tools that he makes. Some of the tools he most often produces and assembles in the courtyard with their wooden handles and other fittings include knives, trowels, rakes, and scythes (Figure 8). A much larger project is a wooden plow that he constructed out of multiple pieces of wood, and then fit with an iron plow bit forged in his workshop (Figure 9).

3.2. Workshop 2, Zhang Ngu Khog

In the larger village of Zhang ngu khog, near the monastery and school, is another blacksmith's workshop (Figure 10). This one is open full-time, and the hearth is kept continuously burning. The workshop is built against the side of the blacksmith's house, which is a brick structure of modern construction. The back wall of the workshop constitutes part of the outer brick wall of the house. Log beams support wooden boards that make up the two sides, as well as the wooden slat roof. The workshop is open in the front. A courtyard provides additional working and storage space if needed, and includes a simple table made of a flat stone piece set onto low-lying logs. The blacksmith has connected electricity from the house into the workshop, mainly to power an electric blower for the hearth, which he uses instead of the hand-operated home-made bellows seen in the Lha yul workshop.

The Zhang ngu khog workshop houses a rectangular-shaped hearth, one anvil, and a small selection of tools. However, the open front means it can accommodate as many people as needed. The hearth (Figure 11) is made of stone and refractory brick mortared with clay. An opening in the bottom of one side serves to remove used coal ashes and clinker. A pile of clinker and ashes accumulates below that opening, and a heap of this waste is seen along the back wall of the workshop awaiting disposal. A stone shelf on the hearth provides a place for setting small tools and for the tongs that the blacksmith uses to place small objects into the hot coals for heating.



Figure 10. The Zhang ngu khog blacksmithing workshop serves as a social center in this village. The blacksmith is working on his sole anvil next to a brick hearth. The back wall of the workshop is an outer wall of the blacksmith's home. The front is open and facing the courtyard.



Figure 11. The hearth in the Zhang ngu khog workshop has a shelf (right side) for setting aside small tools that are frequently used by the blacksmith; the opening at the bottom center of the hearth is used for removing burnt coal ashes and clinker. A pile of these can be seen behind the hearth, awaiting disposal.

The Zhang ngu khog blacksmith uses a range of tools similar to those used in Lha yul. The only tool appearing here but not used in Lha yul is a large sledgehammer. The hand-pumped drilling tools made by the Lha yul blacksmith were not observed in the Zhang ngu khog workshop. The larger tools lean against a workshop wall or lie on the floor near the hearth. There is only a single anvil (Figure 12), but it is in constant use. A stump next to the anvil holds a bowl of muddy water for quenching.



Figure 12. The Zhang ngu khog blacksmith at work at the single anvil located close to the hearth. A bowl on the right atop a wooden stump holds water and clay for iron quenching.

The blacksmith considers his workshop to be collaborative. This means that, when villagers commission an object and two people can work the iron simultaneously to make faster progress, then the person doing the commissioning often pitches in and works a second hammer. One person strikes the hot metal while another is pulling up his hammer; hence, there are continuous strikes being made on the metal before it becomes too cool to work with without reheating. The full-time blacksmith wears earplugs to protect his ears from the sound of the electric blower and the constant hammering noise he endures all day every day.

Work can proceed much more quickly and efficiently with two people working than when only one person is forging the metal. The collaborative process also makes the workshop a social center of the village. Unlike the blacksmith's workshop in Lha yul, which is located in a rather isolated place out by the blacksmith's fields, the workshop in Zhang ngu khog is centrally located on the main path between the village store and the monastery. It tends to be a gathering place for conversations, and the person commissioning an object will spend additional time socializing before and after the project is complete.

Benches and logs for visitors are arranged within the shade of the workshop and outside, in the adjacent courtyard.

As with the blacksmith's workshop in Lha yul, tools, especially those for agricultural use, are the most common items commissioned and made here. However, as in Lha yul, repair work on damaged objects constitutes more of his commissions than creating new objects does. Villagers cannot afford to throw out any damaged tools if it is possible to repair them, so they do not often need new tools. This means that the work of even a full-time blacksmith is not very lucrative, so other members of his family pursue other occupations within the village.

3.3. Workshop Products

Some of the most common products made by the blacksmiths in both village workshops include utilitarian knives for various functions, trowels, hoes, and plow bits mounted into complex wooden frames (to be pulled by yaks while being guided by the farmer) (Figure 9). There are also two types of rakes (Figure 8). One is made completely of wood except for iron rivets used to assemble the tines to the head. The other has a wooden handle and head with iron tines. The blacksmiths can make either type, depending on the request and the finances, with the all-wood one being less expensive than the one with forged iron tines.

When fitting iron pieces with wooden handles, adhesives are never used. Instead, the blacksmiths design the wooden pieces to fit tightly with the iron using a connector ferrule, ring, or hollow edge and then hammer the iron tightly over the wood. Occasionally, they will make and use iron rivets.

An item typically made by the local village blacksmiths in the past, but only rarely still made here, is a long knife used to cut roof tiles (Figure 8). A thin leather sheath with a wooden lining protects the blade. A hook on one side of the sheath functions to hang the tool on the wall of the home when not in use.

