

**Moshtagh Khorasani, Manouchehr**  
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# BRONZE AND IRON WEAPONS FROM LURISTAN\*

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## **Summary: Bronze and Iron Weapons from Luristan**

The 30,000 km<sup>2</sup> province of Luristan is situated in western Iran and encompasses the upper valleys of the Zagros Mountains. Even today, local tribesmen inhabit Luristan with their settlement patterns similar to ancient times. Several scientific excavations in the Luristan region have uncovered evidence that this particular region was a major attraction for human settlements from the Paleolithic era onwards. In Ancient Iran, the existence of rich mines together with discoveries made by innovative and inventive artisans spurred the growth of the metalworking culture as an art and a skill among early human communities in Ancient Iran. The art of Luristan can be described as the art of nomadic herdsman and horsemen with an emphasis on the crafting of small, easily portable objects, among these a number of bronze daggers, swords and other weapons. Throughout its history, Luristan was never an ethnic or political entity because Luristan has been occupied by various tribes and races, throughout its history. Next to Elamites, other tribes who inhabited Luristan were the Hurrians, Lullubians, Kutians, and Kassites. As local tribesmen of Luristan were illiterate, information about their history can only be partially reconstructed from the literature of their southern neighbors: the Elamites and Babylonians. Luristan smiths made weapons for both civilizations. The region was later invaded by Assyrians and finally the Iranians settled the area and absorbed the local tribes. Following an accidental find by the local inhabitants in Luristan in 1928 CE, a number of unlawful diggings reveal a number of metal objects made of bronze and iron that showed a high level of craftsmanship. These objects were offered for sale on the art market with fancy names to hide their origin. The subsequent scientific excavations several decades after the initial discovery provided fascinating information about the culture of Luristan. The metalworking art of Luristan spans a time period from the third

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millennium BC to the Iron Age.<sup>1</sup> The artifacts from Luristan seem to possess many unique and distinctive qualities, and are especially noteworthy for the apparently endless, intricate diversity and detail that they characteristically depict. The bronze artifacts found in or attributed to Luristan can be each be classed under five separate heads: a) arms and armor, including swords, dirks, daggers, axes, mace heads, spearheads, shields, quiver plaques, protective bronze girdles, helmets; b) implements related to horsemanship, including decorative or ornamental objects for horses as well as bits and snaffles; c) items for personal adornment and hygiene, including anklets, bangles, bracelets, finger rings, earrings and tweezers; d) ceremonial and ritual objects, including talismans, idols, pins, anthropomorphic and zoomorphic figurines; and e) utilitarian objects comprising various vessels and tools, including beakers, bowls and jugs.<sup>2</sup> The scope of this article is limited to a discussion of the bronze and iron weapons made in Luristan. The techniques used for making bronze weapons in Luristan included: casting with open molds, casting with close molds, and casting with lost wax process. For metal sheets used for quiver plaques and bronze protective belts, the hammering technique was used. Edged weapons made in Luristan can be classified into: a) daggers, dirks, and swords with tangs; b) daggers, dirks, and swords with flanges; and c) daggers, dirks, and swords with cast-on hilts. Next to bronze, iron was also used for making weapons such as the characteristic weapon from this area, the iron mask sword.

**Keywords:** Luristan – casting methods – bronze weapons – iron weapons

### **Resumen: El bronce y las armas de hierro de Luristán**

La provincia de Luristán, de 30.000 km<sup>2</sup>, está ubicada en el oeste de Irán, extendida a lo largo de los altos valles de los Montes Zagros. Aún en la actualidad, habitan en Luristán tribus organizadas en patrones de asentamiento similares a los de la antigüedad. Las excavaciones científicas realizadas en la región de Luristán han revelado un atractivo particular en lo que respecta a los asentamientos humanos desde el período Paleolítico en adelante. En el antiguo Irán, la existencia de minas ricas en metales así como los descubrimientos realizados por artesanos creativos e innovadores, impulsaron el desarrollo de la cultura metalúrgica como un arte y una habilidad entre las primeras comunidades humanas. De este modo, el arte de Luristán se puede describir como el arte de los pastores nómadas y los jinetes debido al énfasis puesto en la elaboración de pequeños objetos fácilmente transportables, entre los que se encuentran un número dagas, espadas y otras armas de bronce. Sin embargo, Luristán nunca constituyó una

<sup>1</sup> Ayazi 2008: 9.

<sup>2</sup> Ayazi 2008: 14.

entidad ni étnica ni política, puesto que estuvo ocupada por diversas tribus y razas a lo largo de su historia. Así, nos encontramos con que, junto a los elamitas, habitaron otras tribus en Luristán como los hurritas, los lullubi, los kuteos y los kassitas. Al no tener los miembros de las tribus locales de Luristán escritura, la información sobre su historia sólo puede ser parcialmente reconstruida a partir de la literatura de sus vecinos del sur: los elamitas y los babilonios, para quienes los herreros del Luristán confeccionaban armas. Posteriormente, la región fue invadida por los asirios y, finalmente, se establecieron en la zona los iraníes, quienes absorbieron las tribus locales. Un hallazgo fortuito por parte de los habitantes locales de Luristán en 1928 reveló una serie de excavaciones ilegales en las que se descubrieron diversos objetos de metal—de bronce y de hierro—que demostraron poseer una artesanía de alto nivel. Estos objetos se pusieron a la venta en el mercado de arte con nombres de fantasía para ocultar su origen. Las excavaciones científicas realizadas varias décadas posteriores a aquel descubrimiento inicial proporcionaron información interesante sobre la cultura de Luristán. El arte realizado con el metal de Luristán se extiende desde el tercer milenio a.C. hasta la Edad de Hierro. Los artefactos de Luristán parecen tener numerosas cualidades únicas y distintivas y son especialmente notables por la terminación, la diversidad y los detalles intrincados que los caracterizan. Cada uno de los objetos de bronce encontrados o atribuidos al Luristán puede ser clasificado en cinco apartados distintos: a) las armas y armaduras, como espadas, dagas, puñales, hachas, cabezas de maza, punta de lanza, escudos, placas carcaj, fajas protectoras de bronce, cascos; b) instrumentos relacionados con la equitación, la inclusión de objetos decorativos y ornamentales para los caballos, así como trozos y filetes; c) artículos para adorno personal y la higiene, incluyendo pulseras, brazaletes, pulseras, anillos, pendientes y pinzas; d) objetos ceremoniales y rituales, incluidos los talismanes, ídolos, alfileres antropomorfos y figurillas zoomorfas; y e) los objetos utilitarios que comprenden varios vasos y herramientas, incluidos vasos, cuencos y jarras. El alcance de este artículo se limita a la discusión de la medalla de bronce y armas de hierro hechos en Luristán. Entre las técnicas utilizadas para la fabricación de armas de bronce en Luristán se incluyen: colado con moldes abiertos, fundición con moldes de cerca, y con el proceso de fundición a la cera perdida. Para las chapas de metal utilizado para las placas de bronce carcaj y cinturones de protección, se utilizó la técnica del martillado. Las armas blancas hechas en Luristán se pueden clasificar en: a) puñales, dagas y espadas con espigas; b) puñales, dagas y espadas de bridas; y c) puñales, dagas y espadas con elenco-en la empuñadura. Junto al bronce, el hierro también se utilizó para la fabricación de armas como la espada de la máscara de hierro, que era el arma característica en esta zona.

