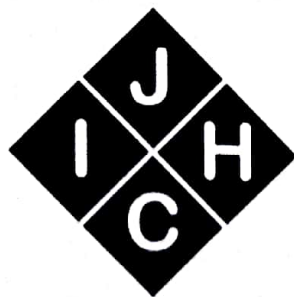


ISSN : 0975 - 7805

**JOURNAL
OF
INDIAN HISTORY
AND
CULTURE**

(under UGC - CARE)

**December 2025
Thirty-sixth Issue**



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Early evidence of Mining, Smelting and Forging in the Ahom Kingdom: An Update

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Abstract

The Ahom dynasty ruled over the Brahmaputra Valley from the thirteenth to the nineteenth centuries. During this period, they utilised iron to make tools and weapons of various shapes and sizes. However, there has not been a detailed study to discuss their sources of iron. The study, therefore, aims to identify the Ahom sources of iron ore and understand their mining, smelting and forging processes; enumerate their iron trade with neighbouring ethnic groups, such as the Khasi; and, third, elicit the acquisition of iron as tribute from the Dimasa kingdom. In doing so, the existing literature is reviewed and corroborated with the Buranji or the Ahom chronicle to provide novel interpretations and understanding. In other words, the article offers a synthesis of Ahom's multiple sources of acquiring iron and its utility aftermath.

Keywords: Ahom kingdom, Buranji, iron ore, Khasi ethnic group, Northeastern region.

Introduction

In the thirteenth century, Sukapha, an adventurer from Mongmao, founded the Ahom kingdom in the Brahmaputra Valley, which lasted till the nineteenth century. During this period, the Ahom utilised iron to make tools, such as sickles, ploughshares and choppers, as well as weapons, including swords, spears and cannons. The earliest reference to the Ahom use of iron is found in their mythical stories, which account for Khun-Lung and Khun-Lai, the ancestors of Ahom royalty, descending to earth from heaven using an iron ladder.¹ Nevertheless, historically, the Ahom knew the utilisation of iron before their advent in the Brahmaputra Valley; as it is evident from the *Buranji* (Ahom chronicle), which states that the Ahom had with them iron-made weapons, such as swords, spears, etc.² Yet, after the establishment of the Ahom kingdom in 1228, and with its subsequent expansion and consolidation, iron was required in large quantities to produce tools and weapons. So, the question is: from where were the Ahom procuring iron ore? Did the Ahom utilise the iron ore found in their kingdom, or were they procuring it through trade or tribute?

Explanations on the questions mentioned above were attempted by Pemberton, Hamilton, Robinson, Hannay and Hunter.³ These colonial accounts and reports help us understand a single aspect of acquiring iron ore, along with the regions where the mining and smelting took place in the Ahom kingdom. However, it was not the only source. Iron ore was smelted on the Khasi Hill by the Khasi ethnic group, with whom the Ahom had a lucrative trade, which constituted the second source of iron. The earliest observations of the availability of iron ore in the Khasi Hill and its subsequent mining and smelting are noted by Cracroft, Yule, Darrah, Oldham, and Allen.⁴ However, regarding the trading activity between the Ahom and Khasi, studies by Mill, Lish, Phukan, and Purkayastha provide some details.⁵ Yet, a novel aspect of tribute remained unexplored. This limitation is remedied by the study of Ahom chronicles, which mention that tribute was a significant source of Ahom revenue, and as such, they received iron as tribute from the Dimasas kingdom. A detailed study of these three aspects of Ahom's acquisition of iron is furnished in the article.