In these farming villages, one of the most-used iron tools is a scythe with an iron blade set into or hammered over a long wooden handle. The blacksmiths also make the wooden handles, often adding large rivets to help keep the blade fully secured to the handle. Many village scythes show evidence of multiple simple and crude blade repairs. This highlights the fact that a major part of the work of both blacksmiths is to carry out repairs of existing tools. With the villagers typically being extremely poor, it is rare for anyone to request a new tool be made unless their precious, long-used tools, handed down from the previous generation, become too damaged to undergo further repairs.

4. Discussion and Conclusions

While artisans and craftsmen working in larger Tibetan towns or production centers created many of the high-quality and expensive iron swords, suits of armor, helmets, and decorative ritual objects used by monasteries and the elites, the production of simple utilitarian iron objects in Tibetan regions takes place mainly in villages and small towns. In many ways, the two Amdo workshops discussed herein are similar to traditional blacksmithing workshops in south-central Tibetan villages. Elsewhere in Tibet, blacksmiths often work part-time while also carrying out farming duties. Where there are large enough families, it is possible for one brother to be a full-time blacksmith [2]. Here, the part-time smith/part-time farmer is represented in Lha yul, and the full-time blacksmith in Zhang Ngu Khog.

There are both similarities and differences in the tool kits currently used in this region compared with the ones employed in south-central Tibet and those described a century ago. For example, in 1892 Bonvalot [37] saw blacksmiths near Lhasa using short- and long-handled forging hammers and large shears, all used here in the two Amdo workshops. However, he also saw a partially buried tree trunk with a large, embedded iron bar serving as an anvil, whereas the Amdo blacksmiths today can purchase anvils. Bonvalot also observed earthenware hearths with goatskin bellows to heat the charcoal. Here in Amdo,

the blacksmiths have higher-quality stone and brick hearths, with clay serving only as the mortar. Goatskin bellows are not used; instead, one blacksmith built a more sophisticated box bellows (a design of Chinese origin), and the other can afford an electric blower. The historic workshops used a homemade wooden trough hewn out of a tree trunk to hold water for quenching the iron, but the two Amdo workshops use large, inexpensive plastic bowls purchased in Songpan. Finally, the historic workshops had a wider range of handmade drilling and boring tools. The Lha yul blacksmith had made a hand-pumped drilling tool to use prior to boring on an anvil-attached protrusion, but we can surmise that in the past, before it was possible to buy so many items inexpensively in town, creativity likely led Tibetan blacksmiths to invent and make an even wider range of their own tools. While change is evident in the ability to purchase ready-made anvils and in the use of a few store-bought implements (such as bowls) and small tools, the blacksmiths still make many of their own tools, retaining a rather limited tool kit.

Repairs of existing objects constitute the bulk of their commissions, and simple utilitarian objects, mainly agricultural tools, comprise the remainder of the commissions. The blacksmiths also have the woodworking skills necessary to craft handles and other wooden fittings for their iron tools. However, most of the inhabitants of the two villages are extremely poor, farming and producing most of their own food. They wear the same few sets of clothes, repeatedly mending them until they are no longer usable. For most villagers, there are few sources of income other than going into the surrounding mountains to collect medicinal herbs to sell in Songpan. They often obtain their goods and services from fellow villagers through barter. As a result, village blacksmithing is a financially marginal occupation.

There is one positive difference in these villages compared with the historic blacksmith families that have been studied in south-central Tibet: there is a complete lack of social stigma associated with being a blacksmith today here in these villages. In contrast to reports from elsewhere [12] that blacksmiths were considered to be “unclean” and so other villagers tried to minimize contact with them while restricting the participation of blacksmiths to only the fringes of village life, here, their fellow villagers do not treat blacksmiths as people of lower status. In contrast, the full-time “collaborative” workshop is a hub of social interaction. While Fjeld [12] reported that residents of Lhasa considered working with fire to be the most polluting aspect of blacksmithing, the villagers of Zhang ngu khog enjoy sitting in front of the hearth chatting with the blacksmith and helping out with any step where he needs assistance. In both Lha yul and Zhang ngu khog, the blacksmiths are integral and respected members of the village, not considered to be of “low class” or practicing a “despised craft” as was reported for Gyantse (south-central Tibet) or further west in Ladakh [9,14].

It appears that the prospects for the long-term survival of blacksmiths in the Amdo villages studied are not good. The Cultural Revolution disrupted many family workshops, and a generation that lacked training opportunities saw skills disappear. Now, there is more competition, with the influx of inexpensive factory-made goods from outside the village readily available. The past few decades have seen the disappearance of even more small workshops in this area, leaving only a few scattered village blacksmiths. In both villages studied, as in many rural villages of the region, few young people stay after finishing at the local school. Most move to the big cities such as Songpan or Chengdu for college or more varied work opportunities. Few young people want to apprentice or take over a family workshop in the village in adulthood.