**Palabras clave:** Luristán – técnicas de fundición – armas de bronce – armas de hierro

## LOCATION AND GEOGRAPHICAL AREA

Luristan<sup>3</sup> is a province located in western Iran, and its territory extends over an area of approximately 30,000 km<sup>2</sup>. The terrain of Luristan consists of the upper valleys of the Zagros Mountains, bordered by Nahavand to the north, by Kermanshah to the northwest, by the Seymareh River to the west, by Khuzestan (ancient Elam) to the south and southwest, to the east by the Dez River separating Luristan from the Bakhtiari territory, and the mountains overlooking Malayer and Boroujerd to the northeast.<sup>4</sup> The Zagros chain of mountains is made up of a number of smaller ranges running parallel beside each other, in a northwesterly to southeasterly direction. The imposing Kabir Kuh range interjects itself between Luristan and Mesopotamia to the south and separates Luristan into two areas: the Pish-e Kuh (that lies directly east of the Kabir Kuh) and the Pusht-e Kuh.<sup>5</sup> The topography of Luristan is flat, and the area is one of open plains intersecting with the treeless highlands of the Zagros Mountains.<sup>6</sup> In antiquity, Luristan was more populous than it is currently, and the province was extensively cultivated. However, its arable soil is no longer being farmed.

To date, local tribesmen continue to inhabit Luristan, and their settlement patterns appear very similar to those that probably existed in ancient times. Local tribes today use two respective areas as winter and summer pasturages. These areas are termed “Garmsir”, the temperate, lowland winter pasture area to the west, and “Sardsir”, the location of the summer settlements.<sup>7</sup> As a result of similar seasonal migration patterns followed by the inhabitants of Luristan in ancient times, there are two different types of archaeological settlements in the region. The settlements in the cool, highland region of Eastern Luristan are relatively small. These were probably villages or tented encampments that were erected in the locus of small citadels temporarily as a result of seasonal migration. By contrast, the settlements in the warmer, lower plains of Western Luristan were both larger and more permanent. It is most probable that the primary metal workshops were situated inside these larger settlements, as

<sup>3</sup>The correct spelling for the region in Persian would be Lorestān and not Luristan as Sadegh-Behnam and Koh rightly put it; however, I will keep to the version “Luristan” since it is widely used in the Western literature.

<sup>4</sup>Ayazi 2008: 10.

<sup>5</sup>Ayazi 2008: 10.

<sup>6</sup>Moorey 1974a: 22.

<sup>7</sup>Sadegh-Behnam and Koh unspecified date: 2.

during the Bronze and Iron Ages, metal industries were closely supervised and centrally controlled. Due to the migratory patterns of life in Luristan, metal products would have been carried regularly into the eastern highlands. It is to be noted that most metal industries in the Bronze and Iron Ages, especially those industries that produced very elaborate artifacts relied upon the patronage of a small minority from among the ruling class. The affluent ruling elite seem to have consisted of warrior horsemen who were buried with their weapons and harness trappings.<sup>8</sup>

#### THE WAY OF LIFE AND ART OF LURISTAN

The art of Luristan can be characterized as the art of nomadic herdsmen and horsemen. Nomadism accounts for the emphasis on the crafting of small, easily portable objects, such as arms, bridle bits, harness rings, and other utensils, all of which were finely decorated. The manufacturing of these objects took place in the period between 2500 BC and 650 BC. Both men and women were buried alongside various artifacts, and the graves of men also contained bronze daggers, swords and other weapons. It is not established with certainty that the entirety of Luristan art has a nomadic character as formerly proposed by many scholars, as there is ancient documentary evidence of conflicts between nomads and farmers. The craftsmen and smiths probably lived in the towns from which the nomads fetched their provisions.<sup>9</sup>

In Luristan, traditional heritage and beliefs appear to have been resilient and enduring. However, Luristan tribesmen were also influenced by the currents of trade, migration, and brigandage. The Luristan tribesmen themselves were illiterate. Hence, it is necessary to reconstruct their history from the literature of their powerful southern neighbors. The specific sources for their history are the records of the Elamites of Khuzestan who had their capital at Susa and the civilization of the Babylonians in Southern Iraq. These powerful urban civilizations were in constant conflict with each other, and, at times, they hired Luristan mercenaries from the Zagros Mountains. The mountain tribesmen of Luristan not only served as mercenaries, but were in the habit of pillaging and plundering the cities on the plains when they were in a vulnerable or weakened state. The Elamites' and Babylonians' written records mention little about these Zagros tribesmen, due to the infrequency of any contact they had with them. The existing period reports on these

<sup>8</sup>Moorey 1974a: 26–27.

<sup>9</sup>Ayazi 2008: 16.

tribesmen are both cryptic and abusive. It would appear that at particular moments in history, the Babylonians and Elamites shared close ties with these Zagros tribesmen. The evidence for this is the discovery of some bronze weapons from Luristan that are inscribed with both Babylonian and Elamite kings' names.

There was a successful campaign against Elam that was waged and which penetrated into the Zagros Mountains. The Babylonian Empire toppled the Elamite Empire one thousand years later, and established strong ties with Luristan. Strong economic ties meant that the local smiths of Luristan were involved in the production of metalwork for foreign patrons between 2500 to 1200 BC. This metalwork is indistinguishable from its Elamite and Mesopotamian counterparts. After the 2<sup>nd</sup> millennium BC,<sup>10</sup> a general pattern of animal (zoomorphic) decoration began to appear on the cast bronze weapons produced in Luristan, and this feature became a distinguishing characteristic of the local style of Luristan. Thus, animal motifs, in the form of engravings on blades and handles, are typical of Luristan bronze arms. The bronze artifacts, some of which are engraved, that have been unearthed from Luristan are remarkable for the quality of their craftsmanship. In particular, the horse trappings, harness ornaments, weapons and standards cast from bronze are of a very high quality. The elaborate cheek pieces of horse harnesses are sometimes decorated with either ordinary animal figures, such as horses or goats, or extraordinary, mythical animals, such as winged, human-faced bulls. It is interesting that a lion's head motif appears as a decorative feature on many axe-heads. The open lion's maw forms the base of the axe head, and the blade is attached to this; the lion is a symbol intended to give the weapon the strength of the most powerful beasts of the animal kingdom. The earliest bronze weapons, particularly daggers, axes, and adzes, share many similarities in form to Mesopotamian artifacts of the 3<sup>rd</sup> millennium BC.<sup>11</sup> Often, weapons from Luristan bearing shaft holes carried several spikes, and these were sometimes further embellished with additional animal heads, protomes, or even complete zoomorphic figures. It was commonplace for the blade in such weapons to project from a lion's head or some other zoomorphic form.

Unfortunately, most of the surviving artifacts from the Elamite civilization are small items scattered over various locations, and there are few pieces in outstanding condition. Elamite smiths also used animal ornamentation on their arms. The territory of Luristan was under the control

<sup>10</sup> Moorey 1974a: 24.