Indigenous Mining and Smelting

Hannay's report suggests that the entire southern frontier adjoining the Naga Hills, south of the present-day Dibrugarh, Sivasagar, and Golaghat districts in Assam—a region roughly between Jaipur and the Doyang River—is rich in iron ore deposits.⁶ In this region, the Ahom monarchy built large establishments for smelting iron ores. Similarly, Hunter also provides evidence of iron ore in Sivasagar, Jaipur, and Barhat.⁷ Yet, in some particular localities, the deposition of iron ore and activities related to it, such as mining and smelting, were more prominent. These regions were Tirugaon Hill and Hattigarh. This particular area was rich in iron ore deposits and Hannay considered the iron of this area to be “the best, both as to the quality and quantity of the ores.”⁸ The second region rich with iron ore deposits was the area between Bossa and Doyang. In this area, iron was obtained from the ferruginous clay.⁹ In fact, according to Hamilton's observation, the iron ore from Doyang used to supply “the whole country with abundance.”¹⁰ Third, was the bank of the Suffrai River, which was also rich in iron ore deposits.¹¹ Robinson also reported about the remains of furnaces in the nearby areas of Jaipur, Barhat, and the Suffrai River banks.¹² The following Fig. 1 represents the distribution of iron ore in a map.

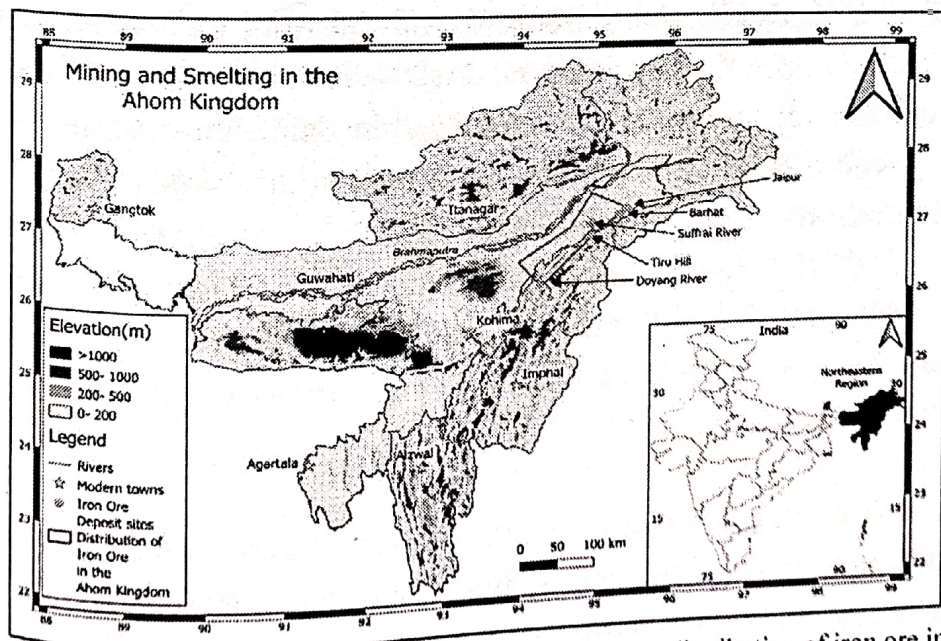


Fig. 1: Map of the Northeastern Region of India showing the distribution of iron ore in the Ahom kingdom, prepared using Google Earth data and QGIS software

The availability of iron ore in the Ahom kingdom led to the development of the iron industry in the Brahmaputra Valley.¹³ There were two separate guilds; one for mining and smelting of iron ore, called *Losalia* or *Tiruwal*, and the other for blacksmithing work, called *Kamar* were engaged with the iron industry during the Ahom rule.¹⁴ The origin of the iron smelter in the Brahmaputra Valley is associated with Sukapha, the first Ahom monarch, who initiated mining and smelting by establishing workshops of smelters in Tirugaon Hill. For supervision, the Ahom monarchs appointed officers, such as Rajkhowa and Tirukakati.¹⁵ Regarding the ethnic background of iron smelters, they mainly comprised the Dimasa and Ahom ethnic groups.¹⁶ Moreover, the iron smelters of the Brahmaputra Valley could have, in all possibility, maintained technological exchanges with the Kunung ethnic group in the Bar-Khampti area in present-day Myanmar, who, according to Robinson's observation, produced the "best iron."¹⁷ Hannay provides an overview of the mining and smelting process.¹⁸

