



STUDY AND ANALYSIS HEISHAN PETROGLYPHS BY DIGITAL PRESERVATION IN  
JIAYUGUAN CITY



DAYONG ZHAO

Graduate School Srinakharinwirot University

2024

ศึกษาและวิเคราะห์ผลงานแกะสลักในถ้ำด้วยดิจิทัลของเมือง Jiayuguan



ปริญญานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตร  
ศิลปศาสตรดุษฎีบัณฑิต สาขาวิชาศิลปวัฒนธรรมวิจัย  
คณะศิลปกรรมศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

ปีการศึกษา 2567

ลิขสิทธิ์ของมหาวิทยาลัยศรีนครินทรวิโรฒ

STUDY AND ANALYSIS HEISHAN PETROGLYPHS BY DIGITAL PRESERVATION IN  
JIAYUGUAN CITY



DAYONG ZHAO

An Dissertation Submitted in Partial Fulfillment of the Requirements  
for the Degree of DOCTOR OF ARTS  
(D.A. (Arts and Culture Research))

Faculty of Fine Arts, Srinakharinwirot University

2024

Copyright of Srinakharinwirot University

THE DISSERTATION TITLED  
STUDY AND ANALYSIS HEISHAN PETROGLYPHS BY DIGITAL PRESERVATION IN  
JIAYUGUAN CITY

BY  
DAYONG ZHAO

HAS BEEN APPROVED BY THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DOCTOR OF ARTS  
IN D.A. (ARTS AND CULTURE RESEARCH) AT SRINAKHARINWIROT UNIVERSITY

.....  
(Assoc. Prof. Dr. Chatchai Ekpanyaskul, MD.)

Dean of Graduate School  
.....

ORAL DEFENSE COMMITTEE

..... Major-advisor

(Assoc. Prof. Dr.Sathit Thimwatbunthong)

..... Chair

(Prof. Dr.Pisit Charoenwong)

..... Co-advisor

(Asst. Prof. Dr.Chakapong Phatlakfa)

..... Committee

(Asst. Prof. Dr.Sitthidham Rohitasuk)

..... Committee

(Asst. Prof. Dr.Kittikorn Nopudomphan)

Title	STUDY AND ANALYSIS HEISHAN PETROGLYPHS BY DIGITAL PRESERVATION IN JIAYUGUAN CITY
Author	DAYONG ZHAO
Degree	DOCTOR OF ARTS
Academic Year	2024
Thesis Advisor	Associate Professor Dr. Sathit Thimwatbunthong
Co Advisor	Assistant Professor Dr. Chakapong Phatlakfa

Heishan petroglyphs, as an important cultural heritage of China's Hexi Corridor, record ancient social forms, religious beliefs, and artistic styles but are severely threatened by natural and human-induced damage, posing a grave challenge to their preservation. Existing studies primarily focused on anthropological and artistic values, while research on digital preservation is scarce. This study took six petroglyph sites at Heishan in Jiayuguan as samples and employed a combination of literature analysis, field investigation, and in-depth interviews to conduct research from three aspects: First, based on image data and historical documents, an image classification system was established to categorize the petroglyphs into six groups—animals, hunting, dance, religion, writing, and plants—exploring their cultural symbolism and social functions. Second, a petroglyphs image database was constructed using high-definition image acquisition to provide data support. Third, images, documents, and other materials were integrated to develop an application platform that encompasses teaching, research, and cultural dissemination, whose effectiveness was preliminarily validated in education and cultural innovation practices. This study was the first to systematically integrate classification, digital acquisition, and resource platform development, enhancing the efficiency of archival and dissemination of petroglyphs and exploring a scientific path for digital preservation. In the future, further integration of virtual reality and artificial intelligence technologies could expand the functionality of the resource library and promote intelligent protection and global dissemination of petroglyphs.

Keyword : Heishan Petroglyphs, Digital Preservation, Resource Library Construction

## ACKNOWLEDGEMENTS

This dissertation could not have been completed without the meticulous guidance, care, and encouragement of my advisors, teachers, colleagues, and family throughout the research and writing process. I extend my sincerest gratitude to all those who have supported and assisted me.

First, I would like to express my heartfelt thanks to my advisors, Professor Sathit and Professor Chakapong. In every phase—from topic design and research methodology to data analysis—they offered rigorous academic standards and profound expertise. Their professional advice and patient guidance not only enhanced my research skills but also broadened my scholarly vision, enabling me to complete this dissertation.

I am grateful to my university for providing an excellent academic environment and abundant resources. I also thank all the lecturers for imparting professional knowledge in their courses and offering valuable insights during seminar discussions, which laid a solid foundation for my research.

During the fieldwork phase, I owe special thanks to the Heishan Rock Paintings Conservation Research Institute in Jiayuguan, Gansu Province, for their strong support and to the experts there for their detailed explanations and guidance. I also thank all the interviewees for generously sharing their invaluable experiences, which provided first-hand academic material for this study; and I appreciate the dedication and technical expertise of the filming team, who carried out the outdoor documentation and comprehensively presented the digital records of the rock paintings.

Finally, I am deeply grateful to my parents for their unwavering support and understanding; to my spouse for encouragement and patience during my doctoral journey; and to my children, whose companionship and love always brought me joy. Your selfless support has been the driving force behind my studies abroad.

Although this dissertation is now complete, I recognise that there remains much to explore and refine. In the future, I will continue to uphold rigorous scholarly standards and strive for ever more substantial achievements in my field. I dedicate this work to all the mentors, colleagues, friends, and family who have helped, supported, and encouraged me, and once again offer my deepest thanks.

DAYONG ZHAO

## TABLE OF CONTENTS

	Page
ABSTRACT .....	D
ACKNOWLEDGEMENTS.....	E
TABLE OF CONTENTS.....	F
LIST OF TABLES.....	K
LIST OF FIGURES .....	L
CHAPTER 1 INTRODUCTION .....	1
1.1 Background.....	1
1.2 Hypothesis of the Study .....	6
1.3 Significance of the study.....	6
1.4 Scope of the study .....	7
1.5 Study Framework .....	8
1.6 Definition of terms .....	8
CHAPTER 2 LITERATURE REVIEW.....	10
2.1 Background, geographical location, environment of the Hexi Corridor, etc. ....	10
2.2 Historical overview of petroglyphs in Hexi Corridor .....	13
2.2.1 Niuwa Petroglyphs in Yongchang County .....	14
2.2.2 Yongchang County 15 Mile Gully Petroglyphs .....	19
2.2.3 Zhangye Sunan Petroglyphs .....	22
2.2.4 Jiayuguan Heishan Petroglyphs .....	26
2.2.5 Petroglyphs in the Horsehair Mountains, Jiuquan .....	29
2.2.6 Jiuquan Subei Petroglyphs .....	32

2.3 Contents of petroglyphs in the Heishan of Jiayuguan .....	38
2.4 Research and application of petroglyphs at Jiayuguan Heishan .....	40
2.4.1 History of discovery and location of Heishan Petroglyphs .....	40
2.4.2 Study of the content of Heishan Petroglyphs.....	41
2.4.3 Totem Worship in Heishan Petroglyphs .....	46
2.4.4 Religion in Heishan Petroglyphs .....	49
2.4.5 Conservation of Heishan Petroglyphs .....	51
2.4.6 Petroglyph applications in Heishan .....	53
2.5 Digital repository construction .....	55
2.6 Domestic and International Relevant Research .....	58
2.6.1 Conservation of rock art abroad: .....	58
2.6.1.1 Conservation of rock art in France.....	59
2.6.1.2 Conservation of rock art in Italy .....	59
2.6.1.3 Conservation of rock art in Africa .....	60
2.6.1.4 Conservation of Bolivian Petroglyphs .....	60
2.6.1.5 Conservation of rock art in Saudi Arabia .....	61
2.6.1.6 Conservation of rock art in Australia .....	61
2.6.2 Conservation of domestic rock art: .....	62
2.6.2.1 Conservation of rock art in Ningxia.....	62
2.6.2.2 Conservation of petroglyphs in Inner Mongolia.....	63
2.6.2.3 Conservation of petroglyphs in Guangxi .....	64
2.6.2.4 Conservation of petroglyphs in Yunnan Province .....	65
CHAPTER 3 METHODOLOGY .....	70

3.1 Research Design .....	70
3.2 Study population and sample .....	70
3.3 Research Instruments .....	70
3.4 Specific research methods .....	73
3.5 Data Collection .....	73
3.6 Data Analysis .....	73
CHAPTER 4 FINDINGS .....	75
4.1 Content analysis of petroglyphs .....	75
4.1.1 Classification study of the content of Heishan Petroglyphs .....	80
4.1.1.1 Animals .....	80
4.1.1.2 Hunting maps .....	106
4.1.1.3 Dance, rituals (activities) .....	121
4.1.1.4 Religion .....	139
4.1.1.5 Text .....	149
4.1.1.6 Plants .....	158
4.1.2 Significance of Heishan Petroglyphs for local study .....	161
4.1.2.1 Importance of Heishan Rock Art for Jiayuguan Pass .....	161
4.1.2.2 Heishan Petroglyphs reflect the characteristics of the region in different eras, geographical evolution, ethno-religious features ...	167
4.1.2.3 Local impacts of petroglyphs in the Heishans .....	173
4.2 Establishment of a photo library of Heishan Petroglyphs .....	192
4.2.1 Digital Conservation Study of Heishan Petroglyphs .....	192
4.2.2 Image Acquisition of Heishan Petroglyphs .....	198

4.3 Construction of the Heishan Petroglyphs Resource Bank .....	204
4.3.1 Cultural and Artistic Value of the Heishan Petroglyphs .....	204
4.3.2 Design of the Heishan Petroglyphs resource base .....	207
4.3.2.1 Pictures of Heishan Petroglyphs .....	211
4.3.2.2 Film and video recordings of Heishan Petroglyphs .....	212
4.3.2.3 Links to web-based information relating to petroglyphs in the Heishans .....	213
4.3.2.4 Film and video animation of petroglyph creation in Heishan .....	213
4.3.2.5 Documentation of Heishan Petroglyphs .....	213
4.3.2.6 Petroglyph Cultural Creation in Heishan .....	214
4.3.2.7 Policies and regulations on Heishan Petroglyphs .....	214
4.3.2.8 Other information .....	214
4.3.3 Resource-based coding and resource statistics .....	214
4.3.4 Application of Heishan Petroglyphs resources in teaching and learning ..	219
CHAPTER 5 DISCUSSION AND CONCLUSION .....	226
5.1 Brief Summary of the Study .....	226
5.2 Discussion of the Results .....	231
5.2.1 Classification of petroglyph content and presentation of cultural connotations .....	231
5.2.2 Contributions and Limitations of Image Capture and Digital Conservation of Heishan Petroglyphs .....	234
5.2.3 Construction and Impact of the Heishan Petroglyphs Resource Database .....	236
5.3 Recommendations for Future Studies .....	238



## LIST OF TABLES

	Page
TABLE 1 Statistical table of the petroglyph category of the third national cultural heritage census .....	2
TABLE 2 List of rock art contents in the main areas of the Hexi Corridor .....	36
TABLE 3 Example table: List of the contents of petroglyphs in the main areas of the Hexi Corridor.....	71
TABLE 4 Example table: Jiayuguan Heishan Petroglyphs Classification Table .....	71
TABLE 5 Jiayuguan Heishan Petroglyphs Classification List - Animals.....	82
TABLE 6 Statistical map of the occurrence of the main animals collected by the author from the Heishan petroglyphs.....	84
TABLE 7 Jiayuguan Heishan Petroglyphs Classification List - Hunting.....	107
TABLE 8 Jiayuguan Heishan Petroglyphs Classification List - Dance, Rituals .....	122
TABLE 9 Jiayuguan Heishan Petroglyphs Classification List - Religion.....	139
TABLE 10 Jiayuguan Heishan Petroglyphs Classification List - Texts.....	150
TABLE 11 Jiayuguan Heishan Petroglyphs Classification Table – Plants.....	158
TABLE 12 Table Coding Table for Heishan Petroglyphs data .....	216

## LIST OF FIGURES

	Page
FIGURE 1 Schematic of the Hexi Corridor .....	3
FIGURE 2 Pathway for the digital preservation of Heishan petroglyphs .....	6
FIGURE 3 Research framework diagram .....	8
FIGURE 4 Petroglyphs at Niwa Mountain - Tiger eating sheep .....	15
FIGURE 5 Petroglyphs at Niwa Mountain - Tiger eating sheep .....	16
FIGURE 6 Petroglyphs of Niwa Mountain--Riding and Hunting Figure .....	17
FIGURE 7 Petroglyphs of Niwa Mountain - Flock of Sheep .....	18
FIGURE 8 Petroglyphs at Shiligou, Yongchang County: Fauna + Shooting .....	21
FIGURE 9 Petroglyphs at Shiligou, Yongchang County: Tibetan text .....	21
FIGURE 10 Petroglyphs of Yumushan, Sunan: Hunting .....	23
FIGURE 11 Petroglyphs of Yumushan, Sunan: Matchmaking (line drawing) .....	23
FIGURE 12 Petroglyphs at Yumushan, Sunan: Bison (line drawing) .....	24
FIGURE 13 Petroglyphs at Yumushan, Sunan: Sun (line drawing) .....	24
FIGURE 14 Heishan Petroglyphs of Jiayuguan City: Sidaoguxinggou .....	27
FIGURE 15 Jiayuguan Heishan Petroglyphs: Sidaoguxinggou and Hongliugou .....	27
FIGURE 16 Jiayuguan Heishan Petroglyphs: Sidaoguxinggou and Mozigou .....	28
FIGURE 17 Petroglyphs in the Mawei Mountains: Mask (sphinx) petroglyphs .....	31
FIGURE 18 Petroglyphs in the Mawei Mountains: Yak petroglyphs .....	31
FIGURE 19 Petroglyphs in Subei County-Yanchiwan Township Taming of the Bull .....	34
FIGURE 20 Petroglyphs in Subei County: Grey Bay Sub-North Goat .....	34
FIGURE 21 Petroglyphs in Su Bei County: Daheigou Pointed Hat Portrait .....	35

FIGURE 22 Petroglyphs in Su Bei County: Daheigou Pair of Sheep .....	35
FIGURE 23 Schematic diagram of the current status of the main research content .....	55
FIGURE 24 Schematic distribution of Heishan Petroglyphs .....	75
FIGURE 25 Motorway to provincial road to reach Heishan .....	76
FIGURE 26 The writer is in Heishan, with the opposite Qilianshan behind him .....	77
FIGURE 27 Entrance to Heishan .....	77
FIGURE 28 Heishan mountain range .....	78
FIGURE 29 Heishan Petroglyphs photographed .....	79
FIGURE 30 Schematic classification of Heishan petroglyphs .....	80
FIGURE 31 Sidaoguxinggou were photographed for images .....	81
FIGURE 32 The rock with the most animals in Heishan petroglyphs(shiguanxia) .....	85
FIGURE 33 Stand-alone rock on the north side of the Jiaohaogou bend .....	86
FIGURE 34 Online interview with Heishan petroglyph researcher Chang Shiya Sr. ....	88
FIGURE 35 Artist Du Yongdong, Advisor of Jiuquan Artists Association .....	89
FIGURE 36 Interviews with local villagers .....	90
FIGURE 37 Li Jianrong, Deputy Director of the Heishan Petroglyphs Conservation Institute .....	91
FIGURE 38 Li Jianrong introduces the petroglyphs of the Heishan Niu. ....	92
FIGURE 39 Guan Hong, Artist of Jiuquan Painting and Calligraphy Academy .....	93
FIGURE 40 Bison, freestanding rock on the south side of Sidaoguxinggou .....	94
FIGURE 41 Petroglyphs on the south wall of Shiguanxia, engraved .....	94
FIGURE 42 Petroglyphs on the south wall of Shiguanxia, engraved .....	95
FIGURE 43 Petroglyphs on the south wall of Shiguanxia, carved by abrasion .....	97

FIGURE 44 Riding shot, south wall of the gully at the mouth of Sidaoguxinggou .....	98
FIGURE 45 Petroglyphs on the west wall of the gully at the mouth of the Sidaoguxinggou .....	99
FIGURE 46 Hunting and livestock maps .....	100
FIGURE 47 The author is photographing the goats and cows in the picture .....	101
FIGURE 48 Petroglyphs on the south wall of Shiguanxia, carved by abrasion .....	102
FIGURE 49 Petroglyphs on the rocks to the left of Sidaoguxinggou, chiselled .....	103
FIGURE 50 Petroglyphs on the left side of Sidaoguxinggou, engraving .....	104
FIGURE 51 Petroglyphs on the north wall of the gully at the mouth of Sidaoguxinggou .....	105
FIGURE 52 A magnificent hunting scene in the Shidao stock-type ditch .....	108
FIGURE 53 The author discusses a hunting picture with Li Jianrong .....	110
FIGURE 54 Mrs Chang Shiya on Hunting .....	111
FIGURE 55 Petroglyphs on the right side of the Sidaoguxinggou, incised .....	112
FIGURE 56 Petroglyphs on the cliffs to the right of the mouth of Mizigou, chiselled.....	114
FIGURE 57 Stone wall on the left side of the Sidaoguxinggou, incised.....	115
FIGURE 58 Petroglyphs at the bottom of Sidaoguxinggou, chiselled.....	117
FIGURE 59 Petroglyphs on the left of Sidaoguxinggou, chiselled .....	118
FIGURE 60 Petroglyphs on the left hillside of the Sidaoguxinggou, rubbed and engraved .....	119
FIGURE 61 Petroglyphs on the left side of Sidaoguxinggou ditch, incised .....	119
FIGURE 62 Petroglyphs on the west wall of the entrance to the Sidaoguxinggou, incised .....	120

FIGURE 63 Pang Ying, Associate Professor, College of Art, Lanzhou University of Finance and Economics.....	124
FIGURE 64 Wang Pu, curator and deputy research curator of Yumen Museum.....	125
FIGURE 65 Single dance, mill carving.....	127
FIGURE 66 Petroglyphs in freestanding rock on the left slope of Sidaoguxinggou, chiselled .....	128
FIGURE 67 Petroglyphs of Sidaoguxinggou, chiselled .....	129
FIGURE 68 Petroglyphs of Sidaoguxinggou, mill-carved.....	130
FIGURE 69 Petroglyphs on the left side of a rocky wall in Sidaoguxinggou, incised ....	131
FIGURE 70 Rock petroglyphs on the left hillside of Sidaoguxinggou, chiselled .....	132
FIGURE 71 Multiplayer Dance Chart, the right cliff face of Sidaoguxinggou, chiselled	133
FIGURE 72 Jianrong and the author talk about the Heishan Petroglyphs Dance Map .	134
FIGURE 73 Petroglyphs of Mazigou, mill carvings .....	136
FIGURE 74 Author and Li Jianrong on the spot.....	137
FIGURE 75 Interview with Wang Quanzhao, President .....	141
FIGURE 76 Interview with Du Yongdong, Advisor of Jiuquan Painting Academy .....	143
FIGURE 77 Petroglyphs on the south wall of Hongliugou, incised .....	144
FIGURE 78 Petroglyphs on the south wall of Hongliugou, incised .....	145
FIGURE 79 Shiguanxia Stupa .....	146
FIGURE 80 Author studies Heishan petroglyphs up close.....	148
FIGURE 81: Explore the religious petroglyphs of Hongliugou in Heishan .....	151
FIGURE 82 Fu Qiang, Director of the Heishan Petroglyphs Conservation Institute .....	152
FIGURE 83 Textual Discernment and Evolution of Shiguan Gorge with Li Jianrong .....	153
FIGURE 84 Petroglyphs on the south wall of Hongliugou, incised .....	155

FIGURE 85 Petroglyphs on the south wall of the Shiguanxia, engraving .....	155
FIGURE 86 Petroglyphs at the bend of Mozigou (now protected) .....	157
FIGURE 87 Petroglyphs on the south wall of Shiguanxia .....	159
FIGURE 88 Petroglyphs on the south cliff face of Mozigou (0.7 metres above the ground), incised .....	160
FIGURE 89 The author and Li Jianrong studying the details of Heishan petroglyphs ..	161
FIGURE 90 Survey of petroglyphs in mozigou .....	163
FIGURE 91 Distribution of petroglyph types at Heishan Petroglyphs .....	165
FIGURE 92 Fu Qiang on the development of petroglyphs cultural tourism in Heishan .	178
FIGURE 93 Interview with Mr Guan Hong .....	179
FIGURE 94 Some of the works of the Heishan Petroglyphs art exhibition .....	180
FIGURE 95 The Beasts--Fung Kwok Wai Design .....	181
FIGURE 96 Cultural and Creative Products of Heishan Petroglyphs in the 80s: Heishan Cow Badge .....	182
FIGURE 97 Ceramics based on reproductions of Heishan Petroglyphs and Subei, by Wang Quanzhao .....	183
FIGURE 98 Computer work based on the image design of rock sheep in Heishan Petroglyphs - by Wang Ying .....	185
FIGURE 99 Jiayuguan Local IP Design Cultural and Creative Products .....	186
FIGURE 100 A group photo of the field teaching at Jiayuguan Heishan Petroglyphs Remaining Site .....	188
FIGURE 101 Launching Ceremony of the Academic Expedition on Heishan Petroglyphs .....	190
FIGURE 102 Online interview with Associate Professor Pang Ying .....	193

FIGURE 103 Online Interview with Curator Wang Pu .....	195
FIGURE 104 Heishan Petroglyph Conservation Institute Director Fu Qiang and Director Li Jianrong talk about digital conservation of petroglyphs .....	196
FIGURE 105 Digital collection site of Heishan Petroglyphs .....	199
FIGURE 106 Author's collection of petroglyph information from a high place.....	200
FIGURE 107 Many places are inaccessible by car, so we can only walk into the mountains to collect petroglyph data.....	201
FIGURE 108 Carrying equipment up the mountain for information collection .....	202
FIGURE 109 Petroglyph survey and collection in Mozigou .....	203
FIGURE 110 Pictures of petroglyphs collected in Heishan .....	204
FIGURE 111 Prof Wang Quanzhao on digital conservation of petroglyphs.....	208
FIGURE 112 Screenshot of Heishan Petroglyphs Resource Library homepage .....	211
FIGURE 113 Heishan Petroglyphs Photo gallery.....	212
FIGURE 114 Video footage of Heishan Petroglyphs .....	213
FIGURE 115 Heishan Petroglyphs bibliography.....	214
FIGURE 116 Proportional distribution of resources in the Heishan Petroglyphs repository (under construction) .....	217
FIGURE 117 Teachers are working on curriculum development .....	220
FIGURE 118 Students drawing petroglyph patterns .....	221
FIGURE 119 Figure Students drawing petroglyphs of Heishan at Jiuquan Museum ....	222
FIGURE 120 Finished product .....	223
FIGURE 121 Teachers practising the Heishan Petroglyph Project .....	224
FIGURE 122 Heishan Petroglyphs cultural and creative works win awards .....	225
FIGURE 123 Framework of New Knowledge from the Study .....	230



# CHAPTER 1

## INTRODUCTION

### 1.1 Background

China's records of petroglyphs are relatively early, and the earliest record of petroglyphs in China's canonical books belongs to Han Fei Zi, written by Han Fei Zi. "The master of Zhao made the workers apply hooks and ladders to the edge of the Podwu (the name of the place) and carved the traces of people on it, which were three feet wide and five feet long, and said that the master had traveled here.". In the Northern Wei Dynasty in the fifth century A.D., the geographer Na Dawuan had many records of petroglyphs in his "Commentary on the Classic of Waters," which had been recorded before that in the "Records of the Historical Records," and in some of the historical works and local history books after that. Before this, the "Shiji," and after this, some historical works and local history books, there have been sporadic records. Until today, petroglyphs have been distributed in most areas except for Shanghai, Hunan, Hubei, Jiangxi, and a few other provinces and municipalities directly under the Central Government. The total number of petroglyphs found is about 100,000, one of the countries with the broadest distribution and the richest number of petroglyphs in the world.

The areas where petroglyphs are found in China are widely distributed and have complex landscapes. They can be roughly divided into northern, southwestern, and southeastern families. Petroglyphs and nomadic culture by Shu Xihong and Li Xiangshi elaborate on the relationship between the animal themes of northern petroglyphs and nomadic culture and construct a historical lineage of the development and change of the northern minorities(Shu & Li, 2007); petroglyphs of the northern system are unrivaled by any other in terms of their geographical distribution, scale, and number(Gong & Zhang, 2006). Northern petroglyphs are mainly distributed in Inner Mongolia, Ningxia, Gansu, Qinghai, Xinjiang, and Tibet. The petroglyphs in the north are mainly animal-based, mainly reflecting people's production, lifestyle, and religious

beliefs. The production technique is based on grinding and chiselling, some incised, and relatively few petroglyphs are painted.

According to the results of the third national cultural relics census, there are 74 petroglyphs in Gansu, ranking fourth in the country. The petroglyphs in Gansu are distributed in the Qilian Mountains and the narrow strip of the Hexi Corridor. Among them, the Hexi petroglyphs occupy most of the area: "The petroglyphs in the Hexi Corridor are mainly distributed in thirteen petroglyph sites such as the Heishan, Horsehair Mountain, Yumu Mountain, and Niuwa Mountain, and there are nearly a thousand petroglyph images" (Wang & Li, 2021).

TABLE 1 Statistical table of the petroglyph category of the third national cultural heritage census

PROVINCE	QUANTITIES
Xinjiang Uyghur Autonomous Region	388
Inner Mongolia Autonomous Region	313
Yunnan	75
Gansu Province	74
Chongqing	7
Shandong Province	7
Guangdong Province	6
Shanxi Province	6

The Hexi Corridor is located west of the Yellow River in Gansu, mainly involving the cities of Wuwei, Jinchang, Zhangye, Jiuquan, and Jiayuguan in Gansu Province. From the viewpoint of historical development and geographical location, the only big channel that can effectively communicate between the East and the West is the Hexi Corridor, which is located between the plateau and the desert. Since ancient times, it has been a major transport route between the Central Plains of China and the Western Regions, and it is also the core area for the integration of multi-ethnic groups, leaving a large number of cultural heritage and cultural tourism resources that can be utilised. The

Hexi Corridor carries a rich history, the integration of nationalities and the collision of different cultures, so it is imperative to record these historical and humanistic records. The appearance of petroglyphs in the Hexi Corridor has opened up and laid the foundation for the inheritance of prairie culture and art and nomadic civilisation in the Hexi Corridor and the meeting place, and it is of great significance for the exploration and application of local petroglyphs for the study of the development of human civilisation and prairie and nomadic culture, and digital preservation of the petroglyphs is of great significance. The digital conservation of Hexi petroglyphs is of great significance; on the one hand, it is beneficial to the conservation, research, and dissemination of Hexi petroglyph culture, and at the same time, it is also of great significance to the application of the art form of petroglyph culture migration.

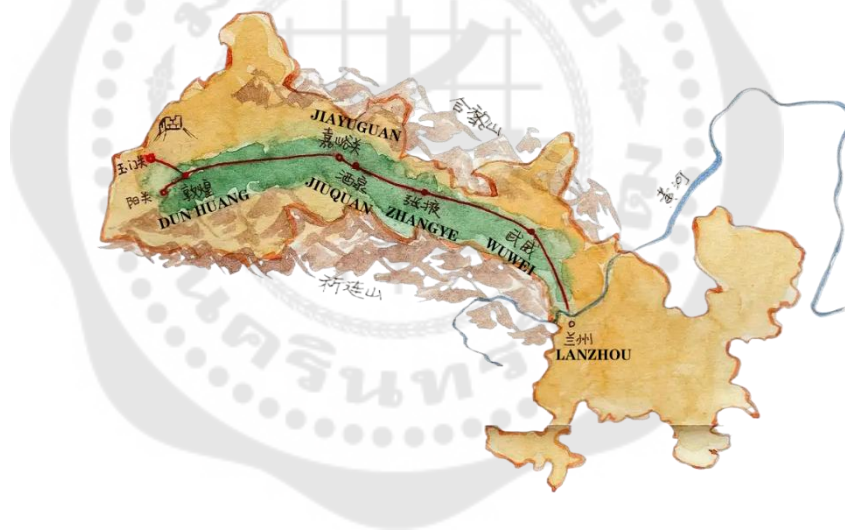


FIGURE 1 Schematic of the Hexi Corridor

Source: From the Internet (<https://zhuanlan.zhihu.com/p/697835137>)

Heishan is located at the western end of the Hexi Corridor, under the control of the Hexi Corridor Silk Road, and is the western end of the throat of the Jiayuguan Pass, known as "the world's first pass." In 1972, Jiuquan Iron and Steel Company, the power plant of the Heishan Lake Farm workers in the mountains of grazing, made the initial

discovery of rock petroglyphs(Chu et al., 1990); there are a total of more than 100 rock art pieces. There are more than 100 petroglyphs, which are rich in forms and have research value. The Heishan Petroglyphs tell us a lot about the rich humanistic history and historical and social changes in the Hexi Corridor over time. This helps us understand the past of the Hexi culture and gives us the historical information we need for the future growth of the Hexi region, which is why studying the petroglyphs of that area is very important.

Digital preservation is the use of digital technology to protect cultural heritage, a practice based on computer technology, multimedia technology, intelligent technology, and information dissemination technology to ensure the vitality of cultural heritage. It is characterised by the three features of "mobility," "fragmentation," and "socialisation.". Nowadays, digital preservation has become a "new approach to safeguarding intangible cultural heritage," applicable to most forms of art and culture. UNESCO has listed some informatisation means in cultural heritage protection, such as the use of optical Pion Motion Capture System (PIMC) technology for 3D motion data capture, as the fifth way to record and protect cultural heritage after picture, text, sound,, and image, and has strongly advocated it as one of the key means for the safeguarding of "intangible cultural heritage"" Mogao Grottoes and the Forbidden City have also been at the forefront of digital protection of cultural heritage and have achieved great success, which is a good reference for other cultural heritage protection. Globally, digital protection of cultural heritage has become a trend with the full arrival of the significant data era. With the continuous improvement of digital technology, new technologies and means can be adopted to protect and preserve petroglyphs and achieve remarkable results. Efforts need to be made to promote the integration of cultural digital resources, accelerate the innovation and transformation of cultural digital technology, pay attention to the cultivation of cultural digital talents, protect cultural digital property rights, and coordinate the solution of social problems derived from cultural digitisation (Zou, 2022).

China's petroglyphs occupy a significant position in the world's petroglyph system, with a staggering number of petroglyphs storing a huge cultural message, and more than 5,000 petroglyphs have been discovered in more than 200 counties in 29 provinces, municipalities, and autonomous regions so far. However, the fact that is highly disproportionate to the vast number of petroglyph resources in China is that, so far, except for extremely individual private websites that have established a very small-scale image database, there is still no authoritative organization that can consolidate the petroglyph resources in the whole country(Zhu, 2019). Although large in number, it is a late starter, with South Africa and Sweden leading the way in relevant research in terms of digitisation techniques for rock art heritage archives. Compared with petroglyph research in other regions within China, Gansu has relatively fewer applications in petroglyph research and has started late. The author has been engaged in film and television production and digitisation-related work, living in the Jiuquan area, in recent years, in the process of petroglyphs cultural research, found that the local public petroglyphs video data and research literature are relatively few. The Heishan petroglyphs have been established as a protected area, but the vast volume can not be closed to management. Based on the current ways of cultural heritage protection, digital protection, preservation, and collation research of cultural heritage has become an internationally accepted new idea and important method(Deng, 2015). To have a deeper understanding of the human civilisation, cultural connotation and nomadic grassland culture of Hexi petroglyphs, based on the existing research foundation, this paper will take the digital protection form of Heishan Petroglyphs as an entry point, and through collecting information of Heishan Petroglyphs, classifying the image content of Heishan Petroglyphs and exploring the digital protection method of Heishan Petroglyphs, to carry out adequate protection, development, dissemination and research of the Heishan Petroglyphs, to form a set of adequate protection, development, dissemination and research, to form a set of effective research paths, and to provide practical reference for other petroglyphs or cultural heritage digital protection and development of.

## 1.2 Hypothesis of the Study

(1) In order to study the characteristics, classification, and cultural connotations of Heishan Petroglyphs, the content of Heishan Petroglyphs has been studied, and a classification system for Heishan Petroglyphs images has been established.

(2) In order to preserve Heishan petroglyphs using digital means, images of Heishan petroglyphs were collected, and a photo database of Heishan petroglyphs was established.

(3) To better study and develop the resources of Heishan Petroglyphs, a teaching resource base has been established for teaching, research, and creation.

<b>Digital preservation of petroglyphs</b>	<b>Digital resource development</b>	data collection	Existing resource collection/documentary information/online information/library information/personal collection
		Field collection	Still pictures/dynamic videos/aerial photography/3D scanning
		digital modeling	Scanning modeling/aerial photography modeling
		data storage	Local storage/cloud storage
	<b>Data management</b>	Database construction	Data planning/data collection/data application/data security
		Platform development	Advanced technology/complete functions/good interactive experience/oriented to different groups/safe and reliable
	<b>digital communication</b>	solid state imaging	Electronic album/online gallery/online platform display
		moving image	Film and television works/short videos/animated short films/game animation
		digital interaction	Digital twin/digital museum/network interaction/VR, AR, MR applications

FIGURE 2 Pathway for the digital preservation of Heishan petroglyphs

Source: Produced by the author

## 1.3 Significance of the study

(1) This study will comprehensively investigate, collate and analyse the Heishan Petroglyphs, classify the petroglyphs in terms of their contents, study their different forms, history, humanities and environmental causes, analyse the meanings of the contents of the petroglyphs, and form a basic framework and classification system for the study of the overall contents of Heishan Petroglyphs, to provide theoretical foundations for the subsequent studies.

(2) Digital conservation of petroglyphs is an important means of petroglyph conservation, and this study will provide new ideas and methods for digital conservation

of petroglyphs, explore a new mode of digital conservation of petroglyphs, and help the cultural inheritance of petroglyphs.

(3) The petroglyphs digital resource base is an important foundation for developing and utilizing petroglyph resources. Its creation will help to realize the openness, sharing, and application of petroglyph resources, promote the dissemination and promotion of the art of petroglyphs, and facilitate the development and utilization of petroglyph cultural resources.

#### **1.4 Scope of the study**

(1) Geographic scope: This study is centred on the Heishan Petroglyphs Group in Jiayuguan Pass, Gansu, China. This group represents petroglyphs in the Hexi Corridor and has important historical, cultural, and artistic values. A comprehensive survey, collation, and analysis of the Heishan Petroglyphs Group is carried out to establish a framework system for the study of the Heishan petroglyphs and a digital conservation model for the digital conservation of petroglyphs in other areas of the Hexi Corridor.

(2) Scope of Characters: This study is mainly aimed at petroglyph conservationists, including staff of cultural heritage departments and petroglyph conservation experts, and researchers, mainly scholars, experts, and artists, as well as local people living in the area.

(3) Scope of Literature: mainly from the research on petroglyphs conservation, digital conservation technology of petroglyphs (in the past five years), the latest technology and direction of digital conservation of cultural heritage, applied research on related tangible heritage culture and applied research on petroglyphs (in the past five years).

### 1.5 Study Framework

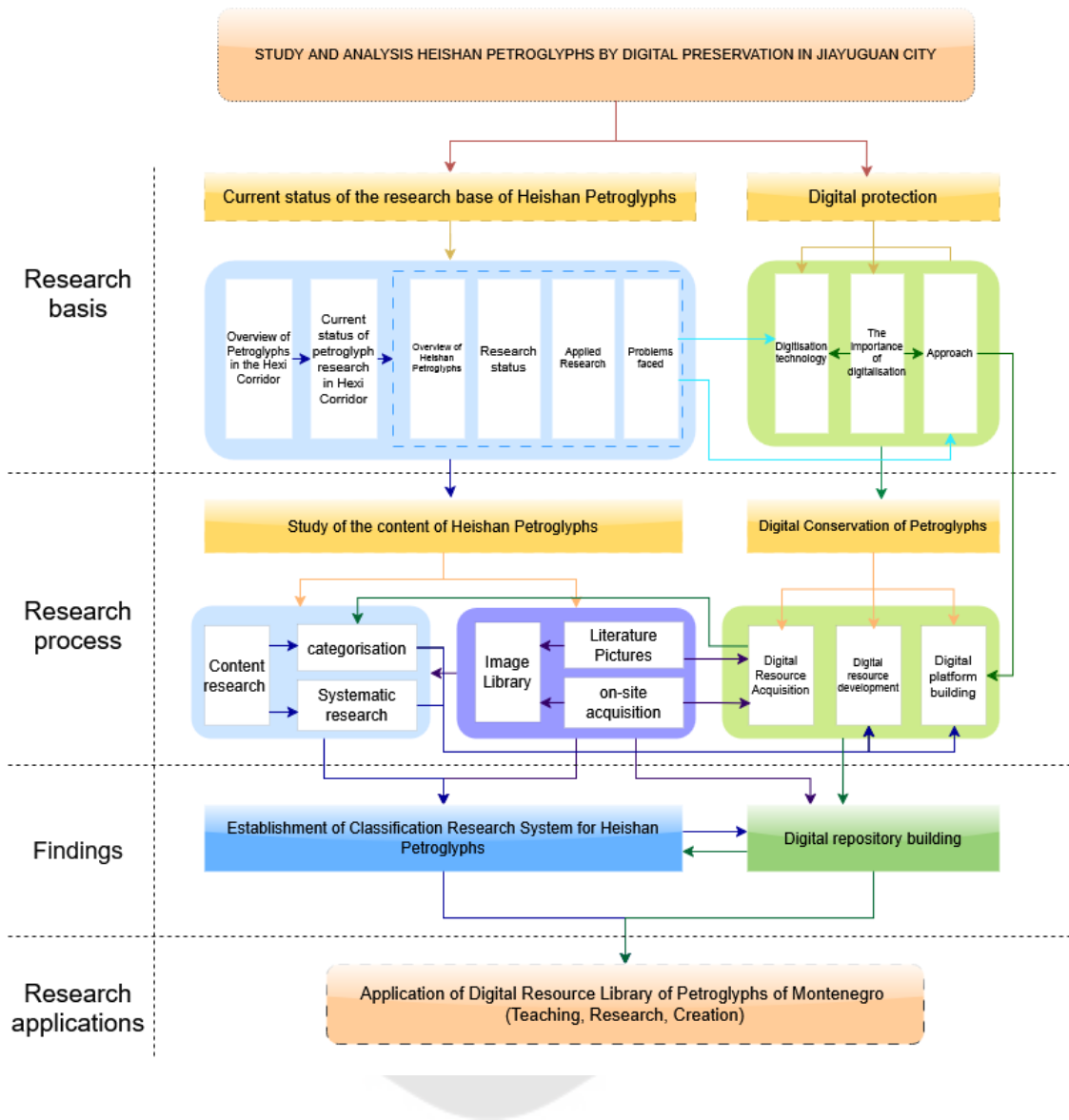


FIGURE 3 Research framework diagram

Source: Produced by the author

### 1.6 Definition of terms

**Heishan Petroglyphs:** this paper refers to the rock carving culture of Heishan, Jiayuguan Mountain in the gallery of the Hexi Corridor in Gansu, which is mainly engraved on outdoor rocks by the ancestors, and is the earliest content used by human beings in the Hexi Corridor area to depict and record the natural environment, the mode

of production, and the way of life of different times, which belongs to early cultural phenomena of the human society, and the various images in the petroglyphs constitute the earliest "literature" before the invention of the written word. The various images in petroglyphs constitute the earliest "documents" before writing.

Digital preservation: The use of digital technology for the protection, research and presentation of cultural heritage, based on computer technology, multimedia technology, intelligent technology and information dissemination technology, to ensure the vitality of cultural heritage, with characteristics such as "mobile", "fragmented", "interactive", "social" and "interactive". It is characterised by "mobility", "fragmentation", "socialisation", and "interactivity".



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Background, geographical location, environment of the Hexi Corridor, etc.

The Hexi Corridor, or "Hexi" for short, is located in the western region of China, in the northwestern part of Gansu Province, south of the Beishan-Alxa Plateau and north of the Qilian Mountains, is a long and narrow strip of land orientated north-west to south-east, and is named Hexi Corridor because it is located to the west of the Yellow River and is shaped like a corridor. Hexi Corridor. The Hexi Corridor is adjacent to the famous Loess Plateau in the east, the Tibetan Plateau in the south, the Mongolian Plateau in the north, and the Tarim Basin in the west. The Hexi Corridor is also known as the Gansu Corridor in foreign geographic literature. Its exact location extends from the Ganxin Junction between Ruoqiang, Akse, and Dunhuang in the west to the Gulang Gorge in the east, with an east-west length of about 1,000 km, and a north-south breadth ranging from about 30-120 km, including the central and western areas of the Alxa Plateau with a total area of about 400,000 square kilometres. It mainly involves the cities of Wuwei, Jinchang, Zhangye, Jiuquan, and Jiayuguan in Gansu(Bureau, 2021).