<sup>11</sup> Sadegh-Behnam and Koh unspecified date: 7, 13.

of Elamite armed forces for most of the 2<sup>nd</sup> millennium BC, and this situation continued up until the last decade of the 12<sup>th</sup> century BC, when the army of the Babylonians inflicted a military defeat on the Elamites—a defeat of such magnitude that Elam was unable to recover from it for 300 years.<sup>12</sup> The effect of this on the material culture of Luristan was very significant. The smiths of Luristan were able to relax their previous habits, in the absence of the oppressive proximity of the Elamite occupiers. Consequently, a culture of innovation and experimentation flourished, and the repertoire of the Luristan smiths expanded in the period between 1150–1050 BC (the Iron Age I). From this time onwards, as iron began to be used for the first time in the Middle East, there is evidence that smiths from Luristan exhibited a growing level of skill in their ability to work iron. Luristan benefited from the decisive defeat of Elam insofar as it was relatively independent during the 11<sup>th</sup> and earlier 10<sup>th</sup> centuries BC. Never, there was a strong Babylonian political influence on Luristan during this time. The ties between the Babylonians and Luristan were so close and important that local smiths often crafted daggers and arrowheads with Babylonian royal inscriptions upon them. Luristan's relative independence was preserved until Iranian tribes invaded the region. During Iron Age II–IIIB, meaning from 1000–700 BC, when, in Northwestern Iran, the Assyrian Empire expanded west towards the Mediterranean and east towards Luristan, the local Luristan aristocracy patronized an exceptionally productive group of smiths. It is those smiths who were primarily responsible for the richly decorated bronze artifacts from Luristan. However, the patrons of these bronze objects themselves are unknown, as is the origin of the material wealth they depended upon to supporting the Luristan metalworking industry.<sup>13</sup>

Never at any time during the last three millennia BC was Luristan an ethnic or political entity. Its inhabitants had relations, through warfare and trade, with neighboring civilizations, such as the Sumerians, Assyrians, Babylonians, and Elamites, in the period from 3<sup>rd</sup> millennium to 2<sup>nd</sup> millennium BC. The Scythians (a nomadic, pastoralist group of Aryan tribes) moved into the region from the 8<sup>th</sup> to 7<sup>th</sup> century BC.<sup>14</sup> Excavations at a shrine in Dum Surkh have brought to light iconography on some bronze artifacts, which show that the Elamite influence in at least Southern Luristan from 725 to 700 BC experienced a brief revival. However, due to the demise of Elam at the hands of the armies of Assyria in the middle of the next century, this period of

<sup>12</sup>Moorey 1974a: 24.

<sup>13</sup>Moorey 1974a: 25.

<sup>14</sup>Grotkamp-Schepers and Joerißen 1997: 16–17.



Elamite revival was short-lived. A little over a generation later, the Assyrians were defeated by the Babylonians and Medes in unison. The resulting vacuum of power in Luristan was thus filled by Iranians who arrived from the south and west. The local tribal aristocracy of Luristan lost its political authority after the Medes and their associates created a capital in Hamadan and succeeded in establishing an increasing degree of Iranian political unity. The Luristan smiths accordingly lost their rich, local patrons and the access to raw materials they had previously enjoyed. There are sufficient bronze and iron artifacts from the Achaemenian period to prove that these objects share little or no legacy with the workshops of Luristan. There was a severe crisis in Luristan's metal industry at some time during the 7<sup>th</sup> century BC, and as a result its uniqueness and independence suffered demise. Throughout their period of activity, the smiths of Luristan were responsible for creating a broad range of bronze items that were deposited in the region's cemeteries from about 2600 to 650 BC.<sup>15</sup>

#### THE ORIGIN OF THE LURISTAN TRIBES

Luristan has been occupied by various tribes and races, throughout its history. Elam, which means literally "elevated land", was an inhabited region from the 8 millennium BC onwards. The Elamites dominated and controlled southern, south-western, and western Iran for 2200 years. They managed to successfully establish their kingdom by consolidating the southwestern territories of Iran including Simash. The Elamites were allied with the inhabitants of Simash, who inhabited the Luristan region.<sup>16</sup> The Elamites' language shared some similarities with Caucasian languages, and did not belong to either the Indo-European or Semitic branches of language. In the early part of the third millennium BC, the Elamites established their kingdom in southern Zagros and on the Khuzestan plain. Thereafter, they were able to successfully preserve their Elamite identity for thousands of years, resisting assault and extinction at the hands of powerful rivals such as the Sumerians and Assyrians. The existence of the Elamite Kingdom as an independent political entity ended with the capture of Elam, its capital, by the Assyrians.<sup>17</sup>

<sup>15</sup> Moorey 1974a: 28.

<sup>16</sup> Ayazi 2008: 11.

<sup>17</sup> Ayazi 2008: 11.

Other inhabitants of the Luristan region, apart from the Elamites, included various tribes, such as the Hurrians, Lullubians, Kutians, and Kassites<sup>18</sup>, who were all related to the Elamites. Initially, Luristan was settled during the 3<sup>rd</sup> millennium BC by the Asiatic mountain tribes, the Lullubians and Kutians.<sup>19</sup> The Lullubians were associated with the Zagros Mountains, and inhabited a very large proportion of the mountains and foothills of Zagros, from the upper Diyala towards the northwest up to Lake Urmia. It is likely that the Kutians occupied lands to the east of the Lullubians. The term Kutians was first used to refer to a particular ethnic group that lived in the Middle East during the third and second millennium BC. Then, in the first millennium BC, the term Kuti began to be used to refer to all Urartians, Mannaeans (a branch of Hurrians in northwestern Iran), and Medians. The language of the Kuti and Lullubi tribes is related, to an extent, to the group of Elamite languages that was widely used in the entire Zagros region.<sup>20</sup> Northern Mesopotamia, parts of Syria and the whole Armenian plateau were settled by the Hurrians, who were native to Zagros, in the 2<sup>nd</sup> millennium BC.<sup>21</sup>

According to Akkadian texts, the Kassites, a people of Asiatic origin, were also present in Luristan from the beginning of the 2<sup>nd</sup> millennium BC. However, the earliest reference to the Kassites can be found in texts dating to 2400 BC from the time of Puzur-Inshushinak, the powerful king of Elam.<sup>22</sup> The Assyrians termed the Kassites' land the Kassi, and the Kassites were the most important mountainous tribes of Zagros. The region today known as Luristan was a mountainous region upstream of the rivers with valleys, including the land of Elam. The Kassites, as a mountain tribe, were engaged in pastoralism, and used a language closely related to the Elamite language.<sup>23</sup> Until recently, some researchers believed that the Kassites were an Indo-European tribe. However, this view was not supported by conclusive evidence. It has also been proposed that the Kassites were Asiatics, and that they were neither Indo-European nor Semitic. This would imply that they were an ethnic group of Caucasian or Caspian origin that settled in the

<sup>18</sup> Ayazi 2008: 11.

<sup>19</sup> Ayazi 2008: 12.

<sup>20</sup> Ayazi 2008: 12.

<sup>21</sup> Ayazi 2008: 12.

<sup>22</sup> Ayazi 2008: 12.