At Bossa and Doyang, iron ore was obtained from ferruginous sand, deposited in a separate bed, and found at a depth of 10, 12, 15, and 16 cubits under the surface.¹⁹ The process of mining started with finding the beds containing iron ore, and the work took about four to five days.²⁰ Once the bed was found, six men were employed. Two of them used to dig out the lumps containing the oxide; the third took those and placed them along the pathway leading to the entrance of the pit. Meanwhile, the fifth took those lumps outside, and the sixth shaped them into a large rectangular heap. The dimension of the heap was about 12 cubits in length, 7 cubits in breadth, and 3 to 4 cubits in height.²¹ Hence, six men working for 10 continuous days collected a heap of 1000 maunds of iron ore-bearing clay.

Once mined, the heap was divided into seven shares, which were then equally distributed among themselves and their landlord. After that, the smelters washed the ore, a process that took 10 to 12 days. In this process, the lumps containing the ore are thrown into a large water

pit where the smelters stamp the lumps with their feet. Thus, iron ore was separated from the lumps. After washing and collecting iron ore, the smelting process starts with the construction of a *hadora* or open-hearth furnace. It was a bowl-shaped pit in the ground, the circumference of which was covered with hardened clay. The entire smelting process was supervised by a head smelter who was also required to draw out the melted lump of iron from every 15 seers of iron ore.²² In addition to the head smelter, there were two other assistants. One assistant was entrusted to blow the goat skin bellow, while another was to bring iron ore and charcoal, which were thrown into the furnace. Usually, the bellow was used by an assistant by squatting on the ground and blowing it with his arm. Thus, by working every day, 13 pieces of iron were extracted by smelting.

The organisation of blacksmiths as a guild is associated with the annexation of the Chutiya kingdom in 1523 by the Ahom monarch Suhungmung (1497-1539). The annexation led to the migration of many Chutiya blacksmiths into the Ahom kingdom.²³ The blacksmiths who settled in the vicinity of Bossa established smithy workshops and were required to produce and supply swords and cannons to the royal storehouse.²⁴ However, in the western part of the Ahom kingdom, the blacksmith guild was composed of the Kalita community and the Koch ethnic group, and they were engaged in making weapons, such as spears, matchlocks, and sacrificial choppers.²⁵ Thus, the social organisation of the blacksmith guild in the Ahom kingdom varied according to region. Officers, including Saikia and Hazarika, oversaw the guild.²⁶ Apart from Bossa, the blacksmith also established their workshop in Messa, Messamara, Dergaon, Kamarbandha, Kamargaon, Denkial and Dadhara.²⁷

To create a weapon or tool, a blacksmith placed metal in the forge, heated it with charcoal, and then used the bellows to blow air into the charcoal. The bellow was made of goatskin and was fixed with two pieces of bamboo at the rear end. More charcoal is added if necessary. Thus, the

metal's heating continued until it reached a temperature where it could be moved to an anvil for hammering. There were four particular types of anvils. These were *bor-niyari*, or large anvils used for hammering large metal pieces, and *belmuri*, or medium-sized anvils, which were fixed to a wooden piece, *dheka*, or medium-sized anvil with a sharp point on both ends, and *chatuli*, or small-sized anvils.²⁸

The heated metal was removed from the forge using a tong. The blacksmith used six different types of tongs to lift, grip and move the heated metal. These were *pat-sarah*, its front end was flat; *akora-sarah*, its front end was twisted; *chenidhara-sarah*, used to hold a cutter; *gall-sarah*, its front end was twisted towards the back; *beji-sarah*, a small tong used to pick tiny objects; and *pon-sarah*, a small tong designed like a forcep.²⁹ Once removed, the blacksmith first put the heated metal in the anvil and used a cutter to remove metal pieces. Then he pounded the metal with a hammer to derive the required shape of the weapon or tool. If the metal became cold, it was reheated again. Thus, repeated heating and hammering continued until the desired shape was acquired. The blacksmith used a variety of hammers. These were *borhaturi*, or large hammers, *topalagoch*, or medium-sized hammers, and *mathani*, or small hammers, particularly used for engraving and gilding.³⁰ After acquiring the desired shape of the tool or weapon, the blacksmith profiled it to remove any hammering marks and other impurities. Then it was heated for quenching. For quenching, the blacksmith used a water pot. After that, the blacksmith checked whether the metal was hardened or not. If it remained soft, then it was reheated for quenching. Later, the handle is constructed out of animal bone, horn, or wood. These were attached to the blade by either heating the tang and inserting it into the handle or by pinning it to the tang using rivets.