Geological research shows that the Hexi Corridor was formed about 200 million years ago. About 80 million years ago, it had four spring seasons and dense vegetation. However, about 40 million years ago, due to the Himalayan movement, the climate of the entire Hexi Corridor tended to deteriorate, and the ecological environment became very fragile. Therefore, regarding natural geographic features, the Hexi Corridor "has obvious transitional features in terms of landforms, climate, vegetation, soil, etc"(Li, 2018). The Hexi Corridor, located at the junction of the three central plateaus in western China, has a temperate continental climate, with scarce precipitation, deserts on the surface, and widespread distribution of the Gobi; however, oases have been formed in the places where the ice and snow of the high mountains mingle, making the Hexi Corridor "a complex of mountain-oasis-desert systems".(Huang, 2023)

The Hexi Corridor has a vast land area that is theoretically very suitable for the development of farming. However, the Gobi desert and mountains occupy most of the corridor area. The land suitable for agricultural development is limited to the oasis plains in the middle of the corridor, coupled with the scarcity of water resources in the Hexi Corridor, which restricts the scale of the development of agriculture in Hexi, and according to the statistics of the Hexi Corridor, the land suitable for agriculture is only 13,360 square kilometres, accounting for 5% of the total land area, of which the artificial oasis area of 11,125 square kilometres, accounting for only 4.12% of the total land area (Zhang, 2018).

From the perspective of the natural environment, the transitional nature of the Hexi Corridor in terms of its natural geographic characteristics makes the production and life of the people in the region have specific "composite" characteristics: the mountainous terrain has significant undulations, which makes it inconvenient for farming, and the natural vegetation is mostly grassland, which makes it suitable for the development of animal husbandry; the desert area lacks water resources for the development of cultivation, and nomadic pastoralism has gradually developed; the central part of the Corridor is relatively flat, with fertile soil and abundant water resources, and oasis agriculture is more developed. The desert area lacks water resources for the development of plantation, and the nomadic pastoralism of "living by water and grass" is gradually developed; the central part of the corridor has a relatively flat topography, fertile soil and abundant water resources, and oasis agriculture is more developed. Since the Western Han Dynasty, the Hexi Corridor of mountain animal husbandry, desert nomadic pastoralism has always been accompanied by oasis agriculture symbiosis, nomadic and farming people interact with exchanges and integration, and integration and symbiosis. According to "Wei book - food and goods" records, "Shizu (Tuoba To) of the level of the system of Wan, set Qin Long, to the west of the river water and grass is good, it is thought to pasture, livestock breeding, horse to more than two million horses. Camels will be half of it, cattle and sheep are countless" (D. L. Yang, 2023). This is an early record of the nomadic herdsmen engaged in animal

husbandry in the Hexi Corridor during the Wei, Jin, and North and South Dynasties. From the perspective of historical development, before the Qin Dynasty, the Hexi Corridor was home to the Qiang, Rong, Dizi, Usun, Yuezhi and Xiongnu peoples. At the beginning of the Western Han Dynasty, the nomadic Xiongnu mainly controlled the Hexi Corridor. However, with the victories of generals such as Wei Qing and Huo Zhaoqi against the Xiongnu, the farming people gradually expanded their influence in the Hexi Corridor. Emperor Wu of the Han Dynasty established Wuwei County and Jiuquan County in 121 B.C., Zhangye County in 111 B.C., and Dunhuang County in 88 B.C., which are known as the four counties of Hexi. From then on, the agricultural people stood firm in the Hexi Corridor, and it can be said that the history of the exchange and integration of nomadic people and agricultural people in the Hexi Corridor was also started objectively.

According to the main content of the Report on the Prehistoric Archaeological Survey of the Hexi Corridor, from September to December 1986, the Department of Archaeology of Peking University and the Gansu Provincial Institute of Cultural Relics and Archaeology carried out a wide-ranging prehistoric archaeological survey of the Hexi Corridor in Gansu (except for the autonomous county of Aksu County), and found more than 40 ancient sites. The vast majority belong to the late Neolithic and Bronze Age, and there are some Iron Age and even individual sites as late as the Han and Jin Dynasties. The archaeological cultures involved include the Majiayao Culture, the Mid-levels Mafang Culture, the "Transitional Type" remains, the Dongjiatai Culture, the Qijia Culture, the Siba Culture, the Geldings Culture, the Shajing Culture and the Xindian Culture. These discovered cultures and other ancient cultural sites indicate human activity in the Hexi Corridor about 5,000 years ago, and from the late Neolithic sites, it appears that the inhabitants of this area entered the era of farming civilisation about 4,000 years ago.

Combined with archaeological findings, human civilisations had already converged in the Hexi Corridor as early as the prehistoric Majiayao and Qijia cultures. By the time of the Wusun, Yuezhi and Xiongnu periods, there were strong elements of

the civilisations of the Central Plains, Central Asia and the Western Regions in the remains found in the Hexi. By the Han and Tang dynasties, the area remained a conduit and stage for several major cultural exchanges in the neighbourhood, represented by the art of the Dunhuang Grottoes and the multi-ethnic language writings in the Cave of Tibetan Scriptures. Taking an overview of Chinese history, since the Han Dynasty, the Hexi Corridor, as an intermediate channel of the official Silk Road, has always played the role of a cross and transition zone for exchanging Chinese and Western civilisations. In the course of the history and civilisation of Hexi, the fusion of Chinese traditional civilisation and foreign civilisation has never stopped, and this fusion has been manifested in the rich historical and cultural heritage that has survived in the Hexi Corridor.

From the Central Plains, the core of Han culture, to the west, the Tibetan Plateau, with an average altitude of more than 4,000 metres, is to the south. The north are the vast Gobi Desert, with the Hexi Corridor, between the plateau and the desert, being the only significant corridor that can effectively communicate between the East and the West. During the Han and Tang dynasties, when the culture of the Central Plains was at its peak, several other major ancient civilisations, such as Ancient India, Ancient Persia and Ancient Rome, were located in the western part of the Central Plains. Since the sea transport lines had not been commonly established then, economic and cultural exchanges on the Hexi Corridor were frequent, becoming the most important channel for cultural exchanges between China and the West (Fu, 2014).

## **2.2 Historical overview of petroglyphs in Hexi Corridor**

Chinese petroglyphs are concentrated in the northern grasslands. In the 1993 edition of Chinese Petroglyphs, there are 89 petroglyphs, or 65 per cent, of the 137 petroglyphs in 20 provinces and districts in the northwestern region, as identified in the "Schematic Map of the Distribution of Petroglyphs in China" (Nei Menggu, Gansu, Xinjiang, Ningxia, and Qinghai)(House, 1993), and there are even more petroglyphs that have been newly discovered in recent years. Chen Zhaofu divides Chinese petroglyphs into three systems: northern, southwestern and southeastern, and he believes that: "The

petroglyphs of the northern system are mainly distributed in Inner Mongolia, Xinjiang, Ningxia, Gansu and Qinghai, with the content of animals as the primary focus, the style is more realistic, and most of the techniques are chiselled and engraved. It is the work of hunting and nomadic people in the grassland area of northern China (Chen, 2002). "Gansu petroglyphs are right at the centre of the northern petroglyph system. It is bordered by Inner Mongolia and Ningxia petroglyphs to the east, Qinghai petroglyphs to the west, and Xinjiang petroglyphs to the northwest. The narrow strip of the Hexi Corridor connects the four northern provinces and regions, so that its petroglyphic zone is connected as one. Also because it is a work of hunting and nomadic people in the northern steppe region, the content is dominated by animals (Wang & Pang, 2019).

In the Hexi Corridor, the prehistoric and historical period had flourished Xirong, Western Qiang, Seed, Yuezhi, Usun, Xiongnu, Xianbei, Turkic, Huihe, Tubo, Danghang, Mongolia and other grassland peoples. In the long process of historical development, they created a splendid, brilliant, and unique grassland culture. Using petroglyphs to express their life, production and so on is one of the earliest cultural forms. They used petroglyphs to open up. They laid down the grassland culture, art, and nomadic civilisation in the Hexi Corridor inheritance and convergence, which is a part of the "one and multiple" Chinese civilisation and is also one of the important cultural forms of the splendid culture of Huaxia.

### 2.2.1 Niuwa Petroglyphs in Yongchang County

Yongchang County belongs to Jinchang City of Gansu Province, located in the eastern part of the Hexi Corridor, bordering Wuwei City, Jinchuan District, Shandan City and Sunan County, and the main discovery sites of petroglyphs in Yongchang area are scattered in Xinchengzi Town, Hongshanyao Town, Jiaojiazhuang Town and Chengguan Town of the county. The towns where petroglyphs are found account for 1/3 of the existing administrative towns in Yongchang County, which shows that the petroglyphs in the region span a wide area.

Niuwa mountain petroglyphs are located in Gansu, Yongchang County, Xinchengzi Town, Zhao Dingzhuang Village, south of the bay, southwest of about 1.5

kilometres; petroglyphs are mainly scattered on the Niuwa Mountain beams and the east and north slopes of the sunny side of the wind; the western slopes are almost gone. The petroglyph group is not a large area of rock wall petroglyphs, but rather a scattered distribution of boulder petroglyphs. The distribution area of petroglyphs is about 2 square kilometres, with more than 200, and the picture of the situation according to the stone is that most of the clear and identifiable ones are preserved more intact. The petroglyphs group was first discovered in the second half of 1994. In July 1995, the Yongchang County Museum organisation made a survey and initial exploration. 2002 6 on the 5th of Gansu Provincial Institute of cultural relics and archaeology Yue Banghu, Wang Yuanlin, Yue Xiaodong and Yongchang County Museum Zhang Dezhi and jointly carried out a detailed investigation. Niuwa mountain petroglyphs are extremely rich in content, there are wild animals, animal husbandry, riding and shooting, a variety of pictures, generally a stone one, and a small number of different sides on the boulder block, carved two or three in a row. These pictures are vivid, reflecting and embodying the developed primitive hunting and herding civilisation created by the ancestors in Niuwa Mountain from an artistic point of view(Yue et al., 2007).



FIGURE 4 Petroglyphs at Niwa Mountain - Tiger eating sheep

Source: Yue, B.H. et al. (2007). Archaeology and cultural relics: survey and research on the rock paintings at Niuwa Mountain, Yongchang, Gansu. P. 93



FIGURE 5 Petroglyphs at Niwa Mountain - Tiger eating sheep

Source: Yue, B.H. et al. (2007). Archaeology and cultural relics: survey and research on the rock paintings at Niuwa Mountain, Yongchang, Gansu. P. 93

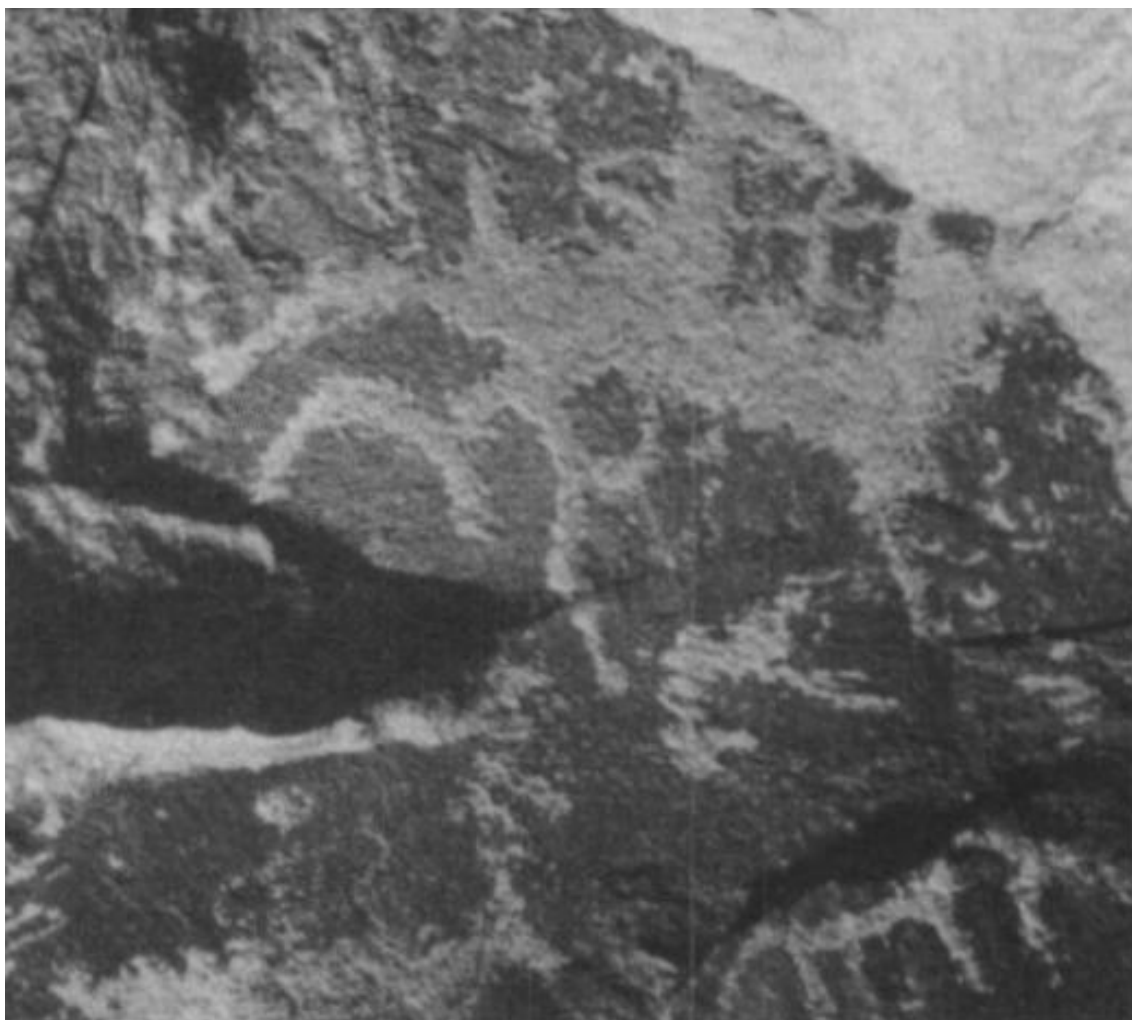


FIGURE 6 Petroglyphs of Niwa Mountain--Riding and Hunting Figure

Source: Yue, B.H. et al. (2007). Archaeology and cultural relics: survey and research on the rock paintings at Niuwa Mountain, Yongchang, Gansu. P. 93



FIGURE 7 Petroglyphs of Niwa Mountain - Flock of Sheep

Source: Yue, B.H. et al. (2007). Archaeology and cultural relics: survey and research on the rock paintings at Niuwa Mountain, Yongchang, Gansu. P. 92

The degree of wind erosion, rain, and sunshine is one of the main bases for judging the age of petroglyphs (Gai, 2001). The petroglyphs in Niwa Mountain are highly eroded by wind, and some are poorly preserved, so it is not easy to distinguish them from other petroglyphs. Moreover, as the petroglyphs are carved on black rocks, the engraving marks are light, the colour is light black, the stone scale, i.e., stone rust, is thick, and the colour is black and brown. This shows that the petroglyphs have been created for a long time.

Most of the petroglyphs in Niuwa Mountain are of the type of abrasive carving of earlier times, and there are also a small number of works of chiselling and scratching that are later than the abrasive carving technique (Su, 1994). According to the different carving techniques, they can be divided into two kinds: chiselling points into lines and picking the ground.

Many petroglyphs of successive dynasties are distributed in Yongchang County, where the Niuwa Mountain petroglyphs are located. Early petroglyphs, such as the red sheep circle petroglyphs in the north-west kilometre of Jinchuanxi Village in Beihaizi Township, the upper limit of which is the Maobra petroglyphs of the Warring States period, the subject matter and style are comparable to the Niuwa Mountain petroglyphs. Jiaojiazhuang Township Chenjiazhai Village, north of the Beishan petroglyphs, identifiable animals such as sheep, horses, dogs, and other characters riding horses, driving sheep, grazing, and other images for the Han Dynasty remains; Jinchang City, Jinchuan District, Ningyuan Fort Township, white Jiazui Village, kilometres west of the Shiyangzi Dasan petroglyphs, for the period of the Warring States. In addition, many similar petroglyphs are also found in Wuwei and Sunan, which are located in the northern foothills of the Qilian Mountains(Yue et al., 2007).

By comparing the petroglyphs of Niwa Mountain with those of Dahigou in Beigai Township of Subei in the northern foothills of the Qilian Mountains, the petroglyphs of Horsehair Mountain in the Mongolian Autonomous County of Subei, the petroglyphs of Heishan in Jiayuguan Pass, and the petroglyphs of Altay Mountains in Xinjiang, it can be deduced that the relative age of the creation of the petroglyphs of Niwa Mountain should be designated as the period from Spring and Autumn and the Warring States Periods to the Qin and Han Periods(Yue et al., 2007).

### 2.2.2 Yongchang County 15 Mile Gully Petroglyphs

Fifteen Mile Gully Petroglyphs is located in the northwest of Yongchang County on the border with Shandan County, 41.5 kilometres from Yongchang County. The petroglyphs are located in a ravine in the Huacaotan Forestry District, specifically named Fifteen Mile Gully, which belongs to the southern branch of Longshoushan

Mountain, with the highest peak in the vicinity, Fifteen Mile Dasan, at an altitude of 2,975 metres(Committee, 1993).

In the fifteen-mile ditch, four locations, eight rock faces are found petroglyphs, a total of 29 single patterns, including animal modelling, grazing diagrams, Tibetan language, all located on the hillside sunny side. Fifteen Mile Gully petroglyphs are part of the Qilian Mountains petroglyphs. In terms of the subject matter, the composition form, and the expression of the unique style of the northern nomadic grassland culture. In the petroglyphs found so far, the most significant number of animal modelling, mainly camels, deer, sheep, cows, wolves, and so on, followed by nomadic hunting scenes. The Tibetan Buddhist six-word truths in the petroglyphs are strong evidence of the spread and influence of Tibetan Buddhism on the Hexi Corridor(Xi, 2021).

Most petroglyphs in Fifteen-Mile Gully are carved, and only the Tibetan rock faces are chiselled. The grinding and carving technique mainly uses chiselling points to create lines.

Yongchang County has a large number of petroglyphs of different dynasties, ranging from the Spring and Autumn and Warring States Period to the Ming and Qing Dynasties, the location of which is in a sparsely populated valley without suitable soil and water conditions for farming. The farming nation cannot make them, but they can only be made by herders grinding and carving them during their stationing in this area, and the contents reflect scenes of animals and herding, too. Tibetan Buddhism was introduced to the Hexi Corridor in the middle of the Xixia period, and the six words of truth in Tibetan appeared in the petroglyphs also proved this historical fact. The Tibetan text in the petroglyphs of Fifteen Mile Gully should be from the Xixia-Yuan period, while the other animal modelling may be earlier (Xi, 2021).



FIGURE 8 Petroglyphs at Shiligou, Yongchang County: Fauna + Shooting

Source: Feng, X.L. (2021) Journal of Hexi College: Research on the rock paintings in Shiwuligou, Yongchang, Gansu, P.28

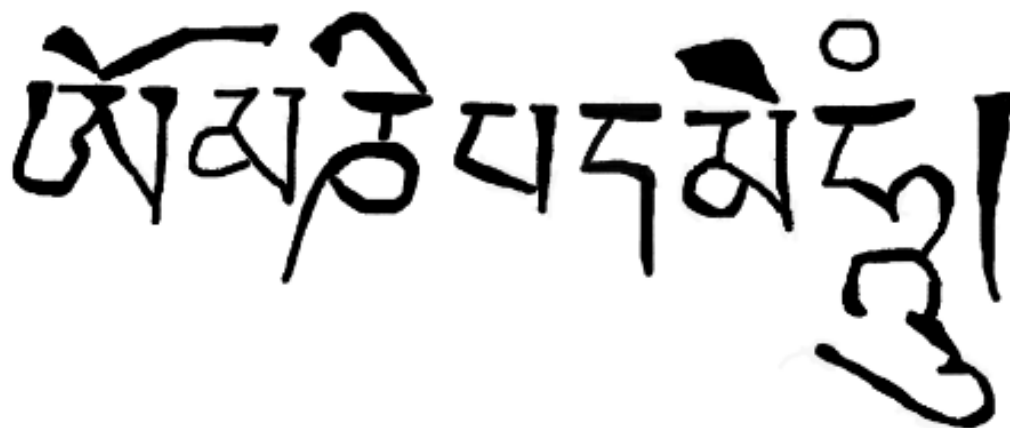


FIGURE 9 Petroglyphs at Shiligou, Yongchang County: Tibetan text

Source: Feng, X.L. (2021) Journal of Hexi College: Research on the rock paintings in Shiwuligou, Yongchang, Gansu, P.27

### 2.2.3 Zhangye Sunan Petroglyphs

The mountain grassland at the northern foot of the Qilian Mountains has many petroglyphs and subjects. The content of the petroglyphs involves three different stages of social structure of the distant ancestors of the northern nomadic people, namely, "hunting society, animal husbandry society, nomadic society".(Du, 2012) . --The content covers the social structure, economic situation, natural geography, social practices, religious beliefs, aesthetic thoughts, and other fields of the three different stages of the "hunting society - animal husbandry society - nomadic society" of the distant ancestors of the northern nomadic people(Du, 2012).

Su'nan petroglyphs were first discovered in 1985, and since then dozens of petroglyphs have been found one after another in the Yumu Mountain area, in which animals appearing roughly include yaks, bighorn deer, rock sheep, pan sheep, northern goats, camels, tigers, leopards, wolves, eagles, geese, swallows, snakes, horses, sheep, and so on(Wang & Pang, 2019). Up to now, 145 sites with thousands of individual and combined images of petroglyphs in Su'nan Yugu Autonomous County territory have been investigated. These petroglyphs convey information from different periods regarding the style of creation, content, preservation, superimposition phenomenon, the degree of wind erosion of the incised marks and stone scales, or the colour differences. They can be traced back to the Stone Age(Du, 2012). The contents of Su'nan petroglyphs can be broadly classified into animal images, hunting and animal husbandry, celestial motifs, symbols and religious worship. The symbols and religious worship are the most mysterious(Rui Ting Guan & Chen Feng Du, 2015).



FIGURE 10 Petroglyphs of Yumushan, Sunan: Hunting

Source: Web, Explore the rock paintings of the Hexi Corridor--Jinchang rock paintings([http://www.360doc.com/content/21/0707/13/76123715\\_985515196.shtml](http://www.360doc.com/content/21/0707/13/76123715_985515196.shtml))

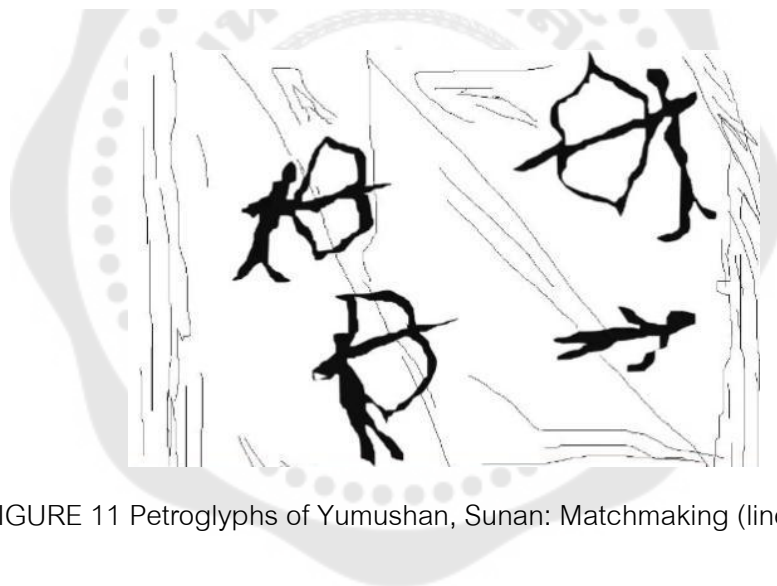


FIGURE 11 Petroglyphs of Yumushan, Sunan: Matchmaking (line drawing)

Source: Du, C.F.(2017) WeChat public number: one man's field. Discovery of petroglyphs in Yumu Mountain's Yangtan Gorge

(<https://mp.weixin.qq.com/s/GoTdOV36BsNK3Hzfqhw4RQ>)

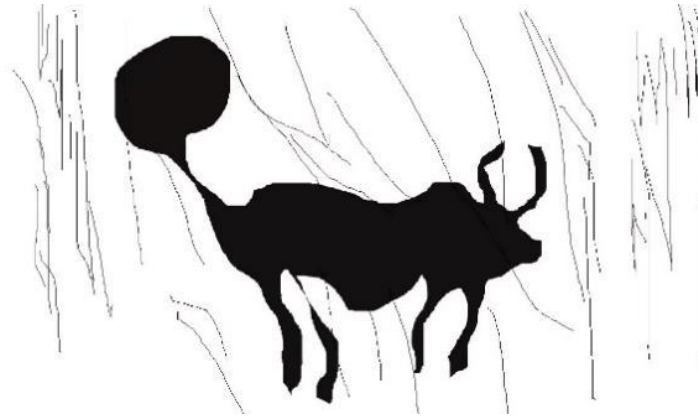


FIGURE 12 Petroglyphs at Yumushan, Sunan: Bison (line drawing)

Source: Du, C.F.(2017). WeChat public number: one man's field. Discovery of petroglyphs in Yumu Mountain's Yangtan Gorge

(<https://mp.weixin.qq.com/s/GoTdOV36BsNK3Hzfqhw4RQ>)



FIGURE 13 Petroglyphs at Yumushan, Sunan: Sun (line drawing)

Source: Du, C.F.(2017) WeChat public number: one man's field. Discovery of petroglyphs in Yumu Mountain's Yangtan Gorge

(<https://mp.weixin.qq.com/s/GoTdOV36BsNK3Hzfqhw4RQ>)

The selection of tools and materials for making petroglyphs is the crystallisation of the ancestors' experience in production and life and the material embodiment of their aesthetic ideals. Petroglyphs painted with different tools, materials and methods have different visual effects. Most of the petroglyphs in Yumu Mountain in Sunan are made by hammering and chiselling, and some are made by grinding and line carving. The earliest petroglyphs in the Yumu Mountains were made by hammering and chiselling. The method of hammering and chiselling was to use hardened pointed stone tools or metal to chisel the rock surface to form the images, and to use pointed stone tools to chisel the pockmarks of varying sizes into lines to form the paintings. This kind of petroglyph is childish and clumsy, with shallow and rough traces and varying sizes of trace lines and pits. The trend of the pits is out of tune. The difficulty of manipulating stone tools causes this, and the author's chiselling skills are also a factor. The petroglyph images chiselled with metal tools have deep and evident traces, showing some local details, such as animal ears, tails, hooves, palms and so on. Metal tools are sharp, pointed, and chisel-shaped, with the characteristics of a chisel; they are chiselled through the whole body into the painting and uniform puddle combinations are used in the painting of two kinds. For example, the petroglyphs of hunting with a big bow in Alatau Mountain use this technique(Rui Ting Guan & Cheng Feng Du, 2015).

Yang Huifu and Zhang Junwu proposed in their book *Jiayuguan Heishan Petroglyphs* in 2001 that: "From the pattern of climate change in the northern region of China over the past 10,000 years, the period between 8,000 and 5,500 years ago (geologically referred to as the Atlantic Ocean period) was the best period for the world's climate. At that time, the climate in northern China was mild, with abundant rainfall, vegetation development, lush forests in mountainous areas, and abundant wildlife. The famous black soil of Northeast China and the carbon deposits of mud and rocks in North China are the products of this period. Accordingly, we speculate that the appearance of elk and bison rock art era is more likely to be the middle of the Neolithic period (equivalent to the heyday of Yangshao culture) in the late Neolithic period, large antlered deer, bison, elk, and ostrich, in the Yinshan region, no longer exist. The wildlife

of that time consisted only of northern goats, rock sheep, horse deer, reindeer, and other cold-loving animals(Yang & Zhang, 2001). The images of rhinoceros, large-horned deer, and elk are common in the petroglyphs of Yumushan in Sunan, and the degree of wind erosion is relatively severe, which suggests that there are surviving works of the Stone Age in the petroglyphs of Yumushan(Du, 2012).

In 1987, during the cultural relics census, only two Yumushan petroglyphs were found at the bottom of the mountain, which were initially identified as from the Qin-Han period. The 2002 census confirmed that some of the petroglyphs may be earlier than this period, and the age of the petroglyphs may be earlier than the Qin-Han period.

#### 2.2.4 Jiayuguan Heishan Petroglyphs

Heishan Petroglyphs are the earliest petroglyphs found in Gansu. Heishan is located in Jiayuguan City, 20 kilometres northwest, and belongs to the Horsehair Mountain tributary. There have been Sidaoguxinggou, Shi Guanxia, a grinding ditch, and a red willow ditch, where petroglyphs have been found in many places. In May 1972, it was found by the Department of Cultural Relics to investigate. A total of 31 petroglyphs were surveyed, and the survey results were published in the name of Jiayuguan City Cultural Relics Clearance Group in the "Cultural Relics" magazine in 1972, Issue 12. Among the animal images are mainly horses, cows, sheep, tigers, deer, camels, dogs, flying geese, birds, snakes, chickens, fish, and so on (Team, 1972). It belongs to mammals, reptiles, birds, herbivores, and carnivores. The animals are mostly yaks. From the point of view of the age and environment of the animals, "the animals in the Heishan Petroglyphs include the remnant genera of animals that appeared in the Pleistocene, animals that like warmth and humidity, animals that like coolness and humidity, and animals that like drought and cold, and more animals that can spread to a wider area and have a strong adaptability(Yang & Zhang, 2001).

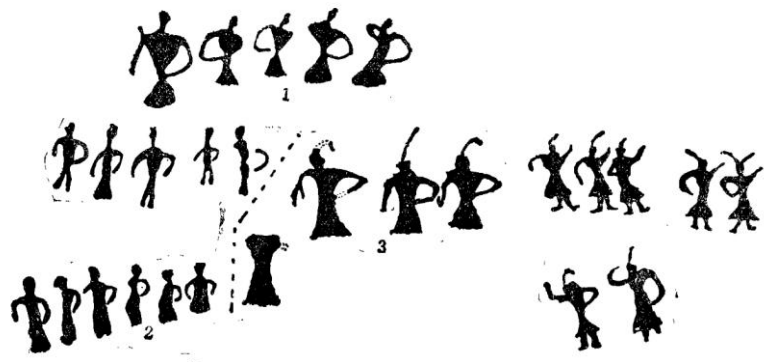


FIGURE 14 Heishan Petroglyphs of Jiayuguan City: Sidaoguxinggou

Source: Chushibin et al. (1990). Archaeology: Ancient Rock Paintings on Heishan, Jiayuguan, Gansu P. 345

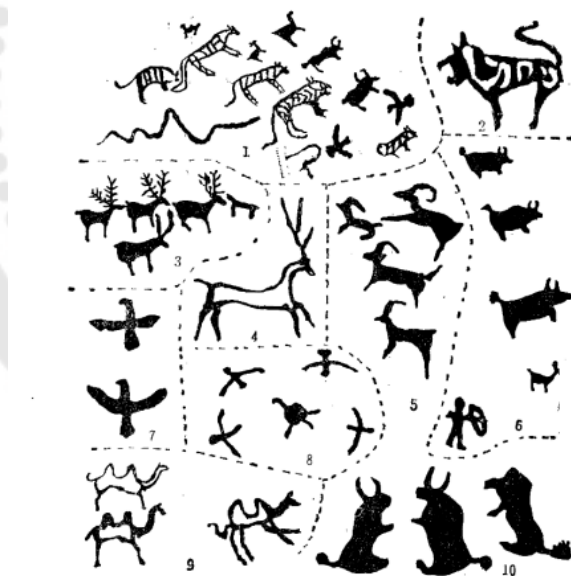


FIGURE 15 Jiayuguan Heishan Petroglyphs: Sidaoguxinggou and Hongliugou

Source: Chushibin et al. (1990). Archaeology: Ancient Rock Paintings on Heishan, Jiayuguan, Gansu P. 348

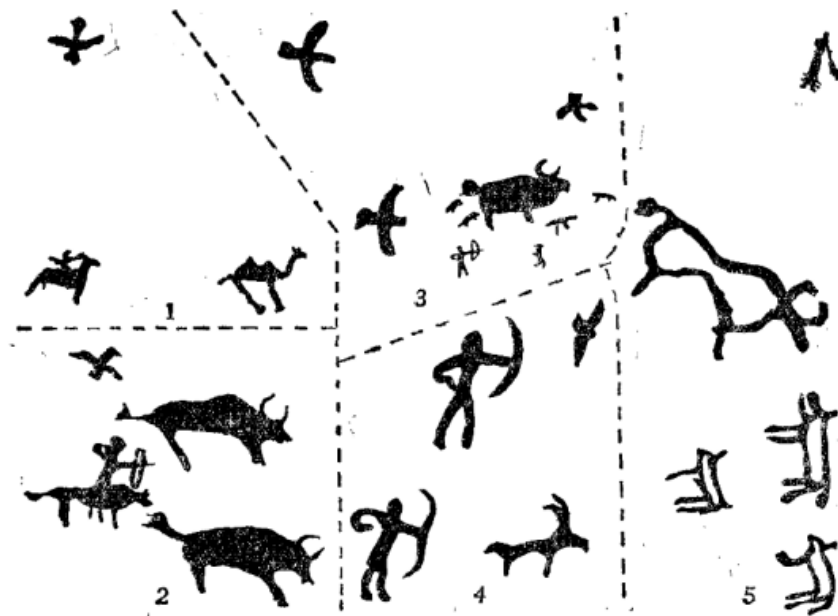


FIGURE 16 Jiayuguan Heishan Petroglyphs: Sidaoguxinggou and Mozigou

Source: Chushibin et al. (1990). *Archaeology: Ancient Rock Paintings on Heishan, Jiayuguan, Gansu* P. 347

The most striking Heishan Petroglyphs are the images of dances. Performance of dance petroglyphs in the above three grooves has been found, and the Sidaoguxinggou has more and finer, in various forms, beautiful dances, a single dance, a double dance, and a multi-person dance. The dancers mostly put feather ornaments on their heads, crossed their arms, and danced, reflecting the joyfulness of the ancient nomadic people living in this area, who were good at singing and dancing and loved life (Chu et al., 1990).

The production method can be divided into three kinds based on the traces left in the petroglyphs. The first is the grinding and carving method. Using this method of petroglyphs, the traces of carving are very shallow, and the image is ancient, primitive, and generally unclear. The second is the hammering method; most Heishan Petroglyphs are made by hammering. The third is the line carving method, probably with a sharp

chisel, knife, and other metal tools, carving lines on the stone surface, to outline the picture with a shaded line; some carving lines are thicker and deeper. The halls, statues, stupas, symbols, and inscriptions in Heihongliugou are mostly made of thick lines(Chu et al., 1990).

There are also several opinions about the formation period of the Heishan petroglyphs in Jiayuguan. One opinion is that "they may be cultural relics of the early Qiang, Dayuezhi or Xiongnu tribes(Team, 1972)" Another opinion is that "they are the works of the Zoran, Turkic or Tubo tribes, but their hat decorations are very similar to those of the Yi heroes' knots, or the answer can be sought from the historical connection between the Yi ancestors and the ancient Qiang tribes"(Ban, 206) The third opinion is that "these are the remains of the ninth century Tubo herdsmen. (Ban, 206) The third opinion is that "these are the remnants of the Tubo herdsmen of the ninth century", and another opinion is that "these petroglyphs in Hongliugou in the Heishans were carved by the Yuezhi people, an ancient ethnic group that inhabited the area at that time. The third opinion is that "these are the remains of the Tubo herdsmen of the ninth century".

Wu Xiaotang, in his book *Into the Jiayuguan Pass*, speculates that the Heishan petroglyphs "initially judge that the time of carving extends from the Warring States period to the Ming Dynasty, and that there is a certain relationship with the ancient Qiang and other northern peoples". The petroglyphs of Hongliugou in Heishan include images of temples, Buddha statues, pagodas, and other deities. From the point of view of their styles, contents, and methods of expression, the era of painting is not very early, with the upper limit being only the Middle and Late Tang dynasties. The latter being the Song and Yuan dynasties. The cliff inscriptions in Hongliugou, Heishan, entitled "Dust and Clearness in the Northern Desert", date from the Ming Dynasty(Chu et al., 1990).

#### 2.2.5 Petroglyphs in the Horsehair Mountains, Jiuquan

Gansu Beishan, i.e., Horsehair Mountain, is a general name for the quasi-plain dry and denuded low mountains, residual hills, and flood and denuded flatlands centred on the central peak of Horsehair Mountain at an altitude of 2583 m. In the 1980s, Gansu cultural relics and archaeologists conducted a cultural relics census of the area. They

found some petroglyphs and Late Paleolithic struck stone tools near the petroglyph site of HuoLeZaDeGai in the northwest of the Horsehair Mountain. In 2001, several archaeological remains were discovered, mainly consisting of petroglyphs and stone enclosure dwelling sites. In 2001, several archaeological remains, mainly petroglyphs, burials, and stone enclosure sites, were discovered. This survey found 35 petroglyph sites and 301 rocks with petroglyphs in an area of nearly 10,000 square kilometres north of the mountain, centred on Mazhoushan(Li et al., 2006).

Horsehair Mountain petroglyphs are rich in content, including various animal images, mainly horses, sheep, camels, and figures, such as riders, hunters, shepherds, dancers, sphinxes, etc. Other content, such as wells, vehicles, houses, shields, patterned symbols, etc., with various subjects, including hunting, herding, dancing, rituals, fertility worship, and other aspects. The form of expression is mainly silhouette type, followed by bold line type. The silhouette style refers to the use of shadows to depict the outline of the object, not to show the details of the thick line style refers to the use of thick and straight lines to express the object, the thickness of the lines of the various parts of the object is roughly the same, ignore the proportion, and do not show the details. In the petroglyphs of the thick line style, the lines of some animals' body parts are thicker than others, which is close to the silhouette style. The production method is mainly based on chiselling, grinding, and scratching. Some only use one method, and some use both methods. In the silhouette petroglyphs, some are hammered and chiselled in their entirety, while others are carved out in outline and then filled in with blanks(Li et al., 2006).

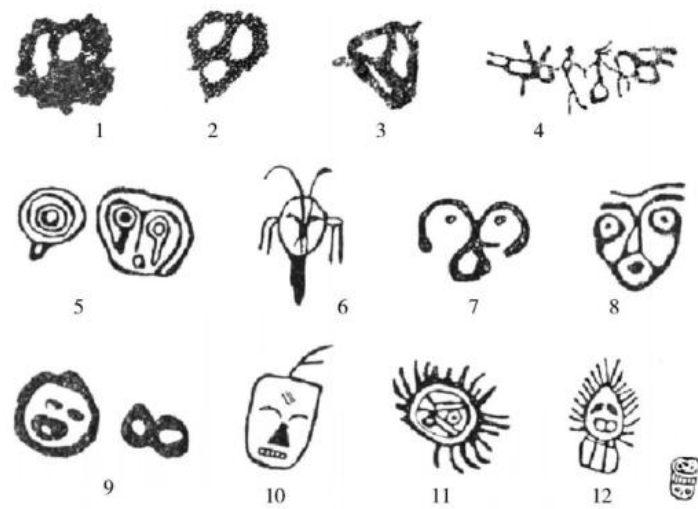


FIGURE 17 Petroglyphs in the Mawei Mountains: Mask (sphinx) petroglyphs

Source: Xi, L. (2009). Archaeology and cultural relics: a tentative discussion of the cultural factors of rock paintings in the Mazong Mountains area of Gansu Province. P. 98



FIGURE 18 Petroglyphs in the Mawei Mountains: Yak petroglyphs

Source: Xi, L. (2009). Archaeology and cultural relics: a tentative discussion of the cultural factors of rock paintings in the Mazong Mountains area of Gansu Province. P. 99

The surface form of the round stone tombs in the Mawashan area is close to that of the round stone tombs in the Dongheigou site and the Heigouliang Cemetery in

the Barkun Steppe. In Heigouliang Cemetery, two fragments of copper mirrors with feather-like ground pattern made in the Central Plains were found(Qian, 2006) It is known that the appearance of this kind of relics in the East Tien Shan area could not be earlier than the end of the Warring States period to the beginning of the Western Han Dynasty. Xilin in "Preliminary Study of Slate Tombs in the Mabeishan Area of Gansu" deduced that the age of the slate tombs in the Mabeishan area should be from the 2nd century B.C. to the post-B.C., which, together with the deer and stone style petroglyphs, constitutes a group of cultural factors in the nomadic cultural remains in the Mabeishan area, and may be related to the influence of the culture of the slate tombs of the Trans-Baikal and the Mongolian plateau(Xi, 2010). Therefore, the formation of petroglyphs in the Mazhoushan Mountains should be in the same period, i.e., not earlier than the end of the Warring States period to the beginning of the Western Han Dynasty.