<sup>23</sup> Ayazi 2008: 12.

southern Azerbaijan territories before the migration of the Arian tribes into the Zagros valley.<sup>24</sup>

Various other tribes also settled there at the end of the 2<sup>nd</sup> millennium, soon followed by yet more tribes at the beginning of the 1<sup>st</sup> millennium BC. At the beginning of the 9<sup>th</sup> century BC, the Assyrians embarked on military campaigns into the Zagros region. In the 8<sup>th</sup> and 7<sup>th</sup> centuries BC, the Cimmerians and Scythians invaded the region, taking their passage south of Lake Urmia. The area was later occupied by another wave of Iranian tribes that settled there. These included the Medians, who settled near Malayer at the Nush-i-Jan Tepe citadel that had its heyday from 725–550 BC, and in and around adjacent sites. Inside this timeframe, the most characteristic artifacts date to the 12<sup>th</sup> century BC, and the most intensive production took place from the 9<sup>th</sup> to the 7<sup>th</sup> century BC. As a matter of fact most bronze artifacts kept in the National Museum of Iran are dated to 10<sup>th</sup> century BC. Iranian tribes finally made incursions into the Luristan region at the end of the 8<sup>th</sup> century BC, from the north or north-east. Over the next fifty years, the Iranian tribes influenced the whole region and absorbed most of the local tribes of the region.<sup>25</sup> A united kingdom of Media emerged at the end of the 7<sup>th</sup> century BC while the Assyrian Empire slowly collapsed, and allied with the Babylonians to crush Assyria. Cyrus the Second, the King of Ashan, revolted against the Median Empire only 70 years after its inception, and annexed its land to the Achaemenian Empire over which he had complete dominion.<sup>26</sup>

#### CLANDESTINE DIGGINGS AND CONTROLLED ARCHAEOLOGICAL EXCAVATIONS IN LURISTAN

There have been incidents over the course of history, of excavations having been carried out clandestinely by the local population, and this makes exact dating and classification of the bronze objects difficult. Not a single one of the tombs from which many typical bronzes were had been excavated in the proper, scientific way. The ancient bronze of Luristan was discovered following an accidental find by the local inhabitants there in 1928 CE. Following this, there was a spate of unlawful excavations, which led to considerable pillaging in the eastern part of Luristan in Iran. Many of the stolen and pillaged pieces found their way onto the art markets. In fact, most of the Luristan bronze

<sup>24</sup> Ayazi 2008: 12.

<sup>25</sup> Moorey 1974a: 28.

<sup>26</sup> Ayazi 2008: 12–13.

artifacts in the western world came from illegal excavations. Due to the unlawfulness of their procurement, the diggers would usually disguise the true origin of these objects by making false representations as to their real origin. They would claim that the objects were found in diverse locations, such as Nihavand, Luristan, Amlash, Talesh, and Azarbaijan. These attributions are not always completely false, but tend to be oversimplified. The two major errors that give cause for error in identifying the provenance of the artifacts are as follows: firstly, ancient Luristan, Amlash, and Talesh comprised a much larger landmass than either modern Luristan, the small territory of Amlash, or the single mountain that is today's Iranian Talesh; secondly, due to the fact that the name "Luristan" was known to western collectors, on purpose, many bronze objects from other places were marketed as Luristan bronze when they were not.<sup>27</sup> Several decades after the initial discovery, the first scientific excavations took place, supplying for the first time some fascinating information about the culture of Luristan. Pillaging in 1950 CE led to the discovery of the western part of Luristan, which had been isolated until shortly before the Second World War. Following this, the Belgian Archeological Commission undertook scientific excavations based on a reliable chronology, from 1965 to 1979 CE. The evidence from these excavations show that the so-called Luristan bronze items belong to various different categories according to the time period in which they were made, and exhibit differences in style that necessitate a more precise classification. The items excavated by Vanden Berghe date back to various periods between 2600 BC and 700 BC.<sup>28</sup>

During the Iron Age I period, all metal tools were made from bronze, and iron was used only for a few ornaments. It is almost impossible to date these articles, many of which are held by museums and private collections, with precision, due to the fact that they are the product of opportunistic looting rather than disciplined archaeological excavations. However, some weapons bear inscriptions with the names of Babylonian and Elamite rulers upon them, and can be dated to the last two centuries of the 2<sup>nd</sup> millennium BC. Not one of the weapons bearing such inscriptions were sourced from legitimate archaeological excavations.<sup>29</sup>

<sup>27</sup> Calmeyer 1964: 1.

<sup>28</sup> Schippmann 1973: 71.

<sup>29</sup> Medvedskaya 1982: 68.

## MAKING BRONZE WEAPONS

Bronze is a metal alloy, constituted from copper along with small amounts of other metals, usually zinc, tin, or arsenic. When these impurities are added to copper, copper becomes less malleable, and thus suitable for the construction of sharp and hard items, such as tools and weapons.<sup>30</sup> In Iran, the most well-known and oldest copper artifact is a copper bead that was found from the Ali Kosh site, on the Deh Luran Plain. This item dates to around 6750–6000 BC.<sup>31</sup> Usually, bronze consists of copper and tin in the ration of nine to one respectively. The tin, or other alloying metal, serves to greatly increase the hardness of the resulting material. Another advantage of tin as an alloying metal is that tin allows a lower smelting temperature to be used, and this allows the metalworker to conserve valuable heating fuel for the furnace. In addition, bronze when liquefied is much easier to pour into casts than simple copper.<sup>32</sup> The oldest bronze artifacts containing tin as the alloying metal were found in Susa, and these items date back to some time from the late 4<sup>th</sup> millennium to early 3<sup>rd</sup> millennium BC.<sup>33</sup>

The vast number of bronze artifacts excavated from Luristan graves indicates that the most important use of metal and metalworking in ancient times was the production of weapons and tools. Most of these objects were weapons, found in the graves of persons who held an elevated social status as warriors. By contrast, tools were used continually until they expired from wear or damage, at which time they would be melted down again in order to recycle the bronze.<sup>34</sup> The activity of metalworking in Luristan was closely supervised and under the control of a central authority, and acquired its unique character at some time in the period from the mid-3<sup>rd</sup> to the end of the 2<sup>nd</sup> millennium BC. During the last two centuries of the 2<sup>nd</sup> millennium, there was an increase in the production of weapons and vessels compared to previously.<sup>35</sup> Most of the objects in the West Persian bronze collections are tools and weapons. The earliest dated objects from the 3<sup>rd</sup> millennium BC were weapons and tools furnished with socket holes. It is to be noted that the socket is a more

<sup>30</sup> Moshtagh Khorasani 2006: 49.

<sup>31</sup> Ayazi 2008: 16.

<sup>32</sup> Moshtagh Khorasani 2006: 49.

<sup>33</sup> Ayazi 2008: 17.

<sup>34</sup> Moorey 1974a: 33.