Khasi trade in Iron

Although the Ahom had iron ore deposits in their kingdom, they still resorted to trade to procure iron from different regions. One of these regions was the Mikir Hills, inhabited by the Mikir ethnic group, who,

along with various other articles, traded in iron with the Ahom.³¹ To facilitate trade with the Mikir, the Ahom monarchy established several markets. For example, Susengpha (1603-1641) established a market at Phulaguri on the banks of the Kalang River. Similarly, during the reign of Surampha (1751-1769), another market was set up at Raha.³² A market also existed at Mikirhat on the left bank of the Kalang River. Similarly, the Khasi and the Garo of the Khasi-Jaintia Hills, as well as the Kunung ethnic group in present-day Myanmar, also traded in iron with the Ahom, which was again confirmed by Leach.³³ Nevertheless, the Khasi held the major share of the iron trade. But the question is: why were the Ahom procuring iron from the Khasi? Before addressing this question, it is essential to determine whether iron ore was available in Khasi Hill. Iron ore was mined and later smelted in numerous places in the Khasi-Jaintia Hill, of which the largest quantity of iron ore was deposited at the Nongkrem and Nuspoong sites.³⁴ Hunter noted the availability of iron ore throughout Khasi-Jaintia Hill and mentioned that it was primarily found in Khyrim, Cherra, Myllien, and Nongspung.³⁵ Regarding the origin of the smelting process among the Khasi, radiocarbon dating of charcoal from iron slag revealed evidence of continuous iron smelting in the Khasi Hill in Nongkrem site (25° 29' 34" N. lat. and 91° 52' 54" E. long.) to 353 BCE-128 CE.³⁶

Yule, in the mid-nineteenth century, documented the mining process in Khasi Hill.³⁷ Accordingly, a semi-circular broken slope of trash and boulders was seen from the mine. A stream of water flowed down the slope to the dig site. Excavators used long poles with iron spikes to remove soil from between the boulders as they worked on one side of the project. The displaced sand was swept away by the flowing water and deposited 200 yards away and 80 feet below in a shallow stream. A dam was then built by erecting little poles on either side of a stream and placing poles on top. The iron particles were stopped, but the fast-flowing stream swept away the lighter soil grains. The dam was raised as the iron accumulated, and when it reached a height of one foot above the bank, the ore, as fine black sand, was removed, and the dam was lowered.

A miner above the dam used a hoe to keep the ore from clogging the stream's path, and he also used a long-hooked fork to remove any chunks of stone that the current had carried down. Two women conducted the process of washing iron ore. The ore was washed in a trough, and the water used for this purpose came from a branch of the upper stream.³⁸ The women washed the ore using their feet while turning and mixing it with a hoe. Then the washed ore was collected in a heap for drying. Once dried, it was rewashed, which was repeated four times. After thorough washing, the iron ore was shifted to the smelting house. According to Cracroft's observation, the Khasi smelt house was an oval thatched hut, 25 feet in height, with a ground plan measuring 15 by 30 feet.³⁹ It was divided into three rooms, with the central one functioning as the smelting room.⁴⁰ The following Fig. 2 illustrates the Khasi smelting process based on Cracroft's observation.⁴¹