#### 2.2.6 Jiuquan Subei Petroglyphs

Su Bei petroglyphs were first discovered in 1983. In 1989, the Gansu Province Archaeological Survey Group conducted a second expedition, not far from the petroglyphs in the Horsehair Mountain, and accidentally found the Palaeolithic period of beaten stone tools, which establishes that the petroglyphs of the creation of time laid the foundation. At the same time, this expedition also found more petroglyph sites. Seven petroglyph sites with more than 300 petroglyphs were found in the Qilian Mountains in the southern part of Subei County, among which Dahigou, Graywanzi, Seven Donkeys, and Algelitai petroglyphs were more intensively distributed(Yue et al., 2004).

Petroglyphs in Sukhumvit County used different methods of production at different times. The most common of these is the abrasion and carving method. Abrasive carving is a more commonly used means of expression in petroglyphs, i.e., the outline line is first chiselled (or drawn), and then rubbed back and forth along the outline line with a hard stone tool, so that the whole body is smoothed out, or becomes grooved(Chen, 2009). Most petroglyphs in Subei County were created by the rubbing and carving technique found in Dahigou, Hougaiwanzi, Shandel, and other petroglyph sites. At the same time, chiselling and line carving methods also appear in the

petroglyphs of Subei. For example, there is a chiselled petroglyph image on the cliff wall of Dahigou in Subei, and there is an image of a line carving method in the petroglyphs point of Dry Gorge in Yu'erhong Village of Shibao Township in Subei County, in which there are two artistic images of a dog and a deer depicted. In the later stages of the creation of the Subei petroglyphs, the production method no longer focuses on the three types of grinding, chiselling, or line carving. However, it shows a diversified tendency of expression, which, to a certain extent, makes the artistic style of the petroglyphs in Subei more diversified and the artistic characteristics more distinctive(H. Li, 2023).

As one of the largest counties in Gansu Province, the Subei Mongolian Autonomous County has a vast land area and rich petroglyph resources. According to statistics, the county has more than 20 petroglyph sites, including ten petroglyph sites in the south, such as Dahigou, Graywanzi, Seven Donkeys, Algeltai, Dry Gorge, Dajingquan, and petroglyph sites in the north, such as Shandel, Laodao Hudug, Holezadegai, Gegewusu, and so on. About 5,000 or more petroglyph images have been found, of which nearly 3,000 are recognisable (Han, 2015). It is deduced that most of the petroglyphs in the region were created during the Spring and Autumn and Warring States period to the Western Han Dynasty, and their creators were most likely the Xiqiang, Yuezhi, Wusun, and Xiongnu ethnic groups that were active in the Hexi Corridor region in the early period(Chen, 2016). These petroglyphs revolve around aspects of social life in the region in the early period, reflecting the ecological environment, geographic features, animal and plant production conditions, and human living standards, and revealing the origin of the ethnic groups in the region and the process of the development of their cultures. The petroglyphs in Subei can be roughly divided into four types, namely, animals, figures, scenes of life and other images, and the analysis of these four types can help to understand the ideology, production methods and religious culture of early human beings, thus further revealing the motives for the creation of the petroglyphs(H. Li, 2023).



FIGURE 19 Petroglyphs in Subei County-Yanchiwan Township Taming of the Bull

Source: Li, H. (2023). A study of the art of the northernmost cave paintings, P.

35



FIGURE 20 Petroglyphs in Subei County: Grey Bay Sub-North Goat

Source: Li, H. (2023). A study of the art of the northernmost cave paintings, P.

35



FIGURE 21 Petroglyphs in Su Bei County: Daheigou Pointed Hat Portrait

Source: Li, H. (2023). A study of the art of the northernmost cave paintings, P.

50



FIGURE 22 Petroglyphs in Su Bei County: Daheigou Pair of Sheep

Source: Li, H. (2023). A study of the art of the northernmost cave paintings, P.

51

TABLE 2 List of rock art contents in the main areas of the Hexi Corridor

NO	placement	Time of discovery	Tthrust	Production method	Time of formation	note
1	Niuwa Mountain, Yongchang County, Jinchang City	1994	Wildlife, animal husbandry, horsemanship, etc.	Abrasive carving is predominantly used in the late period, with chiselling and scratching.	Spring and Autumn, Warring States, Qin and Han Dynasties	--
2	Jinchang City, Yongchang County, 15 Migou	After 1994	Animals, grazing, Tibetan	Abrasive carving is the primary method. Tibetan for chiselled	Warring States to Ming and Qing Tibetan for Western summer	No clear time record found
3	Yumushan, Sunan County, Zhangye City	1985	Animal imagery, hunting husbandry, celestial motifs, symbols, and religious cults	Knockout chiselling is the primary method, followed by abrasive carving in the early period and line carving in the later period.	Neolithic, earlier than the Qin-Han period	--

TABLE 2 (Continued)

4	Jiayuguan Heishan	1972	Animals, Hunting, People, Dance, Religion, Other	Knockout chiselling is the primary method Abrasive engraving, line engraving	The Warring States period lasted until the Ming Dynasty	--
5	Jiuquan Horsehair Mountain	1980	Animals, hunting, herding, dancing, rituals, reproduction, etc.	Knockout chiselling is the primary method Abrasion and Scratching	Late Warring States period to early Western Han	--
6	Subei County, Jiuquan City	1983	Animals, people, life scenes, and other images	Abrasive carving is the primary method Chiselling, line carving, synthesis	Spring and Autumn, Warring States, and Western Han	--

By exploring the content and history of the central petroglyphs found in different areas of the Hexi Corridor, it can be seen that the petroglyphs in Hexi, although widely distributed and rich in content, are mainly concentrated in the four counties of Hexi, appearing in places with relatively intensive human activities. The content of the petroglyphs also confirms the phenomenon of the intertwining of steppe nomadic and farming cultures in the Hexi Corridor's history, and according to the literature collated

and analysed, the wind erosion of the petroglyphs, such as part of the Yumu Mountain area in Su'nan, may have appeared in the New Period. According to the literature analysis, the petroglyphs with a more serious degree of wind erosion, such as some of the petroglyphs in the Yumushan area of Sunan, may appear in the New Age. The petroglyphs with more animals appeared in the Warring States period before the Western Han Dynasty. The religious petroglyphs should at least appear in the post-Tang Dynasty. The form of their expression is weaker than that of Dunhuang mural paintings (the earliest appearance of Dunhuang mural paintings was in the Northern Wei Dynasty). According to the historical development, Tibetan script rock carvings should be presumed to have appeared in the Xixia-Yuan period. Therefore, the appearance of petroglyphs with different contents, such as animal, religious, and Tibetan scripts, in the same area indicates the occurrence of petroglyph iteration, which further illustrates the continuity of the human settlement area in the Hexi Corridor region, which is also in line with the principle of human adaptability to the geographic and natural environment of the Hexi Corridor.

### **2.3 Contents of petroglyphs in the Heishan of Jiayuguan**

The Heishan Petroglyphs are mainly distributed in six places, such as the Sidaoguxinggoues, Hongliu Gully, Shiguanxia, Banana Trench Gully, Jiaojie Gully, and Mozigou in the Heishan area of Jiayuguan Pass.

Sidaoguxinggou petroglyphs for the Heishan petroglyphs an important part of the village is located in Jiayuguan City, Yuquan Town, Huangcaoying Village northwest of the southern foot of the Heishan in the Sidaoguxinggou, ditch mouth of the Heishan Lake, the second brick and tile factory, in the ditch east and west side of the cliff rock wall found a total of 87 petroglyphs, grinding carved chiseled and engraved, carving the subject matter of dancers, hunters, riders, sand grouse, geese, horses, deer, donkeys, camels, wild oxen, mountain goats, yellow goat, blue goat, tigers, Wolves, foxes, snakes, and ancient poems from the Qing Dynasty.

Red willow ditch petroglyphs for the Heishan petroglyphs an important part of the village, is located in jiayuguan city Yuquan town yellow grass camp village west,

Heishan south foothills of the red willow ditch east from the Great Wall scenic area of the hanging wall of 7,000 metres, ditch the south side of the mountain on the mountain has three hill duns, the west side of the ditch with two grass beach connected to the cliffs and rock walls on the south side of the ditch found petroglyphs in 7 places, mochis, chiseling and engraved into the carving content of the Buddha hall, stupa, statue of the Buddha, the Tibetan inscriptions, animals and so on.

Shiguanxia petroglyphs, an important part of the Heishan, are located in Jiayuguan City, Yuquan Town, northwest of Huangcaoying Village, Heishan south foothills, the Great Wall of the Hanging Wall, on the west side of the Cultural Management Office. Grinding carving, when carved into, on the north and south sides of the gap on the cliff stone wall, found petroglyphs inscription 26, carving content reindeer, bison, goats, pan sheep, sika deer, ferns, camels, pythons, jackals, horses, dogs, foxes, and so on.

The petroglyphs of Mozigou are an important part of Heishan petroglyphs, located in Mozigou at the eastern foot of Heishan, north of Huangcaoying Village, Yuquan Town, Jiayuguan City. In the ditch on both sides of the cliffs on the stone wall found in a total of 9 petroglyphs, chiselled and engraved, engraved subjects are hunters, knights, dancers, flowers, wild boar, horses, camels, bison, donkeys, goats, goats, yellow goats, sheep, Tibetan inscriptions, Republic of China ancient poetry and so on.

Jiaoyuguan City, Yuquan Town, an important part of the Heishan petroglyphs for the Yellow Mountain petroglyphs, is located in the Yellow Grass Camp village north of the Heishan east foothills of the banana artemisia ditch. In the ditch on both sides of the cliffs on the stone wall found a total of 12 petroglyphs, when the carving and become, carving subjects are dancers, hunters, knights, pagodas, horses, deer, donkeys, camels, bison, goats, goats, antelope, tigers, wolves, foxes and so on.

An important part of the Heishan Petroglyphs are the Jiahegou petroglyphs, located in Jiayuguan City, Yuquan Town, Huangcaoying Village, northwest of Heishan, the southern foot of Jiahegou, east of the Great Wall Scenic Spot 3,000 metres, a ditch

on the south side of the Dachautan Reservoir, in the mouth of the cliffs, where petroglyphs are found, 2 chiselled and engraved, with the subject matter of knights, flying eagles, and tent skeletons.

## **2.4 Research and application of petroglyphs at Jiayuguan Heishan**

### **2.4.1 History of discovery and location of Heishan Petroglyphs**

In May 1972, Jiuquan Iron and Steel Company, Heishan Lake Farm, a worker in the Heishan Sidaoguxinggou sheep, found the Heishan petroglyphs. After the discovery of the petroglyphs, it immediately attracted people's attention. The Jiayuguan City Cultural Relics Clearance Team in the Shiguanxia Gorge, Sidaoguxinggou, carry out a preliminary investigation and found that the petroglyphs 31(Team, 1972).

In November 1978, with the assistance of the Gansu Provincial Museum, Jiayuguan City Cultural Education Bureau, the city of cultural relics management and the local garrison composed of a survey team, the Sidaoguxinggou and the branch ditch, grinding ditch, Shikuangxia, Hongliu ditch for the first time the census work, the discovery of the petroglyphs of 84, and Sidaoguxinggou petroglyphs to number the registration, indicating the content of the engraving, engraving method, the size of the picture. At the same time, with a transparent film instead of paper, the petroglyphs were copied one by one, and photographic data were taken(Hu, 2012).

On 10 September 1981, the Heishan Petroglyphs were announced as a provincial cultural relics protection unit(Gong, 1990).

In 1987, Jiayuguan Cultural Relics Protection Working Group again on the Heishan Shi Guanxia, red willow ditch, Sidaoguxinggou, grinding ditch, Jiaoha ditch, and banana artemisia ditch to do the second petroglyphs census, and the discovery of petroglyphs on scientific numbering, recording, copying, and topography reproduction work. A total of 153 petroglyphs were found before and after the two surveys. 10 more petroglyphs were found in Jiaogaogou in 2005 (Hu, 2012).

In October 2006, the Jiayuguan Municipal Bureau of Culture, Radio and Television and the Jiayuguan Cultural Relics Scenic Spot Management Committee

organised specialised personnel to carry out a comprehensive census of the six petroglyphs in the Heishan area of Heishan in the Heishan Shikuangxia, Hongliu Gou, Si Dao Shaped Gou, Mazi Gou, Banana Artemisia Gou, and Jiaoxie Gou based on the information of the previous two censuses. The census used satellite positioning instrument for each petroglyphs of latitude and longitude and elevation for accurate positioning, the use of video equipment and cameras to do a detailed image, image data, each petroglyphs were measured on the ground size, scientific and good records of all kinds, will be these valuable information to preserve the integrity of the archives, for the convenience of the future to find. Moreover, delineate the petroglyphs protection scope, set up a protection mark, set up a special person regularly on the petroglyphs protection area for serious inspection, make inspection records, and ensure the petroglyphs are effectively protected (Hu, 2012).

In July 2008, Jiayuguan City Bureau of Culture, Radio and Television and Jiayuguan Cultural Relics Scenic Spot Management Committee organised the third cultural relics census, this census work by and reference to the original information on the petroglyphs for the registration of the census, but also expanded the scope of the census in the Heishan a few of the main ditch depths of the new petroglyphs found in the 11, and do a good job of record-keeping and establishment of the archives work. So far, 164 petroglyphs have been found (Hu, 2012).

In October 2015, Jiayuguan Great Wall Museum, jointly with the Great Wall Cultural Management Institute of the Heishan petroglyphs, once again organised a survey and re-numbered the petroglyphs. A total of 143 petroglyphs were reviewed.

#### 2.4.2 Study of the content of Heishan Petroglyphs

Petroglyphs in the Heishan are mainly concentrated in 164 petroglyphs from the Warring States to the Ming Dynasty period in six places, namely the Sidaoguxinggou, Hongliugou, Mozigou, Shiguanxia, Jiahegou, and Jiaohaogou, which are about 2 kilometres long (Lan, 2017).

The Heishan Petroglyphs left traces of their production methods, which can be divided into three kinds: the first is the abrasion and carving method, in which the traces

of carving are very shallow, and the image is ancient, primitive, and generally not very clear. The second kind, the knocking chisel method, uses a firm such as an even knocker and metal tools, knocking a chisel with a dense point that constitutes the outline and not a line. Some images of the chisel traces are still self-explanatory. The vast majority of Heishan Petroglyphs are chiselled. The third is the line-carving method, probably using sharp chisels, knives, and other metal tools to carve lines on the stone surface, outlining the picture's outline with shaded lines, some thicker and deeper(Chu et al., 1990).

In the more than 30 petroglyphs found in the early days of Heishan, the vast majority of the content, like the petroglyphs in Xinjiang, reflects nomadic and hunting life. Although the individual images show simple military drills, no weapons such as swords and spears are seen. The images and costumes of the characters are similar to the style of the land and water attacking and fighting pictures on the copper containers of the Warring States unearthed in Huixian County. Therefore, it seems that the petroglyphs are of an earlier age and should be the cultural remains of the ancient nomadic people in northwest China(Team, 1972).

Through the petroglyphs appear in the animal images, the picture of human production, life situation, as well as the costumes of the characters to infer the age of the petroglyphs, the combination of the above factors and refer to part of the literature analysis, Hu Xue in the Jiayuguan Heishan Petroglyphs protection and use of the investigation of the Heishan Petroglyphs roughly divided into the Heishan Petroglyphs of the early period (emergence), the middle period (maturity), and the late period (continuation) of the three phases:

The early Heishan Petroglyphs belong to the era of primitive domesticated petroglyphs, the end of the Palaeolithic Age and the early Neolithic Age, about 10,000 to 6,000 years ago. The petroglyphs distributed in the Sidaoguxinggou have more than 430 figures and animal individuals, among which, the appearance of large-horned deer, water deer, rhinoceros, bison, giant tapirs, jackals, tigers, pythons and other animals indicates that at that time, the climate here was warm and humid, rainfall, dense forests,

canyons and rivers for a variety of animals to flourish and provide suitable climatic conditions, with the apparent characteristics of the subtropical climate. Early ferns evolved into plants in the petroglyphs of Heishan and Horsehair Mountain. Ferns warmed up with the climate of the Hexi Corridor and could only be preserved until 11,000 to 7,000 years ago. Only when the ancient people in the Heishan region saw this plant could they have chiselled it on the cliff wall(Yang & Zhang, 2001). A comparative study of the two reveals that some of the petroglyphs here are early works(Hu, 2012).

Heishan petroglyphs in the middle period belong to the cultural remains of the nomadic peoples of the Warring States period, the Qin Dynasty, and the early Western Han Dynasty. During this period, the ancient Chinese nomadic herders active in the Hexi Corridor included the Wusun, the Yuezhi, and the Xiongnu. During the Spring and Autumn Period and the Warring States Period, the Wusun were active in the Western Corridor "between Qilian and Dunhuang(Ban)". The Xiongnu liked to use tigers in their paintings to show their fierce national character. There are many tiger images in the petroglyphs of Yinshan and Heishan, and most of the tigers are realistically depicted, often in groups, and some are decorated with lines(Gai, 1986). Thus, it is believed that the Huns were the leading creators of the petroglyphs at Heishan in the middle period(Hu, 2012).

Heishan petroglyphs in the late period mainly reflect religious and cultural contents. The halls, pagodas, statues, and ancient Tibetan inscriptions in the petroglyphs at Hongliugou and Shiguanxia may belong to religious relics from the mid-Tang Dynasty onwards. Tibetan Buddhism, commonly known as Lamaism, was founded in the 7th century A.D. along with the ancient Tibetan language when Songtsen Gampo was a member of the Tubo dynasty(Hu, 2012).

In 1990, Chu Shibin et al. in "Ancient Petroglyphs in the Heishans of Jiayuguan Pass, Gansu" classified Heishan petroglyphs into five categories according to their contents:

1. Hunting images. Reflecting the hunting content of the petroglyphs is one of the main subjects of the Heishan Petroglyphs. Hunting is the primary source of

economic survival for ancient nomadic people; these petroglyphs reproduce the ancient ancestors of nomadic life.

"North American natives dance the 'Bison Dance' is when they cannot catch the bison and face starvation, the dance has been to continue the appearance of the bison, because the Indians believe that the appearance of the bison and the dance have a causal relationship(Yang & Zhang, 2001)." On the one hand, the scenes of hunting, dancing, rituals, and other activities in the petroglyphs of the Heishan reflect the survival of human beings at that time, which was mainly based on the hunting economy. On the other hand, it is still related to worshipping animals and totems, reflecting the early human beings' ascension from survival to spirituality. This, having an ordinary object of worship, obeying certain sacrificial rituals (dance), and unifying the will of the clan to accomplish the significant survival or production activities of the clan (hunting), is also a manifestation of the beginning of the germination of early social organisation (Xu, 2016).

Heishan petroglyphs hunting scenes, in addition to showing a single person with a bow and arrow to shoot goats or reindeer, include more of the performance of group hunting activities and scenes. All these images truly reflect the vigorous pursuit of the spiritual life of ancient nomads(Kang, 2015).

2. Dance images. The most striking Heishan Petroglyphs are dance images. Dance petroglyphs to Sidaoguxinggou for more and finer, in various forms, beautiful dance, single dance, double dance, and multi-person dance.

Heishan Petroglyphs dance figure in the image and clothing costumes with distinctive national characteristics and rich national flavour, the figure of the top of the head are erected with high pointed ornaments, clothing, some of the long skirt girdle, only exposed feet; some wearing short skirts, appear to be dexterous and lightweight, in some other dance scenes, enthusiastic people dressed in girdle robes, the top of the head of the feathered ornaments, cross the waist to raise their arms and twisting the torso, or the formation of group dance, or a single solo dance, rich in life. Or a single solo dance, full of life interest. All these pictures truly reflect the vigorous pursuit of the spiritual life of the ancient nomads(Kang, 2015).

3. Animal images. In the Heishan Petroglyphs, animal images are the most numerous, and they are also the thematic content reflecting nomadic life. Animals in the cattle for the most part, followed by deer, sheep, horses, birds, camels, tigers, dogs, and so on. Forms vary in size, the largest being a tiger body length, electrons centimetres, the smallest being a deer body length, and height centimetres. Some animal images are primitive in conception, rough and ancient, while others are delicately carved and vivid(Chu et al., 1990).

The recurring animal images in the Heishan Petroglyphs are no more than bison, camel, wolf, dog, mountain goat, sheep, and so on. This fully reflects the characteristics of the natural conditions of the Jiuquan Heishan area and the life of the petroglyphs' authors. In ancient times, wild oxen in the Jiuquan area "weighing thousands of kilograms" ran in large herds, and fierce wolves infested the mountains and fields, hurting people and animals; as for camels, they are still one of the most potent means of traffic and transport among the people(Yin, 1987).

4. Religious images. This kind of petroglyph is less common and was only found early. It is carved in the red willow ditch cliffs, and it contains halls, Buddha, pagodas, and other images.

Buddhism since the Eastern Han Dynasty from India to China, the Hexi Corridor built by the successive generations of grotto temples, temples, pagodas, such as Dunhuang Mogao Grottoes, Zhangye Buddha Temple, Wuwei Roshi Temple Pagoda, etc., are treasures of Buddhist art and rare cultural relic remains. However, stone Buddhist petroglyphs with images of temple deities such as these are still found for the first time in the Hexi Corridor(Chu et al., 1990).

According to historical records, after the Tang Zhenyuan, because of the pacification of the "Anshi Rebellion", the West River was empty, and the Tubo took the opportunity to occupy the River Long for more than 100 years. Tubo people living west of the river, in the red willow ditch, ShiGuanXia carving Buddhist temple, bodhisattva, statue, stupa, is entirely possible. From this, it is inferred that the stupas, Buddha

statues, and Tibetan inscriptions in Hongliugou and Shiguanxia in Heishan are religious relics of the Tubo people after the mid-Tang Dynasty(Hu, 2012).

5. Wheel images. Only one wheel petroglyph was found in the early period in Sidaoguxinggou in Heishan. Its shape is simple, similar to the single-drawn carts in the Bronze Age and even in the early Iron Age in China. This kind of wheel petroglyph is also found in Inner Mongolia Yinshan, with obvious period characteristics(Chu et al., 1990).

#### 2.4.3 Totem Worship in Heishan Petroglyphs

Most of the scenes in the Heishan Petroglyphs reflect primitive totem worship, which, according to the pictures' content, can be classified into animal worship, fertility worship, and dance worship.

In "Interpretation of Animal and Totem Worship in Petroglyphs of the Heishans of Jiayuguan", Xu Navy points out that animal petroglyphs have religious connotations worldwide. Most animal petroglyphs may have mimicked the significance of witchcraft, with prayer ceremonies held near the petroglyphs both to appease the souls of the slain animals and to reassure the hunters of another successful hunt(Xu, 2016)."

In the petroglyphs of the Heishan, in addition to most of the images of animal groups appearing in hunting or grazing scenes, there are also some individual animal images, which are generally more finely chiselled and full of meaning. The petroglyphs of the Sidaoguxinggou depict a tiger with a large head, a wide open mouth, a pair of pointed ears, a short and thick neck, a strong and unmarked body, four legs on the ground, claws with tips exposed, and a long tail. "The primitive artist has succeeded in carving out the tiger's ferocious personality and features, but the man does not hunt the tiger and shows no fear. The tiger was likely a totem worshipped by the ancestors who inhabited this land(Yang & Zhang, 2001)." Similar to the petroglyphs of the Heishan is a clear petroglyph of a pan sheep, which can still be seen from time to time in this area, found on a separate rock deep in the Jiaosu Gorge during the third cultural relics census in 2008. Such detailed animal images in these petroglyphs show that these animals were closely related to the survival or life of the people at that time, and the

painters deliberately carved these animals in beautiful and evocative images, reflecting their feelings of worship for the animals. In many scenes of Heishan Petroglyphs, when people and animals appear in the same picture, the image of animals is often much larger than the actual proportion of people. The size of the human and animal images in these pictures is intentional by the painters, from which the painters' worship of animals can be reflected(Xu, 2016). "In Helan Mountain petroglyphs, there is a combination of sheep and sun graphics; this dual structure form is actually through the combination of the sheep and the sun, showing the worship of animal totem and sun totem(Li, 2012)."

Hegel says: "What is often emphasised and venerated in the East is the universal vitality of nature, not the spirituality and prowess of ideology, but the creative power of reproduction ..... Specifically, the view of the universal reproductive power of nature is expressed and worshipped in the shape of the male and female genitals(Hegel, 1997)." He argues that genital worship is one of the most prevalent forms in the East.

In the Heishan Petroglyphs, most of the images of fertility worship with human subjects are shown in dances. "There is a nude female dancer with protruding breasts, and next to her is an object that looks like a baby." "In addition, the M2 picture of Mozigou carved four dancers, divided into the upper and lower two groups. In the upper group, two men dance with their left hands folded and their right hands in a strong position; in the lower group, two men hold hands and dance in pairs, with the strong man facing the thin woman, and the man exposing his exaggerated genitals(Yang & Zhang, 2001). This is a petroglyph of fertility worship with a clear intent. This petroglyph illustrates the position of men in reproduction and directly expresses the idea of fertility worship of the ancestors(Luo, 2015). Heishan Petroglyphs often show images of male and female genitals, symbols of reproduction, and so on. Moreover, the men depicted in the petroglyphs have erect and large genitals (Lan, 2017).

The bow and arrow are symbols of sexuality. Weiler in *The Cult of Sex*: "The male genitals are also symbolised as arrows, the two feathers of which imply the testicles. Cupid, the god of love, is usually represented as holding a bow and an arrow

or a box of arrows, symbols of the male genitalia inspired by legitimate conjugal life(Wei, 1988).

Painter Chen Zhaofu agrees that bows and arrows have a two-tiered meaning in primitive art: "They often appear in petroglyphs of hunting and war. However, people often overlook the other layer of symbolism of the role of the bow and arrow, that is, the significance of reproductive reverence worship(Chen, 2002). The bow and arrow petroglyphs in the Heishan Petroglyphs, in addition to a large number of hunting petroglyphs, the petroglyphs about bows and arrows are symbols of a kind of reproduction worship, and they exist as reproduction worship petroglyphs. This kind of petroglyph with bow and arrow as reproductive sympathetic sorcery has appeared in many regions of China, and there are also sun bow and arrow type petroglyphs in the Hutubi reproduction worship petroglyphs in Xinjiang, the Yinshan petroglyphs, the Helanshan petroglyphs, and the Cangyuan petroglyphs in the south. These petroglyphs with bow-and-arrow type are, to a large extent, far more symbolic than they are realistic (Luo, 2015).

Footprints and hoofprint-type petroglyphs are one of the manifestations of fertility worship in ancient times. It is not very widespread geographically among northern petroglyphs. "Many stone prints of the late Palaeolithic ancestors' hands have been found in places such as Binggou Farm in the Qilian Mountains, which is distantly opposite to Heishan, and Zhoujia Housi in the western part of Jiuquan City(Yang & Zhang, 2001)". This type of petroglyphs also exists in the petroglyphs of the Heishan, as explained by Mr Chen Zhaofu: "It [the 'Human and Footprints' petroglyphs] is ethereal art, which connects to another world, which is not the real world, but may be a world that is believed or conjectured to exist elsewhere(Chen & Xing, 1993)." The appearance of footprint petroglyphs coincides with some of the myths and legends of China's ancient times, which should not be an unintentional coincidence, but has some connections(Luo, 2015).

"The Linking Arm Dance is a religious ritual closely associated with procreative coitus. The presence of erect phalluses on the Lien-Arm Dance figures on the coloured

pottery of the Majiayao culture is a representation of the cult of reproduction(Shao, 2010). As there were many beasts and few people in ancient times, human reproduction was essential, so the mystery and worship of sex arose. During the long period from matrilineal to patrilineal clan societies, primitive people were immersed in the joy of games characterised by reproduction, and dance was precisely a manifestation of this idea of sexual aggrandisement(Luo, 2015).

Heishan petroglyphs have three large "dance pictures"; the performance of the ritual dance, the characters of the headdress, clothing, and movement are more or less the same, two of them painted with the sorcerer or kneeling or standing prayer scene(Kang, 2015). There are also many images of drill dance scenes, which are more delicately and exaggeratedly portrayed, and it is not difficult to see their religious fervour in the postures of these dancers, which also reflects the love of the primitive ancestors in the Hexi region for dance(Lan, 2017).

In addition to hunting, the most significant number of scenes reflecting the activities of people in Heishan Petroglyphs are dances. Dance is also a primitive religious worship ritual, has a mysterious symbolism, and is very common among primitive peoples. The Bechuanas in Africa "practise a unique totem dance, which varies from one ethnic group to another. Because of this, if the Beytna want to know to which ethnic group they belong, all they have to do is ask, 'What kind of dance do you do?' (C.A.), 1985).

Dancing rituals in the petroglyphs of the Heishans, with small scenes of two or three people, and large scenes of one or twenty people(Xu, 2016).

#### 2.4.4 Religion in Heishan Petroglyphs

Jiayuguan Heishan Petroglyphs are the most representative. The pagoda in the Heishan region has many Buddhist caves, such as Dunhuang's Mogao Grottoes, a Buddhist art site. However, the style of the pagoda found does not have many similarities with the stupa. Most pagodas are different from the stupas in the Indian region in shape and composition, and only a small number of pagodas are more similar to stupas(Lan, 2017). The pagodas in the petroglyphs of the Heishan are mainly located

in Hongliugou, Shiguanxiakou and Mozigou. There are five pagodas in the article "Ancient Petroglyphs in the Heishan of Jiayuguan Pass, Gansu Province" published in 1978, and two more pagodas have been found by the relevant expedition teams in Shiguanxiakou and Mozigou, so that the total number of pagodas in the petroglyphs in the Heishan is seven at present. The pagoda-shaped drawings in the Heishan Petroglyphs are relatively dispersed, and the contents of the carvings are distinctly different from those of the neighbouring petroglyphs(Long, 2017).

Most scholars believe that the religious attributes of the pagodas in the Heishan Petroglyphs belong to the Buddhist remains, such as Su Bai's Investigating the Buddhist Remains in Xinjiang: A Few Issues to be Aware of, Tendering Wen's The Art of Petroglyphs in Gansu, Gansu Jiayuguan Heishan Petroglyphs in the Gansu Provincial Museum, Zhang Junwu's Heishan Petroglyphs: The Symbol of the Ancient Civilisation. While Yang Huifu and Xu Dong's article "Pagoda Figures in Jiayuguan Heishan Petroglyphs and Their Related Problems" argues that these pagoda figures are a product of the fusion of Buddhism and Benjamineism(Long, 2017).

The pagodas in the Heishan Petroglyphs are later than the fifth stage of the pagodas in the petroglyphs of Tibet, and they are not the "Gadang Joktun" pagodas that were popular in the Hexi region in the 14th century. The pagodas in the Heishan Petroglyphs date from the Middle and Late Tang to Song and Yuan Dynasties, i.e., the religious relics of the Tubo people from the middle of the eighth century to the beginning of the fourteenth century(Long, 2017). The pagoda figure in the petroglyphs of Heishan in Jiayuguan has long been regarded as a Buddhist relic, and even some scholars have explicitly pointed out that it is a lama's pagoda(Zhang, 1994).

According to the staging method in the book "Petroglyphs of the Heishan in Jiayuguan" and in combination with the viewpoints in "Ancient Petroglyphs of Jiayuguan in Gansu", the pagoda pattern should belong to the religious relics of the Tubo ethnic group in the third period of the petroglyphs in the Heishan, i.e. from mid-Tang Dynasty to the Song and Yuan Dynasties. According to the analysis of their ethnicity, the source of these pagoda pictures in the petroglyphs of the Heishan should be in Tibet. Prof. G.

Duqi, a famous Italian Tibetologist, pointed out when analysing the development process of petroglyphs in Tibet that the carvings of pagodas appeared in the late stage of the development of petroglyphs in Tibet. Recently, many archaeological discoveries in Tibet have proved that Professor Duqi's view is correct(Committee, 1994).

Compared with such patterns in Tibet's petroglyphs and Helan Mountain's petroglyphs in Ningxia, the pagoda-shaped pictures in the Heishan Petroglyphs are more delicate and complex. They are a branch of the petroglyphs of Tibet that were developed in the Hexi Corridor. However, their shapes and their religious contents differ from the pagoda-shaped pictures in the petroglyphs of Tibet and Helan Mountain. These pagoda pictures not only reflect Buddhism's ideas but also the ideas of Benjaminism, which is a product of the fusion of Buddhism and Benjaminism. They provide valuable original data for us to understand the religious beliefs of the Tubo people who lived in Heishan at that time(Yang & Xu, 2009).

#### 2.4.5 Conservation of Heishan Petroglyphs

Heishan Petroglyphs are distributed on the exposed rocks of Heishan, and long-term damage to the petroglyphs is caused by wind, sun, rain, erosion, animal trampling, plant climbing, natural defacement, and climate change. Hu Xue in the Jiayuguan Heishan Petroglyphs protection and use of investigation pointed out that some of the petroglyphs have appeared fissures, falling blocks, flaking and other phenomena, 1978 census found individual petroglyphs, in a short period of more than 20 years are by the wind, sun, rain erosion, weathering difficult to find a trace of. A similar phenomenon exists in the petroglyphs of Shiguanxia and Jiaogaogou(Hu, 2012). Yang Mei in the "Exploration of the types of diseases and protection strategies of northern petroglyphs heritage--Taking Jiayuguan Heishan Petroglyphs as an example" pointed out that the diseases of Heishan Petroglyphs due to natural factors are mainly fissures, mechanical damage, surface weathering, surface discolouration, biological damage, and the fissures are the dominant hazardous factors that affect the stability of the rock body the most, and the Heishan Petroglyphs have different degrees of fissure development. There is a similar phenomenon in Shiguanxia and Jiaogangou. The

Heishan Petroglyphs all have different degrees of fissure development, and most of them are tectonic fissures, mechanical fissures, and superficial fissures, which bring significant challenges to the restoration of the petroglyphs in the later stage(M. Yang, 2023).

In addition to the damage caused by natural factors to the Heishan Petroglyphs, the inspection process found visitors and passing herdsmen in the petroglyphs on the carving picture, randomly knocking and chiselling. Other behaviours on the petroglyphs caused the most prominent damage, seriously damaging their integrity and beauty. In recent years, mining, quarrying, construction and other behaviours around the protection range of petroglyphs have seriously damaged the geography, geomorphology and natural environment around the petroglyphs, posing a potential threat to the protection and safety of the petroglyphs(Hu, 2012).

There are petroglyphs in more than 100 countries in the world, and there are also petroglyphs in more than 20 provinces and districts in our country. Protecting, researching, and utilising them is always tricky (Hu, 2012). For the protection of Heishan Petroglyphs, scholars have given the following suggestions according to the reasons for their formation:

About the Heishan Petroglyphs that are diseased due to natural factors, Yang Mei suggests that the treatment methods that can be adopted include grouting of fissures, anchoring and reinforcement of the rock body, bonding of flaky exfoliated petroglyphs, sealing of the weatherproof surface, seepage-proofing and drainage of the petroglyphs, cleaning of petroglyphs' surface and stains of the fissures, and removal of plants between the rock body and the fissures of the petroglyphs, etc(M. Yang, 2023). Xu Haijun, on the other hand, suggests that some of the Heishan Petroglyphs are scattered with small pieces that are easy to move, and there is a danger of losing them. In order to ensure the safety of these petroglyphs, they should be registered, archived, and preserved in museums or other places for protection.

For the Heishan petroglyphs due to human factors caused by the disease, in addition to strengthening the publicity, government protection, Yang Mei, Xu Navy in,

suggested to take treatment methods are set up to protect the fence, protect the petroglyphs of the endowment environment, to carry out the petroglyphs of the legislative protection of the(M. Yang, 2023), suggested that Jiayuguan City, the relevant departments of the protection of petroglyphs in the Heishan petroglyphs can be used in the formulation and implementation of the "Regulations on the Protection of Petroglyphs in the Heishan(Gao, 2016)".

Carrying out digital protection of petroglyphs, digital protection of cultural heritage, preservation, and collation research has become an internationally accepted new idea and important method. Carrying out digital conservation of Heishan Petroglyphs is one of the important means of modern protection of cultural relics resources and cultural heritage, obtaining detailed petroglyphs ontology and surrounding environment data through digital conservation technology, and constructing permanent archives of petroglyphs, so that the petroglyph data can be permanently retained(M. Yang, 2023). Establish and improve the archives of Heishan Petroglyphs, and carry out a petroglyph census every year against the archives to grasp the changes of petroglyphs in detail.

#### 2.4.6 Petroglyph applications in Heishan

Petroglyphs, as primitive art, are full of wildness and vitality because of their rugged, rustic, and simple characteristics, making them irreplaceable in the history of prehistoric art. Using Heishan Petroglyphs resources for cultural development is another form of conservation.

In "Research on Visual Design Based on Jiayuguan Heishan Petroglyphs", Feng Guowei proposes that, based on in-depth research on the content, culture, and visual aesthetic characteristics of Jiayuguan Heishan Petroglyphs, the current design status of the petroglyphs can be analyzed and positioned. The design elements, such as subject matter, modelling, and colour, can be extracted for visual design, so that visual design works conforming to the modern aesthetic characteristics with the regional characteristics of Jiayuguan Heishan Petroglyphs can be designed and used for the visual application of derivatives. Design works and carry out the visual application of

derivatives. In this way, we can promote the protection and development of the petroglyphs in the Heishan of Jiayuguan, innovate and enrich the tourism and cultural products, and enhance the popularity and influence of the petroglyphs in the Heishan(Feng, 2020).

Xu Fucang and Zhang Rui in "Excavating the Connotation of Petroglyphs Resources, Experiencing the Charm of Culture and Art - A Brief Introduction to the Petroglyphs in the Heishan of Jiayuguan Pass" indicate that through the collation and research of the petroglyphs resources in the Heishan, it will be more systematic and clearer to seek for the entry point suitable for the children's art education, to develop the school-based teaching materials, and to expand the content of the art teaching activities. Let the excellent traditional art culture be spread, promoted, and inherited through art teaching(Xu & Zhang, 2016).

Ma Jianxin and Zhang Yu also put forward four suggestions for the application of Heishan Petroglyphs in teaching, including approaching the art of Heishan Petroglyphs, perceiving the art of Heishan Petroglyphs, experiencing the art of Heishan Petroglyphs, and expanding the art of Heishan Petroglyphs in the "Research on Visual Design Based on the Heishan Petroglyphs Carvings in Jiayuguan Mountain" in the context of their professions(Ma & Zhang, 2018).

Wang Ying is promoting the preservation of petroglyphs through the design of the Heishan Petroglyphs Silk Scarf(Wang, 2020).

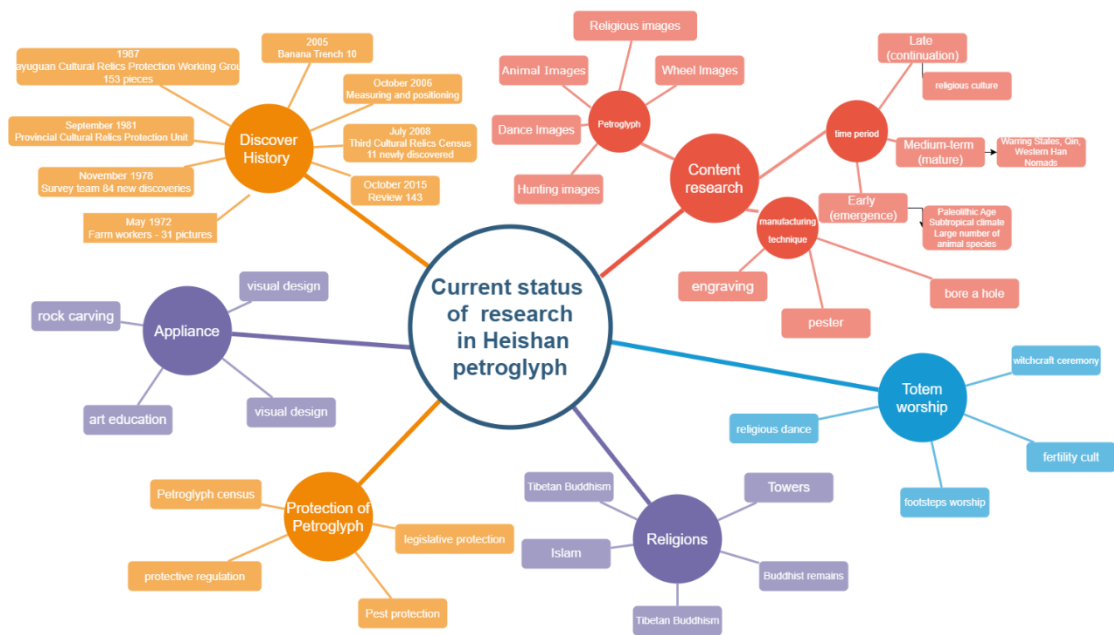


FIGURE 23 Schematic diagram of the current status of the main research content

Source: The author summarises the drawing

To sum up, the applied research on Heishan Petroglyphs is still relatively small, failing to form an effective way to learn from the research. This is because there is less basic research on petroglyphs, no research platform is available, and petroglyphs are not enough to effectively disseminate, develop, and utilise the petroglyph resources.