<sup>35</sup> Sadegh-Behnam and Koh unspecified date: 9.

secure way of attaching the object to a wooden haft than having a tang. These weapons developed into a plethora of different forms in the 2<sup>nd</sup> millennium BC, and the numerous new forms and were used until 800 BC at least. These objects include axes and adzes (an axlike tool with a curved blade), pick axes, daggers and dirks, spears, swords, helmets and shields.<sup>36</sup> Arms and armor were produced differently. Weapons were usually cast, and armor parts were made by a hammering process. Quivers and shields were constructed of hammered metal, and belts were adorned with metal plaques.<sup>37</sup>

The techniques used by Luristan craftsmen to create bronze weapons were highly sophisticated. They used a wide variety of surface finishes: repoussé work, chasing and engraving. The fact that the mountains of Luristan are particularly rich in copper and tin, which are required for making bronze, was a significant advantage to the metalworking industry, that would cast both simple copper and the stronger copper-tin alloy (bronze). Experiments with arsenic and copper, resulting in a less successful type of bronze alloy, were also undertaken by the smiths of Luristan. Between different types of artifact, the tin-bronze alloy varied considerably. For example, there was a standard quotient in the proportions of tin, in tin-bronze swords and daggers. Other items that were not intended for use as arms, for example standard-finials and pins, did not have to be as strong as the weapons, and accordingly contained higher ratios of tin.<sup>38</sup> The typical composition of a bronze alloy is as follows:<sup>39</sup>

Copper	90%
Tin	8%
Lead, iron, nickel, and arsenic	2%

The source of the metal that was used by the smiths of Luristan is as yet uncertain. The copper may have been sourced from the region of Anarak (in the central province of Isfahan). In the areas where the copper was sourced, iron may also have been mined.<sup>40</sup> In the 2<sup>nd</sup> millennium BC, transportation of tin took place in a direction from east to west through Iraq and Syria.

<sup>36</sup> Ayazi 2008: 15.

<sup>37</sup> Ayazi 2008: 15.

<sup>38</sup> Moorey 1974a: 31.

<sup>39</sup> Grotkamp-Schepers and Joerißen, 1997: 16.

<sup>40</sup> Moorey 1974a: 32.

However, the original source within Iran of the transported tin remains highly uncertain. It is possible that it may have been derived from the region of Khorasan, which lies to the east of Luristan some considerable distance away.<sup>41</sup>

There are two classes into which the method of producing bronze weapons may be categorized: a) casting (*rixtegarī* in New Persian) (see picture 13: a cast bronze horse bit from Luristan) and b) hammering (*čakoškāri*) (see pictures 10 and 11: a protective bronze belt from Luristan made via hammering).<sup>42</sup> The technique of bronze casting lends itself to the production of a wide range of different weapons. Unlike ferrous weapons, bronze weapons were not forged but had to be cast.<sup>43</sup> Blades were cast by first creating a mold, from sandstone or clay or bronze, in the form of the item to be manufactured, into which liquid, alloyed metal was later poured. Later, when the metal had cooled and hardened, the mold was broken open and the rough-cast weapon was taken out. Following this, the stock of the rough-cast metal was reduced, filed and polished until the weapon obtained its final shape. The method of casting can be summarized as a process of creating metal artifacts by pouring liquid, hot metal into a mold, usually of baked clay or stone, that had been prepared previously.<sup>44</sup>

In Luristan, the casting of bronze methods was variable but generally fell into one of three different categories:<sup>45</sup>

(a) Open molds (*qāleb-e bāz*): this is where the mold is covered during the casting process. This is known as the one-piece mold, and is one of the simplest and earliest known casting techniques (picture 1: a tanged dagger made in an open mold; picture 2: a flanged dagger made in an open mold). The method involves the use of simple molds of clay or stone, and was used to make swords and daggers that had flanges along the blade. The metal object is cast, then hammered and annealed (annealing involves reheating the metal to make it soft and malleable).

(b) Close (bivalve) molds (*qāleb-e baste* or *do kafe*): this involved making a mold from two halves that were joined together. Molds constructed using this method had one or more channels in them, through which the liquid metal would be poured. Bivalve molds lent themselves to the manufacture of axes,

<sup>41</sup> Moorey 1974a: 32.

<sup>42</sup> Ayazi 2008: 19–20.

<sup>43</sup> Grotkamp-Schepers and Joerißen, 1997: 15.

<sup>44</sup> Ayazi 2008: 19–20.

<sup>45</sup> Ayazi 2008: 19–20.

adzes, spearheads and other socketed weapons. The shaft hole was made by placing a solid core inside the mold. The molten bronze would solidify around this core when it was poured into the mold, and created a space in the weapon for the insertion of the shaft. The unadorned weapons, especially the axes, adzes and picks, were made using simple clay or stone bivalve molds with a core inserted into them to form the socket for the shaft (pictures 4 and 6: axeheads made in close molds).<sup>46</sup>

(c) Lost wax (*cire perdue*) casting *qālebgiri bā mum gomšode*: this technique involved first sculpting an object in wax. Then, sometimes, a core of sand or clay was inserted into the way to provide a hole for a shaft in the finished item. Next, the mold, with a hole in it for pouring the liquid metal, would be encased in clay and hardened by baking. Following this, liquid hot metal was poured into the mold, and the wax would melt away. After the metal cooled, the mold was broken away and the casting retrieved. A variation of lost wax casting involved creating a model of the finished item in wax, then covering it with clay. The clay was baked after it dried, and the wax was heated and poured out of the mold through a hole. The liquid bronze was then poured into this mold. After the solidification of the bronze, the mold was shattered and the bronze artifact taken out. It is probable that the lost wax method was used for only the most intricate parts of the handle, and not for the whole weapon. It is highly probable that the smiths used another method, called the cast-on method, to attach the handle to the blade. The cast-on technique was a two-stage process whereby the blade was made in one mold and the grip made in another mold that was cast directly onto the blade's tang. The blade, usually made of bronze but sometimes of iron, was always made first, in the cast-on method. The hilt was then constructed and placed over the tang, gripping it securely.<sup>47</sup> Usually, an extra mold was made for the grips, which were cast separately. In many instances, the cast-on method was used to cast the grips directly on to the blade (picture 3: a Luristan dirk with a cast-on hilt made with lost-wax process. The Luristan smiths were highly skilled and particularly adept at the *cire-perdue* or lost-wax process technique. They would also engrave intricate details onto the wax mold, before casting.<sup>48</sup> The lost wax method has the advantage of allowing a great deal of depth of morphological and decorative detail in the final casting (picture 5: a bronze axe head with animal figures from Luristan made with lost-wax process; picture 8: A knobbed bronze macehead from

<sup>46</sup>Moorey 1974a: 31.

<sup>47</sup>Moorey 1974a: 31.

<sup>48</sup>Moorey 1974a: 31.



Luristan made with lost-wax process; picture 9: a spiked bronze macehead from Luristan made with lost-wax process). Applied wax coils were used, as evidenced by the existence of sinuous ridges on some pieces (picture 7: Another spiked axe head from Luristan with sinuous lines). Additionally, the existence of punched circles and linear decoration show that a cutting method was also deployed, probably on a harder wax than was used usually.