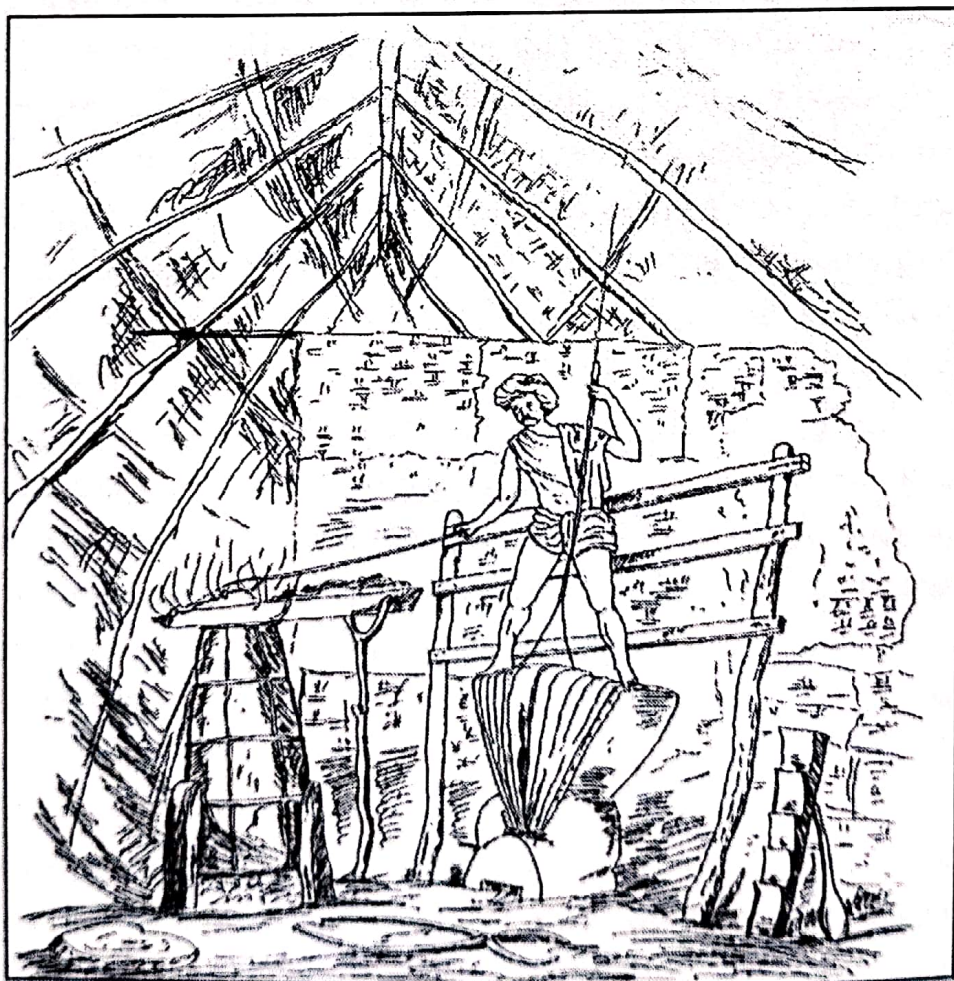


Fig. 2: Recreation of the Khasi Smelting Process

The smelting process was carried out by a man standing on the upper half of two enormous double bellows, with one foot on each, while two planks supported his back.⁴² There were two strings attached to a stick in his left hand, while shaking his loins and using his leg strength to work the two bellows. They were connected to the hearth by a tube that ran underground from a wind chest of about 4 feet in front of the bellow. There was a pipe-clay chimney braced with iron hoops above the fire. It was 2 feet in diameter at the bottom and 6 feet high. As the bellows and chimneys were located on opposite sides, these were positioned to move warm air away from each other toward a roof opening.

Besides that, there was a trough containing damp charcoal and iron sand on the right side of the bellows, and at every motion of the operator, a piece of this charcoal with the iron sand adhering to it was pushed into a funnel in the furnace. Thus, a mass of melted or softened iron was formed on the hearth. It was then taken out with tongs and beaten with a heavy wooden mallet on a large stone as an anvil. Table 1 elicits the Khasi smelting tools along with their functions.