## 2.5 Digital repository construction

The digital teaching resource library is a good form of protection for petroglyphs. Cao Xiaojin, in "Research on the Construction of Digital Resource Base for Non-Heritage under Digital Information Technology", said that the digitisation of non-heritage preservation is undoubtedly the focus of intangible cultural heritage preservation in the coming decades, and that while drawing on the experience of advanced technology, non-heritage items of different regions, populations, and natures are also digging their new ways of digital preservation(Cao, 2023).

Digital preservation is not a temporary task, but a part of ongoing preservation work, and the qualities of the non-heritage items it records and the process of their

development and even extinction will become the heritage of humanity. A large number of new digital cultural and tourism projects revolve around cultural resources such as cultural relics, non-heritage items, documents, sites and landscapes, and are digitally empowered by virtual reality, theatre on the cloud, digital exhibitions, intelligent scenic spots, etc., which in turn lead to new forms of viewing, new modes of industry, and new scenarios of consumption(Cao, 2023).

The establishment of a digital teaching resource base for Heishan Petroglyphs is conducive to the digital protection of Heishan Petroglyphs resources. On the other hand, it is more convenient for relevant experts, scholars, and petroglyph enthusiasts to carry out research work, and the presentation of digital resources provides a certain degree of convenience for developing the application of Heishan Petroglyphs.

Multimedia teaching resource library is a kind of open teaching resource system that uses modern information technology to integrate, present, and manage multimedia materials of educational teaching resources, and update, disseminate, and share teaching resources through a computer network environment(Sun et al., 2013). Compared with traditional teaching methods, multimedia teaching resource library is more conducive to the construction and application of multi-level and three-dimensional teaching mode, with distinctive features such as systematicity, diversity, practicability, dynamism and synchronicity(Wang, 2017).

The purpose of creating and improving resource databases mainly lies in application. For databases to have the value of an application, database users should be given more complete functions(Gao, 2020). Therefore, the resource database should collect as many works and related materials as possible. The collection process should be exhaustive, with an awareness of collecting the already available resources. At the same time, it is also necessary to collect the resources that have not been entered into the library, such as some physical painting resources, and carry out the corresponding digital conversion(Jin, 2017). In the process of creating the database platform of non-heritage resources, it is necessary to fully take into account all kinds of technological strategies, such as two-dimensional and three-dimensional, to achieve the sound effect

of three-dimensional and complete presentation of multimedia graphics, text, and audio-visual(Gao, 2020).

Standardisation and normalisation are the fundamental guarantees for the quality construction of databases and are important prerequisites for realising the common construction and sharing of resources and information. The collection of information, collation, recording, citation, processing, and entry of each link, as well as the construction of the database foreground, etc., should be standardised as the premise. The database construction function should be divided into several links according to the construction principles of the premise. It is necessary to establish a systematic and comprehensive resource database to clarify its functionality and make a "top-level design" for each link, using digital technology to collate and classify raw data. Comprehensively use a variety of modern digital technologies, such as digital photography, digital audio recording, video, virtual reality, and other technologies, to digitise existing raw data, such as historical photographs, maps, oral histories, etc., in order to obtain a realistic, present effect(Zhao, 2016). Effectively ensure the accuracy, validity and reasonableness of information(Wang, 2015). Due to the special characteristics of intangible cultural heritage, such as living, highly personalised, inherited, and mutated, the resource database is both a carrier of knowledge and a medium of communication(Chen et al., 2017).

Xiao Yuanping mentioned in "Research on the Path of Construction of Digital Public Service Platform for China's Cultural Heritage" that different types of databases can be constructed according to the contents, carrier forms, and users' needs involved in intangible culture, including but not limited to (1) literature bibliographic database. Store bibliographic information of books related to intangible cultural heritage. (2) Audio database. Recordings of intangible cultural heritage are collected and stored in a database for long-term research by interested people. (3) Video Resource Library. Video resources are the permanent preservation, management and display of performing arts, rituals, ceremonies, etc. of intangible cultural heritage using modern

media technology, which are divided into three types, namely real resources, virtual resources, and resources integrating the reality and the virtual(Xiao & Wang, 2016).

Comprehensive above concluded that the construction of Heishan Petroglyphs teaching resource base is necessary, in digital storage of Heishan Petroglyphs resources have important significance, on the one hand, play a role in the protection of the dissemination of the role of the other hand, but also facilitate academic research and enthusiasts to learn and study, but also to facilitate the application of the development of the local culture and tourism industry. In the construction process, standardisation and top-level design of the overall layout of the digital teaching resource library, three-dimensional resource storage through text, literature, sound, pictures, video, animation, virtual reality, and other forms must be considered.

## **2.6 Domestic and International Relevant Research**

### **2.6.1 Conservation of rock art abroad:**

The distribution range of foreign petroglyphs is vast, covering many continents such as Europe, Africa, Asia, and the Americas. European petroglyphs are mainly distributed in caves and open cliffs in France, Italy, and other countries. On the other hand, African petroglyphs are mainly found in sub-Saharan regions such as Egypt and Ethiopia. Because of their different historical and cultural traditions, these countries have adapted to their local conditions and formed petroglyph conservation methods with regional characteristics. Due to the effective petroglyph protection measures, these countries have successfully applied for the World Cultural Heritage. At the same time, the successful application of the World Cultural Heritage also promotes the further implementation of petroglyph protection(Huang, 2016). Most foreign countries will, on the one hand, strengthen the protection and research of petroglyphs ontology, explore the method of scientific, standardised and comprehensive recording of petroglyphs, and try to establish digital archives; on the other hand, actively explore the management methods of petroglyphs and the protection laws and regulations; make the best use of the situation to build a variety of public platforms, carry out a variety of forms of publicity and education, and form a good social atmosphere for the protection of petroglyphs. At

the same time, also pay great attention to the exploitation and utilisation of petroglyphs, the Formation of petroglyphs protection sustainability(Huang, 2016) Professor Anati, President of the International Association of Petroglyphs, wrote an article to the world to call for the "rescue of the world's petroglyphs(Qin & Qin, 1987)".

#### 2.6.1.1 Conservation of rock art in France

Many European countries have a rich cultural heritage of petroglyphs, and their petroglyph research and petroglyph conservation started earlier. As most of the petroglyphs in France are concentrated in caves, some outstanding petroglyph researchers have carried out in-depth research on them for a long time, and adopted the method of in-situ restoration to reproduce the important cave petroglyphs and even the caves themselves, which can control the number of people who visit the site, and also restore the real environment of the prehistoric petroglyphs, which can allow tourists to view the prehistoric art in a more realistic context(Zhang, 2014). For example, the Lascaux Petroglyphs Conservation Project has successfully protected the petroglyph resource by limiting the number of tourists, establishing protected areas, and sheltering structures. Visitors must follow strict rules when visiting the petroglyphs, which prohibit touching the petroglyphs and using flashbulbs, etc. Virtual reality technology is also used to display images and information about the petroglyphs to tourists to deepen their understanding of them (D. K. Li, 2023).

#### 2.6.1.2 Conservation of rock art in Italy

Italy's Monica Valley petroglyphs are relatively well protected, and entered the World Heritage Protection List as early as 1979, when Vanlcamoni created a national park model of petroglyph management and protection. Petroglyph researchers here have worked hard for many years to develop a methodology for excavating, arranging, and recording petroglyphs, and in 1964 established the Research Centre for Card Prehistoric Art, creating the world's largest and most comprehensive archive of petroglyphs. The Research Centre also has an international journal on prehistoric and primitive art, and publishes occasional annual issues of the journal and works related to petroglyphs and archaeology. As a result, Italy's petroglyph conservators are exploring

the conservation of local petroglyphs while providing an excellent research platform for petroglyph research experts and enthusiasts from around the globe. (Huang, 2016). The protection of cultural heritage is explicitly stipulated in the Italian Constitution and the Law on Cultural and Natural Heritage. The Code for the Protection of the Heritage of Cultural and Natural Landscapes has been specially formulated, which grants punishments and imprisonment to vandals in different amounts and for different periods, depending on the severity of the vandalism behavior (Yang, 2012). This has also played a positive role in the conservation of petroglyphs in Italy.

#### 2.6.1.3 Conservation of rock art in Africa

Africa is rich in petroglyphs and has the most significant number globally. The Tsodilo Mountains in Africa are known as the "Louvre of the Desert", one of the world's most concentrated areas of petroglyphs. Africa's petroglyph research and protection has been strongly advocated and supported by the government, in the 1980s, South Africa's famous petroglyphologist Lewis Williams created the South African University of Kingsford Institute of Petroglyphs, the world's only petroglyphs specialised university, petroglyphs have even become a symbol of the country's image (Huang, 2016). Petroglyph scholars in South Africa have summarised a research method that combines petroglyph investigation and research with local ethnography, and uses local archaeological, historical, and cultural information, as well as local folklore activities, as vivid notes for petroglyph interpretation. Petroglyph managers take the approach that residents themselves conserve the petroglyphs, and scholars actively provide training in ways that enable residents to benefit from petroglyph conservation, in order to achieve sustainable development of petroglyph heritage conservation (Africa) & Qinglin, 2013).

#### 2.6.1.4 Conservation of Bolivian Petroglyphs

Bolivia in South America has more than 1,000 petroglyph sites with petroglyphs nearly 1,000 years old. The Livia Petroglyph Institute, composed of professional archaeologists, plays an important role in conserving petroglyphs here. On the one hand, they provide guidance for petroglyph education and publicity. On the other hand, they provide professional advice to the relevant institutions before the

government turns some petroglyphs into cultural resources. In addition to strengthening the protection of the petroglyphs, they are also actively involved in the state authorities' planning of the archaeological parks (Huang, 2016). The National Archaeological Institute of Bolivia has created four parks to protect the petroglyphs, limiting as much damage as possible to them by tourists. The Institute's experts are now also trying to work with local governments to carry out several projects on petroglyph documentation, research, basic management programmes, conservation measures, assessment of the state of the protected petroglyph sites, and the construction of some basic infrastructures, including the setting up of signposts, the training of guides, multilingual visitor guides, and a more regulated visit (Matthias Strecker, 2014).

#### 2.6.1.5 Conservation of rock art in Saudi Arabia

Saudi Arabia pays excellent attention to the promotion of rock art, and they use various media to make the local population of rock art aware of the value of rock art, which is a very effective method of rock art conservation. Almost all of the hundreds of petroglyph sites throughout Saudi Arabia have been surveyed, recorded, and catalogued, and data have been collected. Their conservation efforts focus on human damage to petroglyphs by tourists and residents (Huang, 2016). The Protection of Cultural Objects Law was enacted and implemented in 1971, which prevents the theft, destruction, and illegal export of cultural objects through legal sanctions. In order to prevent the destruction of petroglyphs by tourists, nets made of high-strength steel wires were constructed around 300 petroglyphs and archaeological sites, and guards were provided within a specific range, who not only protect the petroglyphs within the fence, but also protect the petroglyphs in the surrounding area (Dr. Majeed Khan, 2014).

#### 2.6.1.6 Conservation of rock art in Australia

Australia's petroglyphs are large in scale but well-protected, with a remarkable semi-arid climate providing excellent conditions for their preservation along with a relatively low population density and a historical and cultural tradition that strictly forbids the destruction of any traditional archaic practices (Huang, 2016). As early as the 1980s, Australia established the Rock Art Association, creating an authoritative

academic journal in rock art research and two rock art promotion newsletters. They have promoted rock art through various channels to make people know rock art, like rock art, and actively engage in rock art research. In addition, although some petroglyphs in Australia are located on private land, after good petroglyph publicity and education, these landowners also have a good awareness of protection, including the installation of footpaths and viewing platforms for visiting visits, which all play a good role in isolating and protecting the petroglyphs(MavisGreer & Sha, 2014).

#### 2.6.2 Conservation of domestic rock art:

China is rich in petroglyphs, with petroglyph sites found in 23 provinces and regions, and is also the first country in the world to record petroglyphs(Gai, 1993). Nevertheless, as of August 2010, 16 petroglyph sites were inscribed on the World Heritage List, and regrettably, none of them were selected in China(Yang, 2012). In recent years, the government, scholars, and people in China have gradually recognised the value of petroglyphs and have been exploring and trying various methods of protection. The Central University for Nationalities, Northwest University, and Northern University for Nationalities have cooperated, effectively combining digital humanities and petrography, and applying digital technology to research the multi-dimensional spatial protection of the cultural heritage of petroglyphs and their cultural inheritance. Launched a series of results, built a petroglyph database and a digital museum, explored the origin of human civilisation, and realized that the petroglyphs' cultural heritage is alive(Shu, 2022). However, China's protection of petroglyphs from the overall level is still a little gap from that of foreign countries(Huang, 2016).

##### 2.6.2.1 Conservation of rock art in Ningxia

The petroglyphs in Helan Mountain of Ningxia are one of the earliest petroglyph sites in China to be announced as a national key cultural relics protection unit. The Ningxia Hui Autonomous Region attaches great importance to protecting petroglyphs in Helan Mountain, and the Ningxia Petroglyphs Research Centre was established in 1999. Since 2004, the Ningxia Petroglyphs Research Centre has conducted a large-scale census of many petroglyph sites. The collection of information

on petroglyph sites has achieved an all-around and in-depth record of petroglyphs. Since its establishment, the Ningxia Petroglyph Research Centre has actively carried out exchanges on petroglyphs at home and abroad. It has also founded and continuously published the annual journal "Petroglyphs Research", which has set up a platform for academic exchanges on petroglyphs at home and abroad. Relevant government departments in Ningxia have formulated a series of laws and regulations specifically for the protection of petroglyphs, such as the Regulations on the Protection of Petroglyphs in Helan Mountain of Yinchuan City and the Regulations on the Protection of Petroglyphs in Ningxia Hui Autonomous Region, etc. The promulgation of this series of protection laws marks the protection of the petroglyphs in Helan Mountain as being incorporated into a legal track from now on (Zhuang, 2003), and it also marks the enhancement and improvement of the legal system for the construction of petroglyphs in Ningxia. Yinchuan City has also set up the Helan Mountain Petroglyphs Management Office, which is specially responsible for protecting the petroglyphs heritage and developing and utilizing the 12 mountain passes in the eastern foothills of the Helan Mountain.

In November 2008, the Yinchuan World Petroglyph Museum was built in Helan Mountain. It focuses on the wonderful contents of more than 200 petroglyph sites in 30 countries around the world. This is currently the largest petroglyph museum in the world and the only one in China. It displays the fine contents of more than 200 petroglyph sites, which are rare both at home and abroad (Yang, 2012).

#### 2.6.2.2 Conservation of petroglyphs in Inner Mongolia

The total number of Yinshan petroglyphs in Inner Mongolia is about 50,000; no less than 5,000 have been lost in the past 30 years. Since 2007, Inner Mongolia has invested more than 12 million yuan in the census and protection of Yinshan petroglyphs (Huang, 2019). Experts in related fields and disciplines were organised to adopt high-tech means such as photography, videography, satellite positioning, etc., to carry out an all-round examination of the number, distribution, subject matter, and scope of Yinshan petroglyphs, and to establish a database of Yinshan petroglyphs. Given that the scattered petroglyphs in the north are not conducive to the management of the

characteristics of the relative concentration of petroglyphs in the distribution of the use of advanced solar energy electronic video monitoring system, built the "electronic eye", can monitor the petroglyphs up to more than 3,000(Wu, 2012). Inner Mongolia has held several conferences on petroglyphs, inviting experts from the Chinese Academy of Social Sciences, Peking University, and other universities and research institutes to conduct in-depth discussions on the research and protection of petroglyphs in the Yinshan Mountains. In order to better protect Inner Mongolia's Yinshan petroglyphs, the government of the Inner Mongolia Autonomous Region has also promulgated the Measures for the Protection and Management of the Yinshan Rock Carving Heritage(Huang, 2019).

#### 2.6.2.3 Conservation of petroglyphs in Guangxi

In the 1950s and 1960s, Guangxi Huashan petroglyphs began to attract attention in China. From 1956 until 2010, the Zuojiang petroglyphs underwent seven relatively large investigations, providing a good foundation for conserving the petroglyphs. Government agencies have organised seminars on petroglyphs, filmed high-quality feature films on Huashan petroglyphs, and encouraged professionals from cultural conservation units to publish feature articles in journals and websites. In 2016, Zuojiang Huashan Petroglyphs successfully passed the World Organization of Petroglyphs deliberations. They became the first World Cultural Heritage Site of Petroglyphs in China, which fills the gap in the list of China's petroglyph-type World Heritage Sites. Relevant government agencies in Guangxi prepared the Plan for the Protection of Huashan Petroglyphs Cultural Relics. They implemented the Measures for the Protection of Zuojiang Petroglyphs of the Guangxi Zhuang Autonomous Region, which is the first government regulation on the special protection of petroglyphs in the Guangxi Zhuang Autonomous Region(Huang, 2019)—using virtual reality technology to digitally present Huashan petroglyphs through the "Zuojiang Huashan Petroglyphs Cultural Landscape Display" virtual museum at the Chongzuo Zhuang Museum(Nie, 2023).

#### 2.6.2.4 Conservation of petroglyphs in Yunnan Province

Yunnan petroglyphs are one of the leading representatives of systematic petroglyph sites in southern China, and petroglyphs have been found within 15 counties in the province. Since the discovery of petroglyphs in the Nujiang River in 1957, about 60 petroglyphs have been found in Yunnan. Although discovered relatively late, the petroglyphs of the Jinshajiang River in Yunnan are different from the types of petroglyphs in China and even in any other region of Southeast Asia, South Asia, and Southeast Asia due to their unique styles, forms, and themes. A few of the images drawn in pigments are also similar to those of the Magdelene culture of the Late Paleolithic period in Europe and some of the hunter-gatherer styles of petroglyphs in South Africa (Li & Li, 2011). The antiquity and uniqueness of the paintings they reflect have attracted the attention of experts at home and abroad. The Yunnan Provincial Institute of Cultural Relics and Archaeology, in cooperation with the local cultural management department, formulated a protection programme for Jinsha River petroglyphs in 2004 and signed a cooperation document with the University of New South Wales, Australia, on the subject of Jinsha River petroglyphs research in 2008. For more than three years, scholars from China and Australia have been carrying out a detailed documentation of five points on the Jinsha River and extracting samples of the petroglyphs for dating. The Jinshajiang petroglyphs have also become the first petroglyphs in China to be dated by the uranium method.

Through literature collation, it is found that at present, the main form of protection of petroglyphs in China mainly consists of the following kinds:

The first is the direct protection of rock art sites, including legislation and the formulation of relevant regulations. Most commonly, fences are built to prevent pedestrians or tourists from approaching petroglyph images, and those who damage petroglyphs are held accountable. Some of China's central petroglyph provinces and regions, such as Ningxia, Guangxi, and Inner Mongolia, have directly intervened in protecting and managing petroglyphs through strict legislation (Zhang et al., 2022).

Second, through the construction of museums, to effectively promote the protection of petroglyphs. In 2008, the Helan Mountain Petroglyphs Management Office created the Yinchuan World Petroglyph Museum in the goukou area outside the famous Helan petroglyph site group, which is the first petroglyph museum in China and the only one that provides a comprehensive and systematic introduction to and display of petroglyphs around the world. Although there are no pure petroglyph museums in other central petroglyph provinces, especially in the north, petroglyphs are the most important exhibits in many museums.

Thirdly, through the development and promotion of petroglyph tourism, we can promote petroglyphs and let more people know and love them. Yinchuan Municipal Government has set up the Helan Mountain Petroglyphs Management Office, which is responsible for managing and developing petroglyphs in the northern area of Helan Mountain. Due to the concentration of petroglyphs, the richness of images, and the variety of modelling and artistic styles, it is a highly suitable site for petroglyph tourism development, and the tourism industry of Helan Mountain petroglyphs is also developing very well.

Fourthly, different cultural communication channels are used to publicise and protect petroglyphs. For example, Jiangzhou District takes the success of heritage bidding as the starting point and driving force, deeply excavates and creates the living culture of Huashan which is naturally active in the folklore, organises relevant experts and scholars to regularly go deep into the countryside to pick up the wind, digs deep into the folklore, folk stories, folk music, dance art, etc., and collates, arranges and innovates them to make them into unique living cultural gems of Huashan and make the culture of Huashan petroglyphs to shine again in the modern cultural system(Tan & Tan, 2021).

Fifth, through scientific and technological means to protect the petroglyphs, the rock body, the picture, and the environment. 2002 General Cliff petroglyphs and Kongwangshan cliff statues rock anti-differentiation protection project design, the project began on September 14, 2005, completed in October 2015, the anti-

differentiation project with the latest German organic cinnamon polymer on the rock body for the overall treatment, significantly improved the surface of the rock body of the waterproofing and weatherproofing. Moreover, the establishment of a cultural relics observatory, observation of petroglyph carriers, and the degree of weathering of the body, to grasp the changes in the rock cleavage, to provide important data support(Luo, 2017).

Sixthly, the use of digital technology for the conservation of petroglyphs. The main aspects are as follows:

(a) Constructing a petroglyph database, permanently preserving and sharing petroglyph ontology data and information. Along with the continuous development of new technologies, digital protection and preservation of cultural heritage have been internationally recognised and advocated methods. The digitalisation of petroglyphs in China has achieved many results, and one of the important results is to obtain a large amount of detailed and realistic petroglyph ontological data and natural geographic environment data around the petroglyphs, and establish a petroglyph database based on this, to permanently retain the petroglyph data. Through the petroglyph database, an open and shared petroglyph resource platform will be built to disseminate the vivid and lively petroglyph heritage and realise the efficient use of petroglyph resources.

(ii) Using digital technology to bring petroglyphs heritage to life and establishing a digital museum of petroglyphs, combining the characteristics of diversified, three-dimensional, real-time, and interactive information dissemination in the new media era, so that the public can quickly learn about petroglyphs anywhere.

(c) Developing petroglyphs, cultural creations, games, etc., relying on some characteristics of petroglyph resources, tapping the cultural added value of petroglyphs, and realizing a complementary mode of petroglyph resource development and protection. , The ancient, childish, rough, childish and condensed artistic beauty of petroglyphs is a perfect resource for the development of cultural creations and games based on the cultural and periodical attributes of petroglyphs, thus generating cultural added value and realising a new mode of petroglyphs heritage management that

organically combines the preservation, dissemination and promotion of petroglyphs heritage with the development and utilisation of petroglyphs resources, and mutually supports each other.

(iv) Creating a virtual platform for the digital dissemination of petroglyphs. For example, establishing a digital exhibition hall of the Yuan universe allows viewers to experience real exhibitions virtually. The digital virtual platform can promote the research and protection of petroglyphs cultural resources and facilitate users' in-depth understanding of petroglyphs' cultural background and value through virtual tours and field excursions. Virtual reality technology allows audiences to have immersive contact with petroglyphs, breaks the limitations of physical museums, expands the display space, and improves the efficiency and depth of audience experience and dissemination.

In summary, although there has been a minor achievement in the conservation of petroglyphs both at home and abroad, the following aspects were found in the study:

1. It is understood that the Jiayuguan government cultural relics management department and some organisations and individuals have been measuring and digitally collecting Heishan Petroglyphs in recent years. However, the degree of sharing is very low. So far there is no unimpeded data research system, so that the subsequent researchers are still facing the problem of imperfect information when conducting relevant research. The necessary information needs to be examined in the field, which, on one hand, causes great inconvenience in time and space, and on the other, more field examinations also face the possibility of destruction of the petroglyphs. On the one hand, it is very inconvenient in terms of time and space, and on the other hand, more field studies are facing the possibility of destroying the petroglyphs again.

2. At present, the open petroglyphs classification and coding system is not perfect, mainly with the discovery of the first letter of the alphabet plus the number of naming and classification statistics, which for the research work of the petroglyphs themselves and accurately understand the discovery of the geographic location of the

petroglyphs have a certain degree of convenience, but as a digital resource in the classification, search, application and is not convenient.

3. Heishan Petroglyphs did not form a practical digital protection approach and paradigm, petroglyphs resources development and application degree is not enough, for the petroglyphs of the familiarity and acceptance of the degree of relative to such as the Forbidden City, Dunhuang culture, etc. is still a lot lower, on the one hand, because of Heishan Petroglyphs data is still relatively small, on the other hand, is also the publicity is not in place, Heishan Petroglyphs have a higher value of the research, but the public's understanding of the Heishan Petroglyphs and familiarity is not high enough. The Heishan Petroglyphs have high research value, but the public's understanding and familiarity with the Heishan Petroglyphs is not high, and they cannot be effectively applied to develop and protect publicity.

Based on the above problems, the research in this paper, firstly, is to collect data on Heishan Petroglyphs, establish the image resource base of Heishan Petroglyphs, sort out the classification system of Heishan Petroglyphs, and prepare the foundation for establishing the digital resource platform of Heishan Petroglyphs; secondly, through the in-depth study of digital conservation of petroglyphs, the research, exploration and summary of the digital conservation form that is suitable for Heishan Petroglyphs, and to provide a feasible path for Heishan's petroglyphs resources to be The second is to provide a feasible path for the development, application and dissemination of Heishan Petroglyphs resources through in-depth research on digital conservation of petroglyphs. The third is to design and produce a digital resource library of Heishan Petroglyphs based on classification research and image collection, and apply it to teaching and research.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Research Design

Firstly, a literature review is conducted to sort out, analyse, and summarise the literature to determine the research methodology and theories. This is followed by case studies, sample analysis, fieldwork, and interviews. Finally, the information and data collected are collated, analysed, and summarised.

#### 3.2 Study population and sample

Research object: Heishan petroglyphs are the research object.

Sample: Image of petroglyphs at Heishan. Petroglyphs in the Hexi Corridor are distributed in the Qilian Mountains, with a high degree of similarity in geographical environment and petroglyph content. Heishan petroglyphs are the earliest discovered, and the petroglyph content spans the most extended period, which is the most concentrated compared to the petroglyphs in other parts of the Hexi region.

Interviewee:

1. Staff of Heishan Petroglyphs Reserve, with more than 3 years of working experience, mainly work is the daily protection, management, and data collation of Heishan Petroglyphs.

2. experts in petroglyph research, including scholars and researchers related to petroglyph protection, petroglyph inheritance, petroglyph cultural and tourism resources development, and cultural heritage protection, etc., who have been engaged in the relevant research work for more than 5 years.

3. Local residents are people who grew up in the area or have lived in Jiayuguan for a long time.

The total number of interviews was in the region of eight.

#### 3.3 Research Instruments

The main research tools involved in the research process were classification sheets, interview outlines, and other statistical analysis sheets for the data.

(1) Statistical analysis table

By studying and analysing the literature and case studies, the contents of petroglyphs and forms of protection are made into horizontal or vertical tables for comparison, to sort out the research more clearly and carry out the study.

TABLE 3 Example table: List of the contents of petroglyphs in the main areas of the Hexi Corridor

NO	placement	Time of discovery	thrust	Production method	Time of formation	note
1						
2						
3						
.....						

(2) Disaggregated statistical tables

The contents of the unified classes, regions, and attributes are classified and organised, and their patterns of change and development are analysed using tabular data.

TABLE 4 Example table: Jiayuguan Heishan Petroglyphs Classification Table

NO	Content of petroglyphs	name (of a thing)	Production method	placement	sizes	note
1						
2						
.....						

The content of Heishan Petroglyphs was categorised, and different tables were made according to animals, hunting, dance, religion, etc. The content of the petroglyphs

was photographs taken in the field, indicating their names and production methods, coded at a later stage, with their locations, sizes and dimensions.

### (3) Character Interviews

This study mainly focuses on structured and open-ended interviews, setting up interview questions with different contents for different groups of people related to petroglyphs, and analysing and summarising the questions.

It is important to focus on the validity and credibility of the questions and the ethical issues involved in the interview.

Validity and reliability of questions: all questions in this study involving interviews were submitted to the mentor for review, and consent was obtained from the mentor to conduct the interviews.

Ethical considerations: During the interview process, inform the participants in the research study or interview of the relevant reasons, obtain the consent of the interviewee or consultant to carry out the research or interview, and at the same time obtain the consent of the other party before displaying his or her relevant personal information, fully respecting and protecting the personal privacy of the participants.

Example of interview questions: interview questions directed at the Petroglyph staff.

1. How long have you been working here? Tell us about your views on petroglyphs.

2. What is the current scale of petroglyphs in the Black Hills? What are the types and motifs? What are their main characteristics?

3. What aspects of national and governmental measures or systems are in place for the conservation of Heishan Petroglyphs? What specific measures and systems are in place by the competent authorities? Is sufficient attention being paid to the conservation of petroglyphs?

4. Who are the main organisations or individuals that come to Heishan nowadays to study petroglyphs? What are the main applications of their petroglyph research?

5. From your point of view, what techniques or methods do you think can be effective in conserving petroglyphs?

.....

A list of specific questions and interviews is attached.

### 3.4 Specific research methods

Literature analysis method: analysing and organising the literature on the conservation of petroglyphs and related contents.

Fieldwork method: visit the petroglyph group in Heishan, conduct fieldwork and collect digital photos for digital treasure conservation research of Heishan Petroglyphs.

Interview method: Interviews were conducted in three groups, namely, staff, experts and local ordinary people in Heishan Petroglyphs and related fields, and different interview questions were designed for the subgroups, which were then analysed and collated.

### 3.5 Data Collection

Organise and analyse the content of the literature and collect relevant data. Field visits to Heishan petroglyphs for photographing and collecting photos of Heishan petroglyphs, collecting digitised photos for classification and data statistics. Completing interviews and creating a database of interviews during the interview process.

### 3.6 Data Analysis

The data collected is processed, counted and analysed, and data analysis tools are available to assist in this task. On the one hand, data are scientifically recorded and analysed through qualitative research methods such as content analysis, thematic analysis and case study analysis, and on the other hand, statistical analyses are carried out descriptively to summarise and demonstrate the basic characteristics of the data collected.

3.6.1 Analysis of data on petroglyphs in terms of type, colour, chiselling technique and size.

The collected Heishan Petroglyphs were classified and counted according to their different forms and contents, and the representative petroglyphs were counted and analysed for their colours, chiselling techniques and sizes, and conclusions were drawn.

### 3.6.2 Analyse the significance of petroglyphs in relation to local life and culture.

We looked up relevant books, visited relevant petroglyphs staff and local residents to understand the information related to petroglyphs and local life, and extracted relevant content for research based on the interviews.



## CHAPTER 4

### FINDINGS

#### 4.1 Content analysis of petroglyphs



FIGURE 24 Schematic distribution of Heishan Petroglyphs

Source: Produced by the author

From February to December 2024, we made five trips to the Heishans of Jiayuguan, making practical examinations of the Sidaoguxinggoues, the Red Willow Ditch, the Shiguanxia, and the Mizigou. The Heishan area is very large and there are not many roads to walk on, and in many places a car cannot be driven in, so you have to walk.



FIGURE 25 Motorway to provincial road to reach Heishan

Source: Photographs by the author

Heishan due to its unique geographical structure, and six places with petroglyphs are not concentrated, so each visit can only go to a place for investigation, the current Heishan Petroglyphs Reserve has also established a protection mechanism, but is not open to the public, so each time you enter the need to coordinate with the local department of culture and conservation of communication, on the one hand, for the protection of cultural relics to establish a good mechanism, on the other hand in the conduct of the investigation also does require more coordination and communication. communication.



FIGURE 26 The writer is in Heishan, with the opposite Qilianshan behind him

Source: Photographed by the author's team



FIGURE 27 Entrance to Heishan

Source: Photographs by the author

The Black Hills require a long stretch of mountain road to enter, and once inside, there are smooth mountains on both sides with only a few weeds for vegetation.



FIGURE 28 Heishan mountain range

Source: Photographs by the author

After several field visits, digital information was collected at five Heishan Petroglyphs, thousands of photos and videos of Heishan Petroglyphs were taken, and the photos were selected and categorised.



FIGURE 29 Heishan Petroglyphs photographed

Source: Photographed by the author's team

After the local field survey, information collection, visits, interviews, and overall sorting based on the complete study of the existing literature, and classification based on the commonality of Jiayuguan Heishan Petroglyphs in different locations, and at the same time, fully listening to the relevant Heishan Petroglyphs experts and staff on the analysis of the petroglyphs, and finally according to the content is divided into figures, animals, rituals (dance), hunting, towers (religion), text, and plants six kinds of data records from the content of production techniques, location, colour, and size. Moreover, plants and the data were recorded regarding petroglyphs content, production techniques, location, colour and size.

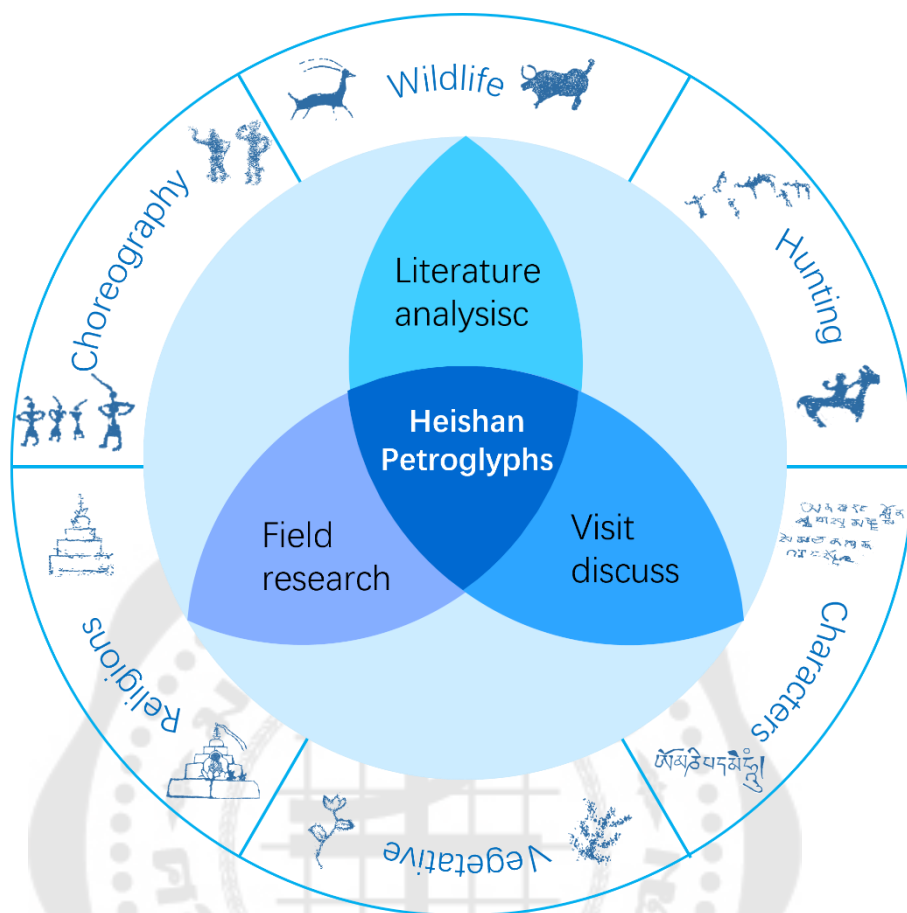


FIGURE 30 Schematic classification of Heishan petroglyphs

Source: Produced by the author

#### 4.1.1 Classification study of the content of Heishan Petroglyphs

##### 4.1.1.1 Animals

Animals are the most numerous motifs in the Heishan Petroglyphs, and animal motifs have been found in Hongliu Gorge, Sidao Stock-type Gorge and Shiguanxia, etc. After fieldwork and comparing with the motifs of the previous research data, we categorised and sorted out all the information on animals and found that the most frequent places are Shiguanxia and Sidao Stock-type Gorge, which is on the one hand because the volume of the content of the petroglyphs of the two places themselves is significant. On the other hand, it also reflects that the human and animal activities in these two places were still more frequent. On the one hand, these two





places have a large volume of petroglyphs, and on the other hand, they also reflect the frequent human and animal activities in these two places, and most of the animal images are chiselled and carved, as shown in the table below.



FIGURE 31 Sidaoguxinggou were photographed for images

Source: Photographed by the author's team

TABLE 5 Jiayuguan Heishan Petroglyphs Classification List - Animals

NO	Content of petroglyphs	name	metho	colour	Size (m)	place	
1		antelope	pester	light gray	0.40*0.20	Shiguan Xia	
2		bison	engraving	light gray	0.36*0.27	Sidao guxin ggou	
3		tigers	pester	light gray	0.2*0.15	Sidao guxin ggou	
4		sandgrouse	pester	light gray	0.6*0.35	Sidao guxin ggou	
5		ninny	engraving	light gray	0.22*0.13	Jiaohaogou	

In the content of petroglyphs we know, animals are frequent images, with a higher proportion than other motifs, and animal images in Gansu petroglyphs are also relatively abundant, especially in the Hexi Corridor where the number is higher, covering a wide range of wild and domesticated animals, such as deer, horses, yaks, pan sheep, etc., which show the biodiversity and human living environment of that time, and the images of these animals are usually expressed through robust but straightforward lines and symbols. Characteristic parts, presenting a rough and simple artistic style, reflecting the intertwining of ancient hunting and nomadic cultures.

In our research on Heishan petroglyphs of Jiayuguan Pass, we also found that the proportion of the number of animals in them is also the largest. Animals are common subjects in prehistoric art, and most of the animals appearing in most of the early petroglyphs found so far are large animals. The images of large animals in the rock carvings in the north of the country are not products of the same period or cultural background, but some of them can be regarded as works of the period of the early hunters (Pang Ying). Many depictions of deer and rock goats in petroglyphs in the province are very realistic. On the one hand, animals appeared as hunting or domestic animals in ancient times. On the other hand, they were often given religious significance in the scope of the lineage. The study of animals can trace and reason out the lineage of local human development. The animal images have a specific mnemonic purpose, which can effectively respond to the local social culture in different periods. Therefore, it is normal to find a large number of animal images in the petroglyphs of the Heishan in Jiayuguan Pass, which appear in the form of singles or groups, with rich styles and diversified contents, which not only show the deep connection between the ancient nomads and the natural world, but also express the people's understanding of the survival, religion, beliefs, and the social structure of the people in different periods through the unique forms of expression.

TABLE 6 Statistical map of the occurrence of the main animals collected by the author from the Heishan petroglyphs.

NO	WILDLIFE	SUBTOTAL	QUANTITIES	PLACEMENT	NOTE
1	goats	115	71	Sidaoguxingou	
2			26	shiguanxia	
3			7	Mozigou	
4			11	jiaohaogou	
5	cow	89	71	Sidaoguxinggou	
6			11	shiguanxia	
7			3	Mozigou	
8			4	Jiaohaogou	
9	deer	51	47	sidaoguxinggou	
10			2	Shiguanxia	
11			2	Jiaohaogou	
12	horse	22	14	Sidaoguxinggou	
13			1	Shiguanxia	
14			3	Mozigou	
15			2	Jiaohaogou	
16			1	Hongliugou	
17	birds	19	16	Sidaoguxinggou	
18			1	Jiaohaogou	
19			1	Zozigou	
20			1	Jiaohaogou	
21	ninny	16	10	Sidaoguxinggou	
22			3	Shiguanxia	
23			2	Maozigou	
24			1	banana trench	
25	tigers	14	13	Sidaoguxinggou	
26			1	banana trench	
27	dog	13	8	Sidaoguxinggou	
28			3	Shiguanxia	
29			1	Jiaohaogou	
30	wolves	6	4	Sidaoguxinggou	
31			2	Shiguanxia	
32	tapir	5	5	Sidaoguxinggou	
33	sandgrouse	15	15	Sidaoguxinggou	

We can see the proportion of different animals from the list of animal statistics of Heishan Petroglyphs. The most frequent images are those of cows and sheep. Sheep are the most frequent in the petroglyphs in various areas of the Hexi Corridor, mainly rock goats and pan goats, proving that sheep have existed for an extended period in the Hexi Corridor. Even now, some locals still consider goat-herding one of the primary sources of life. Some animal images are primitive in conception, rugged and clumsy, while others are delicate and vivid(Chu et al., 1990). In ancient times, wild oxen in the Jiuquan area, which "weighed thousands of pounds," were found in large herds, while fierce wolves infested the mountains and fields, harming people and animals, and camels are still one of the most powerful means of transport for the people(Yin, 1987). Out of the Heishan cattle and sheep, in also appeared many species, such as deer, horses, birds, camels, tigers, dogs and other animal images, which also fully reflects the nomadic life of the human social activities at that time, the animal images, some for a single, some are 3, 5 together, there are dozens of engraved together, Heishan petroglyphs, the most one of the number of animals reached 83.



FIGURE 32 The rock with the most animals in Heishan petroglyphs(shiguanxia)

Source: Photographed by the author's team



FIGURE 33 Stand-alone rock on the north side of the Jiaohaogou bend

Source: Photographs by the author

There are 83 images of horses, antelopes, camels, birds, bison, snakes, and other animals, some of which are superimposed on each other, and which, according to conjecture, would have been engraved at different times.