*Čakoškāri* (hammering) comprises an additional technique that was used by the smiths of Luristan and western Iran to construct bronze items. This technique involved taking sheets of metal and metal, hitting them with a hammer, and annealing them (heating and reheating for malleability) from time to time. The technique of hammering was also used to produce the “work hardening” effect, in the final stages of the manufacture of bronze weapons, to give them harder edges.<sup>49</sup> Sheet metal objects were made by taking large cast sheets of copper and bronze, and then hammering and annealing them. It is possible to observe two different categories of surface decoration on many bronze items: repoussé (worked from the back of the visible surface) (see picture 12: a bronze quiver plaque from Luristan with a repoussé figure of a winged man holding two ibex by their feet) and tracing (worked from the front of the visible surface).<sup>50</sup>

#### DIFFERENT TYPES OF EDGED WEAPONS FROM LURISTAN MADE OF BRONZE AND IRON

In order to classify the edged weapons of Luristan and western Iran accurately, a uniform measurement unit is required in order to define which items are daggers, which are dirks and which are swords. There is confusion and contradiction at times, when it comes to classifying items according to these categories. Moorey<sup>51</sup> bases his definition on Gordon, and states that daggers are edged weapons not greater than 36cm in length, that dirks (short swords) are between 36cm and 50cm in length, and that swords are edged weapons greater than 50cm in length. This classification system has been adopted for the purposes of this article. Edged weapons can be further categorized into various groups as follows: a) daggers, dirks, and swords with tangs (see picture

<sup>49</sup> As the edges of bronze weapons cannot be hardened via tempering as would be later the case with steel blades, the smiths of bronze weapons developed a method of hardening the edges of bronze blades. The method is called “work hardening” and involves extensive hammering of the edges of bronze blades.

<sup>50</sup> Moorey 1974a: 31.

<sup>51</sup> Moorey 1971: 66.

1: a tanged bronze dagger from Luristan), b) daggers, dirks, and swords with flanges (see picture 2: a flanged bronze dirk from Luristan), and c) daggers, dirks, and swords with cast-on hilts (see picture 3: a bronze dirk with a cast-on hilt from Luristan).<sup>52</sup> Edged weapons with tangs are the simplest form, and this basic type was hardly altered in the period when bronze was the most important material for the construction of weapons. The retention of this basic type with so few alterations makes precise dating of such items impossible. In this category, the bronze daggers, dirks, and swords exist only as bronze blades, and have lost their perishable handles over the course of time.<sup>53</sup> In Luristan, the daggers and dirks up to the second half of the 2<sup>nd</sup> millennium BC were simple bronze or copper blades with tangs, attached by rivets to a handle made of a degradable organic material. However, in some rare cases the handles were metallic, and have survived.<sup>54</sup>

Around the 14<sup>th</sup> century BC, the smiths of Luristan responded to influence from the West by beginning to construct blades and hilts cast together in one mold. These new items often had flanges along their hilts, so that wood, bone or metal inlaying could be inserted. Typically, examples of bone inlaying were cut so that the hilts had winged or “ear-shaped” pommels.<sup>55</sup> Pieces of bone or limestone inlays still survive on some pieces.<sup>56</sup> Some of the surviving daggers, swords and dirks with flanged hilts still bear the indentations on each side, that were intended to hold the inlays securely in place. Those daggers and dirks that bear the names of monarchs of the Second Isin Dynasty comprise a significant milestone in the chronology of the development of these types of daggers and dirks. Examples of dirks inscribed in similar ways are held in various collections, such as a dirk in the Holmes collection with a Marduk-nadin-ahhe inscription, a dirk in Toronto inscribed with the name Marduk-sapik-zeri, and another dirk with a probable inscription for Enlil-nadin-apli in the Foroughi collection.<sup>57</sup> Some of these items carry inscriptions in Assyrian, which allow them to be dated. The period between the 12<sup>th</sup> and the 10<sup>th</sup> century

<sup>52</sup> See Grotkamp-Schepers and Joerißen 1997: 18, Medvedskaya 1982: 68.

<sup>53</sup> Medvedskaya 1982: 68.

<sup>54</sup> Moorey 1974b: 23.

<sup>55</sup> Moorey 1974b: 23.

<sup>56</sup> Lebedynsky (1992: 50) shows a bronze dagger from Luristan from 1000–800 BC, notes the empty spaces that were meant for bone scales on the grip, and says that this was the prototype for using bone and horn for grip scales in the region in later periods.

<sup>57</sup> Moorey, 1971: 70–71.

BC account for a few pieces, although the majority belong to the period between the 8<sup>th</sup> and 7<sup>th</sup> centuries (Iron Age III). Hence, despite the fact that the Bronze Age dates from the 3<sup>rd</sup> millennium to 1300 BC; most of the Luristan bronze objects come from the Iron Age period, from 1300 to 600 BC.<sup>58</sup> The use of bronze at such a late period was limited to the production of precious objects such as ceremonial weapons, jewelry, jars, and horse trappings. The strongest influences on Luristan bronze were Assyrian, Hittite, Hurrian, and even Scythian. However, in addition to those, there are many Persian forms of the Sialk A and B styles that are present among the Luristan bronze pieces.<sup>59</sup>

At the Klingensmuseum (Blade Museum) in Solingen, there is an inscribed dirk 45.5cm in length. This item lacks inlays but, interestingly, carries inscriptions on its forte. The inscriptions on this example differ from the many examples from the 1300–1200 BC period, insofar as they are written in Old Persian cuneiform instead of old Babylonian.<sup>60</sup> The name of the Achaemenian King, Darius, is partly legible on this blade.<sup>61</sup> The authenticity of this short sword has been verified by Eilers from the University of Würzburg. It is likely that this short sword was a gift from King Darius to one of his officers in change of a contingent of Luristan auxiliaries serving in the Persian army. Eilers also states that the inscriptions in Old Persian cuneiform make this weapon unique, as this type of inscription was not known to have been prevalent on any swords from the Archaemenian period. The inscription also indicates that this type of weapon, unique to the Luristan tradition, remained in use even up to the Archaemenian period. There is a possibility that the blade was not inscribed when it was made, but that the inscriptions were added some 600 or 700 years later.<sup>62</sup> The handle inlays on many of the flanged hilted daggers and dirks from Luristan have been lost. Usually, these inlays would have been made of wood, although there are some examples of limestone and bone inlays. There are some pieces of limestone or bone close to the blade hilt, on some examples.<sup>63</sup>

<sup>58</sup> Grotkamp-Schepers and Joerißen 1997: 17.

<sup>59</sup> Wulff 1966: 10.

<sup>60</sup> Uhlemann 1967: 18–20.

<sup>61</sup> Moorey (1971: 71) also points out this dirk and states that the status of this dirk, bearing the name of Darius in Old Persian cuneiform signs on one side and illegible signs on the other side, remains uncertain.

<sup>62</sup> Uhlemann 1967: 18–20.

<sup>63</sup> Moorey 1971: 74.