Table 1: Types of Khasi Smelting Tools and their Functions⁴³

Sl. No.	Smelting Tool	Function
1.	Narsuh	It was a long iron bar with a wooden handle that was used to stir charcoal in the furnace
2.	Uddie	It was a rough axe that was used for splitting iron blocks
3.	Kajingthap	It was an iron bat used for beating the red mass of iron partially into shape
4.	Kanap	It was a pair of heavy iron pincers
5.	Jingking	It was a pair of iron chisels used for widening the cut made by the <i>usdie</i>
6.	Kaphah	It was a trough in which dry bracken was smeared with a mixture of water and ore
7.	Khongoi	It was a trough for holding water, placed immediately below the <i>kaphah</i>

The Khasi, after smelting iron ore, bartered the iron in the plain regions. They kept very little of the smelted iron for themselves; instead, a significant portion was exported to Assam and Sylhet.⁴⁴ To provide an extent of iron being exported from the Khasi Hill, Allen, in 1858, writes, "The average quantity of iron exported every year from the hills is probably 50000 maund."⁴⁵ Allen also pointed out that the Khasi kept a tiny portion of smelted iron with them, with which they forged tools, such as a chopper, a hoe, and a spear,, while the greater bulk of it was sold in circular lumps of four or five seers each.⁴⁶

However, the Khasi kept the best iron to themselves, which was shaped into flat bars. It was sold from 1 rupee to 10 *annas* to 1 rupee 12 *annas* per *maund*. In contrast, the lump iron had an average price of one rupee four *annas* to one rupee six *annas* per *maund*. For trading, markets were essential, and every Khasi village had a market nearby.⁴⁷ The Khasi trade was mainly with the Brahmaputra Valley and the Surma Valley. The exchange was conducted through well-established trade routes that traversed the hills via settlements such as Nartiang, Jowai, and Jaintiapur on the Jaintia side and Nongkseh and Sorah on the Khasi side. Lish's account helps elicit the lucrative trade between the Khasi and the inhabitants of the Brahmaputra Valley.⁴⁸ The Khasi exchanged with the Ahom, limestone and iron works in place of various kinds of silk cloth, which were in high demand among them.⁴⁹

Thus, barter was the mode of exchange between the Khasi and Ahom, which occurred at frontier markets, such as Ranihat, Sonapur, Palasbari and Gohainhat.⁵⁰ There is also another account that referred to the Ahom-Khasi trade. According to Pemberton and later Robinson's account, the Ahom exchanged articles with the Khasi, including iron, mustard, cloth, silk, rice, salt, tobacco, and goats.⁵¹ Moreover, on bartering, Lish further mentions that the Khasi had the habit of bartering their hill produce with those living in the plains.⁵² They sold oranges, honey, iron, beeswax, ivory, rubber, etc., in exchange for rice, fish, salt and spices.

The Khasi were mining and smelting iron ore, and likewise trading it with the Ahom. But the question is: why were the Ahom importing iron from the Khasi? There were two particular reasons. First, the quantity of iron smelted by the Ahom smelters proved to be insufficient to fulfill the demands of blacksmiths engaged in forging weapons and tools.⁵³ However, what caused this insufficiency? Was there a shortage of iron ore or any technological lag in the smelting procedure? Purkayastha argues that the Ahom smelters had some technical deficiencies in iron ore smelting compared to their Khasi counterparts.⁵⁴ For example, the smelters in the Ahom kingdom used an open-air furnace, while the smelters of Khasi Hill used an indoor furnace inside a smelting house.⁵⁵ Thus, there existed a minor variation, but it had a significant impact on the production of iron. To enumerate how this variation affected, Purkayastha asserts:

The use of open-air furnaces indicates that the smelters were engaged in smelting iron only at a specific period of the year. The lack of smelting houses further testifies to their less productive technology than the Khasi smelters. Therefore, the supply was insufficient for the demand, and they had to depend on the Khasi smelters for crude iron.⁵⁶