In the process of studying the petroglyphs in the Heishan, there are several views on the main body of the petroglyphs, one opinion is that "they may be the cultural relics of the Qiang Brigade, the Dayuezhi, or the early Xiongnu tribe", another opinion is that "they are the works of the Ruo Ran, the Turkic, or the Turfan tribe, but their hats are very similar to those of the Yi heroes, or they may seek an answer from the historical connection between the ancestors of the Yi tribe and the ancient Qiang tribe". Another opinion is that "they are the works of Zoran, Turkic or Tufan, but their hat ornaments are very similar to the hero's knot of Yi or can be answered by the historical connection between Yi ancestors and ancient Qiang", the third opinion is that "these are the remains of Tufan herdsmen in the ninth century", and another opinion is that "these petroglyphs of Hongliu Gou in the Heishan were engraved by Yuezhi, an ancient ethnic group that was living in the area at that time". There is also another opinion that "these petroglyphs

in Hongliugou, Heishan, were carved by the Yuezhi people, an ancient ethnic group living here at that time. Since ancient times, Gansu has been inhabited by many ethnic groups. Before the Warring States, Dunhuang belonged to the range of Guazhou, China's ancient Qiang, who lived in the Guazhou area. "Shuowen" from the shape of the word to explain, Qiang people from the sheep, that is, engaged in nomadic animal husbandry, to livestock sheep-based ethnic groups. Either way, all fully illustrate the Hexi area to the nomadic people, and petroglyphs are more dispersed characteristics, which can also confirm the nomadic people with "animal migration" characteristics.

Therefore, there are two classifications of animal motifs on petroglyphs, one is the domestic animals that have been gathered with human beings, that is, the animals that have been circulated by people, such as horses, dogs, sheep, camels, etc., which are also in line with the historical evidence, and on the other hand, there are some animals that have not been tamed by human beings, surviving in the nature, and have become the objects of hunting by people, such as bison, deer, tigers, tapirs and eagles. We analyse the petroglyphs through the characteristics of the species, artistic expression, cultural significance and connotation, historical background, cultural exchanges, petroglyph creators, social background, protection, and inheritance of several aspects.



FIGURE 34 Online interview with Heishan petroglyph researcher Chang Shiya Sr.

source: screenshot of the author's computer

Chang Shiya said that the appearance of animal images in the petroglyphs of the Heishan reflects a kind of natural observation and record of the state of life and environment of the people at that time. Whether it is modern or ancient, in life will involve animals, appeared in the Heishan Petroglyphs in the image of animals, is to reflect the people at that time on the animals or the natural environment of a kind of observation and understanding, because the animals occupy a large part of people's lives, that is, occupies a large part of the life of the people in the early days, so their lives go to inseparable from the animals. Hence, there are more animal images in the petroglyphs. So there are more images of animals in petroglyphs.



FIGURE 35 Artist Du Yongdong, Advisor of Jiuquan Artists Association

Source: Photographed by the author's team

In an interview with Mr Du Yongdong, an artist and consultant of Jiuquan Artists Association, he said that the animal images in the petroglyphs of the Heishan have a strong artistic component, and that the serious animal paintings, modelling and compositions are very artistic, and that this compositional form of distributing many patterns on an irregular block of stone itself has a natural sense of formal beauty, and that he would also use this form in his artworks for He would also use this form in his artworks.



FIGURE 36 Interviews with local villagers

Source: Photographed by the author's team

The author in the petroglyphs interview process also asked some residents, but asked more about the petroglyphs do not know too much, only an older man said, used to be in the Heishan sheep when I saw the petroglyphs, there are cows, sheep and other kinds of modelling, engraved in the slate, very good-looking, and now on the one hand, Heishan petroglyphs to establish a protected area, on the other hand, their age, they seldom go to see it again.

#### 4.1.1.1.1 Animal rock art and hunting

The hunting content of the petroglyphs is very much in the Heishan Sidaoguxinggou, Shi Guanxia, Jiahe ditch. Hunting was the primary source of survival for the ancient nomadic herders. Through the content of these petroglyphs, it reproduces the nomadic life of the ancient forefathers. Hence, the hunting content is also one of the main performances of the subject matter. The hunting objects, cattle, sheep, deer, camels, geese, and so on, can be seen from the petroglyphs. Hunting animals have a separate roundup and groups of hunting rounds.

Analysed from the petroglyphs, hunting activities in the Heishan region lasted a long time. From the existing literature, it can be inferred that the early hunting activities began in the late Paleolithic period, and flourished about 8,000 to 4,000 years ago. The tapir, water deer, rumen cattle, python, and large-horned deer in the petroglyphs belonged to the sub-tropical animals, and became extinct in the late Paleolithic period around 10,000 BC. The main hunting objects in the petroglyphs are the bison and the elk, which appeared in the middle Neolithic period. The deer became extinct after the middle Neolithic period, around 5,500 years ago, and the bison became extinct after the late Neolithic period, around 4,000 years ago. From the Shikuangxia petroglyphs, it can be seen that the animals of the period were mainly northern ibexes, pangolins, deer, horses, camels, dogs, and so on.



FIGURE 37 Li Jianrong, Deputy Director of the Heishan Petroglyphs Conservation  
Institute

Source: Photographed by the author's team

The cow is one of the most frequent animals in the petroglyphs of the Heishan, and it was also one of the main hunting animals in the early hunting process. When Li Jianrong talked about this, he said that we can see yaks, which is the most talked about cow in the Heishan, on many petroglyphs, and the cow is the animal that appears the most in the petroglyphs of the Heishan, second only to the number of sheep. The cow we see in the petroglyphs is a yak, because its tail is bulbous, and one of the most standard features of a yak is that the tail is bulbous, and the yak's tail goes up when it runs, and in the process throws mud onto the tail, which forms a bulbous shape over time.



FIGURE 38 Li Jianrong introduces the petroglyphs of the Heishan Niu.

Source: Photographed by the author's team

In the early petroglyphs, the body of the bull is more robust. In the later stage, it has been simplified; you can only see the features of its head, and then the

features of the tail, the limbs, and the body have been elongated, so the image of the bull we see will be straightforward. This also represents the improvement of the level of petroglyph carving; the transformation from figurative to abstract shape is not a simple image extraction. However, it shows the improvement of the artistic level of the artist, which shows that with the advancement of time, the artistic level of people is also progressing.



FIGURE 39 Guan Hong, Artist of Jiuquan Painting and Calligraphy Academy

Source: Photographed by the author's team

Jiuquan Painting and Calligraphy Institute consultant Guan Hong said that he worked in the Heishan area troops, and has had many times in-depth understanding of the Heishan petroglyphs; the most profound impression is the "Heishan cattle", the cattle on the rock pattern is very shocking. A lot of carving form and spirit, it has a powerful character, and is the representative symbol of the Heishan petroglyphs. In ancient times, cows were not domesticated, so the cows in the patterns were likely not used for hunting, but also depicted as sacrificial victims.

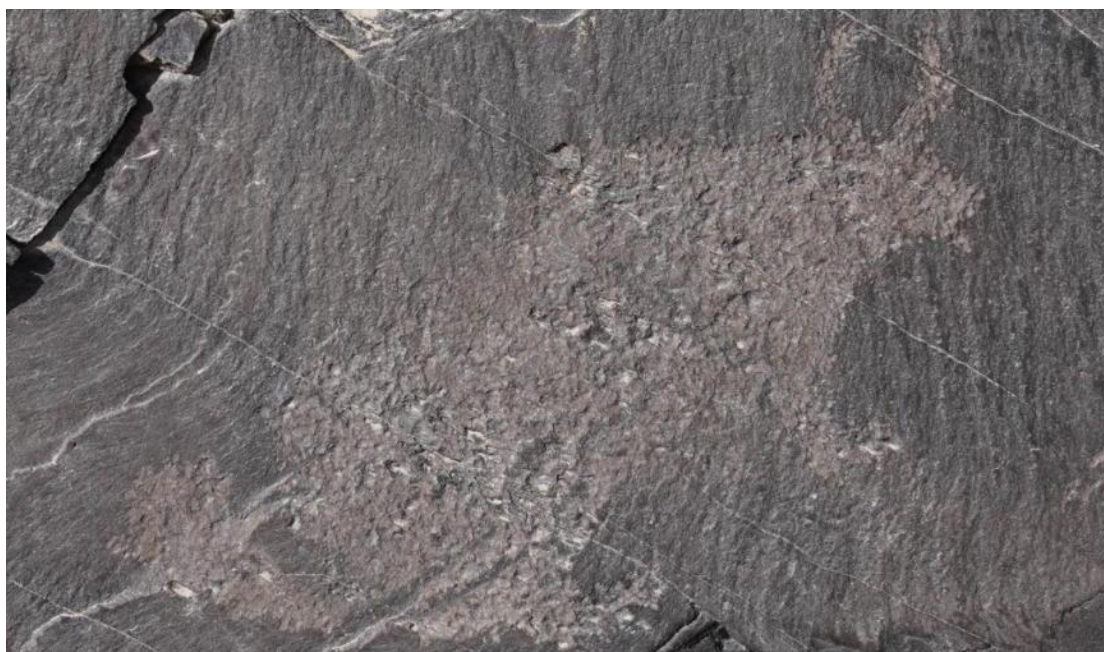


FIGURE 40 Bison, freestanding rock on the south side of Sidaoguxinggou

Source: Photographs by the author



FIGURE 41 Petroglyphs on the south wall of Shiguanxia, engraved

Source: Photographs by the author

Heishan Petroglyphs area in the north of the Qilian Mountains, and the Qilian Mountains near the Tibetan Plateau, Heishan Petroglyphs on the image of cattle and yaks in Qinghai is very similar, from the petroglyphs in the appearance of the cattle, there is a commonality, but also differences, especially in the tail, the early is a globular, the later is a rod, which may be a reflection of the process of domestication of the cattle, in the interview, Li Jianrong also mentioned this piece, which is also the same as the situation recorded in the literature. Sidaoguxinggou cattle image show a robust body, tail up into a ball, according to Li Jianrong's expression, this is because often running bison tail will be stained with mud and water, so become a ball, which also confirms that the early bison is the main object of the hunt, and the Heishan petroglyphs in the image of the cattle is indeed the most. In the petroglyphs of Shiguanxia, the tails of the oxen are in the shape of rods, and there are fuzzy people on their backs, which may indicate that the oxen have been domesticated.



FIGURE 42 Petroglyphs on the south wall of Shiguanxia, engraved

Source: Photographs by the author

The above picture is a hunting scene, the upper left of the picture is a line engraved deer, on the opposite side there are two dogs, the feeling should be in the direction of stopping the deer, which shows that the dog has been a human helper, and the deer may be one of the objects of people hunting, in the lower part of the engraving of a few deer are running, especially in the upper part of the picture of the dog and the deer in the confrontation of the atmosphere is tense, reflecting the beginning of the petroglyphs engraved in a high art, the vivid picture makes people feel like entering the scene, the picture is vivid. The vivid images make people feel as if they had entered the scene then.

The depiction of figures and animal images in the petroglyphs and the state of dress suggest that the main depicors of the Heishan Petroglyphs were mainly nomadic people. The petroglyphs depict scenes of interaction between human beings and animals, such as hunting and herding. These images show the relationship between humans and animals in ancient times and record the basis of the nomadic economy and the importance of hunting in ancient society.

#### 4.1.1.1.2 Animal rock art and husbandry

The transition of humanity from the Palaeolithic to the Neolithic is a revolution in the history of human civilisation, and the transformation from hunting to domestication is another turning point in human civilisation. The Heishan Petroglyphs fully reflect the characteristics of the historical transformation from hunting to domestication and animal husbandry during the transitional period, and the more obvious domesticated animals seen in the Heishan Petroglyphs are dogs and horses.

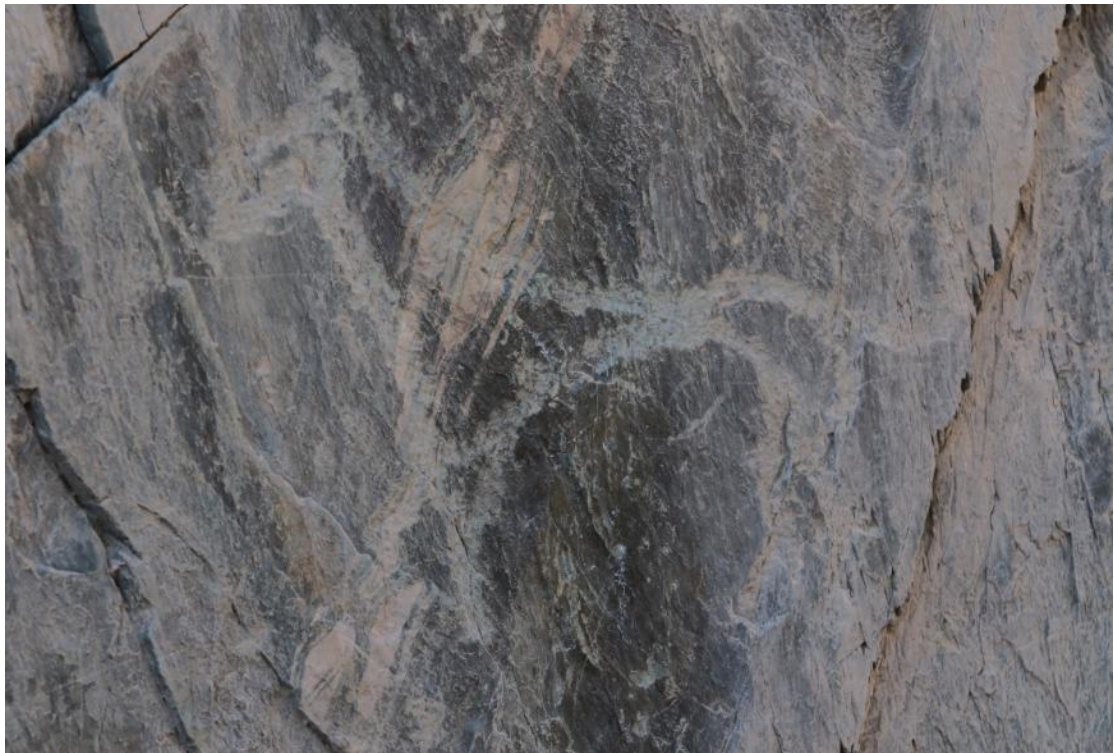


FIGURE 43 Petroglyphs on the south wall of Shiguanxia, carved by abrasion

Source: Photographs by the author

From the data of Dadu, the dog is domesticated from the wolf, Heishan is located in the northern slope of the Tibetan Plateau, the domestication of the dog will not be too late, it should be 8,000 to 4,000 years before the present, it is the period of hunting economy in Heishan area, figure 43 is the image of the dog on one of the rocks in the Shiguanxia, the standing posture is upright, the lines of simplicity, full of vitality.



FIGURE 44 Riding shot, south wall of the gully at the mouth of Sidaoguxinggou

Source: Photographs by the author

The domestication of the horse was basically in the same period as the dog, and the appearance of horses and dogs in the Heishan Petroglyphs precisely reflects the characteristics of this period, which is not for grazing or farming, but should mainly serve for hunting. The domestication of horses and dogs is a significant change in the history of human production. A picture of a person riding a horse is located on the petroglyphs at the mouth of the Sidaoguxinggou.



FIGURE 45 Petroglyphs on the west wall of the gully at the mouth of the Sidaoguxinggou

Source: Photographs by the author

In addition to dogs and horses, camels can be excellent evidence of the transition from hunting to domestication. In the Sidaoguxinggou, found in different petroglyphs on the camel, but appeared in different forms, the first is the object of hunting, and then appeared to have been riding, pulling the picture. Located in the Sidaoguxinggou ditch mouth of the western wall of the middle of the painting there are four hunters, in the middle of the one looks like a command, in command of the other three people for hunting, the main form is to shoot and drive, the hunting object is bison and goats, and there is also intercepting the wild camel picture. In the Sidaoguxinggou on the south wall of the petroglyphs, on the right side of the picture, there is a picture of a person holding a whip to the picture of a camel being driven, which reflects that this camel may have been domesticated. There are still a large number of domesticated camels in the Hexi region.



FIGURE 46 Hunting and livestock maps

Source: Photographs by the author

Hunting period petroglyphs dominate most of the petroglyphs presented at Sidao Stock Gully, but there are also a small number of grazing drawings. According to the description of Yang Huifu and Zhang Junwu, this should be the image material of the transformation from hunting to animal husbandry, which provides the basis for people to explore this economic form. There is a petroglyph above (Fig. 46) in the Sidaoguxinggoues in Heishan, which has both hunting and grazing scenes, with images of six figures, two of whom are dancing, three of whom are shooting wild yaks, and one of whom is chasing a wild yak. The animal group has sheep, camels, and dogs, reflecting the evolutionary transformation from hunting to grazing. Petroglyphs carved with six sheep, two of which are mating, the painting of the early hunting scenes, and late grazing scenes carved in one place, which is the best example of the transformation from hunting to an animal husbandry economy.



FIGURE 47 The author is photographing the goats and cows in the picture

Source: Photographed by the author's team

Li Jianrong pointed out that in the Heishan Petroglyphs, the image of sheep is more diverse, and the number and types of sheep are greater, such as rock goats, pan goats, goats, etc. Now, there are also northern goats in the Jiayuguan area of Jiuquan, which are characterized by shorter and thinner horns towards the back.



FIGURE 48 Petroglyphs on the south wall of Shiguanxia, carved by abrasion

Source: Photographs by the author

The petroglyphs at Shiguanxia in the Heishan reflect the lifestyle of the early Heishan region, which was dominated by animal husbandry. The petroglyphs show that the livestock species for grazing include goats, cows, horses, donkeys, camels, wild animals such as deer and tigers, and some of the livestock are single, but there are also flocks of them. On the petroglyphs on the south wall of Shiguanxia, seven goats are grazing with their heads down in the upper left corner of the west centre, while in another petroglyph, three camels are travelling northwards.

#### 4.1.1.1.3 Totem worship expressed in animal petroglyphs

In most petroglyphs, themes such as flying birds, deer, tigers, and the sun often appear. These motifs occupy an important position in the spirit and beliefs of early humanity, which are important elements in nature and important symbols in human culture and religious beliefs, showing ancient man's reverence for and worship of the power of nature. These images may be related to the worship of heaven and earth, sun

worship, and other beliefs, reflecting the formation of early human religious concepts. The Heishan Petroglyphs show patterns of flying birds, deer and tigers, with simple and powerful lines, especially when people found in the research that flying birds are often combined with the sun and mountains, reflecting the symbolism of power, freedom and communication with the gods, and such subjects may be related to the worship beliefs of the ancient nomadic people, which should be a kind of expression of nature worship and religious beliefs, spirituality and faith. Animals, especially those with fertility, such as deer and sheep, symbolise reproduction and prosperity in petroglyphs.



FIGURE 49 Petroglyphs on the rocks to the left of Sidaoguxinggou, chiselled

Source: Photographs by the author

The bird of prey is often seen as a symbol of the sky and the sun, representing freedom, spiritual ascension, and communication with the divine. In many cultures, the image of the bird of prey in conjunction with the sun symbolises the life force and the cyclical movement of the sun. The sun symbolizes light and life force, representing creation, warmth, and the cycle of time. In many religions and myths, the

Sun God is the supreme deity, governing life and the order of the universe. In the petroglyphs of clothes on the rocks to the left of the Sidaoguxinggou (FIG. 49), the layout is regular, with four birds of prey around them, with wings nearly twice as big as their bodies, flying in the sky with their wings spread out. Their heads face the centre of the circle, with spikes sticking out of its five sides like the sun's rays shining in all directions.

In many cultures, deer symbolise mystery, regeneration, and spirituality. The most famous legend about deer in the Hexi Corridor is the story of the Nine-Coloured Deer in the Mogao Caves in Dunhuang. This legend shows that deer are important spiritual carriers in religious beliefs, often associated with harmony in nature, fertility, and inner light.



FIGURE 50 Petroglyphs on the left side of Sidaoguxinggou, engraving

Source: Photographs by the author

In the northern petroglyphs, the image of the tiger is not only a symbol of strength and courage, but also an important representative of totem worship and spirituality. The tiger's spirit represents bravery and strength, and the image of the tiger is used to ward off evil spirits, avoid calamities, and bring good fortune, reflecting the

spiritual needs of ancient humanity after conquering nature and beasts. In the totem culture, the name of the tiger as a totem also corresponds to the names of clans and tribes. The image of the tiger is heavily depicted in the petroglyphs, reflecting the nomadic and hunting economic form of the ancients, as well as the veneration and reverence for the beasts of prey. Tiger petroglyphs also reflect the ecological environment at that time and the characteristics of nomadic culture.

Heishan Petroglyphs, engraved with tiger images, smooth lines, and fierce images, mainly distributed on the top of the ditch cliffs, is a line engraved, possibly later. Xiongnu people like to use tiger paintings to show their fierce national character. Comrade Gai Shanlin attributed these petroglyphs to the Xiongnu people, probably before the Warring States period and as late as the Qin and Han periods. Compared with the tiger image in the Heishan Petroglyphs, it seems related to the Xiongnu tribe west of the river.



FIGURE 51 Petroglyphs on the north wall of the gully at the mouth of Sidaoguxinggou

Source: Photographs by the author





In petroglyphs, animal mating images are often used to symbolise fertility and reproduction. These images may represent primitive humans' worship of the reproductive power of animals and their desire to enhance their fertility by mimicking the reproductive behaviour of nature. The appearance of animal mating diagrams in petroglyphs may have been part of primitive witchcraft rituals, through which images were used to realize the sympathy and interpenetration of human and natural forces, to pray for reproduction and a good harvest. The petroglyphs on the upper left of the northern wall of the Sidao stock-shaped ditch gully have a mating pattern of 2 goats (Fig. 51).

The Heishan petroglyphs recorded the people's life and beliefs in the ancient Hexi Corridor region. Artistic techniques were used in animal image recordings to precisely capture the animals' dynamic moments, showing nature's vitality and freedom through exaggerated and simplified lines. The animal images are realistic and enhance the visual impact by exaggerating key features, such as antlers and eagle wings, and give the animals deeper symbolic meanings. As their creators were mostly local nomads, such as the Xiongnu, Yuezhi, and Qiang people, their cultural backgrounds and lifestyles profoundly influenced the themes and representations of the petroglyphs, making them not only natural records but also carriers of cultural symbols and social meanings. The similarity of specific expressive techniques in Heishan Petroglyphs with those of Central and West Asia reveals the important role of the Hexi Corridor as an important node of the Silk Road in the cultural exchanges between the East and the West. Protecting and passing on these cultural heritages is not only a respect for history, but also an important responsibility for preserving cultural genes for the future, and they allow us to understand the diversity of the Chinese civilisation and its exchanges with neighbouring cultures more comprehensively.

#### 4.1.1.2 Hunting maps

Hunting pictures are a comparative image form in the Jiayuguan Heishan Petroglyphs group. The main content consists of people and animals in a hunting scene, which mostly appeared in the Sidaoguxinggou.

TABLE 7 Jiayuguan Heishan Petroglyphs Classification List - Hunting

NO	Content of petroglyphs	name	metho	colour	Size (m)	place	
1		poach	engra ving	light gray	1.08*0.61	Shigu anxia	
2		poach	engra ving	light gray	0.91*0.52	Sidao guxin ggou	
3		poach	engra ving	light gray	0.22*0.21	Sidao guxin ggou	
4		Poach (illegal ly shoot game)		light gray	1.07*0.85	Sidao guxin ggou	

Hunting is a human activity that makes a living by hunting ready-made animals in nature, and in the early days, it was mainly done with rudimentary tools and stone tools, and it relied greatly on nature. From the fossils unearthed and petroglyphs found,

it can be seen that, up to the Qin and Han periods, nomadic herders living in remote areas still hunted for a living. Fossils and petroglyphs from Paleolithic sites in China and around the world show that during a long prehistoric cultural period, people hunted dozens of large and medium-sized animals such as bison, wild sheep, wild horses, wild donkeys, wild boars, wild camels, tigers, wolves, bears, elephants, deer, giant tapirs, and cows. The success or failure of hunting directly affects the safety of the hunter. However, it also relates to the group's survival because hunting is the primary source of survival for the ancestors. Because of long-term hunting activities, people are very familiar with the characteristics and appearance of the prey, the grassland animals have a keen observation, it is because of this, the hunter and the prey in the petroglyphs can be carved very vivid image, in ancient times, the residence of the nomadic people usually do not have a written word, petroglyphs to a certain extent, it has become one of the ways of conveying each other's ideas and information, petroglyphs on the one hand, can be rekindled to arouse Petroglyphs can, on the one hand, reawaken people's passion to hunt more prey, and on the other hand, they can use these images to pass on hunting and life experience to future generations.



FIGURE 52 A magnificent hunting scene in the Shidao stock-type ditch

Source: Photographed by the author's team

The Heishan region had a natural environment for the development of the hunting industry a long time ago, with forests, grasslands, large rivers, and many kinds of wild animals living in the habitat, making it an ideal place for hunting. The Heishan had many wild animals surviving then, including mammals, reptiles, and birds. The animals recognisable in the petroglyphs include tigers, wolves, tapirs, foxes, tiger weasels, badgers, bison, wild yaks, rhinoceroses, bighorn deer, ibex, rock goats, northern ibex, pan goats, wild camels, domestic camels, horses, cows, donkeys, eagles, geese, and more than 60 other species. Among these animals, bison are found in all rock art distribution points and have the most significant number, more than a hundred; sheep and deer are the next largest and have more species; the rest of the animals are fewer, but have a broad representation. In a society where hunting was the primary means of livelihood, animals were the leading resource that people relied on at that time. Heishan petroglyphs, with hunting as the picture's theme, are very concentrated, mainly in the Sidaoguxinggou. In the scenes depicted, the figures are often much smaller than the beasts, and the technique is simple but vivid, with a unique style. Hunting is a mode of production that human society has been engaged in for a long time, and the images in the petroglyphs not only record the different ways of hunting at that time, but also have a particular significance of witchcraft, which is mainly used to pray for hunting success through witchcraft.

Analysed from the petroglyphs, hunting activities in the Heishan region lasted a long time. Early hunting activities began in the late Paleolithic period, the flourishing period about 8000 years to 4000 years ago, petroglyphs of tapirs, water deer, cattle, pythons, and large-horned deer belong to the sub-tropical animals, and in the late Paleolithic, around 10,000 years BC, they have long been extinct. The main hunting object that appears in the petroglyphs is the bison, and also the elk. These two animals appeared in the middle of the Neolithic Age, deer extinction will not be later than about 5500 years ago in the middle of the Neolithic Age, bison extinction will not be later than about 4000 years ago in the late Neolithic Age.

The hunting pictures in the Heishan Petroglyphs reflect the tools used for hunting, the scale of the hunt, and the different ways of hunting, and by studying these aspects, the significance of hunting in the Heishan Petroglyphs can be more comprehensively understood. The real emergence of mankind's landmark event is to learn to use tools, so in the hunting activities, the use of tools can also reflect the different periods of human activities.



FIGURE 53 The author discusses a hunting picture with Li Jianrong

Source: Photographed by the author's team

Li Jianrong mentioned in the interview, that the hunting map is divided into 3 categories, there are hunting maps we only look at there are figures following behind the animal, for the repellent hunting; another situation is to bring a bow and arrow, but not on horseback standing hunting. There is also a kind of hunting on horseback riding, which actually reflects the process of gradual improvement of productivity at that time, because the speed of hunting on horseback is improved in terms of efficiency, which is actually an evolutionary process.

At the same time, he also pointed out that in the hunting and riding a horse there are images that can be stretched down the foot, appearing to have a long leg, which illustrates a problem, the horse rider does not have stirrups, because before the Han Dynasty Han people riding a horse is no stirrups, because the early Han armies are infantry-based, so that there is no advantage of the Xiongnu on horseback in terms of speed, to the time of the Han Dynasty and the Xiongnu people do business in the course of the steppe of the military horse introduced to the Domestication of the Central Plains, in the process of the use of saddles, stirrups and other equipment, so that the foot is basically stepped in the stirrups position, there will be no hitchhiking foot pattern, so from this point can be deduced whether the petroglyphs are the same period of work.



FIGURE 54 Mrs Chang Shiya on Hunting

Source: Screenshot of author's online interview

Chang Shiya teacher said when talking about hunting, hunting is the main way of survival of ancient people, especially we do not have many rivers in the Northwest, hunting images are reflecting is a way of life of people in the early days of the early

people, or to show the hunting technology at that time, combined with the animal modelling, can reflect a kind of interaction between people and nature the modern people are still living a very stressful life. However, the ancients recorded this interaction between people and nature, showing their positive attitude towards life.



FIGURE 55 Petroglyphs on the right side of the Sidaoguxinggou, incised

Source: Photographs by the author

#### 4.1.1.2.1 Tools for hunting

Heishan Petroglyphs hunting scenes, in addition to showing the single hunting activities of one person shooting goats or reindeer with a bow and arrow, more often show the scenes of group hunting and roundup hunting. All these images truly reflect the vigorous pursuit of the spiritual life of ancient nomads(Kang, 2015).

In the Heishan petroglyph hunting images, the tools that most often appear in the hands of the hunters are the bow and arrow. On the right cliff face of

Sidaoguxinggou, one hunting scene depicts four wild oxen arranged vertically in a straight line. To the left of the second and third oxen stand two deer; beneath these deer are two dogs barking fiercely at the oxen; below the dogs are three more deer, a camel, and a donkey. A total of ten hunters, each nocking an arrow, are shown in the scene. In another panel elsewhere in the gorge, a lone hunter is drawn at full draw, aiming his bow at a buffalo on the right. On a rock ledge at the bottom of the gorge, a mounted hunter on horseback also draws his bow to shoot; to his right, another buffalo is portrayed running.

The invention and creation of the bow and arrow is undoubtedly a significant advance in the development of hunting tools, which marks a leap forward in human hunting technology. Before the bow and arrow's emergence, human hunting means were relatively limited, mainly relying on unarmed or using simple stone tools, wooden sticks, and other tools for hunting, which were inefficient and often accompanied by high risk. The invention of the bow and arrow completely changed this situation; through the elastic potential energy of the bow, the arrow can be shot at a breakneck speed to achieve long-distance strikes on the prey. This method of hunting improves hunting efficiency so that human beings can capture prey more easily and reduces the risk of the hunting process. Engels pointed out: "The bow and arrow is as decisive a weapon for the age of ignorance as firearms are for the age of civilisation." In addition, the invention of the bow and arrow facilitated the development of human society. With the improvement of hunting efficiency, the ability of human beings to obtain food was greatly enhanced, which provided a solid material foundation for the prosperity and development of human society.



FIGURE 56 Petroglyphs on the cliffs to the right of the mouth of Mizigou, chiselled

Source: Photographs by the author

The petroglyphs on the cliff wall to the right of the mouth of Mozigou (FIG. 56) are typical, showing a hunter with a bow and arrows in his hands, wearing boots and standing on separate legs. However, the bow is two-thirds of the height of the man, and only the shape of the bow is carved out, which is now naturally detached from the petroglyphs. Ilyin Shegar has noted that "it took thousands of years for man to fashion an arrow. Initially, what was shot from the bow was not an arrow, but a projectile. Therefore, the bow also had to be large, as tall as a man." So the earliest bows and arrows were crude; there was no iron in those days, and they were usually made of wood, with branches or bamboo bent into the bow's body, and rattan or animal sinews for the string. Bows and arrows were exaggerated, which most likely came from the bow-and-arrow-type fertility cult of the early forefathers. Weiler in *The Sex Cult*: "The male genitals were also symbolised as arrows, the two feathers of which implied testicles. Cupid, the

god of love, is usually represented as holding a bow, arrow, or box of arrows, all symbols of male genitalia inspired by legitimate conjugal life." Petrographer Chen Zhaofu agrees that bows and arrows have a two-tiered meaning in primitive art: "They often appear in petroglyphs of hunting and warfare. However, people often overlook the other layer of allegory of the role of the bow and arrow, that is, the significance of fertility worship." The bow and arrow petroglyphs in the petroglyphs of the Black Hills, in addition to a large number of hunting petroglyphs, in which the petroglyphs about bows and arrows are symbols of a kind of reproduction worship, and they exist as reproduction worship petroglyphs.



FIGURE 57 Stone wall on the left side of the Sidaoguxinggou, incised

Source: Photographs by the author

While creating a variety of hunting gear, hunters in the petroglyphs of the Black Hills also domesticated hunting dogs and flying eagles to become their hunting assistants. In this panorama of a ritual roundup in Sidaoguxinggou, various pictorial images are presented, and the picture is rich in content. According to statistics, there are 10 dancers, one hunter with a bow and arrow, one ritual object, three eagles, two

tigers, two bison, two deer, one wolf, two foxes, two dogs, and three northern ibexes in the picture, a total of 29 engraved images. The upper part of the picture has an eagle soaring on the wings, the eagle under the nine dancers wearing plume-like headdresses, the upper left side of the picture has a robust bison, above the eagle flying on the wings, the right side of a wolf with ears up, long tail hanging down to the ground, running towards the two goats in front of them; the middle and lower part of the picture engraved with an eagle flying with its wings up, the eagle has a large and a small two tigers, a large tiger under the two antlers divided into six forked sika deer. The deer is followed by a bison, the bison below the three goats, in the whole petroglyphs of the lower left corner of a hunter to the two deer with a bow and arrows.

#### 4.1.1.2.2 Forms of hunting

Hunting is generally a collective activity, especially in the early days of simple tools, and facing a beast much larger than their size requires a greater number of people to participate, work together, and achieve unity and cooperation. For the ancients, hunting is often a life-and-death struggle between man and beast, in the Heishan Petroglyphs presented in the hunting not only collective hunting, but also single, researchers according to the number of people participating in the single hunting, double hunting, hunting and other different ways, colleagues, in the process of hunting, some will be riding horseback for wading, some will be on foot for shooting, but also some researchers have proposed that there may be a beast trap ring sets to take the animals. Some researchers have also suggested that there may have been a hunting method of trapping animals in animal traps.



FIGURE 58 Petroglyphs at the bottom of Sidaoguxinggou, chiselled

Source: Photographs by the author

To hunt alone is to hunt animals alone on foot or horseback. The Heishan Petroglyphs have more images of solo hunting. For example, on the left side of the picture (FIG. 58), there is a hunter on a horse with a bow and arrow, and on the right side of the hunter on horseback, there is a running bison and a prey with arrows.



FIGURE 59 Petroglyphs on the left of Sidaoguxinggou, chiselled

Source: Photographs by the author

Double hunting generally shows two people working together to round up one or more beasts, or two people catching beasts on their own, basically in the form of teamwork, cooperating to capture prey. In the middle of the picture (Fig. 59), there are two strong bison, with horns bent forward, head bent and tail cocked, four feet standing upright on the ground, and two hunters on the right side, the upper one attacking the upper bison with a stone, and the lower one shooting arrows at the lower one. There are three ewes and one hairy-crowned deer between the two bison and on both sides of the picture, which is a vivid image of the hunting scene.



FIGURE 60 Petroglyphs on the left hillside of the Sidaoguxinggou, rubbed and engraved

Source: Photographs by the author



FIGURE 61 Petroglyphs on the left side of Sidaoguxinggou ditch, incised

Source: Photographs by the author

In the petroglyphs of the Black Hills, there are more pictures of multiple hunters, usually more than three people conducting a roundup. In the picture on the rocky hillside on the left side of the Sidaoguxinggou (FIG. 61), you can see four people on horseback chasing a reindeer, the herd of horses galloping by, startling a small bird, behind the herd of horses there is a reindeer, a wild boar and a hare fleeing in the four min. Hunting is undoubtedly an organised, collective activity with a division of labour. For example, a picture of a bull hunt in Heishan shows a vivid scene of a bison roundup.



FIGURE 62 Petroglyphs on the west wall of the entrance to the Sidaoguxinggou, incised

Source: Photographs by the author

#### 4.1.1.2.3 Division of labour in hunting

Another interesting point in the petroglyphs of the Black Hills is that it seems possible to see a division of labour in these petroglyphs. In several petroglyphs, hunting activities can be seen with a hunter in command. There are four hunters in the petroglyphs on the west wall of the entrance of the Sidaoguxinggou (FIG. 62). The one in the centre directs the other three hunters to shoot bison and goats, drive wild yaks and



intercept wild camels, with vivid images and beautiful lines of carving, in which the bison on the left side is 0.16 metres in length and 0.09 metres in height. The calf behind it is 0.08 metres in length and 0.04 metres in height, and the cow on the right side is 0.16 metres in length and 0.08 metres in height. This picture shows that people then engaged in group hunting activities through the initial division of labour. In some images, we can also see a different division of labour, in addition to the command, there are hunting, interception, transport and so on.

People usually record the scenes that often appear around them. These animals, such as bison, camels, wolves, dogs, mountain foes, sheep, etc., which appear many times in the hunting scenes in the Heishan Petroglyphs, fully reflect the characteristics of the natural conditions in the Heishan area of Jiuquan and the life of the petroglyphs' authors.

#### 4.1.1.3 Dance, rituals (activities)

Heishan Petroglyphs have more figures, not only single, but also multiple people appearing together in the form of these motifs, for these motifs, the existing research is important to focus on two kinds of statements, one statement is a ritual figure, one statement is a dance figure, the earliest human dance is actually in the primitive activities such as rituals, celebrating the harvest, etc., and Heishan Petroglyphs of the dance appeared mainly in the Sidaoguxinggou.

TABLE 8 Jiayuguan Heishan Petroglyphs Classification List - Dance, Rituals

NO	CONTENT OF PETROGLYPHS	NAME	METHO	COLO UR	SIZE (M)	PLACE	
1		dances horse	engravi ng	light brown	0.2*0.12	Sidaog uxinggo u	
2		choreogra phy 11	pester	light brown	0.3*0.18	Sidaog uxinggo u	
3		quadrille	engravi ng	light gray	0.5*0.7	Mozigo u	
4		big dance	pester	light gray	1.14*1.28	Sidaog uxinggo u	

One significant difference between Heishan Petroglyphs and those in other places is the abundance and diversity of dance images. In the Sidaoshanggou, Mozigou, Hongliugou, and other places, many dance images of grand scale, diverse

forms, and beautiful dance postures have been found, especially the petroglyphs in the Sidaoshanggou, which are not only numerous but also of wonderful and vivid compositions. These dance images show a part of human life in primitive society and contain deep historical and cultural significance.

The origin of dance can be traced back to the earliest labour activities of humanity. As some scholars have said, "Labour is the source of all arts, including dance. The art of dance was born when humanity escaped from the ape-like stage through labour. It develops with the progress of labour, enriches with the evolution of society, and forms different magnificent results in all ages, its origin always being labour." It has also been suggested that dance may have originated from the relationship between the sexes and the worship of reproduction in primitive societies. "More broadly speaking, the movement of the human body and the physical exercise of weekdays can be regarded as a form of expression of dance." In ancient Chinese literature, there are records of the "Dance of the High Medium", which is a kind of fertility worship dance with religious overtones, while the "Dance of the Sanglin" is directly related to the myth of the Yin Shang ancestor Jiandi's intercourse with the Xuanbird, which expresses the primitive society's praise of reproduction and life. The "Sanglin Dance" is directly related to the myth of the Yin Shang ancestor Jiandi's copulation with the Xuanbird, showing the primitive society's praise for reproduction and life. Heishan petroglyphs dance figures in the image and clothing costumes with distinctive national characteristics and rich national flavour, the characters are erected on top of the head with high pointed ornaments, clothing, some long skirt girdle, only exposed feet; some wearing short skirts, appearing to be dexterous and lightweight, in some other dance scenes, enthusiastic people dressed in girdle robes, head of feathered ornaments, cross the waist to raise their arms and twist the body, or a group dance, or a single solo dance, rich in the life of the mood. Or a single solo dance, full of life interest. All these images truly reflect the vigorous pursuit of the spiritual life of the ancient nomads(Kang, 2015).



FIGURE 63 Pang Ying, Associate Professor, College of Art, Lanzhou University of Finance and Economics

Source: Photographed by the author's team

When talking about dance and rituals in the interview, Ms Pang Ying stated that in the dance included those who wore spiked decorations, which could be hats or symbols representing status, and that the towering fluttering ribbons could be symbolic feathers or other animal parts, suggesting that the higher the status of the person in the ritual, the longer and pointier their decorations might be. This could be a depiction of a ritual role. Regarding the hat, some people mention that it could be feathers, and they believe certain elements, including feathers and robes, may suggest some connection to Xikang. Although in some of the pictures we now see, including the current Qiang, they have long feathers in their hair ornaments or hats, and although she is unsure if there is a direct connection, there is some relationship with the Qiang to a certain extent. In addition, some scholars have linked the musical instruments of Huoyaogou to the dance motifs in the petroglyphs of the Heishans, arguing that they represent cultural

phenomena of the same period, yet the correlation seems far-fetched. In discussing the difference between short robes and long robes, some scholars have recently come up with new insights, pointing out that the long robes may symbolise women's dress, while the short robes, which are not easy to move around in, were worn by men when they hunted.