An additional potential threat is that the government has been urging many villages in this region to relocate closer to main roads. Lha yul and Zhang ngu khog are no exception. The government offers villagers incentives, such as new, more modern homes, to relocate. Most households in these two villages have resisted thus far, but the future possibility of village relocation closer to a paved highway still exists. How such a move would affect the village blacksmiths is unknown.

While there are certainly positive aspects to the availability to villagers of a wider variety of inexpensive goods that compete with the blacksmith's products, and to the more expansive employment opportunities for young people today that compete with this career choice, Tibetan village blacksmiths have a long historical tradition of handmade craftsmanship. That tradition still exists, but it is greatly in flux, after a period of upheaval and interruption. Whether and for how long the Tibetan village blacksmith tradition in Amdo can continue is currently unknown. The local oral history states that in the past, most villages surrounding Serling Monastery once had their own blacksmiths, but most of those workshops have now closed. Given that only two of the villages still have blacksmithing workshops, and those are both financially very marginal, without the intervention of new local governmental policies that would provide support for these small workshops, it is very likely that the village blacksmith tradition could soon disappear in Amdo.

However, a reason for optimism is that China is one of the global leaders in efforts to preserve intangible cultural heritage, including traditional handicraft skills. Many policies, programs, and administrative centers exist at multiple levels (county, municipality, province, national, and international), often with funding, to identify and support local craft traditions [38]. Sichuan Province is extremely active in documenting and supporting traditional skills and products as part of their intangible cultural heritage preservation efforts [39]. At all levels and categories of cultural heritage, as of the beginning of 2024, China has more than 100,000 ongoing representative projects of intangible cultural heritage; 629 traditional handicraft skills are recognized, and many are related to the village blacksmithing workshops discussed here (such as traditional iron smelting and casting in Shanxi Province, various sword and knife forging skills, scissor forging, iron bridge cable-making techniques of Garzê Tibetan Autonomous Prefecture in Sichuan Province, and iron nailsmith craftsmanship in Gansu Province [40,41]). Many of these traditions are considered to be in danger of disappearing and are in vital need of support. While the village blacksmiths in the region under study have not yet drawn the attention of intangible cultural heritage officials, it is possible that they will before it is too late. A thorough survey of the Aba Tibetan and Qiang Autonomous Region may identify other villages who still have local blacksmiths, and thorough documentation of their tools, working methods, and local functions would expand the knowledge of their practices. Financial support for apprentices and assistance in the wider marketing of products might make these workshops more economically viable and prevent their disappearance.

Elsewhere in China, and in other parts of the world, support for traditional crafts has been used successfully in efforts to grow heritage tourism, which positively impacts local economic vitality. Conversely, tourism has been found to support creativity and vitality in local craft traditions [42]. The focus of the two blacksmithing workshops discussed here on utilitarian crafts and repairing villager's tools makes their products unlikely to appeal to tourists seeking craft objects to purchase. However, research has shown that support for local crafts clearly creates cultural resilience and sustainability, and that larger audiences, including tourists, appreciate observing or participating in craft skills because it helps them to feel more engaged with other places and people and more connected with the environment [42,43]. In the case of the Tibetan village blacksmiths discussed herein, the ways in which they use their knowledge and skills to design individualized tools as needed for specific tasks and to repair damaged existing tools so they can continue to be used for long periods of time is quite different from modern practices of purchasing mass-produced items and discarding damaged ones to buy another inexpensive replacement. Given the growing interest in environmental sustainability, this cultural feature of repairing rather than replacing is likely to become more valued in the future. If the Tibetan village blacksmiths of northern Sichuan Province do draw the attention of China's intangible cultural heritage programs in the future and receive some modest support, they may resonate with both local and wider audiences from the point of view of their roles in both cultural sustainability and environmental sustainability.

Some changes from earlier practices have already been noted in these workshops, such as purchasing inexpensive plastic bowls for quenching and one blacksmith substituting an electric blower for traditional bellows. However, since these changes help to make the workshops more economically viable while the core tools and functions of the blacksmiths are retained, these changes are in keeping with China's intangible cultural heritage preservation recommendations. The Sichuan Intangible Cultural Heritage Ordinance, for example, supports some changes and evolution of traditions, saying "We shall encourage exploration of the organic integration of handicrafts with modern science and technology while preserving the main traditional production methods and technologies" to promote a traditional handicraft skill's "entry into modern life and to achieve sustainable development" [39]. Being too rigid and discouraging any changes in response to the modern world is likely to negatively affect the sustainable preservation of a tradition. Some of the most successful heritage craft preservation efforts in Sichuan Province have encouraged the practitioners themselves to discuss and identify what the most crucial, special characteristics of their tradition are that must be retained, and which are peripheral and can change and evolve so that the tradition can thrive in the future [44]. Seeing Sichuan's intangible cultural heritage programs expand to incorporate village blacksmiths of the traditional Tibetan Amdo region would likely ensure a future for this long-standing but disappearing cultural tradition.

Funding: This research was funded by an International Research Award from the Center for International Studies, University of Delaware, USA.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Acknowledgments: The author appreciates the kindness and cooperation in the field provided by many Lha yul and Zhang ngu khog villagers.

Conflicts of Interest: The author declares no conflicts of interest.

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