The second reason was the quality of the Khasi iron, which led the Ahom monarchy to import it in large quantities. In the *Memoirs of the Geological Survey of India*, there is a reference to the superior quality of Khasi iron.⁵⁷ Oldham in 1859 remarked, "The quality of the Khasi iron is excellent for all such purposes as Swedish iron is now used for."⁵⁸ He further goes on to say, "It would also form steel or wootz of excellent quality."⁵⁹

Similarly, Allen praised the quality and availability of Khasi iron.⁶⁰ He writes, "The ore is said to be of the best quality and most abundant in the Khyrim country, and the purest and most superior sort is found at Nungkreem and Nogundree in that district."⁶¹ Therefore, as it turns out, and to quote Hannay:

This iron, from its soft and malleable nature, was considered the best for the manufacture of nails, firearms of small size, and the inner tubes of the large cannons; the iron of the upper Assam ores being found best adapted for swords, axes, knives, shovels, and hoes, etc.⁶²

Iron as tribute article

Annual tribute, which was in kind, formed a significant source of income for the Ahom monarchy. Since the beginning of the thirteenth century, the Ahom received tributes from frontier ethnic groups.⁶³ Accordingly, the Naga of Namchang, Banchang, Jabaka, and Tabloong paid tribute, and so did the Miri, Mishimi, Mikir, and Bhutia ethnic groups. The frontier chiefs of Rani, Dimarua, Ghiladhari, Beltola, Dihing, Kharangi, Sat-raja, Panch-rajahs, Bebejia, Mayang, Panbari, Chundoria, and Dooria were also required to pay annual tribute. Likewise, the Darrang Raja and the Dimasa monarch too paid tribute.⁶⁴ Among them, the Dimasa kingdom is significant as its tribute articles included iron. The Ahom came into conflict with the Dimasa kingdom during Suteupha's reign (1268-1281), who demanded that their monarch, Bicharpati Derchungpha, hand over the territory between the Dikhou River and the Namdang River, or that the latter pay tribute.⁶⁵

Instead of war, they decided to settle the dispute through negotiation.⁶⁶ Thus, an understanding was met, leading the Dimasa to give up territory to the Namdang River.⁶⁷ Yet after this settlement, the Ahom-Dimasa war broke out in 1490 CE, during Suhanpha's reign (1488-1493). The Dimasa massacred an Ahom contingent of 120 soldiers along with their commander, Khu-Na-Seng.⁶⁸ This defeat compelled Suhanpha to make peace with the Dimasa monarch by offering a girl named Jekhring along with two elephants and 12 slaves.⁶⁹ Conflict with the Dimasa resumed during Suhungmung's reign, sparked by Dimasa raids on Ahom territory.⁷⁰ Hence, Suhungmung sent an expedition against the Dimasa under Kan-Seng in 1524.⁷¹ The Ahom defeated the Dimasa on multiple fronts, pushed them back to Marangi, and claimed Dergaon. The Dimasa

withdrew from Dergaon, ceding the territories west of the Dhansiri River.⁷² The Ahom, thus, occupied the region between the rivers Dikhow and Dhansiri. Later in 1531, the Ahom-Dimasa war resumed when the Dimasa, led by Detcha (Dimasa monarch Khunkhara's brother), attacked Marangi. The Ahom killed Detcha and captured Dimapur, the Dimasa capital, while crowning Detchung as the new monarch. Thenceforth, the Dimasa kingdom became Ahom tributary, and they started to pay an annual tribute which included iron, horses, cloth and *Nakoi-da* (a type of chopper).⁷³

The Ahom used iron not only to make agricultural tools but also weapons. Thus, in the paper, has been synthesised the Ahom sources of iron that fostered technological development, facilitated trade between regions and commenced cultural interaction between ethnic groups in the Brahmaputra Valley. The sources include indigenous mining and smelting, trade and tribute. While the iron in the kingdom fell short due to technological lag, the monarchy took steps to procure it through trade and tribute from ethnic groups and kingdoms. As the Ahom chronicles are silent on the total amount of iron acquired as tribute, one can only speculate that the quantity was less in comparison to trade. Furthermore, the monarchy realised the significance of the iron trade, as evidenced by the establishment of markets.

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