In addition, Pang Ying stated that in the Heishan petroglyphs,. However, one image with the primary name is commonly interpreted as a dance. After many observations and sketches, she prefers to interpret it as a ritual activity, and the meaning of the dance seems slightly far-fetched. This is because she noticed that the symbol of a sheep appears on the left and right sides of the image. She believes that these two sheep may suggest the possibility of a sacrifice and that they were perhaps presented as offerings. Therefore, she believes that the image depicts what is likely to be a sacrificial ritual.



FIGURE 64 Wang Pu, curator and deputy research curator of Yumen Museum

Source: Screenshot of the author's online interview

Wang Pu also said that the dance patterns in the Heishan Petroglyphs are amazing, and there is a petroglyph in the Sidaoguxinggou in which there are 32 dancing figures. In the picture of the dance scene in the Heishan Petroglyphs, it can be seen that the figure's costume seems to have some connection with Xikang.

#### 4.1.1.3.1 Forms of dance

Dance images in the Heishan Petroglyphs are rich and varied, vividly reproducing the scenes of human life at that time. The primitive artists were good at expressing grand celebration scenes, and they created both enthusiastic and harmonious images by carefully portraying the characters' dynamics and the arrangement of their positions, as well as by using the spatial composition technique of overhead view. These works convey the dynamic beauty of dance and the joyful atmosphere of celebrating victory. The dances shown in the images include single, double, triple, quadruple, quintuple, and septuple dances. In contrast, the types of dances include the Yu Banner Music, the Tap Dance, the Huteng Dance, the Men's and Women's Pleasure Dance, the Imitation of Fertility Dance, the Dance of the God of Witchcraft and Witchcraft, the Joyful Carnival Dance, and the Ritual Dance, among many others.

The rich dance forms and scenes expressed in the Heishan Petroglyphs fully reflect the joyful emotions of the ancient inhabitants of this region who could sing and dance well and loved life. These works of art are not only precious remnants of early human art but also a vivid portrayal of ancient people's vitality and cultural creativity.



FIGURE 65 Single dance, mill carving

Source: Photographs by the author

The solo dance that appears in the petroglyphs of the Black Hills is in modern terms a solo dance, in which the dancer is alone, in a kind of dance posture. The dancer in the picture above can be seen standing with her left hand crossed and her right hand raised in front of her (FIG. 66), standing with her legs apart and with a feathered ornament on her head. The petroglyphs are carved from hard flint or iron.



FIGURE 66 Petroglyphs in freestanding rock on the left slope of Sidaoguxinggou,  
chiselled

Source: Photographs by the author

Petroglyphs of a two-person dance, i.e., 2 people dancing together. In the upper left corner of a petroglyph (FIG. 66) on a separate rock on the left slope of the Sidaoguxinggou, there are two dancers, both with their left arms outstretched, their right arms bent and uplifted, and their legs bent and separated, dancing, and in another petroglyph, the two are dancing next to the animals, with their left hands folded, and their right hands swinging, as if they were men and women in love and love dance, leisurely and carefree, and stretching and exuberant.



FIGURE 67 Petroglyphs of Sidaoguxinggou, chiselled

Source: Photographs by the author

Dance of Three. This trio dancing in Sidaoguxinggou (FIG. 67) is unusual in that the dancers' robes are trailing and cinched at the waist, their arms are crossed, and their headdresses are horn-shaped. The latter two dancers have feathered heads and intimately dance hand in hand. In front of a cylindrical object, according to the relevant scholars said it is from the matriarchal clan society, symbolising the evolution of the female genitalia of fish. If this is the case, it means that female fertility worship was prevalent here in ancient times.



FIGURE 68 Petroglyphs of Sidaoguxinggou, mill-carved

Source: Photographs by the author

Quad Dance. It is 4 people dancing in a row or two rows. Sidaoguxinggou has a petroglyph carved in a row of four people, head inserted long feather-like, long robes dragging the ground, three people girding the waist, there are two hands on the waist, there is a hand on the waist, one hand, one hand, waving, dancing beautifully. In a petroglyph in Mazigou carved four dancers, divided into the upper and lower two groups. The upper group of two left-handed waist, right-handed dance, strong body; the lower group of two people holding hands on the dance, in the strong man facing a thin woman, the man exposed by the exaggerated genitals.



FIGURE 69 Petroglyphs on the left side of a rocky wall in Sidaoguxinggou, incised

Source: Photographs by the author

Dance of the Seven. There are a variety of formations, in the petroglyphs of the Sidaoguxinggou in three rows of formations, the dancers are all right hand raised in front of the left hand crossed, three people with feathered ornaments inserted in the head, three people with no ornaments on the head, are wearing robes, the sky has flying geese, the ground has a tiger, a deer, a goat.



FIGURE 70 Rock petroglyphs on the left hillside of Sidaoguxinggou, chiselled

Source: Photographs by the author

Group Dance. A group dance with a large formation and an open field. Sidaoguxinggou in 11 dancers (FIG. 70), divided into two rows side by side. Upper row of 5 people, a long neck, like wearing a hat, wearing a long gown; right a girdle, behind a ring, like a kind of belt, the posture of the front, standing; the remaining three people may be male, not with the gown, some of the feet, one of them a man decorated with two forked spikes, and the Tianshan petroglyphs in the dancers are similar. Six people in the lower row, wearing floor-length robes, are women, one girded, raised head, breasts protruding; another person bowed his head, seemingly in deep thought; dancers swinging both hands, singing and dancing. This dance scene, as described by Grousset, is a woman's dance: "dancing women in the head clapping hands, feet together, and knees, so that the legs from the knee to the side - feet and hands to maintain the original position - and quickly back. Because of the rapidity of the retraction, so much so that they strike each other with a sharp clang. This dance is either played with delight by a woman alone or by several women, or sometimes by a woman dancing before a party of male dancers to excite their lust." It is evident that in the primitive multitude of dances, sexuality was stamped.



FIGURE 71 Multiplayer Dance Chart, the right cliff face of Sidaoguxinggou, chiselled

Source: Photographed by the author's team

The largest scene is a ritual dance (FIG. 71) on the right side of the cliff in the Shidoshigou area. There are 33 dancers in the picture, two shamans kneeling on the ground making prayers, and the atmosphere is solemn. There is a cow on the left side of the second row. Dancers are divided into three rows, the top row of 7 people, in front of the team there is a conductor; in the middle row of 11 dancers, one of them in the right side, away from the dance team, there is a conductor in front of the front, as if in the command of the right in front of the two sorcerers for prayer. The third row of nine dancers, above a conductor, six dancers in the next two rows; dancers have long feathered head ornaments, quite heroic. Most dancers have one hand on the waist and one in front of the lift. Eight dancers have two hands on the waist, feet apart, and neat movements, enough to shock people. Visible dance has become the most important means of witchcraft. This dance picture is the most exquisite engraving; the composition is also extremely vivid.

Dance images in the petroglyphs of the Black Hills have a striking feature: many of the dancers are dressed in long robes, with their sleeves dragging on the ground, their waists tightly bound, and their dances are light and elegant, and most of them are female in terms of their images. This feature suggests that the original Northwest dances had women as their main objects of expression, which was very different from the male-dominated dance forms of later times. The appearance of these female figures is not only a simple reproduction of social life, but may also be closely related to religious rituals and the spiritual world. Dance rituals, a primitive religious form of worship with profound mystical symbolism, are prevalent among many primitive peoples. The recurring dance ritual scenes in the Heishan Petroglyphs vividly show an important side of the life of primitive human beings, providing an image and valuable information for the study of the characteristics of primitive thinking. These dance ritual scenes are not only a concrete expression of primitive art, but also a symbolic record of early man's profound thinking about nature, life, and supernatural power.



FIGURE 72 Jianrong and the author talk about the Heishan Petroglyphs Dance Map

Source: Photographed by the author's team

Li Jianrong for the collective dance said, this dance map some people called the ritual map, some people also raised objections that should be drill map, that is, the preparation before fighting, but from the petroglyphs location, the ritual may be more accurate, because the location is chosen better, a bit of the so-called totem worship, because this location is higher, and the lower domain is more spacious, that is likely many people may be regularly perform a ritual there, supposedly primitive witchcraft. The figures in the previous images are wearing robes that cover their feet. However, in this one, we can see that the feet are exposed, so it is possible that only men could take part in the ceremony, and women could not, so it could be a manifestation of a ritual. Regarding the attributes of the figures in the image, Li Jianrong said that the pointed hat and the long robe existed in many ethnic minorities in the Hexi region.

These petroglyphs not only have deep religious symbolism, but also reveal the symbolic characteristics of the nature of primitive art, they use figurative techniques to express the primitive society's understanding of the living environment and the spiritual world, which has become a classic example of primitive art and thinking mode, on the other hand, the Heishan petroglyphs dance images can also be seen in the ancestral people's fertility worship.



FIGURE 73 Petroglyphs of Mazigou, mill carvings

Source: Photographs by the author

#### 4.1.1.3.2 Reproductive worship and rituals in dance

Heishan Petroglyphs in the human theme of fertility worship picture is mainly shown in the dance, muozigou, a picture on the opposite side of two people standing, hands flat, the left side of a man, genitals obvious, the right side of a man for the female. This is a manifestation of the ancient people's worship of reproduction. The Four Dancers Dance in Mozigou (FIG. 73) is a petroglyph of fertility worship with obvious intentions, which illustrates the status of males in reproduction and directly expresses the idea of fertility worship of the ancestors. Since there were many beasts and few men in ancient times, human reproduction was essential, so there was a sense of mystery and worship of sex. From matrilineal to patrilineal clan society, for a long time, the primitive people were immersed in the joy of this kind of game characterised by the reproduction of children and grandchildren, and it can be said that most of the time from

the Late Paleolithic Age to the Neolithic Age was the stage of sexual flaunting. The appearance of images of male sexual organs can be considered the peak of this phase. "A lean and courageous dancer must also be a lean and courageous hunter and warrior, and in this respect, dancing contributes to sexual selection and ethnographic improvement." In Heishan, the dancers engraved in the Sidaoguxinggou are arranged in a row, the first person on the right side wears a long robe, girdle, the left hand crosses the waist, the right hand dances with a long sleeve, the top of the head has a feathery ornament bending backward, and the genitals stand out, in front of the dancers on the right side, engraved with a girdle-shaped object, vertical and on the ground, up and down are in the flat surface, which is also "suspected of being a sex cult object".



FIGURE 74 Author and Li Jianrong on the spot

Source: Photo taken by the author's shooting team

Li Jianrong also talked about their views on the cult of reproduction, he said that the class did not invent the written word, the ancients of their daily lives or what they saw in the petroglyphs there is a process of sublimation, such as the worship of

nature or some of the cult of animals, in the process of recording down there will be a process of sublimation, it is actually from the initial eye to see these matters gradually as a spiritual pillar, the symbolisation of the cult of reproduction, the cult of nature, the cult of animals, the cult of nature, the cult of animals, the cult of animals, and so on. Symbolised. Regarding fertility worship, there are several patterns, such as the palm and footprint patterns, which represent a kind of life worship, including the petroglyphs of goats that we saw earlier, which are some patterns of fertility worship. At a later stage, it is said that about the pattern of footprints, there were some legends that women in ancient times would get pregnant after stepping on the giant footprints, so this is the meaning of the fertility worship of footprints here.

The hunting and dancing images in the petroglyphs of the Qilian Mountains and the Heishans, as well as the portrait bricks of the tombs in the northern foothills of the mountains, further corroborate the above statement. Totem worship reflects the worship of natural phenomena such as the sun, moon, mountains, and rivers. In the perception of the ancient ancestors, the sun has the most significant influence on human beings, light and darkness, heat and cold, and the growth and death of plants and animals are all related to the sun. Hence, the sun first became the object of people's worship. Witchcraft activities are a primitive form of religion. In witchcraft activities, people express their religious feelings through dance, which is the most fervent and drenching expression, so any witchcraft activities are inseparable from dance. The Black Hills petroglyphs have three prominent "dance figures"; the performance of the ritual dance, the characters of the headdress, clothing, and movement are more or less the same. Two depict a witch, kneeling or standing, in a prayer scene. "Native North Americans danced the 'Bison Dance' when they could not catch a bison and faced starvation, and the dance was always to be continuous with the appearance of a bison because the Indians believed that the appearance of a bison and the dance had a causal relationship(Yang & Zhang, 2001)." On the one hand, the scenes of hunting, dancing, rituals, and other activities in the petroglyphs of the Heishan reflect the survival of human beings at that time, which was mainly based on the hunting economy. On the

other hand, it is still related to the worship of animals and totems, reflecting the early human beings' ascension from survival to spirituality. This, having an ordinary object of worship, obeying certain sacrificial rituals (dance), and unifying the will of the clan to accomplish the significant survival or production activities of the clan (hunting), is also a manifestation of the beginning of the germination of early social organization(Xu, 2016).

#### 4.1.1.4 Religion

The mass of Heishan Petroglyphs shows religious motifs in several locations, which indicates that religion has always existed alongside human activities in the Heishan region. The main symbols are stupas, sutra streamers, etc.

TABLE 9 Jiayuguan Heishan Petroglyphs Classification List - Religion





NO	CONTENT OF PETROGLYPHS	NAME	METH O	COLOUR	SIZE (M)	PLACE	
1		pagoda	engraving	light brown	1.2*1.7	Shiguanxia	
2		Buddhist temple	engraving	light brown	0.6*1.2	Hongliugou	

TABLE 9 (Continued)

3		PAGO DA	ENGR AVIN G	LIGHT BRO WN	0.95*1.6	HONGL IUGOU	
4		pagod a	engra ving	light brown	0.98*0.35	Hongliu gou	

Religious Heishan Petroglyphs are not much compared with hunting and dancing, but they are relatively concentrated, these petroglyphs reflect the religious culture of Heishan at that time, the main contents are hall, stupa, Buddha statue, ancient Tibetan inscriptions, which are distributed in the 11 kilometres of Heishan Canyon at the western end of Hongliu Gully and the eastern end of the Shiguanxia, of which there are six pieces in Hongliu Gully, with the contents of the petroglyphs as Buddha hall, Buddha statue, stupa, horseback rider, Tibetan inscriptions, goats, of which four pieces are basically well preserved and two pieces are more seriously weathered. Among them, four petroglyphs are preserved intact, two petroglyphs are more seriously weathered naturally, three petroglyphs are found in Shiguanxia, and one petroglyph is found in Banana Trench. Buddhism since the Eastern Han Dynasty from India into China, the Hexi Corridor built over the generations of cave temples, temples, pagodas, such as the famous Dunhuang Mogao Caves, Zhangye Buddha Temple, Wuwei Roshi Temple Tower, etc., are the treasures of Buddhist art and rare cultural relics remains. However,

stone Buddhist petroglyphs with images of temple deities such as these were found for the first time in the Hexi Corridor (Chushi Bin et al., 1990). According to historical records, after Tang Zhenyuan's pacification of the "Anshi Rebellion", Hexi was empty, and the Tubo took the opportunity to occupy He Long for more than 100 years. Tubo people living west of the river, in the red willow ditch, ShiGuanXia carving Buddhist temple, bodhisattva, statue, stupa, is entirely possible. From this, it can be inferred that the stupas, Buddha statues, and Tibetan inscriptions in Hongliugou and Shiguanxia in Heishan are the religious legacy of the Tubo people after the mid-Tang Dynasty(Hu, 2012).



FIGURE 75 Interview with Wang Quanzhao, President

Source: Photographed by the author's team

Wang Quanzhao pointed out that in the past, when examining other petroglyph sites in Hexi, there would usually be some petroglyphs on the side of villages, so that there would be roads and drains next to them, which would be suitable

for people to survive and rest. The iteration of petroglyphs can be seen at this point: the ancient people made carvings, and the descendants made chiselling based on this. Heishan Petroglyphs can also reflect this, this is because after the opening of the Silk Road in Buddhism appeared a lot of stupas and monks, these appear in our Heishan Petroglyphs, which can reflect petroglyphs are engraved in our Silk Road this area, laying down the East-West cultural exchanges produced by the result of the early cultural exchanges, which is also a kind of cultural exchanges.

Heishan Petroglyphs are the most representative of the pagoda. Heishan has many Buddhist caves, such as Dunhuang's Mogao Caves, which have Buddhist art, but the pagoda style is not very similar to the stupa. Most pagodas are not the same as those in the Indian region in terms of shape and composition, and only a small number of pagodas are more similar to stupas. Research shows that these pagodas are remnants of the Tibetan Buddhist culture (FIG. 77), the local religion of Tibet. The representative of Benjaminism, the Benjaminist pagoda altar, is a stepped pagoda made of stone, similar to the pagodas in the Heishan Petroglyphs. The pagodas in Heishan originated from the pagodas of the Benjaminist rituals in the early period. It is inferred that the stupa, Buddha statues, and Tibetan inscriptions in Hongliugou and Shiguanxia in Heishan are religious relics of the Tubo people after the middle of the Tang Dynasty. They are likely the Tibetan Buddhism, commonly known as Lamaism, which was founded in the 7th century A.D. when Songtsen Gampo of the Tombs of the Tubo Dynasty was inaugurated with the ancient Tibetan language. Next to these petroglyphs of Bodhisattvas and Buddhas, there is a heart symbol and some Tibetan inscriptions. The word "break" is a religious symbol, for Buddhism, an exclusive, auspicious word symbol; it is a bright, sacred, auspicious symbol—the inscribed Tibetan inscriptions, that is, the six words of truth and other prayer terms. Buddhism since the Eastern Han Dynasty from India into China, the Hexi Corridor built over the generations of cave temples, temples, pagodas, such as Dunhuang Mogao Grottoes, Zhangye, Zhangye Buddha Temple, Wuwei Roshi Temple Tower, etc., are treasures of Buddhist art and rare cultural relic remains. However, like this kind of temple deity image

of stone Buddhist petroglyphs, it is still the first time they have been found in the Hexi Corridor.



FIGURE 76 Interview with Du Yongdong, Advisor of Jiuquan Painting Academy

Source: Photographed by the author's team

Du Yongdong said that in the petroglyphs of the Heishan Lake contains some historical gods and goddesses, which reflect different religious beliefs, and may also be the worship of specific objects at that time when the ethnic groups performed rituals, and this worship of motifs and objects may be an expression of the painter as an ordinary person. Including the famous petroglyphs of Ningxia and Heilongjiang regions, these two basic contents are more or less the same, reflecting the local ethnic groups, their environment and their current situation, the most important of which is religion, and the religious elements in Helan Mountain region are richer, mainly showing Tibetan Buddhism or other religious beliefs, which is not accidental, because since the Qin Dynasty the Hexi Corridor region, including Ningxia, has always had a deep religious culture.



FIGURE 77 Petroglyphs on the south wall of Hongliugou, incised

Source: Photographed by the author's team

There is a 1-shaded hall (FIG. 77) with 1 Buddha, 1 Bodhisattva and one monk. The hall is 78cm high and 64cm wide from the base to the top of the hall. Under the rectangular pedestal, face width of 3 rooms, when the centre of the room is slightly wider. 4 columns head, on the semi-circular arch. The top of the hall is high and steep, with two scops owls on it. When the heart sits between the main bodhisattva, round neck light, wearing a five wisdom crown, Zu's right shoulder, diagonally draped robe, hands meditation seal phase, half cross-legged sitting on the base of the platform above and below the lotus seat, the petals of the base of the anti-dropping front. In the roof position on this statue's head is a semi-circular, umbrella-shaped Huagai under the cover of the cross-hanging celluloid tassels. The temple foundation top is in the middle of a flame-like Mani pearl. Buddha's left side of the room, standing one bodhisattva, treasure crown with Buddha, round neck light, ancestor of the upper body, diagonally draped robe, the right hand outside the curved lift, holding a branch of the lotus, the left hand curved lifted chest, under the sheep's intestine large skirt, bare feet, wrist there. On the right side of the Buddha, a disciple is sitting cross-legged, one disciple, with no item light,

and the right shoulder of the ancestor is diagonally draped in monk's robes, hands folded. The entire painting area is 1.25 square metres. Buddha Hall uses a knife, chisel, and other sharp tools, all engraved with deep and neat line engraving. Buddha Hall is carved from the bottom of 3.5 metres of cliffs in the ditch. The bottom of the ditch is flat, making it easy for the herders to carry out their religious activities(Yang & Zhang, 2001).



FIGURE 78 Petroglyphs on the south wall of Hongliugou, incised

Source: Photographed by the author's team

The stone carvings of Buddha statues and stupas in the canyon at the west end of Hongliugou are more concentrated and novel in content. In Hongliu Gully, there is a Yin-carved four-stage mantle stupa. The height is 29.5 cm, and the base of the first level is 17.5 cm wide. The mantle is high and round, with mountain flowers and banana leaves, three phases of the wheel, and a jewel at the top. On the right side of the bowl is engraved an ancient Tibetan inscription. The carving method uses a thick line chiselled diagonally, the corners are neat, and the carving line is continuous. This stupa is carved in the canyon on the south side of the cliff wall, only 80 cm from the bottom of the ditch; The region is open, easy to worship.

A swastika is carved on the base of the stupa at Hongliugou and Shiguanxia. This symbol appears early in China, with the swastika appearing on pottery made by ancestors in Gansu and Qinghai about 6,000 to 7,000 years ago. It has also been found on Neolithic sites in Guangdong and Inner Mongolia. "The swastika takes the meaning of 'infinite cycle', i.e., 'wealth and riches keep on coming', and is also believed to be the worship of the sun god. Inner Mongolia Yinshan, Yunnan Cangyuan, Guangxi Huashan, Lianyungang General Cliff, Sichuan Dove County and other places in the petroglyphs have the "swastika" symbol and the sun god or symbol of the sun god's portrait. The sun god portraits of some head for the round, radiant, or people holding the sun, or painted in the shape of a round sun, round in the painting "ten", "m" or star-shaped or "swastika". They symbolise that the sun rises and falls daily, year after year, in an infinite cycle, "without end". The swastika next to the petroglyph stupa in Heishan Shikuanxia should be regarded as related to Buddhism. "The swastika is the exclusive auspicious symbol of Buddhism, a symbol of light, holiness and good fortune.



FIGURE 79 Shiguanxia Stupa

Source: Photographed by the author's team

Lotus flowers have been used in China for more than 3,000 years. Since the introduction of Buddhism into China, the lotus flower has become closely related to the statue of Buddha. According to legend, when a Buddhist recites the Buddha's name, a lotus flower will be born in the Western Pond, and the more sincere the Buddhist believer is, the bigger the lotus flower will bloom. Hence, Buddhism worships the lotus as the "Holy Flower of the Buddha". Since the lotus flower was planted in ancient India before China, Buddhism was born in ancient India. Buddhists call the land where Amitabha resides the Western Paradise; thus, "Lotus State" becomes a synonym for the Western Paradise. The seat on which the Buddha preached is called the Lotus Seat, or the Lotus Platform. The Three Great Buddhas, the Bodhisattva Guanyin, and the Eighteen Arhats sit on lotus platforms in Chinese temples. Petroglyphs also depict lotus seats; others have petals hanging back in front of the base.

Heishan Petroglyphs symbolise a new stage in the history of human culture, and their significance is very far-reaching. Heishan Petroglyphs are a special form of art engraved by prehistoric forefathers on stone walls, highlighting their spiritual world. Petroglyphs of the Black Hills are the product of primitive religious spirituality, and the discovery of the petroglyphs of the Black Hills is of great artistic value and historical research value for understanding the culture, practical labour, life, folklore and religious culture of the peoples of the ancient northwestern region.

For example, in the four shares in the five goat head pattern represented by the totem worship, Heishan Petroglyphs in the totem worship is the worship of the sun and the moon. Heishan Sidaoguxinggou petroglyphs in the sun image there are three kinds: one is round, radiant, and four birds are hovering in the sky; another is a circle with a point in the shape of "◎"; and a kind of thick line circle, which leaves a hollow, a total of three. The moon image is only one kind, for the half crescent shape. In ancient times, the first people's perception of the nature of the sun had the most significant influence on human beings, light and darkness, heat and cold, the growth and death of plants and animals, all of which were related to the sun. Therefore, the sun first became the object of worship."



FIGURE 80 Author studies Heishan petroglyphs up close

Source: Photographed by the author's team

Witchcraft activity is also a primitive religious formation. "With the incantation, magic ritual, and dance, the three together constitute the trinity of primitive witchcraft form characteristics, especially dance, to become the primary means in witchcraft. People in witchcraft activities in the religious emotions through the dance the most fervent, the most drenching expression, so any witchcraft activities are inseparable from the dance." Heishan Petroglyphs there are three large "dance picture" performance is a ritual dance, headdress, clothing, movement is more or less the same, two of them have sorcerers or kneeling or standing prayer.

Religious sentiments expressed in Heishan Petroglyphs. The pictures in Heishan Petroglyphs express a strong sense of religiosity, making primitive painting and religion the same. The Heishan Petroglyphs reflect the worship of nature, animal worship, totem worship, fertility worship and the worship of Buddha images.

The art of petroglyphs came into being with the creation of witchcraft activities, in which the primitive inhabitants practised witchcraft by carving on rocks to influence the will of the ethnic tribes. As a result, the characteristics of witchcraft in the form of incantations, rituals and dances were gradually formed during the long period of primitive religious activities". Due to the backwards productivity and limited cognitive level, witchcraft and religious beliefs became the primary spiritual activities.

#### 4.1.1.5 Text

Texts in the Heishan Petroglyphs are found in several regions, mainly in Tibetan and Chinese characters, with Tibetan mostly accompanying stupas and other motifs, and Chinese characters predominantly in recent times.



TABLE 10 Jiayuguan Heishan Petroglyphs Classification List - Texts

NO	CONTENT OF PETROGLYPHS	NAME	METH O	COLO UR	SIZE (M)	PLAC E	
1		Tibetan inscripti on	engra ving	light brown	1.4*0.8	Hongli ugou	
2		Jindaiw enzi	engra ving	light gray	0.24*0. 6	Shigu anxia	
3		Buddhi st symbol	engra ving	light gray		Hongli ugou	
4		Tibetan inscripti on	engra ving	light brown	0.75*0. 23	Hongli ugou	



FIGURE 81: Explore the religious petroglyphs of Hongliugou in Heishan

Source: Photographed by the author's team

The words appearing in the Heishan Petroglyphs are strictly inscriptions that differ from petroglyphs. The contents of the words are divided into two periods: Tibetan or Tufan that appeared in the middle and late Tang Dynasty, and the other is the Chinese characters of the Ming Dynasty, Qing Dynasty and the Republic of China. The main ones are the Ming Dynasty inscription "Beimo Chenqing" on the rock wall on the north side of Shiguanxia, the "Qing Dynasty Ancient Characters" limerick engraved on the granite rock protruding from the bottom of Shidaoxue Gully, the Republic of China limerick poem engraved on the independent rock at the third corner of Mazigou, and the Tibetan inscription on the rock protruding from the bottom of Mazigou, the Tibetan inscription following to the petroglyphs of Shiguanxia pagoda, and the Tibetan inscription next to the petroglyphs of Hongliu Gully pagoda, etc. Some of the writings are petroglyphs of broken generations. The text is the best basis for determining the age of the petroglyphs.



FIGURE 82 Fu Qiang, Director of the Heishan Petroglyphs Conservation Institute

Source: Photographed by the author's team

Fu Qiang introduced the Heishan petroglyphs in the area, where some were carved in recent times, which was the main era for the Ming, Qing, and Republic of China periods. This time should be accurately known as the rock carvings. The earlier people record and not the same, there are some with the thinking of the show, close to the pass of the place also appeared in the rock carvings of modern people, on the one hand, they came here to stay as a souvenir of their own, on the other hand, it is also the rock carvings of the ancient people. On the one hand, they came here to keep their memories, on the other hand, it is also an imitation of the ancient rock carvings, but some of them are carved on the original stone, which is a kind of destruction. Therefore, we need to strengthen the protection and monitoring of Heishan Petroglyphs.

Similar to modern Tibetan writing, it appears next to the stupas in both Hongliugou and Shiguanxia, which is good evidence that the religion belongs to the attributes of Tibetan Buddhism. After Songtsen Gampo united Tibet, he formally

established the Kingdom of Tubo, formulated a script, and introduced Buddhism from the Tang Dynasty and the Tianzhu, so it is deduced that the creators of the petroglyphs should have been believers in Tibetan Buddhism.



FIGURE 83 Textual Discernment and Evolution of Shiguan Gorge with Li Jianrong

Source: Photographed by the author's team

Li Jianrong said in the ShiGuanXia wall of the text is the Tibetan language, is what we call the modern Tibetan language, this text it is the yuan dynasty on the formation of the yuan dynasty since a kind of this form, we see this side of the general called the tufan text, or called the ancient Tibetan language. Tibetan language is Songtsen Gampo united the Tibetan tribes after the formation of the unity, so it can be deduced that this age is later than that age. This text is scripture, which is what we call the six-character motto. This is also a Zhejiang University professor who determined that this text is from the Yuan Dynasty, because the process of writing this text is particularly high. After all, these areas have the same writing in our Gansu, Inner Mongolia, and Xinjiang. Another place to test was the Yuan Dynasty. Because the Yuan dynasty ruled

this area, the Mongolians did not use Tibetan; they used Mongolian but believed in Tibetan Buddhism, so the writing here is Tibetan. Moreover, from the Heishan petroglyphs, we can see that the form of the text in the Tibetan language indicates a petroglyph process.

Underneath the stupa in the mouth of Shiguanxia is the Tubo script, which appeared in the Tang Dynasty, so it can be ascertained that the contents of the relevant petroglyphs are from the Tang Dynasty. When Mr Xie came here, he compared the texts. Because Mr Xie is a researcher of ancient scripts, he looked at the petroglyphs of Shiguanxia and Hongliugou. He found that the texts on them might be the same, and after research, he found that although some of the texts had dropped, the texts of the two places could be supplemented by each other. After supplementing, he found that the contents of the texts were the same, which means that the Hongliugou and the Shiguanxia below it are the same, and the carvings came from the same group of people. This means that the carvings are from the same group of people. This also better explains why the form of the stupa on both sides is the same.

Li Jianrong also talked about, in a place are the mountain character in the text can be seen, these words from the Republic of China, because the Republic of China is particularly popular in a kind of game between the literati, they put these words, whether with a wide character, or with a mountain character, and finally carved the characters into this.



FIGURE 84 Petroglyphs on the south wall of Hongliugou, incised

Source: Photographed by the author's team



FIGURE 85 Petroglyphs on the south wall of the Shiguanxia, engraving

Source: Photographed by the author's team

There are five ancient Tibetan inscriptions, one on the right side of a stupa in Hongliugou and one on the upper left side of a niche. Another stupa base is inscribed with three lines of ancient Tibetan inscriptions, and another line of inscriptions is engraved on a rock wall not far from the stupa. The Shiguanxia ancient Tibetan inscription is also engraved on the side. 21 and 22 April 1980, by the northwest institute of nationalities, professor Wang Yinuan, Wei Quanming, Hao Sumin lecturer and Gansu nationalities research society Yidan Caijiang identification. The conclusion is: this text is not written by people who write very well, is an earlier Tibetan script, about not earlier than the Tang Dynasty, and the Sidaoguxinggou petroglyphs can not be mixed; the carving is earlier than the text. Ancient Tibetan inscription for the Buddhist "six words of truth" content. Some words of the ancient Tibetan inscriptions are not engraved. However, the general meaning of the inscriptions can be translated as follows: "All living beings are all masters (the honorific title of the son) (the meaning of the monks) to...all living beings are all victorious (i.e. Buddha) Dharma (suspected to be 'monks') (which means 'falling').".

Shiguanxia, a stone carving, is from the Ming Dynasty Wanli twenty-first year (1593) by the Suzhou military preparation Guo Shigu patrol Jiayuguan Pass defence handwritten "North Desert Dust Qing" inscription, not only providing clear chronological information about the petroglyphs but also reflecting the historical background and official activities at that time. On the granite rocks protruding from the bottom of the Sidaoguxinggou, there is a limerick "Qing Dynasty Ancient Characters" engraved in the first year of the Qianlong reign (1736).

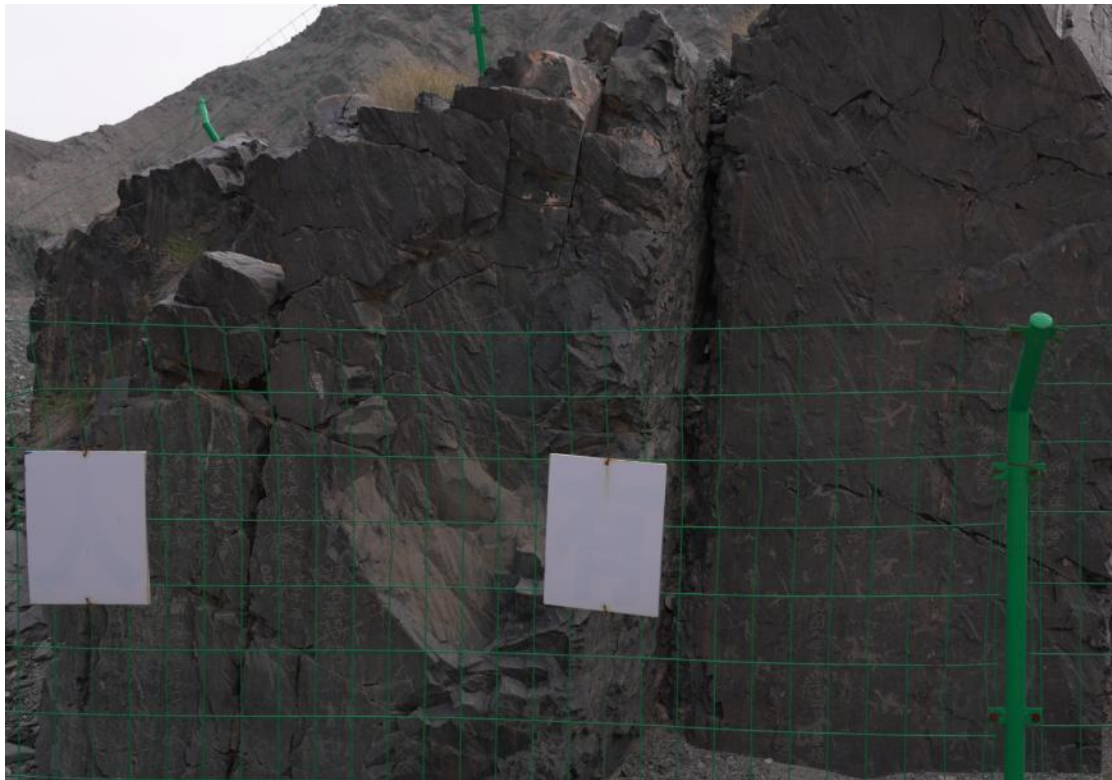


FIGURE 86 Petroglyphs at the bend of Mozigou (now protected)

Source: Photographed by the author's team

Figure 86 shows that limericks inscribed in the eighth year of the Republic of China (1919) are on the independent mountain stone at the third bend of Mozigou. These inscriptions reflect the social climate and cultural atmosphere of the Republican period and are of some significance in understanding the inheritance and change of petroglyphs in Heishan in different historical periods.

For the three petroglyph inscriptions, Li Jianrong, the director, said they should not be considered petroglyphs. In fact, whether they are Tibetan or modern Chinese characters, strictly speaking, they are not petroglyphs. They should be called rock carving, and they belong to the rock carving text, not to the category of petroglyphs.

## 4.1.1.6 Plants

The plants in the Heishan Petroglyphs are mainly ferns, which provides good evidence to corroborate the warm weather of the early Hexi Corridor.

TABLE 11 Jiayuguan Heishan Petroglyphs Classification Table – Plants

NO	CONTENT OF PETROGLYPHS	NAME	METH O	COLO UR	SIZE (M)	PLAC E	NO
1	A petroglyph showing a stylized bamboo plant with long, narrow leaves and a central stalk, carved into a dark rock surface.	Phyllostachys edulis (botany)	engraving	light gray		Shiguanxia	
2	A petroglyph showing a plant with clusters of small, round fruits hanging from a stem, carved into a dark rock surface.	Lonicera japonica	engraving	light gray		Hongliugou	
3	A petroglyph showing a large, broad, and slightly curved leaf, carved into a dark rock surface.	banana leaf	engraving	light gray		Hongliugou	



FIGURE 87 Petroglyphs on the south wall of Shiguanxia

Source: Photographed by the author

There are fewer studies on the images of plants in the Heishan Petroglyphs, both from the literature and from the studies of experts and scholars. Combined with his fieldwork, the author believes that the plants in the Heishan Petroglyphs are mainly made up of two aspects, on the one hand, it is the objective reflections of the forefathers on the plants appearing in the area, such as ferns appearing at the time of the early tropical climate, and it has been proved now that the climate of Gansu belonged to the sub-tropical climate 1,000 years ago. , so the survival of ferns is particular, from the early Heishan Petroglyphs petroglyphs found in several animal species, such as large-horned deer, water deer, rhinoceros, bison, etc., indicating that at that time, the climate here was warm and humid, with sufficient rainfall, dense forests, and from the mode of climate change in China's northern region in the last 10,000 years, about 8,000 - 5,500 years before the present day (geologically known as the Atlantic Ocean period), is the the best period for the world's climate. However, now the large class of plants has long been extinct in the Northwest, and most of the surviving ones are herbaceous miniatures. Ferns have only survived until 11,000 to 7,000 years ago, as the climate in the Hexi Corridor warmed up. Ancient people in the Heishan region only saw this plant;

it is possible to chisel it on the cliff wall. Moreover, the poppies and curly grass that appeared on the petroglyphs still exist in the Northwest.



FIGURE 88 Petroglyphs on the south cliff face of Mozigou (0.7 metres above the ground),  
incised

Source: Zhang Xiaodong, Niu Haipeng (2016) Catalogue of Heishan Petroglyphs: the petroglyphs of Mozigou P122

Another is the source of Buddhism, such as the appearance of the lotus flower, in Buddhism belongs to the sacred objects, whether from the Bodhisattva's lotus sitting platform, or some Buddhist figures in the hands of the magic weapon, the lotus flower is indispensable to Buddhism, so the existence of religion with good wishes in the carving may be.



FIGURE 89 The author and Li Jianrong studying the details of Heishan petroglyphs

Source: Photographed by the author's team

Regarding the plants in the Heishan Petroglyphs, Li Jianrong said that some of the plants that appear are related to existing associations, such as poppies, which we can see now. The ones next to the stupa are *Lonicera japonica*. We see another plant in fact in many modern patterns can also be seen, especially in ancient buildings, this is the curtain grass, often appear in the beams and columns below, presented in a pair of interconnected, that is, we often say continuous pattern, as a decorative pattern, but this is frankly a class of aggregated plants. This confirms some climate change facts we discussed before, because corresponding plants and animals appear.

#### 4.1.2 Significance of Heishan Petroglyphs for local study

##### 4.1.2.1 Importance of Heishan Rock Art for Jiayuguan Pass

Petroglyphs of the Heishan, known as "Petroglyphs of the Heishan Cliffs and Shallow Rock Carvings", are located on the craggy cliffs of the Heishan Canyon, about 20 kilometres north-west of Jiayuguan City in Gansu Province.

Located in the north-west of Jiayuguan Pass, Heishan is a branch of Horsehair Mountain known as Dongting Mountain in ancient times, with steep mountains, gurgling streams, and water plants, where many ancient ancestors used to live. Heishan is a place full of history and culture, and it is also known for its rich cultural heritage and natural landscapes. With its unique geographical location and lengthy historical background, Heishan has become an important site for studying ancient cultures and changes in the natural environment.

"Repair Suzhou new record" records: "Heishan, also known as the ' Dongting Mountain ', is located seventy miles west, with four sides of the cliff, people can not go up, look at the flame flame as cast copper colour". Heishan mountain is steep, with gullies and ravines, jagged rocks. In the rolling Heishan range in the middle of the two mountains although in the Heishan many mountains surrounded by but has a very different characteristics with the Heishan, two mountains were Sidaoguxinggou mountain system and mill ditch mountain system, they are made of grey-white granite composition of the mountain, mountain streams throughout the year, spring water, streams all over the water, water and grass. This greyish-white granite stone is not only highly load-bearing; highly resistant to compression; has good abrasive ductility; it is also easy to cut and shape, has a uniform texture and grain, and is not easy to weather, which makes it the best stone for building the cornerstone of the citadel. Moreover, Mazigou is close to Guancheng, which makes it easy to transport. Furthermore, Mazigou has abundant water sources for personnel and livestock. Analysed from these factors, the rocks of the granite mountains in Mozigou were the stones used in the construction of the Jiayuguan Pass City at that time.