There is a type of flanged dagger or dirk, cast in one piece that has a heavy, penannular rib. The rib was cast onto the blade itself, gripping the midrib between its open ends. A study into the technology of this weapon has revealed that in some cases, the blade, flanged hilt and pommel were all cast together, while the penannular guard was most likely cast on separately to provide strengthening at the critical juncture of the hilt and the blade.<sup>64</sup> The most likely origin for this type of dirk is from the north.<sup>65</sup> This type of dirk first appeared in western Iran near the end of the Late Bronze Age, and the technique for their construction was retained and used for the first iron dirks.<sup>66</sup>

Later developments included the exact replication of the inlaid hilts in bronze, with the hilt made separately and cast directly onto the blade.<sup>67</sup> This class of dagger, dirk and sword has an ear-lobed bronze pommel. It is clear that the ear-lobed bronze pommels mimic the earlier all—bronze flange—hilted daggers and dirks that had been constructed in separate parts, with bone hilts secured in place with rivets and flanges (see picture 3).<sup>68</sup>

Bronze hilts began to be cast directly onto iron blades from the start of the 10<sup>th</sup> century BC, and it is interesting to note that the first iron daggers directly imitated their bronze predecessors in their basic shape.<sup>69</sup> Several daggers, dirks and swords from Luristan can be seen to have bronze hilts cast directly onto iron blades. There is clear evidence of there having been a closely linked series of workshops in Luristan at some time during the 9<sup>th</sup> and 8<sup>th</sup> centuries BC, which produced iron swords. The iron swords produced in these workshops have clear links with their bronze predecessors, inheriting their style and morphology.<sup>70</sup> It has been suggested by some researchers that cast bronze would have been unsuitable for long weapons due to the fact that long cast bronze blades tend to break easily.<sup>71</sup> Nevertheless, there are extant

<sup>64</sup>Moorey 1971: 73.

<sup>65</sup>Moorey (1971: 73) states that a magnificent example in gold of this type of dirk was found in clandestine excavations at Kalardasht in Northern Iran. For a picture of this piece, see Huot 1965: 196. Huot (1965: 223) states that the handle inlays of this example are missing and that this piece stems from Kalardasht in Mazandaran from 900 BC.

<sup>66</sup>Moorey 1971: 74.

<sup>67</sup>Moorey 1974b: 23.

<sup>68</sup>Moorey 1971: 74.

<sup>69</sup>Moorey 1974b: 24.

<sup>70</sup>Moorey 1974b: 24.

<sup>71</sup>Grotkamp-Schepers and Joerißen 1997: 21–22.

examples of durable long bronze weapons. However, the inherent strength advantages of iron led to Luristan metalworkers experimenting with iron as a material for making new weapons. It is to be noted that the procedure for working with iron is considerably different from working with bronze. Firstly, iron had to be sourced from natural iron ore. This necessitated a process of smelting to extract the iron from the rocky iron ore material. This meant that the existence of smelting as a technology was a prerequisite for constructing iron weapons. It has been postulated by some researchers that iron had cost and availability advantages over bronze, and that this accounted for why it originally supplanted bronze as a preferred material for the construction of weapons. However, in due course iron proved itself more durable than bronze, and lent itself to taking a sharper edge. Initially, kilns were used to smelt the iron. After being filled with a charcoal and iron ore mix, the kiln was ignited, and bellows were employed to pump air inside the kiln. The melted bloomery iron was retrieved from the base of the kiln. At this stage, the raw bloomery iron still contained a significant amount of slag. The deposit of bloomery iron was split into small pieces after cooling, and these fragments were taken to be heated up over a furnace, and forged into bars. Forging caused the transformation of the brittle bloomery iron into wrought iron (with a carbon content of 0.5% to 0.25%) by reducing the amount of carbon in the iron.<sup>72</sup> The wrought iron was worked by smiths, who forged iron objects by hand. This process involved frequent heating, and this carburized the wrought iron, causing it to take on the characteristics of mild steel.<sup>73</sup> The distinction between iron and steel was not clear, for several centuries.<sup>74</sup> It has been posited by some researchers that the earliest known crucible steel blade originates from Luristan.<sup>75</sup>

The iron swords, daggers and other blades found at the Djub-I Gauhar site in Luristan can all be classed into three categories of double-edged weapons: a) blades with straight cutting edges and a simple, ovate cross-section (this accounts for most of these weapons); b) weapons where the blade has inverted cutting edges (this accounts for one of the blades found there); c) weapons with signs of having a midrib (this class accounts for two of the weapons

<sup>72</sup> See Grotkamp-Schepers and Joerißen 1997: 22.

<sup>73</sup> Moorey 1974a: 32.

<sup>74</sup> See Grotkamp-Schepers and Joerißen 1997: 22.

<sup>75</sup> See Feuerbach 2002: 229.

found at this location).<sup>76</sup> The tangs on all of the blades found at this site have cross sections that are either round, rectangular or square, or that devolve from round to square. Remarkably, some of the tangs are very sturdy; for example, one is 1.6 cm thick. Among this collection there is a sword 52 cm in length that has indentations in the grip, to fit the wielder's fingers, that was mounted with wood. When this piece was excavated, around 20 bronze nails lay beside the grip, and it is clear that these would have been used to decorate the handle and pommel. Towards the blade, the grip's shape transforms into a very large cone-shaped tang that culminates in a disc of bronze.<sup>77</sup> This indicates quite clearly that the smiths of the period combined bronze and iron in the construction of weapons. It has been proposed by some researchers that round tangs lend themselves more readily to the mounting of disc-shaped or spherical pommels. However, there are some examples of weapons, including a piece from Chamahzi Mumah, with round tangs that terminate in crescent-shaped pommels. From the Chamahzi Mumah weapon, it is to be noted that any other shape would have been unsuitable for this type of tang, as it would have been more difficult to affix and may even have rotated around the tang.<sup>78</sup> On this specimen, the grip would likely have been made of a perishable material, such as wood, bone, or ivory. When the blade was excavated, three bronze nails lay next to the upper portion of the blade. These nails may have been used to decorate a scabbard or they may have been a part of a scabbard suspension system.

The blades found at Djub-i Gauhar possess the same characteristics as those iron blades currently held at the Gul Khanan Murdah in Luristan, and they may have served to function in many different respects, for example a utility knife may also have been used as a spearhead or a dagger. There is great variation in length between the blades from Gul Khanan Murdah, and these pieces are double-edged, with round or square tangs. Interesting features can be observed on two short swords, one 35 long and the other 38 cm long, from this collection. The grips on these items are very large, and square in cross section, and have an iron rivet with a bronze disc and elevated rim, indicating that there would have been additional mountings on the grip, forming a handle. These features are clear evidence that the mounted grip was perpendicular to the blade.<sup>79</sup> This feature is not commonplace, and is only found on a particular

<sup>76</sup> See Haernick and Overlaet 1999: 25.

<sup>77</sup> See Haernick and Overlaet 1999: 25.

<sup>78</sup> See Haernick and Overlaet 1999: 25.