FIGURE 90 Survey of petroglyphs in mozigou

Source: Photographed by the author's team

About this unique stone, there are folk stories about goat camel bricks, fixed city bricks, ice road transport stone, etc. Goat camel bricks have a certain reliable source, from the petroglyphs, a large number of rock goats have survived in the Heishan area since ancient times, the rock goats itself can walk freely between the cliffs, compared to the manual handling is more convenient, but this should only be limited to smaller bricks, for the 2 metres or so of the bricks and stones is obviously not applicable.

"Ice Road transport stone" said in the construction of Jiayuguan City, the need for thousands of blocks of 2 metres long, 0.5 metres wide, 0.3 metres thick stone, craftsmen in Heishan will be chiseled stone, but people can not afford to lift the car can not be pulled, and the mountains are high and far away from the transport. Guys chiseling stone while worrying, see the winter season is coming, the stone has not been transported from the mountain out of a piece, if you want to delay the schedule, there is no money is small, this head can be difficult to protect. We are long boo short sigh, then,

suddenly the mountain top a muffled thunder, from the white clouds floating down a piece of silk, the craftsmen hastened to catch, only to see above the hidden several lines of words, we look at it after a sudden realisation, according to its action. Waiting for the arrival of winter, the crowd from the mountains to the city to build a road, splashing water on the road surface, so that it formed an ice road, and then put the stone on the ice road on the skidding transport, the result is very smooth to the stone to the Jiayuguan Pass under the city, not only there is no delay in the construction period, but also saves a lot of construction period. In order to thank God for his blessings, the craftsmen built a temple near the fortress and enshrined the gods, which became a place where the craftsmen had to worship after they left the fortress.

A special researcher has examined this story and found that it is not an empty story, combined with the examination of the local area, it should be a real historical event that existed and took place. The Heishan in the legend of "Ice Road and Stone Transport" is located in the west of Huangcaoying Village, 8.5 kilometres northwest of Jiayuguan Pass, which is now also inhabited by people, and the Great Wall Cultural Protection Centre is located here. Heishan's Stone Pass Gorge, also known as the "Water Pass Gorge", is the ancient Silk Road Hexi Corridor must pass through, we also see at the scene between the two mountains by the traces of water scouring, and only between the two mountains to form a valley by a relatively large number, according to Li Jianrong's introduction, in fact, in the ancient times of the Silk Road in this section is to pass through here, on the one hand, the two mountains formed a natural barrier, on the other hand, the two mountains formed a natural barrier, the two mountains formed a natural barrier. On the one hand, the two mountains formed a natural barrier to block the cold winds of the Northwest, on the other hand, there is water here, there are trees, suitable for rest, people who have come to the Northwest know that in the north there are trees both people, which also confirms the early Jiayuguan main settlement on the claim that this is the place.

Mazigou is commonly known as "Mazigou" because the granite stones on the mountains in the ditch are used to make stone mills, stone grinders and stone

hammers, which are also called "mazishi" by local elders. In modern times, mill ditch also constantly people for ore development, in recent years, the country has strengthened the environmental governance and cultural protection work, the nearby mines basically disappeared, which is also a good aspect of cultural protection, in the mill ditch, the researchers found a top-down "sliding stone groove" and from the depths of the mountain downward flow a stream of Spring water club in the lower left of the stone groove, forming a natural pool, from the geography of the mill ditch to analyse, here is a very abundant water source of the ravine, so the story in the legend is by the possibility of happening, plus the interpretation of the local people, into a beautiful legend now.



FIGURE 91 Distribution of petroglyph types at Heishan Petroglyphs

Source: Statistical mapping by authors

We can also see this from the distribution of petroglyphs; a large number of petroglyphs in the Sidaoguxinggoues are of animals, hunting, and ancient figures, while only in Hongliugou and Shiguanxia are there religious patterns, Tibetan text, and even modern text carvings, which explains that the vicinity of Shiguanxia is more suitable for habitation, and in this way, it is not difficult to understand that Shiguanxia, Mozigou, and other places are in fact the closest to Jiayuguan City nowadays. In this way, it is not difficult to understand that Shiguanxia, Mozigou and other places are actually the

closest to Jiayuguan City nowadays, and at the same time, the patterns and writings that only appear in the middle and late Tang Dynasty or even in the Song Dynasty appeared, and this is also in line with the law of migration from the Sidaoguxinggou from the inside of the mountains to the outside of the mountains, and also in line with the characteristics of the change from the hunting to farming economy.

This also confirms the inference that the Sidaoguxinggou are more early Jiayuguan petroglyphs, appearing in prehistory, while the others belong to the middle and late petroglyphs.

Before the discovery of the Heishan Petroglyphs, Jiayuguan was famous for the Great Wall, and the unearthed tombs of the Wei and Jin dynasties are also known to many people, and the gold content of these two items in the cultural relics industry is actually very high, especially the Wei and Jin dynasties tombs of the postmen's map objectively and realistically recorded the situation of the postmen in this area more than 1,600 years ago, and it is the earliest image of the postmen's image of ancient times found in China.

The continuation of Heishan Petroglyphs from prehistory to modern times precisely also confirms the continuity of long-term population activities in the Heishan area, and petroglyphs themselves are the product of appearing before the writing because people did not have suitable recording tools or ways, which is also a good understanding of why there were petroglyphs in prehistory, and petroglyphs appeared in modern times and appeared in the period of the Tang Dynasty of the Tubo, which is a great deal of connection with the writing as well as the development of the society, and also It can be said that Heishan has witnessed the change and development of Jiayuguan Pass, and petroglyphs are exactly the favourable evidence on this side.

As the cultural card of Jiayuguan Pass area, Heishan Petroglyphs have a positive effect on enhancing the cultural popularity and influence of Jiayuguan Pass. With their unique art forms and rich cultural connotations, these petroglyphs have become an important part of the history and culture of Jiayuguan Pass area, attracting many tourists and scholars to visit and study them, and injecting new vitality into the

development of Jiayuguan's cultural tourism industry. They not only reflect the cultural level and artistic achievements of ancient human beings in Jiayuguan Pass area, but also show the important position of Jiayuguan Pass area in the historical process of the Chinese nation. Through the study of these petroglyphs, we can gain a deeper understanding of the historical development lineage and cultural inheritance of Jiayuguan Pass area, providing a strong support for the construction of a more complete human history and cultural system. Through the publicity and promotion of Heishan petroglyphs, more people can understand the history and culture of Jiayuguan Pass and enhance their sense of identity and pride in the excellent traditional culture of the Chinese nation. Therefore, Heishan petroglyphs have far-reaching and unique significance to Jiayuguan local area, they are not only the precious heritage of ancient history and culture in Jiayuguan area, but also an important carrier for the inheritance and development of Jiayuguan history and culture, we should strengthen the protection and utilisation of Heishan petroglyphs, so as to let these precious cultural heritages to be better inherited and carried forward, and to make a greater contribution to the development of Jiayuguan's cultural undertakings and cultural industries. Contribute to the development of Jiayuguan's cultural cause and cultural industry.

#### 4.1.2.2 Heishan Petroglyphs reflect the characteristics of the region in different eras, geographical evolution, ethno-religious features

As a typical representative of petroglyphs in northern China, Heishan petroglyphs not only record the production life of the forefathers in Heishan in ancient times, but also reflect the geographic evolution of different eras and the characteristics of ethnic religions, etc. There are six petroglyphs in Heishan. There are 6 Heishan Petroglyphs, distributed in six places, namely, Heishan Shiguanxia, Mozigou, Banana Artemisia Gully, Sidao Stock-shaped Gully, Hongliu Gully, and Jiaoha Gully in the period from the Warring States Period to the Ming Dynasty with a total of 212 petroglyphs, and according to the classification chart, we can come to the following conclusions:

Religious sites are mostly found in Hongliugou, Shiguanxia (mid-late Tang Dynasty to Song and Yuan Dynasty Tufan); animals are mostly found in Sidao stock-type

ditch, Shiguanxia, Jiaogaogou (2), and Mozigou (1); animals, hunting, and rituals are mostly found in Sidao stock-type ditch; plants are mainly found in Hongliugou (algal ferns), Mozigou (modern), and Shiguanxia; and writings are mainly found in Hongliugou (Tibetan), Sidao stock-type ditch (Tibetan and Qing) and Mozigou (Qing) and Shiguanxia (Qing). The images of tigers and ferns found in the Heishan Petroglyphs indicate that the Stone Age Jiayuguan generation was very different from the present environment; the pagoda-type diagrams illustrate the introduction of Tibetan Buddhist culture during the Tubo period; the ritual diagrams and hunting round-up diagrams embody the scenes of the life of the local nomads who lived in the early period; according to the above images and the corroboration of the relevant dates, the most typical representative of these petroglyphs is the one that Yang Huifu and Zhang Junwu, in the Heishan Petroglyphs, have identified as the most typical petroglyphs through The most representative is Yang Huifu and Zhang Junwu in "Heishan Petroglyphs", who divided the development of Heishan Petroglyphs into three periods by extensive examination. Combining the literature and the actual site inspection of the Heishan Petroglyphs, the authors think that this classification is more accurate.

Confirmation of the age of petroglyphs has a positive effect on the research and application of petroglyphs, firstly, it helps to determine the historical value and cultural significance of petroglyphs, and provides a scientific basis for the protection of petroglyphs. For example, after the discovery of Heishan Petroglyphs, they were listed by the State Council as a national key cultural relics protection unit, which not only raised the protection level of petroglyphs, but also provided legal and policy support for the protection of the local cultural heritage, and also attracted a large number of researchers and enthusiasts to study them. At the same time, it also attracts a large number of petroglyphs research workers and enthusiasts to study the Heishan Petroglyphs; secondly, the determination of the age of the petroglyphs can promote the cross-study of various disciplines, such as archaeology, sociology, fine arts, linguistics, anthropology and ecology, etc., and this kind of cross-disciplinary research can help to deeply understand the historical, cultural and environmental backgrounds reflected in

the petroglyphs, and promote the development of academics; thirdly, the study of the age of the petroglyphs has an important role in Enhancing the popularity and influence of the Heishan Petroglyphs has a positive role, and the results of the research of petroglyphs can be used as an important resource for cultural tourism, which helps to attract more scholars and tourists at home and abroad, for example, in 2017, you ah Jiayuguan City, through the Heishan Petroglyphs Academic Expedition, attracted a large number of experts and scholars from scientific research colleges and universities to participate in the research of Heishan Petroglyphs, which is not only capable of promoting the protection and research of the petroglyphs, but also Promote the integrated development of culture and tourism, local cultural exchanges and the development of local tourism, and more local cultural tourism has brought new opportunities for development; Fourth, the research and protection projects of the painting era can cultivate cultural relics protection talents, promote the digital protection project, improve the quality of cultural relics protection of the participants, form a core team of petroglyphs protection, and promote the digital protection and monitoring, which is important for enhancing the professional level and efficiency of the local cultural relics protection work. professional level and efficiency of heritage conservation work as well as for future research.

History of Heishan Petroglyphs Determination of the age of petroglyphs is a very difficult task. Research practice shows that the age of petroglyphs can only be determined by the animal images in the petroglyphs, the human production, life in the picture, and the costumes of the characters, etc., and at the same time, it should be compared with the characteristics of the petroglyphs in the surrounding neighbouring regions and even all over the world. Taking into account the above factors and referring to some literature analysis, in the book "Heishan Petroglyphs", Heishan Petroglyphs are roughly divided into three stages: early (emergence), middle (maturity) and late (continuation).

(a) Early petroglyphs in the Heishan of Jiayuguan Mountain are mostly animals, mainly in Sidaoguxinggou, and the animal images in the petroglyphs include

giant tapirs, tigers, leopards, large-horned deer, elk, bison, wild camels, sheep, horses, etc., which indicates that the climate here at that time was warm and humid, with abundant rainfalls and dense forests, which provided suitable climatic conditions for the reproduction and development of these animals, and had obvious subtropical climatic characteristics, and that the early evolution of ferns into tree plants appeared in both the Heishan rock art and the Mazhoushan rock art. Horsehair Mountain petroglyphs, appeared in the early ferns evolved into trees and plants, ferns can only be retained to 11,000 years to 7,000 years before the present, which together with the animal motifs confirm this period, according to which it should be inferred to be the end of the Paleolithic Age, the early Neolithic Era, about 10,000 years before the present 6,000 years, the early era of Heishan Petroglyphs of the people can only see the image of these animals and trees, and only then may be put it chiselled onto the rock walls. With the change of the natural environment, the animals and plants in the petroglyphs disappeared and became extinct in the later historical period, which is one of the most important conditions for judging the age of the petroglyphs.

Between 4100 and 2500 years ago, the area around Heishan was inhabited by the Western Qiang nomads who migrated with the water and grass. The petroglyphs at the foot of the Kunlun Mountains in Xinjiang, and the Qiangs (Western Qiangs) are said to be the works of the Ancient Qiangs (Western Qiangs), and the images of big-horned goats and dancers adorned with feathered headdresses in their petroglyphs are almost the same as those of the same kind of petroglyphs in Heishan, therefore, it is deduced that the early petroglyphs in Heishan petroglyphs may be the cultural relics of the Ancient Qiangs and their predecessors. Therefore, it is inferred that the early petroglyphs in the petroglyphs of Heishan may be the cultural remains of the ancient Qiang people and its predecessors, and even the late *Homo sapiens*. Since writing did not appear in this period, petroglyphs became the main form of record for the ancestors in the Hexi Corridor.

(b) The mid-period petroglyphs in the Heishan area belong to the cultural remains of the nomadic people from the Warring States period to the Qin Dynasty and

before the establishment of the four counties of Hexi by the Western Han Dynasty. In the early years of Emperor Wen of Han Dynasty (174 years ago), the powerful Xiongnu people in the north occupied the western part of Hexi for about 56 years, and the works of the Xiongnu people can be seen in the middle-period petroglyphs of the petroglyphs of Yinshan Mountain and the petroglyphs of Heishan in Jiayuguan Pass in Inner Mongolia, and the petroglyphs of the Wolf Mountain area of Yinshan Mountain Range have more images of tigers, which are used by the Xiongnu people in their paintings to show their tough national character, and the petroglyphs of Hongliugou in Heishan and the petroglyphs of Shikuanxia in Heishan Mountain are mainly nomadic, and the images of tigers are found as well. Tiger images were also found. These petroglyphs are mainly located in Shiguanxia and Si Dao Shou Shou Gou in the Heishan.

(iii) Late petroglyphs Late Heishan Petroglyphs mainly reflect religious culture. The halls, pagodas, statues, and ancient Tibetan inscriptions in the petroglyphs of Hongliugou and Shiguanxia may belong to the religious relics after the middle of the Tang Dynasty . Tubo is an ancient ethnic group that grew up in the Tibetan region, and Songtsen Gampo founded the ancient Tibetan language and Tibetan Buddhism (commonly known as Lamaism) in the 7th century AD. According to historical records, after the Tang Zhenyuan for the pacification of the "Anshi Rebellion", the guards were forced to transfer the army to the east, the Tubo in the first year of Zhide (AD 756) captured the army of the cities of Qinghai, and further captured most of the areas of Longyue and Hexi counties, the Shazhou people of all ethnic groups in AD 848, under the leadership of Zhang Yichao to start an uprising, and in the fourth year of the Xiantong ( AD 863), the Tubo was the only one of its kind in the Tibetan region. In March 863 A.D., gradually recovered the lost land ruled by the Tubo for more than 100 years in this period of time the Tubo people live in Hexi, in the red willow ditch, Shi Guanxia carved Buddhist halls, bodhisattvas, statues, pagodas is entirely possible, and the content of these petroglyphs on the discovery of the Tibetan rock carvings by the examination also belongs to the Tibetan Buddhism, which is deduced from the Heishan red willow ditch, Shi Guanxia stupa, Buddha, and the Tibetan inscriptions for the It is

inferred that the stupa, statues and inscriptions in Tibetan language in Hongliugou and Shiguanxia in Heishan are the religious relics of the Tubo people after the middle of Tang Dynasty.

On the whole, the early petroglyphs of the four stranded gorges in Heishan are cultural relics of the indigenous tribes and ancient Qiang ancestors of the late Paleolithic to the middle Neolithic period. The petroglyphs of Hongliugou and Shiguan in the middle period are the works of the Yuezhi or Xiongnu tribes from the Warring States period to the Qin and Han dynasties. The Buddhist petroglyphs in Hongliugou and Shiguanxia of the Heishan in the late period are religious relics of the Tufan tribe after the middle of the Tang Dynasty.

From the above, it can be seen that the judgement of the petroglyph era has had a multifaceted positive effect on the local area, including the protection of cultural heritage, the promotion of academic research, the development of cultural tourism, the economic and social development, the training of human resources, and digital preservation. Together, these effects have promoted the sustainable development of local culture and economy. It should be noted here that although relevant scholars have made a rough analysis of the period of petroglyphs, there is no direct historical record of petroglyphs due to their special attributes and the large time span of their creation. During our visit, Li Jianrong said that Heishan Petroglyphs actually still exist on the same rock with the appearance of petroglyphs in different styles in different periods, which indicates that there are iterations appearing, suggesting that people in different eras have been Carving, so the time division is currently only stay in the speculative level, different scholars may be based on their own research methods and standards to reach slightly different conclusions. With new archaeological discoveries and deeper research, these time divisions and petroglyph descriptions may be adjusted and improved in the future.

#### 4.1.2.3 Local impacts of petroglyphs in the Heishans

Petroglyphs in the Heishans have far-reaching and multiple significance for Jiayuguan localities, and they show unique and irreplaceable values in natural geography, history and culture, tourism and culture, as well as academic research.

##### 4.1.2.3.1 Physical and geological aspects

From the point of view of natural geography, the Jiayuguan Heishan area, with its unique geographical environment, has become a natural barrier in this land. Heishan, together with Wenshu Mountain and Qilian Mountain in the south, constitute a natural barrier of the Hexi Corridor. Its steep mountains and peaks provide the Jiayuguan Pass area with unique military defence conditions. The mountain streams and vast pastures of the Heishans, on the other hand, have provided rich natural resources for the historical development of Jiayuguan, making it an ideal place for human activities and reproduction since ancient times.

The Heishan Petroglyphs have become an important treasure trove for the study of the geographic changes of the Heishan area and even the Hexi Corridor as a whole, with their rich historical information. A large number of prehistoric animals and plants depicted in the petroglyphs not only vividly reproduce the ecological environment of the Heishan area at that time, but also provide us with profound insights into the geographic changes of the area.

The animal species in the petroglyphs are diversified, and there are not only warm and humid animals, but also arid and cold animals, such as bison, deer and camel, which appear in the petroglyphs. This reflects the transformation of the local climate from warm and humid to arid and cold. For example, the appearance of big-horned deer, water deer, rhinoceros and other animals shows that the climate is warm and humid, with abundant rainfall and dense forests, which provide suitable climatic conditions and rich food sources for many kinds of animals to flourish and reproduce. With the passage of time, the climate gradually became arid, and some warm and humid animals gradually disappeared. The appearance of wild camels and other animals reflected that the desertification trend of the region was not yet obvious, and

there were still some water sources and oases for them to survive, and with the change of climate, the arid and cold animals in the petroglyphs gradually became the mainstream. The appearance of carnivores such as wolves, badgers and foxes in the petroglyphs also reflects the complexity of the food chain and the diversity of the ecosystem at that time. The existence of these animals not only provides us with important information about the ecological environment at that time, but also provides us with valuable clues for the study of geographic changes in the Heishan region.

In terms of plants, although relatively few plant species appear in the petroglyphs, the appearance of early vegetation such as ferns still provides us with important evidence about climate warming. These plants usually grow in warm and humid environments, and their appearance indicates that the climate of the Hexi Corridor region was undergoing a warming process at that time. For example, the appearance of early vegetation such as ferns reflects the historical period when the climate of the Hexi Corridor was warming. These plants gradually disappeared as the climate changed and were replaced by vegetation adapted to the arid environment. The food sources and habitats of the animals in the petroglyphs also reflect the changes in the vegetation landscape. For example, the presence of herbivores, such as bison and deer, indicates that vegetation was lush at that time, while the gradual decline of these animals over time, replaced by animal species adapted to the steppe-desert environment, illustrates the gradual disappearance of green plants.

In addition to animals and plants, hunting scenes in petroglyphs also provide us with important information about the impact of human activities on geographical changes. For example, hunting scenes depicted in petroglyphs usually take place in ecological environments such as forests or grasslands. These scenes not only reflect the lifestyles and survival strategies of human beings at that time, but also reveal to us the impacts of human activities on ecological environments and their changes. As time goes by, human activities have gradually intensified and the impact on the ecological environment has become more and more significant. These scenes in the

petroglyphs provide us with precious records of the interaction between humans and nature.

Elements such as prehistoric animal and plant species, as well as hunting scenes, appearing in the Heishan Petroglyphs, provide us with a deep insight into the geographical changes in the region. These elements not only reflect the climatic conditions, vegetation landscapes and animal species of the time, but also provide us with valuable physical materials for studying the historical development and ecological changes of the region. By studying and analysing these elements, we can gain a deeper understanding of the natural environment and human history of the Heishan region, providing useful reference and inspiration for future ecological protection and cultural inheritance.

#### 4.1.2.3.2 Historical and cultural aspects

From the perspective of history and culture, the discovery of petroglyphs in Heishan has undoubtedly injected new vigour into the historical study of Jiayuguan and even the entire Hexi Corridor. These petroglyphs are not only a visual record of the life of the nomads in ancient times, but also a comprehensive reflection of their history, culture, religious beliefs, social structure and aesthetic concepts. With their rich cultural connotation and unique artistic style, these petroglyphs have become an important window for the study of the ancient history and culture of Jiayuguan Pass area, and have irreplaceable value for the inheritance and development of Jiayuguan Pass's history and culture.

Heishan petroglyphs are the real records of the production and life of the ancient nomadic people in Jiayuguan Pass area, which reveal the historical and cultural background of the ancient nomadic people in Jiayuguan Pass area, show the scenes of the life of the ancient human beings, such as hunting, herding, sacrifices and wars, and reflect the close connection between the nomadic people and the natural environment as well as their ideals, religious beliefs and other spiritual pursuits and the wisdom of survival that they have accumulated through the long-term practice of life. and their survival wisdom accumulated in their long-term life practice. At the same time,

the scenes of rituals and wars in the petroglyphs also reveal the characteristics of the nomadic people in terms of their religious beliefs and social organisational structure. With the presentation of this information, these petroglyphs not only provide us with valuable information to understand the living conditions of ancient human beings, but also enable us to have a glimpse of the cultural style and national spirit of the ancient nomads in Jiayuguan Pass area, which provides us with important clues to deeply understand the historical and cultural background of the ancient nomads in Jiayuguan Pass area.

Heishan Petroglyphs also have important historical value in terms of religious beliefs. Religious elements such as Buddha statues and pagodas in the petroglyphs not only reflect the ancient nomads' belief in and worship of Buddhism, but also provide us with valuable information for the study of the spread and development of Buddhism in the Hexi region. At the same time, other religious symbols and ritual scenes in the petroglyphs also provide important references for us to understand the religious belief system of ancient nomads.

In addition, the Heishan Petroglyphs also show us the aesthetic concepts of the ancient nomadic people. The animal images in the petroglyphs, such as wild cattle and deer, are not only vivid but also artistically infectious. The portrayal of these animal images not only reflects the nomads' love and reverence for nature, but also shows their unique aesthetic concepts and artistic talent. At the same time, other figures and scenes in the petroglyphs also provide an important basis for us to understand the aesthetic interests of the ancient nomads.

Heishan Petroglyphs also have high cultural relics and archaeological value. These petroglyphs have been eroded by wind and rain for thousands of years, but they are still well preserved, providing precious physical information for the study of ancient human culture. Through the study of these petroglyphs, we can gain a deeper understanding of the production methods, lifestyles, religious beliefs and aesthetic concepts of ancient mankind, and provide powerful evidence and support for the study of archaeology and history and other disciplines.

The study of Heishan Petroglyphs not only helps us to gain a deeper understanding of the historical and cultural background, religious belief system, aesthetic concepts, and cultural relics and archaeological values of the ancient nomadic people in Jiayuguan Pass area, but also helps us to promote the exchanges and integration between related disciplines. Through interdisciplinary research methods, we can interpret the historical and cultural connotations embedded in these petroglyph works in a more comprehensive and in-depth manner, and inject new vitality into the historical and cultural research of Jiayuguan and even the entire Hexi Corridor. Therefore, we should strengthen the protection and utilisation of Heishan and Heishan Petroglyphs, so that these precious cultural heritages can be better inherited and carried forward.

#### 4.1.2.3.3 Cultural aspects of tourism

Heishan Petroglyphs have attracted much attention in the industry and the local area since they were discovered in 1972. In recent years, they have been opened up in terms of tourism and cultural and creative products, which are mainly shown in the following two aspects.

For one thing, the Heishan area's natural form has attracted many travellers and petroglyph enthusiasts. Wang Quanzhao said that Heishan petroglyphs are the closest petroglyphs to the city. While petroglyphs in many places are far away from the city, the petroglyph sites are inconvenient to travel to, Heishan petroglyphs are only about 20 kilometres away from the city. From the perspective of cultural tourism development, it provides great convenience; no matter where the petroglyphs are, they have historical value, cultural relics, and, more importantly, cultural and social anthropological value. This can form a kind of complementarity with Dunhuang culture and achieve differentiated development, which I think is a perfect development channel. Especially in Jiuquan and Jiayuguan, the current cultural tourism and cultural and creative development are primarily influenced by Dunhuang culture, which relies on Dunhuang culture for development, making the development seem single. If we can create petroglyphs as an important element of cultural and creative development, such

as the Heishan Petroglyphs, which are cultural relics, their dance and animal modelling are very unique, known as the "Heishan cattle" by the industry, and have a significant influence and representation. Such elements can become valuable resources for developing cultural and creative products, combining ancient culture with modern life to launch a series of creative products. This approach will not only pass on and promote the art of petroglyphs but also enable more people to understand and appreciate petroglyphs.



FIGURE 92 Fu Qiang on the development of petroglyphs cultural tourism in Heishan

Source: Photographed by the author's team

Fu Qiang said in an interview, Heishan Petroglyphs in Jiayuguan Jiuquan area is a unique cultural phenomenon or cultural IP, it has a significant economic and cultural value, the cultural value of the excavation will have an absolute advantage, can form a point to promote the local economic growth, to promote economic growth has a very helpful, we are also in the next step of the plan to consider the improvement of the infrastructure, the protection in the Area using the cultural value

of petroglyphs to generate economic benefits, and then to feed the cultural protection, the formation of a virtuous circle.



FIGURE 93 Interview with Mr Guan Hong

Source: Photographed by the author's team

Guan Hong after graduation was assigned to a regiment in the Heishan area as a film projectionist, do propaganda work, because in the army belongs to the civilian, so after the discovery of the petroglyphs many people have come here to see the fireworks, Guan director has become the most frequent guide, according to his recollections, before and after then, there are scholars, photographers, painters and so on many times into the Heishan to pick up the wind, Li Jianrong also said that the Heishan in recent years for the investigation of the people is a lot, which shows that the Heishan Petroglyphs still has a particular popularity. We entered the Heishan area for five times this year, we can meet the tourists come to hiking, some are local people,

walking from the pass, some are specially come to hiking, from the domestic media account can also be seen many people to Jiayuguan Heishan hiking as a challenge, as well as explicitly made into the strategy, of course, this is also on the protection of local cultural relics to bring a certain degree of difficulty in the tour at the same time, but also Inevitably, individual petroglyphs will be damaged, environmental damage and other phenomena, but at the same time also shows that the Heishan Petroglyphs have a very high tourism value.



FIGURE 94 Some of the works of the Heishan Petroglyphs art exhibition

Source: Xinhua Gansu Channel

(<http://www.gs.xinhuanet.com/gstatics/zhuanti/temp2017/hsyh/index.html>).

Heishan Petroglyphs have attracted many culture and art enthusiasts to create. 19 July 2017, Northwest Normal University College of Fine Arts Jiayuguan Heishan Petroglyphs Art Exhibition was held in Jiayuguan, many artists created a series of art works based on Heishan Petroglyphs, the exhibition is not only the artistic value of Heishan Petroglyphs excavation, it is also through the creation of art to make more people have a Heishan Petroglyphs have a further understanding. This exhibition explores the artistic value of Heishan Petroglyphs, gives more people a further understanding of Heishan Petroglyphs through artistic creation, and promotes the publicity of Heishan Petroglyphs.



FIGURE 95 The Beasts--Fung Kwok Wai Design

Source: Feng Guowei (2021) Visual design research based on petroglyphs in the Heishans of Jiayuguan, P.35

The unique petroglyph content of Heishan Petroglyphs has also become the source of Jiayuguan's cultural and creative products. Feng Guowei expresses the feasibility of using Heishan Petroglyphs for cultural and tourism product design in the article "Research on Visual Design Based on Heishan Petroglyphs in Jiayuguan", and proposes that through in-depth research on the content, culture and visual aesthetic characteristics of Heishan Petroglyphs in Jiayuguan, the current situation of the petroglyphs' design should be analysed and positioned. Elements such as design themes, shapes and colours needed for visual design should be extracted—visual design elements include design themes, shapes, and colours. At the same time, based on the principles of regionality, culture and innovation, graphic redesign, mood creation and flat design methods are integrated into logo design, illustration design, poster design and painting creation in visual design, to design visual design works in line with the modern aesthetic characteristics and with the regional characteristics of Jiayuguan Heishan Petroglyphs, as well as the visual application of their derivatives. In this way, it

can promote the protection and development of the resources of Jiayuguan Heishan Petroglyphs, innovate and enrich the tourism cultural products, and enhance the popularity and influence of Heishan Petroglyphs.



FIGURE 96 Cultural and Creative Products of Heishan Petroglyphs in the 80s: Heishan Cow Badge

Source: 7788 Collections

([https://pic13.997788.com/\\_pic\\_auction/00/11/65/01/11650151a.jpg](https://pic13.997788.com/_pic_auction/00/11/65/01/11650151a.jpg))

([https://pic13.997788.com/\\_pic\\_auction/00/11/65/01/11650151b.jpg](https://pic13.997788.com/_pic_auction/00/11/65/01/11650151b.jpg))

In the Guan Hong interview, he mentioned that in the last century, specifically for the Heishan petroglyphs, a Heishan cattle commemorative medallion appeared on the market. However, this medallion has been very difficult to see in the market, which shows that the design of the Heishan petroglyphs dates back a long time.

Guan Hong said, Heishan Petroglyphs is the ancestors left the real history, can not be replicated, as a modern man, we should be able to face our ancestors, their talent, aesthetics of this form of trust is significant, really want to

strengthen the protection from tourism development, cultural and creative production and other aspects of the positive publicity does not go, do not be restricted by geographical restrictions, it should be introduced to publicise the introduction of out to form a local business card.



FIGURE 97 Ceramics based on reproductions of Heishan Petroglyphs and Subei, by Wang Quanzhao

Source: Photographs by the author

Professor Wang Quanzhao of Jiuquan Institute of Vocational Technology has been devoted to the development of petroglyphs products in recent years. Based on the premise of cultural relics protection, he collects rock slices from the Heishan area. He makes reproductions of Heishan Petroglyphs through specific technical means, such as digitisation, etc., and promotes these products through several related competitions. At the same time, these products have been recognised by the government and have been purchased as gifts. It was learnt in the feedback that the external response was more acceptable. Purchase, in the feedback that the outside world is more recognised, while the classic petroglyphs early line extracted, combined with the traditional Chinese porcelain made of Jingdezhen teapot, tea cups and other

forms, in several external cultural and creative trade fairs, has been widely concerned about the intention of the products reached the cooperation, is currently doing a lot of research and development attempts, the next step will be based on the market response to enter the commercial promotion link.

Wang Quanzhao said that he is currently engaged in the cultural and creative work related to Heishan Petroglyphs. Regarding product development, he mainly reproduces petroglyphs in Heishan to protect cultural relics. Then, he collected silver and stone tablets near Heishan, which are made of the same material as the petroglyphs. He also applied technical means, such as digitisation, to reproduce the petroglyphs accurately. The petroglyphs' shape belongs to the painting category, so it must be as consistent as possible with the original painting. The petroglyphs can be reproduced as cultural and creative products through information technology and digital processing, combined with the jade carving profession and ancient techniques for chiselling. Wang Quanzhao believes that, from the current research status quo, about petroglyphs of cultural relics protection, cultural research and anthropological research, there are many experts have carried out in-depth discussions, but at present in Gansu, petroglyphs of the cultural tourism development is relatively lagging, such as Guangxi's Huashan petroglyphs and Ningxia's Helan Mountain petroglyphs in this regard to do better, for us to set an example. We should be committed to making these petroglyphs "fire" up, which is the focus of our current research. In addition, breakthroughs in digitisation technology are also a key area of concern for us.

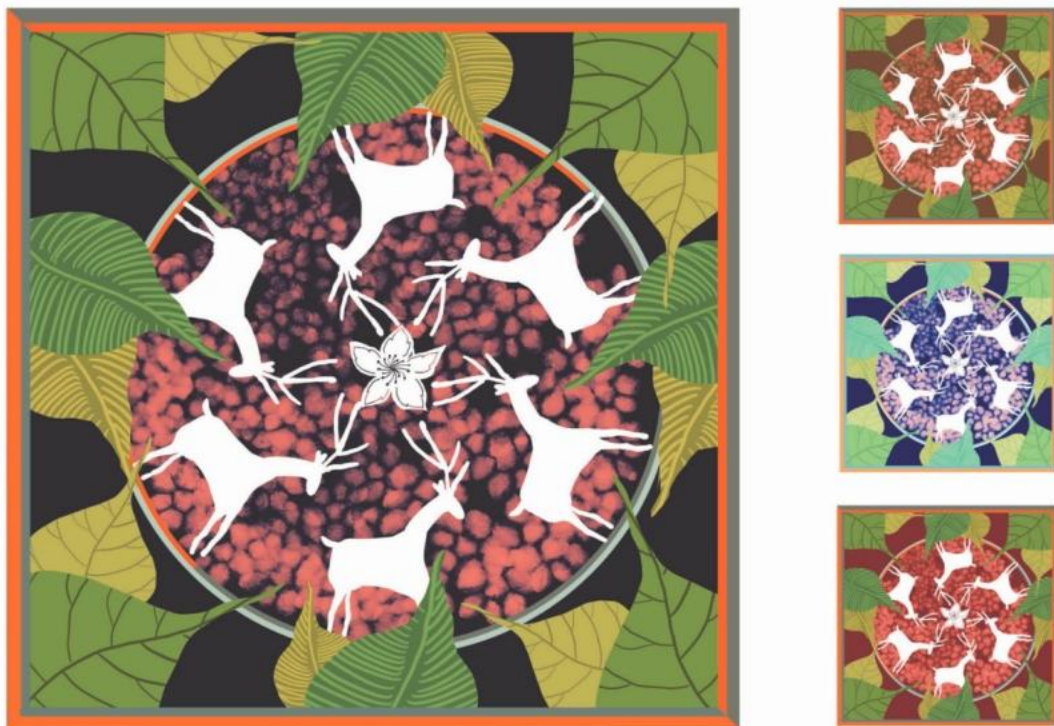


FIGURE 98 Computer work based on the image design of rock sheep in Heishan  
Petroglyphs - by Wang Ying

Source: Ying Wang (2020) Silk scarf design of petroglyphs at Jiayuguan Heishan. Gansu Social Sciences P244.

Wang Ying from the College of Fine Arts of Northwest Normal University extracted the image of the rock sheep in Heishan and designed the Heishan Silk Scarf through computational art technology, which is an attempt to break through for cultural and creative products.



FIGURE 99 Jiayuguan Local IP Design Cultural and Creative Products

Source: Web article: Jiayuguan City's Cultural and Creative Tourism Commodities Win Another Award in National Competition

(<https://baijiahao.baidu.com/s?id=1682788929837294114&wfr=spider&for=pc>)

In recent years, relying on Jiayuguan Pass City and other cultural IP, the local has developed a series of cultural tourism products, in the last family has also been the Heishan cattle as the image of the development of cultural and creative products, covering pendants, ornaments, wood carvings, fabrics, stationery, calligraphy and painting and other categories, forming a desert wind and rain sculpture, sandstone art paintings, "Jia have a good gift! The cultural and creative products with various styles and rich functions such as the desert wind and rain sculpture, sandstone art painting, "Jia have good gifts", the Great Wall pot, "the first majestic pass under the sky" creative blocks, etc.. These Heishan Petroglyphs have a positive significance in the transformation of cultural creation, combined with tourism, allowing tourists to visit, but also "cultural memory" to take home. Through policy support, financial support, industrial integration, platform building, and other all-around measures, cultural tourism consumption hotspots can be cultivated, innovation and entrepreneurship of cultural enterprises can be fully guaranteed, and the efficient development of cultural and creative industries can be promoted At the same time, Jiayuguan City also actively organises cultural and creative enterprises to participate in all kinds of cultural and

creative product exhibition activities, continuously improving the popularity and influence of Jiayuguan's cultural and creative products.

With the comprehensive recovery of the cultural and tourism market, Jiayuguan City is gradually strengthening the protection and utilisation of cultural heritage and formulated the Regulations on the Protection of Petroglyphs in the Heishan of Jiayuguan City in 2020, which illustrates the government's attention to the protection of petroglyphs in the Heishan and further promotes the high-quality development of the integration of culture and tourism, and has issued a series of relevant policies such as the "Implementing Opinions on the Strengthening of Research, Development and Marketing of Tourism Commodities", "The Jiayuguan City to promote the development of regional tourism to support incentives to promote the local cultural and tourism market is booming.

#### 4.1.2.3.4 Academic research aspects

The Heishan Petroglyphs, with their unique artistic style and rich historical connotation, provide valuable research materials for local scholars. The in-depth study of Heishan Petroglyphs has broadened the research horizons of local scholars, which has a positive effect on the in-depth understanding of ancient nomadic people's living customs, religious beliefs, social structure and other information, which not only fills in the gaps of local history and culture, but also provides important references to the research of other related fields. Research on Heishan Petroglyphs. Studying Heishan Petroglyphs involves several disciplinary fields, including history, archaeology, fine arts, anthropology, sociology, etc. This interdisciplinary research approach promotes exchanges and co-operation among local academics. It facilitates cross-fertilisation of disciplines, as local scholars continue to learn from the theories and methods of other disciplines in their research, and improve their research level and innovation ability. The study of Heishan Petroglyphs also promotes the development of local cultural and tourism industries, and injects new vitality into the economic development of the Jiayuguan Pass region.

At the same time, the unique charm and deep historical and cultural heritage of Heishan Petroglyphs have attracted many outside scholars to research. These scholars come from different countries, regions, academic backgrounds, and research experiences. Their arrival has not only injected new vitality into studying Heishan Petroglyphs but also promoted academic exchanges and co-operation between the local and the outside world.



FIGURE 100 A group photo of the field teaching at Jiayuguan Heishan Petroglyphs Remaining Site

Source: China Rock Art, China Rock Art Society, WeChat

(<https://mp.weixin.qq.com/s/yegwHeUKkc8vIKtJt3PZnQ>).

In order to promote the academic value and historical and cultural significance of petroglyphs, for the society to stimulate and cultivate more specialists in the discipline of petroglyphs, in 2015 the CPC Gansu Provincial Party Committee Propaganda Department, Gansu Provincial Department of Culture, Gansu Provincial Bureau of Cultural Relics, the China Petroglyphs Society hosted the "One Belt and One

Road - Gansu Petroglyphs Symposium and the first professional training course for the study and protection of petroglyphs ", this training course participants involved 8 cities and 14 counties and municipalities in Gansu Province, invited in the petroglyphs professional with high academic attainments experts, professors, scholars, are from the Chinese Society of Petroglyphs member of this meeting on the preservation of China's petroglyphs, archives and the construction of databases, the petroglyphs of the remaining sites of the authentication of the standardisation of the construction of an important role. The field training of this course took place at the petroglyph site of Heishan in Jiayuguan Pass, and included: access and intervention at the petroglyph site (including observation and trekking of the petroglyph environment) (Li Yongxian); investigation of the petroglyph ontology and archiving in the field (Qiao Hua); photographic techniques for petroglyphs (Na Dalenggu Ribu); field training in the topography of petroglyphs; and publicity of petroglyph preservation work, among other things. This is very helpful for the adequate protection of the natural environment, cultural ecology and petroglyphs ontology of petroglyphs in the places where petroglyphs remain, and for grass-roots cultural relics workers and personnel engaged in research and protection to systematically master the knowledge and skills of petroglyphs investigation, research and preservation, and the establishment of a database, to let the petroglyphs treasures inherited from the ancestors of China be passed on forever (Article: One Belt, One Road - Gansu Petroglyphs Symposium and the First Research and Protection Training Course for Petroglyphs Expertise was successfully held in Lanzhou). (Article: Belt and Road - Gansu Petroglyphs Symposium and the First Petroglyphs Research and Conservation Training Course were successfully held in Lanzhou)

In order to promote the in-depth development of the research on Heishan Petroglyphs, Jiayuguan City and related organisations have organised several academic conferences and seminars. These conferences provided a platform for scholars to display their research results and exchange academic views. They also promoted cooperation and communication between the academic community,

government, enterprises, and other social sectors. Through these conferences, scholars could discuss the research direction, methodology, and prospects of Heishan Petroglyphs, which provided strong support for promoting the in-depth development of petroglyph research in Heishan.