<sup>79</sup> See Haernick and Overlaet 1999: 166.

set of multi-piece iron swords. This group of swords is characterized by their decoration: they all feature bearded men and lions on their hilts, and they are all believed to have originated from Luristan. Although the reason for this peculiarity remains uncertain, it reinforces the view that these swords originate from the Iron Age II–III period. There are several iron swords from Luristan that are highly ornamented, and which have indentations along the grip, and round-disc-shaped pommels that sometimes feature lions and human heads.<sup>80</sup> However, none of these swords were unearthed in scientific excavations.<sup>81</sup> This type of sword has been termed the “iron mask sword” (see picture 14: the handle of an iron mask sword from Luristan).<sup>82</sup> These were constructed of various iron parts—the blades are composed of different iron sections and set perpendicular to the hilt. There is also a wide, flat midrib that runs along the whole length of the blade.<sup>83</sup>

Two raised rings divide the rectangular hilt into three sections. Two bearded heads stand out from the flat disc pommel, and there are two crouching lions on either side of the guard. The human heads are characterized by round, protruding eyes, large noses, small, horizontal mouths, beards and small lumps of hair on the forehead. There is also a flange with three steps, at the juncture of the pommel with the hilt. The lions also have bulbous eyes and the same pattern of hair.<sup>84</sup>

The technology and complexity of these compositely assembled swords represents the most advanced level of expertise in weapon-making of antiquity. Each sword was constructed very carefully from various pieces, and the number of different parts varies between different swords.<sup>85</sup> There is seamless continuity in these swords; such that it is extremely difficult to see where the parts join together. They were assembled by way of inserting the blade, which was constructed separately into a cavity in the hilt, and then adding two hit rings. The disc pommel was affixed to the tang, and a flange was added to hide the joint. Finally, the human heads and crouching lions were attached to the guard and pommel. The parts locked together tightly into grooves, and it is likely that a process called sweating (involving heating) was

<sup>80</sup> See Haernick and Overlaet 1999: 25.

<sup>81</sup> See Muscarella 1988: 352.

<sup>82</sup> See Amiet 1976: 36, plate 43; Muscarella 1988: 352.

<sup>83</sup> Muscarella 1988: 349.

<sup>84</sup> Muscarella 1988: 349.

<sup>85</sup> Muscarella 1988: 350.

used to fit them into place. On some pieces, there are rivets that hold together the different parts of the hilt, but these are not present universally. On some of the pieces, the blade and hilt are constructed of one single piece.<sup>86</sup> There is evidence that weapons were sometimes made of eight, nine, eleven or fifteen pieces.

The fact that the blade is set perpendicularly to the handle gives rise to some uncertainty regarding these swords. It has been suggested by some researchers that a weapon designed in this way would have been unsuitable for use in combat, and have surmised that they served a purely symbolic function. Other researchers have suggested that these weapons were meant to be used both as utilitarian implements and as weapons, while yet others have suggested that another inlaid section would have been added to the hilt to allow these weapons to be held in a more conventional manner. It is clear from the embellishments that these swords were intended to express a particular message, perhaps a military or religious rank or ethnic identity, or a mix of all three. Following tests carried out in scientific laboratories, it is now clear that each sword was hand forged in it all of its constituent parts, and no parts were cast. It is likely that the practice of casting was reserved for detailing.<sup>87</sup>

Radiocarbon dating has revealed that two of these swords, currently held at the Musée Royaux d'Art d'Histoire (Royal Museum of Historical Arts) in Brussels, were made at some time during the 1<sup>st</sup> millennium BC.<sup>88</sup> In addition, two iron swords from the Royal Ontario Museum and the Massachusetts Institute of Technology were subjected to mass spectrometry radiocarbon dating, and the outcome of this test was that they had been made at around 1094 BC +/- 60 years. This would have been the time of Iron Age I (1200–1000 BC), and the results were a surprise to archaeologists and researchers, as the prevailing opinion until that point was that these daggers or swords came from the period of Iron Age III (ca. 800–550 BC).<sup>89</sup> However, it is important to note that this type of test is only capable of determining when the iron was first smelted, and not the date of construction of the metallic objects. Accordingly, it is possible that the swords may have been made of recycled iron. If other items in this category are subjected to the same testing, there will be sufficient

<sup>86</sup> Muscarella 1988: 350.

<sup>87</sup> Muscarella 1988: 351.

<sup>88</sup> Stöllner, Slotta and Vatandust 2004: 692.

<sup>89</sup> Note that Moorey (1974a: 19) classifies the Iron Age III as 800–650 BC.



evidence to know whether this type of weapon can be classed with the earliest iron objects of western Iran<sup>90</sup>.

## CONCLUSION

This article has provided a general overview on the analysis of some bronze and iron weapons from Luristan. Luristan is a province located in western Iran and it has been occupied by various tribes and races, throughout its history, such as the Elamites, the Hurrians, the the Lullubians, the Kutians, the Kassites, and the Medians. To date, local tribesmen continue to inhabit Luristan, and their settlement patterns appear very similar to those that probably existed in ancient times. Local tribes today use two respective areas as winter and summer pasturages.

The art of Luristan can be characterized as the art of nomadic herdsmen and horsemen. In Luristan, traditional heritage and beliefs appear to have been resilient and enduring. However, Luristan tribesmen were also influenced by the currents of trade, migration, and brigandage. The artifacts from Luristan in Iran show an exceptional quality and knowledge of weapon making. Unfortunately, many illegal excavations and considerable pillaging took place after the initial discovery in the eastern part of Luristan in Iran, and many pieces were sold on the art markets. The majority of bronze objects that are known as Luristan bronze in the West actually came from illegal excavations. The first scientific excavations took place in the decades after the initial discovery, providing satisfying information about a fascinating culture. The vast number of bronze artifacts excavated from Luristan graves indicates that the most important use of metal and metalworking in ancient times was the production of weapons and tools. Weapons were usually cast, and armor parts were made by a hammering process. The techniques used by Luristan craftsmen to create bronze weapons were highly sophisticated. Different methods of the casting of bronze weapons were used in Luristan that can be classified into three major categories: a) open molds (*qāleb-e bāz*), b) close molds (*qāleb-e baste*), and c) Lost wax (*cire perdue*) casting (*qālebgiri bā mum gomšode*). Additionally, they used a wide variety of surface finishes: repoussé work, chasing and engraving. There are different types of bronze and iron weapons from Luristan that can be classified based on their shape, function, and methods of casting. There are still lots of promising studies which need to be conducted on numerous artifacts from this region. A thorough study and classification of all weapons from Luristan that are kept in the National

<sup>90</sup> See Pigott 2004: 354.

Museum of Iran in Tehran, Museum of Khoramabad in Khoramabad and other Iranian museums should provide a new insight into understanding of these weapons. Some of these weapons stem from controlled excavations and could provide a very useful basis for further research of weapons from Luristan. Although many of these weapons can be classified in the categories provided by Medvedskaya,<sup>91</sup> there are some new forms and shapes that require a new classification. Although there is some metallurgical analysis on some weapons from Luristan, further, metallurgical analysis of the blades of bronze weapons should reveal whether Luristan blades have a higher content of tin in the edges in comparison to their body as is the case in Chinese bronze weapons. This sandwich technique makes a blade with a hard edge in comparison to the soft body. A technology that was later used in making folded steel weapons in China. Although most steel blades were made via crucible steel process in Persian history, folded steel was also made<sup>92</sup>. New archaeological excavations by Iranian archaeologists over the recent years have shown that other regions in Iran also show remarkable funds of weapons which need to be classified and studied so that they can be placed in their proper historical context.

All pictures are courtesy of the Cultural Institute of Bonyad in Tehran.

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<sup>91</sup> Medvedskaya 1982.

<sup>92</sup> See Moshtagh Khorasani 2006.

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**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**



**Figure 7**



**Figure 8**



Figure 9



Figure 10





Figure 11



Figure 12



**Figure 13**



**Figure 14**