FIGURE 101 Launching Ceremony of the Academic Expedition on Heishan Petroglyphs

Source: Sohu.com ([https://www.sohu.com/a/158353177\\_123753](https://www.sohu.com/a/158353177_123753)).

Jiayuguan held an academic expedition to the petroglyphs in the Heishan on 19 July 2017, inviting Chinese and foreign experts in petroglyphs research to conduct a field visit to the petroglyphs site of the Sidaoguxinggou and the Shiguanxia site among the petroglyphs in the Heishan of Jiayuguan Pass, which attracted the participation of experts and scholars from Italy, India, the United States, Russia and other countries, as well as many scientific research colleges and institutes in the Mainland. This activity was sponsored by China Petroglyphs Centre, School of Fine Arts of Northwest Normal University and Jiayuguan Silk Road (Great Wall) Cultural Research Institute, during which field visits, petroglyphs art works exhibition, academic talks and

other activities were held, which greatly helped the protection, use and research of Heishan Petroglyphs.

During the conference, experts and scholars at home and abroad had a discussion and exchange on the discovery, research and protection of Heishan Petroglyphs. Emmanuel Anati, Chairman of the First International Petroglyphs Committee, Vice President of International Prehistoric Science, and Director of the Prehistoric Research Centre of Camono, Italy, said that the petroglyphs here are impressive. The petroglyphs are very beautifully shaped, with a rich variety of themes, showing the living scenes and social conditions of the nomads at that time. American archaeologist and famous Indian petroglyphs research expert Alice M Tratebas (Alice M Tratebas) said that in the world's human hunting and gathering period, petroglyphs are similar, mainly hunting scenes and the depiction of animals. However, more recently, petroglyphs have become more of an embodiment of rituals and other human activities. She also said that the current attention to petroglyphs is not enough, and the significance of petroglyphs needs to be reawakened. Zhang Yasha, professor of the Central University for Nationalities and director of the China Petroglyphs Research Centre, believes that the Heishan petroglyphs of Jiayuguan are very surprising in their exquisiteness, and some of them are very beautiful and well-made. Early religious symbols, modes of production and livelihood, and even collective sacrifices and war-related drills appear in the petroglyphs, conveying dense and rich cultural information, and the Heishan Petroglyphs represent the early Steppe and Silk Road culture.

Zhang Xiaodong, director of Jiayuguan Great Wall Museum, said that in the future, we should dig deeper into the value of cultural heritage of Heishan Petroglyphs and their reflections of natural changes, thinking characteristics, primitive worship, religious beliefs, hunting methods, animal husbandry economy, dance forms, artistic styles, as well as the correlation between Heishan Petroglyphs and the culture of Yumeng Huoyaogou. Multidisciplinary cross-disciplinary research should be conducted in sociology, history, archaeology, aesthetics, religion, ethnology, linguistics and other

disciplines to tap into the spirit of hard work, wisdom and perseverance of the ancient people embodied in the petroglyphs.

This activity has had a positive effect on further excavating the cultural resources of Heishan Petroglyphs, promoting the protection, utilisation and research of Heishan Petroglyphs, and enhancing their popularity and influence.

Heishan Petroglyphs have had a profound impact on local academic research. By broadening research horizons, promoting cross-fertilisation of disciplines and enhancing historical and cultural values, Heishan Petroglyphs have injected new vitality into local academic research. At the same time, Heishan Petroglyphs have also attracted a large number of outside scholars to come to conduct research and academic conferences and other activities, promoting academic exchanges and co-operation between the local and outside world. These efforts not only help to promote the in-depth development of the research on Heishan petroglyphs, but also provide strong support for the cultural heritage and economic development of the Jiayuguan Pass area.

## **4.2 Establishment of a photo library of Heishan Petroglyphs**

### **4.2.1 Digital Conservation Study of Heishan Petroglyphs**

In the process of in-depth research on the Heishan Petroglyphs, we found that relatively little information exists, and the information that can be seen on the Internet is the same and not a lot of information, and there are more than 200 Heishan Petroglyphs petroglyphs, and the ones that can be seen on the Internet are less than a fraction of them. There are two published books about the Heishan catalogue, namely, "Heishan Petroglyphs" and "Petroglyph Catalogue of Heishan in Jiayuguan Pass", and after comparing them, it is found that the petroglyphs in the two books are not the same, which includes the possibility of the difference of the petroglyphs found on the time line, and the possibility of the petroglyphs that have been there before are now falling off. From the literature, the earliest Jiayuguan cultural relics investigation team in the literature into the Heishan investigation and now can see that the information is not consistent, indicating that the Heishan petroglyphs from the discovery of 1972 to the

present 50 years have indeed disappeared or been damaged. When we were resting outside Huangcaoying, we met a local old man who mentioned that there used to be a huge petroglyph in the pass, but it was blown up because of mining. Although there is no official proof, it can be seen that the petroglyphs have gone through a very difficult time from discovery to protection. At present, the protection measures of the Heishan Petroglyphs is also the local cultural heritage fixed cycle of mountain patrols, in recent years in some places on the fence, but can only "prevent the gentleman" in the cultural heritage to do a lot of years in the protection of cultural relics protection work of the LijianRong helplessly said to. Although the Institute has applied for the installation of webcam monitoring, but so far has not been implemented, so for the protection of petroglyphs still have certain difficulties.



FIGURE 102 Online interview with Associate Professor Pang Ying

Source: Photographed by the author's team

In an interview with Pang Ying of Lanzhou University of Finance and Economics, she said that she had previously learnt that the Dunhuang Research Institute as a whole had digitally scanned and collected data on the Heishan petroglyphs as a whole, and that two weeks before the author's interview, Professor Pang Ying had gone to the Dunhuang Research Institute and visited Jin Liang, who is responsible for the petroglyphs in Gansu, to consult on the construction of a digital resource library, and that in fact, they had only taken all the photographs, and had not carried out any 3-D scanning. Because 3d scanning currently requires certain conditions, the Mogao Grottoes in Dunhuang can be scanned because they are indoors, but the technology is still very difficult for external rocks, huge mountains. In August to Chongqing's rock petroglyphs archaeological institute to understand, at that time, please Hebei Normal Tang Huisheng teacher, specializing in 3D scanning, at the same time there is a doctoral tutor with two master's degree students from Zhejiang University with 3D scanning equipment, but ultimately scanned out the image is not ideal, not as clear as in the identification of the scene, because the petroglyphs in the rock, due to the natural formation of the gullies and ravines, with the current 3D scanning is not scanned out! Because the petroglyphs are on the rocks, due to the natural formation of gullies and ravines, the current 3D scanning is not able to scan them out, and there is no way to automatically identify which are man-made imprints and which are natural formations, and the traces can not be recognised, and the effect is not as clear as that of the artificial collection.

Later in the Dunhuang Research Institute specifically interviewed Jinliang's teacher, Dunhuang research in cultural relics protection is at the forefront, should represent the domestic advanced level of protection of Wenhui. But in fact at present in the Dunhuang Research Institute is mainly cave scanning, so can only be used to apply to the cave, and the requirements must be the wall is flat, petroglyphs due to its one is not flat wall, the second is the field can not be brought to these applicable to the cave equipment, so can only be the collection of photographs, GPS positioning, to complete the collection of basic information.

Because to the current position there is no standard, although the Mogao Grottoes established advanced digital cave, but because of the limited environment and conditions, can not be replicated Mogao Grottoes art of digital conservation protection measures, in fact, that is, in other cities to carry out the digital conservation is also currently also still stay in the photo collection aspect. But just purely in terms of photographs, certainly not a database in the true sense, and therefore currently do not know how to proceed. So, for the time being, the digital library of petroglyphs that can be realised at the technical level is still basically at the stage of image collection and presentation.



FIGURE 103 Online Interview with Curator Wang Pu

Source: Photographed by the author's team

In the Yumen Museum Wang Pu curator interview, Wang curator said digitalisation is our current needs in terms of cultural relics of the new technology, this should now the current new technology words. Now there are more advanced technical means and methods, such as positioning, modelling, but the more unfortunate point, although there is, but in the protection of the current data of these achievements are only used for researchers, ordinary people are difficult to get, it is more difficult to talk about the excavation of the protection of inheritance, at the same time, such a data collection at present the cost of the cost is also very high, the budget is very high, we are currently in the yumen also found petroglyphs, the other day I went to see specifically We also found petroglyphs in Yumen, two days ago I went to see them, but unfortunately, ran a long way, the number of petroglyphs is very small, if the use of digital methods of remote monitoring, such as the dispersed and far away is very difficult, because some places are not even the signal, petroglyphs of the digital protection of the collection is still very difficult, and I also hope that people can pay attention to the protection of cultural relics, such as the establishment of the resource base is certainly a very meaningful thing.



FIGURE 104 Heishan Petroglyph Conservation Institute Director Fu Qiang and Director Li Jianrong talk about digital conservation of petroglyphs

Source: Photographed by the author's team

Fu Qiang said in the Heishan Petroglyphs protection institute's work, heritage work is three aspects of work protection, heritage and use. For example, from the protection of the level of the first from the government level, the first few years for the protection of Heishan Petroglyphs have done a lot of work, first of all, the surrounding mines are closed, from the province specifically issued a document, the collection points, quarries are closed. Because mining on the cultural damage is great, and then the government legislation, the Standing Committee of the Provincial People's Congress through the introduction of the Heishan Petroglyphs protection regulations, in addition to the protection of cultural relics organisation for the refinement of the original Heishan Petroglyphs Institute of Cultural Heritage on the unified management, is now specifically set up Jiayuguan Cultural Relics Jiayuguan Silk Road Great Wall Cultural Research Institute, specialising in the protection of research and development use of these. In the inheritance of the continuation of the previous two atlas, so that the various periods of petroglyphs to get the content of a retention and protection, but also to the outside world to play a role in the study of understanding, at the same time there is the development of several cultural and creative products, including colleagues wrote several papers to do some basic research, which is also a manifestation of the inheritance of the petroglyphs, but the protection of petroglyphs require very extensive knowledge of in-depth research. Li Jianrong said the protection of petroglyphs is also for the better use of the future, but this is not a contradiction; they were complementary relationship, not an antagonistic relationship. Petroglyphs themselves are of many types, with a long historical span, and a detailed classification of petroglyphs will be of great help to the overall research in the later stage.

Li Jianrong said in the digital protection hope to achieve real-time monitoring, for example, through different periods of photographs taken by the colour, image, etc. to analyse the changes in the petroglyphs, to infer the process of change of the petroglyphs, Such a continuity of the record for the protection of the petroglyphs have a positive effect, but also to do a good job of environmental monitoring.

To sum up, for the protection of Heishan Petroglyphs, the protection strategies and methods that can be achieved are still relatively limited, and digital monitoring and digital data retention are still blank. Today's digital protection in various forms, but Heishan Petroglyphs in the actual protection of natural and technological limitations, on the one hand, the complex terrain and huge rocks in the field can not be achieved with the existing technology, on the other hand, the current prevalence of indoor petroglyphs of the relevant technology, such as 3D scanning is not suitable for the petroglyphs, the domestic collection of petroglyphs faced with the problem, and at present there is no uniform resource base establishment standards, so most of the digital protection of petroglyphs still stay in the picture data preservation. There is no standard for establishing a unified resource library, so most of the digital protection of petroglyphs remains in preserving picture data.

#### 4.2.2 Image Acquisition of Heishan Petroglyphs

We mainly collect digital data on-site for Heishan Petroglyphs and organise it in two ways. Content that cannot be collected or is missing is mainly collected through the network, including the collation of literature, books, Internet information, etc. The pictures are labelled with the sources, and copyrighted materials are not used.

Regarding field collection, we contacted the local cultural protection department and entered the Heishan area to collect six petroglyph sites. During the collection process, we asked the managers of the local protection department to accompany us, on the one hand, in order not to cause secondary damage to Heishan petroglyphs, on the other hand, it also guarantees us an understanding of Heishan petroglyphs.



FIGURE 105 Digital collection site of Heishan Petroglyphs

Source: Photographed by the author's team

The six sites in the Heishan area are relatively concentrated, but due to the terrain can not be completed at one time collection, we entered the Heishan before and after five times collection, respectively, on the Sidaoguxinggou, Hongliu ditch, Shiguanxia, Mozigou, banana trench ditch, jiaohuigou, and other six petroglyphs sites for the collection of pictures and videos, in the collection process we found that the Heishan area has a complicated terrain, the car is more difficult to travel, some sections must be travelled on foot, and it is indeed difficult to take with the equipment is very difficult, in the collection we once also faced the problem of manpower shortage and equipment transport difficulties, some rock art sites in the high hand, to the collection also caused greater difficulties, there is a certain degree of danger, which also verifies the experts expressed in the actual collection process of the original equipment can not be applied to the collection of the field terrain, and at the same time in the mountainous

areas there is no signal problem, which also for the digital preservation of caused a This also creates difficulties for digital protection.

In this process, we found that the petroglyph image collection work is indeed, as experts and scholars say, has a certain degree of difficulty; many petroglyphs are not distributed centrally. However, the Heishan Petroglyphs have many more centralised. However, petroglyph painting locations are not consistent. On the one hand, the carving of different eras and the carving authors are different, with a certain degree of randomness. On the other hand, over the past thousand years, Heishan's topography and morphology have undergone many changes. On the other hand, the terrain of Heishan has also changed a lot over the past thousand years, so some places that might have been convenient for carving have become very difficult to access now.



FIGURE 106 Author's collection of petroglyph information from a high place

Source: Photographed by the author's team

Petroglyphs in the Heishan are distributed in Sidaoguxinggoues, Hongliu ditch, Banana Trench ditch, Shiguanxia, Mazigou, and Jiahe ditch. Although relatively concentrated in all places, it is still not easy to enter the Heishan collection. Collect no signal, in fact, in the later construction of the digital monitoring, this is also a need to solve the author's drone in the Heishan to carry out filming soon after the fall of a mountain, which can not be found.



FIGURE 107 Many places are inaccessible by car, so we can only walk into the mountains to collect petroglyph data

Source: Photographed by the author's team

Some petroglyph sites, such as Banana Trench, are inaccessible by car. Each time the Heritage Conservation Institute's inspection team members drive the car to the nearest place and then hike into the mountains for inspection, we can only get out of the car and walk with all the filming equipment to enter the mountains to collect the petroglyphs when we collect them in these places.



FIGURE 108 Carrying equipment up the mountain for information collection

Source: Photographs by the author

Heishan, whose ancient name was "Dongting Mountain", stands on the north side of the Hexi Corridor and belongs to the Horsehair Mountain branch. The top of the mountain is rounded, with steep gullies, ravines, and strange rocks. Heishan and the south of the Wenshu Mountain, Qilian Mountain confrontation, forming a narrow east-west aperture, the terrain is dangerous, forming the Hexi corridor of the "lock and key". Heishan, on the south side of the Shikuan Gorge, was once the ancient East-West Road and the Silk Road, the main traffic artery. Therefore, in the shooting, there is still a danger itself, the rocks in the mountains, with shale loose texture, after the rain, walking on it is not stable, a little careless will slide down, in fact, this is also a problem faced by the Heishan Petroglyphs. However, the ancients chiselled in the time of the choice of the more complex rock, but because of its geographical characteristics, some rock fragments or, in the course of history, will be detached. Many places have no focus, especially the high places, because the shooting caused many difficulties, reflecting the

ancients' wisdom. In the same place, carving and painting are still complicated, excluding the factors of terrain change.



FIGURE 109 Petroglyph survey and collection in Mozigou

Source: Photographs by the author

After entering the Heishan several times, with the help of the personnel of the local cultural relics protection unit, we have completed the collection of full coverage of Heishan petroglyphs. Indeed, some petroglyphs sites could not collect the overall information due to the protection measures, and some petroglyphs higher up could not be collected due to the drone was damaged in the first time to enter the mountain, from March 2024, we entered the Heishan area of Jiayuguan Mountain to conduct a field study, during which A total of five field trips were made, completing the audio and video collection of six places, including the Sidaoguxinggoues, Hongliu ditch, Shiguanxia, Mozigou, Banana Artemisia ditch, and Jiaojie ditch, to effectively ensure the accuracy, validity, and reasonableness of the information(Wang, 2015). More than 2,000 photos and 300 minutes of video were collected to build a digital teaching resource library of Heishan Petroglyphs, which is fully prepared for constructing the petroglyph picture image database, and provides basic research conditions for later research.

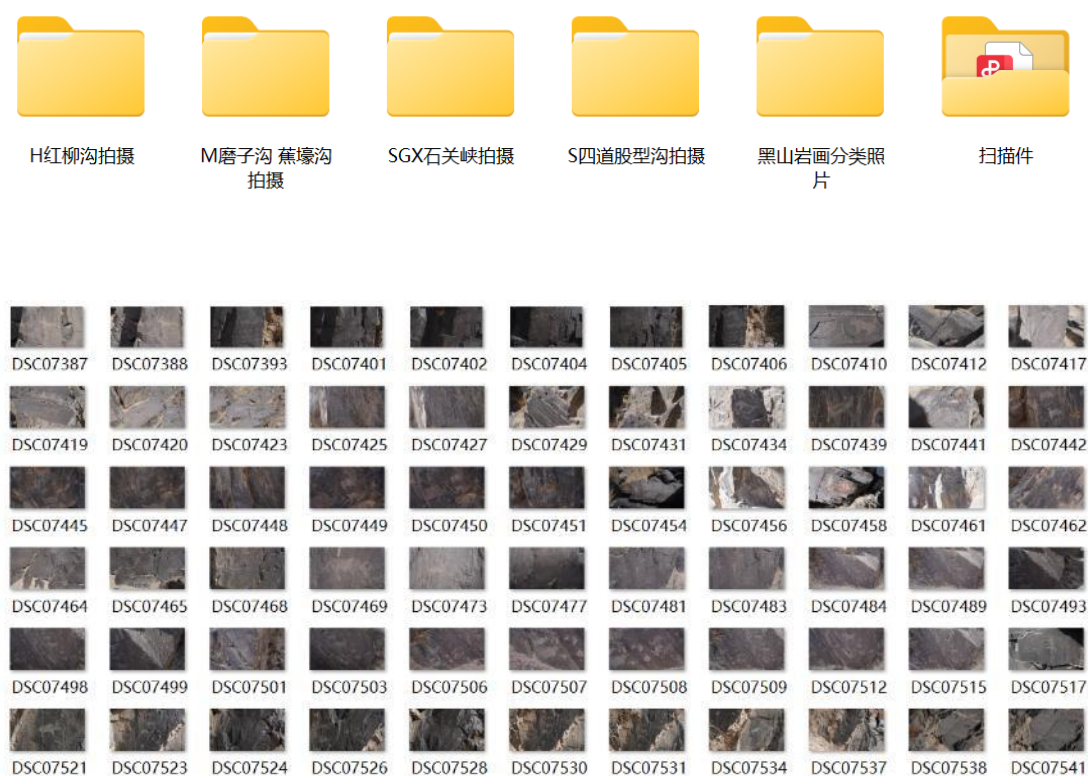


FIGURE 110 Pictures of petroglyphs collected in Heishan

Source: Compiled by the author

### 4.3 Construction of the Heishan Petroglyphs Resource Bank

#### 4.3.1 Cultural and Artistic Value of the Heishan Petroglyphs

The Heishan Petroglyphs are located at the core area of the ancient Silk Road, bearing a long-standing historical memory and rich cultural connotation. Through research, their value is mainly reflected in the following aspects:

First, as a record of history and civilization. The Heishan Petroglyphs, as a direct record of early human activities, vividly reflect the production methods, living scenes, and religious rituals of ancient societies. Their concise and symbolic patterns record the ancestors' understanding of nature and strategies for coping with survival challenges, bearing witness to the formation and development of nomadic culture. They serve as carriers of ancient people's cognition of the world and constitute important

physical materials for studying the ancient civilisation of Northwest China, providing valuable clues for scholars to reveal historical changes, social structures, and cultural inheritance.

Second, as evidence of multicultural integration. The unique geographical advantages of the Heishan Petroglyphs make them an important window for the exchange of multi-ethnic cultures. The petroglyphs not only present the hunting, totem worship, and spiritual rituals of early nomadic peoples, but also reflect later influences from foreign cultures (such as Tibetan Buddhism), with the appearance of stupa-like structures, Tibetan script symbols, and other elements. These reveal differences in lifestyle, religious belief, and aesthetic concepts across different periods, reflecting the integration of diverse cultures.

Thirdly, they serve as a symbol of cultural identity and a means of transmitting intangible cultural heritage. The Heishan Petroglyphs are material carriers of ancient culture and important symbols linking ancient cultural memory with modern social identity. The religious rituals, totem symbols, and artistic expressions embedded in the petroglyphs not only reproduce the life and beliefs of the ancestors but also provide contemporary people with a sense of cultural identity and belonging. As intangible cultural heritage, the Heishan Petroglyphs play an important role in cultural transmission both locally and more broadly, providing a solid foundation for regional cultural preservation and promotion, and driving the continuous development of regional culture.

As an important petroglyph heritage in Northwest China, the artistic value of the Heishan Petroglyphs is not only embodied in their primitive and vivid visual language but also in the reflection of ancient people's unique aesthetic consciousness and expressive techniques. Although the early petroglyphs were created as records of early human life, the process involved concise and powerful lines and carving techniques. This primitive and intuitive form of expression made the petroglyphs an important medium for the ancestors to transmit information and record life without written language. The original chiseling techniques and bold lines create a substantial visual

impact, demonstrating the ancient people's direct experience and perception of life and nature.

The realistic patterns and scenes depicted in the petroglyphs form a symbolic artistic system; while recording, these symbols and totems also represented ancient people's worship of nature and their desire to express their spiritual world through visual language. Due to its unique historical composition, the artistic expression in the Heishan region was influenced by nomadic peoples' aesthetic preferences and religious thoughts. It not only faithfully reproduced primitive life scenes but also incorporated elements of Tibetan Buddhist culture in later periods, showcasing a unique artistic style of multicultural fusion.

This endowed the petroglyphs with a sense of era and regionality and inspired modern artists to explore interdisciplinary integration. Although the petroglyphs were created in ancient times, their imagery's interpretative and aesthetic features, marked by simplicity, can still resonate with contemporary viewers. Through these works, the ancient people's records of primitive life, reverence for nature, and worship of faith are vividly conveyed through powerful visual symbols. Therefore, the Heishan Petroglyphs hold significant importance in archaeology and historical research and provide inspiration and material for modern artistic creation due to their artistic and aesthetic value.

Given the profound artistic and cultural connotations of the Heishan Petroglyphs, their preservation and transmission are critical. According to current research, traditional preservation methods often prove inadequate in the face of natural weathering and human-induced damage. Therefore, it is imperative to use new technologies and methods for cultural research, transmission, and artistic exploration and application of the petroglyphs. Against this backdrop, digital collection and preservation have become key approaches to continue and transmit this precious cultural heritage. It allows for the comprehensive and detailed preservation of the petroglyphs' features and enables the integration of these cultural resources online and offline through digital resource databases. This model helps improve the preservation

quality of petroglyph data and plays an important role in cultural transmission, educational innovation, and the development of cultural and creative industries, injecting new vitality into regional cultural confidence and economic development.

#### 4.3.2 Design of the Heishan Petroglyphs resource base

Therefore, to overcome the limitations of traditional protection models and establish a new path for the preservation of the Heishan Petroglyphs, it is a practical approach to build a unified and standardized digital resource database of the Heishan Petroglyphs based on the existing image database results. Through a digital platform, efficient data integration, retrieval, and sharing can be realized, and detailed reproduction of the petroglyphs can be achieved using multimedia technologies later.

This not only helps to preserve and transmit the deep cultural and artistic connotations embedded in the petroglyphs but also provides unprecedented opportunities for academic research, educational dissemination, and the development of the cultural and creative industries.

In summary, the digital preservation and database construction of the Heishan Petroglyphs serve as strong guarantees for the continuation and transmission of this precious cultural heritage. They provide data support and a theoretical basis for studying ancient culture and art and open new paths for contemporary cultural communication, art education, and the development of creative industries.

During the construction of the resource database, data collection, demonstration, and field interviews were carried out. In the interview, some experts and managers also said that constructing the petroglyphs resource database is a more practical and meaningful work based on the current protection strategy. Pang Ying said there is no standard for the petroglyphs database in China. Professor Su Xihong is doing a significant project on a database of Chinese petroglyphs, but there are no final results. This issue has also been asked to a few teachers in the industry, who said that, less than ideal, there are no domestic petroglyph benchmarks and no normative standards (Pang Ying).



FIGURE 111 Prof Wang Quanzhao on digital conservation of petroglyphs

Source: Photographed by the author's team

Wang Quanzhao said that the conservation of petroglyphs should focus on two aspects. On the one hand, it is to gather all the research and development resources to build a digital resource base. The reason why a digital resource library is necessary is that these petroglyphs are located in nature and are bound to be eroded by external factors such as wind and rain, leading to constant changes in their state. We have observed that certain petroglyphs show obvious differences between several expeditions, which is mainly due to the influence of natural factors. Of course, we cannot rule out the damage caused by human factors to the petroglyphs. If we can build digital resources that will effectively protect and preserve our existing cultural resources, and at the same time facilitate future researchers in their research and utilisation. In addition, it is necessary to popularise the knowledge of petroglyphs and other cultural resources to the general public. Through popularisation, we can make people realise the important value of these cultural resources, so that more people can participate in conservation. This is one of the objectives of our cultural and creative development and cultural

tourism development. For example, through study programmes, the next generation of primary and secondary school students will be made aware of the existence of such important cultural resources in our place, so that they can build up an awareness of the protection of cultural resources at an early age.

Fu Qiang said that when talking about specific protection measures, the current protection of Heishan Petroglyphs is still relying on people to go into the mountains to carry out inspections, and is also actively engaged in the implementation of digital protection projects. He believes that there are two aspects of digital protection, first of all, from the visible place, the video surveillance network for full coverage, with intelligent control, such as access control, shouting devices and access to the Internet of Things, the formation of a digital interaction centre, through the Internet of Things linkage, timely transmission of petroglyphs in the area of monitoring video, data and information, and is the construction of the resource base of the Heishan Petroglyphs is necessary for the protection of the current feasible.

According to the classification study of Heishan Petroglyphs and the necessity of digital conservation of Heishan Petroglyphs research, we have designed and integrated the Heishan Petroglyphs repository.

The design of the resource library needs to rely on a certain platform, the resource library has the characteristics of sharing, common construction, and constant maintenance, so there will always be a demand for storage, because it generates a huge amount of funds, and it is a more difficult problem for individuals to afford. Based on this, in the construction of Heishan Petroglyphs digital resource base, relying on the author's unit of cooperation of China Super Star website digital resource base for construction, on the one hand, the resource base has openness, on the other hand, can also be used as a teaching resource base for academic research in colleges and universities, and the Super Star Teaching Resource Base for the domestic one of the professional teaching resource base, with the openness of all walks of life to facilitate access to study and research.

The design of the resource library coincided with the integration and updating of the resource library by Superstar, because the construction process of the resource library was not the same as before, and after many revisions and attempts, the resource element was finally designed and ready for construction as desired.

After determining the platform on which the resource library relies, we firstly carried out system design for Heishan Resource Library, as the Super Star Resource Library belongs to the education resource library, the content of the resource library mainly comes from the construction of the curriculum, but also serves the teachers and learners of the curriculum learning, because we are divided into several first-level columns according to the required content, such as international communication, resource construction, literature and materials, network resources, policies and regulations, cultural and creative products, etc. In the resource In terms of resource construction, it is divided into 8 types of digital resources, which are: pictures of Heishan Petroglyphs, videos of Heishan Petroglyphs, links to network materials related to Heishan Petroglyphs, film and video animations of Heishan Petroglyphs, documentary materials of Heishan Petroglyphs, cultural and creative products of Heishan Petroglyphs, policies and regulations of Heishan Petroglyphs, and other materials.

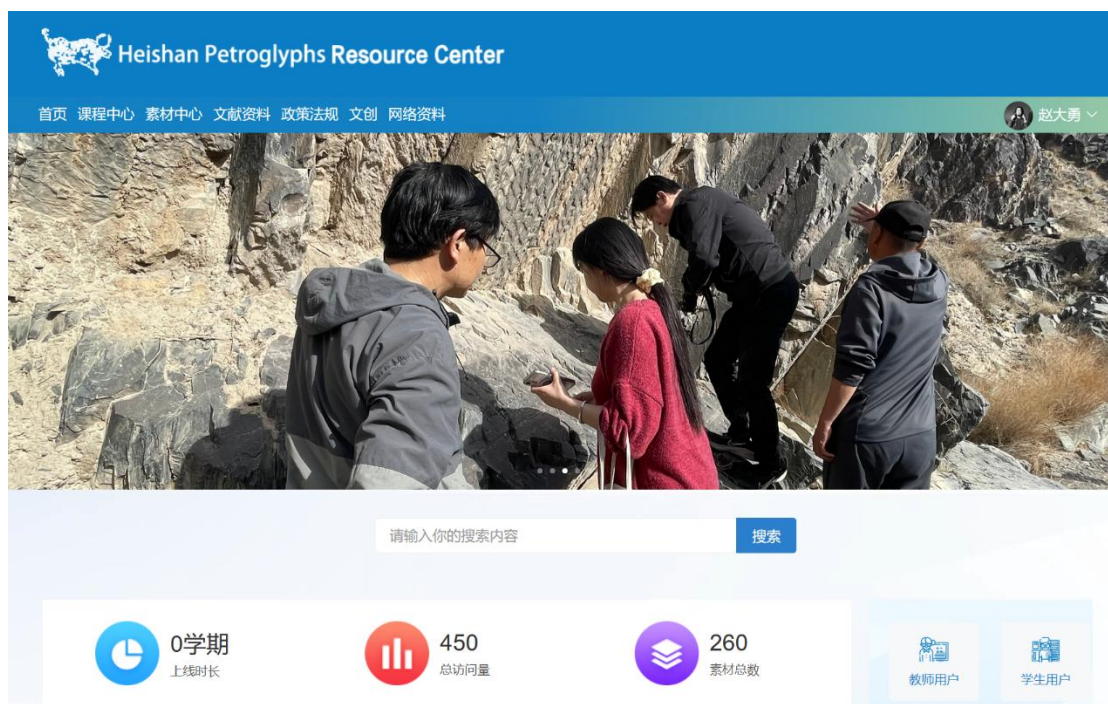


FIGURE 112 Screenshot of Heishan Petroglyphs Resource Library homepage

Source: Compiled by the author

#### 4.3.2.1 Pictures of Heishan Petroglyphs

It mainly includes the latest image collection data, historical data, network data, etc., which are used to study the content, system, and classification of Heishan Petroglyphs.

This part of the resources mainly from the author collection, information pictures and historical pictures, the first display is mainly the author team personally collected Heishan Petroglyphs pictures, the collection of pictures basically do not do any processing, in the form of the original pictures presented on the network to facilitate everyone to browse and learn to use, we are in the process of the examination, we found that some of the petroglyphs information is different from our collection, or we did not collect it, this is the Due to the age, some petroglyphs are missing, and some have been destroyed by human beings, so the information is not completely consistent, for this situation, we use other scholars' historical pictures according to the images that have

been proved to exist, and for some other angles or perspectives of the pictures we will use other pictures such as printed books, research documents, network search pictures, news pictures, remake, etc., which will be famous. We will use other images from other angles or perspectives, such as printed books, research documents, internet search images, news images, reprints, etc., from famous sources.

It is important to note that the construction of the repository is a long-term endeavour, so it will not be completely finished, but will continue, and the data will be subject to constant change.



FIGURE 113 Heishan Petroglyphs Photo gallery

Source: Compiled by the author

#### 4.3.2.2 Film and video recordings of Heishan Petroglyphs

We are currently in the process of collecting Heishan Petroglyphs, also carried out the collection of video materials, video materials are mainly two aspects of the collection, one is the Heishan Petroglyphs of the content of the filming of video materials, including petroglyphs of the contents of the petroglyphs and the investigation of the chronicle, the other petroglyphs of the process of the investigation of the character interview video transcript.

Dynamic video materials are mainly videos shot in the field of Heishan, so that researchers can have a more three-dimensional understanding of the whole picture of Heishan Petroglyphs, and conduct a more three-dimensional and in-depth study of Heishan Petroglyphs.

The interviews are mainly about the Heishan Petroglyphs, and related petroglyph researchers and conservationists, as well as enthusiasts, express their views and ideas.



FIGURE 114 Video footage of Heishan Petroglyphs

Source: Compiled by the author

#### 4.3.2.3 Links to web-based information relating to petroglyphs in the Heishans

The web information about Heishan Petroglyphs is relatively scarce, and most of the research information about Heishan Petroglyphs remains on the web, in the form of various forms of blogs, videos, travelogues, notes, articles, news and so on, so that effective links can facilitate people to know more about Heishan Petroglyphs. Currently, we have collected several web links.

#### 4.3.2.4 Film and video animation of petroglyph creation in Heishan

Film, documentary, and animation productions related to Heishan Petroglyphs, mainly from the collection, are used to study the effective conservation of Heishan Petroglyphs.

#### 4.3.2.5 Documentation of Heishan Petroglyphs

Heishan fireworks-related literature links, given that the Heishan Petroglyphs data are basically on some formal academic website, its information has a certain degree of protection, part of the open literature for the full text of the display, for the unpublished, with the ownership of the literature for the link to jump.

- |                          |                             |
|--------------------------|-----------------------------|
| 1972_甘肃地区古代游牧民族的岩画——黑... | 保护利用黑山岩画,助推嘉峪关市文化产业...      |
| 北方岩画遗产病害类型及保护...究——以嘉... | 初仕宾 等 - 1990 - 甘肃嘉峪关黑山古代岩画  |
| 从祁连山、黑山岩画看羌民族发展-李兴华      | 冯国威 - 2020 - 基于嘉峪关黑山岩画的视... |
| 甘肃地区古代游牧民族的岩画——黑山石...    | 甘肃黑山岩画中的体育-曹成红              |
| 黑山石刻岩画_游牧民族的影像_亢鹭        | 胡雪_2012_嘉峪关黑山岩画保护与利用调查      |
| 基于嘉峪关黑山岩画的视觉设计研究-冯国威     | 嘉峪关黑山岩画保护与利用调查-胡雪           |

FIGURE 115 Heishan Petroglyphs bibliography

Source: Compiled by the author

#### 4.3.2.6 Petroglyph Cultural Creation in Heishan

Heishan Petroglyphs cultural creation is mainly for artists, heritage conservation workers on the Heishan Petroglyphs IP secondary creation and development, some of the products are circulated, some just exist in the research and development stage, the research and development and display of cultural and creative products on the one hand, is conducive to the protection of petroglyphs, and on the other hand, is also conducive to the dissemination of the culture and development of petroglyphs.

#### 4.3.2.7 Policies and regulations on Heishan Petroglyphs

Display of international, national, and local policies related to Heishan Petroglyphs and tangible cultural heritage to facilitate researchers to study and learn about relevant policies.

#### 4.3.2.8 Other information

Other uncategorised information, such as publications.

#### 4.3.3 Resource-based coding and resource statistics

The resource library has the characteristics of continuous updating, rich information, diversified types of resources, etc. To better manage the resource library of Heishan Petroglyphs, on the one hand, it is convenient for managers to manage, on the other hand, it is convenient for researchers and learners to learn easily, and at the same time, it is convenient to build and share, we have established a coding code of Heishan Petroglyphs.

During the interview, Mr Pang Ying said that at present there is no uniform standard for the construction of the petroglyphs resource base, and there is no standard for the digitisation construction, so it is difficult to have an accurate normative basis, in the early statistics, most of the research scholars, such as Chu Shibin in the 1990 in the Journal of Archaeology published in the Gansu Jiayuguan Heishan Ancient Petroglyphs in the article to the Heishan 6 the initials of each region plus the number of the encoding, and the late Yang Hui Fu and Zhang Junwu also followed the updated way in the book "Petroglyphs of the Heishan". Yang Huifu and Zhang Junwu also followed and updated this approach in their book Heishan Petroglyphs. The authors classified the Heishan Petroglyphs according to their contents in the course of their research, so the coding form must have been different, and thus, the coding form of the repository was developed. Because of the specificity of the Heishan Petroglyphs, their English name is Heishan, which represents the special geographical attribute. So, in the process of coding with HS as the first letter, to reflect its regionality and differentiate it from the environment of Heishan in other places, add J, i.e., Jiayuguan initials in front of it, so the Heishan Petroglyphs Digital Resource Library is named JHS, and the naming for the different types is JHS+resource type, which is the first level. Naming specification, specifically:

JHS-P (Images), JHS-D (Documentary Images), JHS-I (Internet), JHS-V (Creative Film and Animation), JHS-C (Cultural and Creative Products and IP Derivatives), JHS-P (Policies and Regulations), JHS-O (Other Materials).

The repository exists with a secondary catalogue in addition to the primary category, which is designed with a classification code of primary catalogue + file attributes, specifically:

JHS-P (image): image type files are named as primary code + secondary code + specific attribute JHS-PSW001202404P, meaning Heishan Petroglyphs (JHS) Picture Material (P) Animal (A, i.e., animal) Sidaoguxinggou (S) the first (001) Picture Material, April 2024 (202404) shooting collection of unprocessed pictures (P). According to the suffix, the type of picture is classified into P (field photography type of material, mainly

unprocessed original pictures for the first time to carry out the shooting), S (sweeping file, originated from the scanning of the book, the literature material interception), I (network download pictures) and other suffixes to distinguish.

JHS-D (Documentary Image):

JHS-I (Internet), JHS-V (Creative Film and Animation), JHS-C (Cultural and Creative Products and IP Derivatives), JHS-Z (Policies and Regulations), JHS-O (Other Materials).

TABLE 12 Table Coding Table for Heishan Petroglyphs data

NO	CATEGORISATION	ENCODINGS	TYPICAL EXAMPLE	
1	Photo Images	JHS-P	JHS-P-a-s-001202404-p	
2	Shooting Video	JHS-D	JHS-D-a-s-001202404-p	
3	Web links	JHS-I	JHS-I-001202404	
4	Animation for film and television	JHS-V	JHS-V-001202404	
5	documentation	JHS-T	JHS-T-001202404	
6	creative industries	JHS-C	JHS-C-001202404	
7	Policies and regulations	JHS-Z	JHS-Z-001202404	
8	Other information	JHS-O	JHS-O001202404	

Since the establishment of Heishan Petroglyphs Resource Library, there are currently a total of various types of resources, including pictures, videos, texts, and links.

Scale map of the resources of the Montenegrin  
petroglyph repository

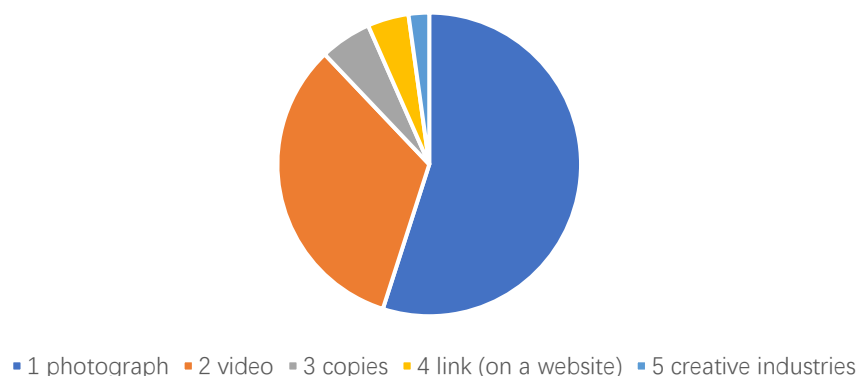


FIGURE 116 Proportional distribution of resources in the Heishan Petroglyphs repository  
(under construction)

Source: Compiled by the author

The completion of the Petroglyph Resource Bank of Heishan is like a bridge connecting distant ancient times with modern times, bringing the marks of history to a new lustre in modern society. It is not only a precious treasure house of cultural heritage but also a multifunctional platform integrating scientific research, education and popularisation, tourism, and cultural dissemination.

Regarding cultural inheritance and protection, the Heishan Petroglyphs resource base plays a pivotal role. After thousands of years of baptism by wind and rain, these petroglyphs retain the unique artistic style and aesthetic concepts of the ancient nomadic people. With vivid pictures, they record the production life, religious beliefs, social structure, and other aspects of ancient human beings, providing valuable information for studying ancient history, culture, and folklore. Through professional protection and management measures, the Resource Library ensures the preservation status of these petroglyphs, enabling them to be passed on to become a cultural link between the ancient and modern worlds.

In scientific research and education, the Heishan Petroglyphs Resource Bank provides rich materials and cases for academic researchers. It promotes the cross-research and development of many disciplines such as petroglyphs, history, and ethnology. Through an in-depth study of petroglyphs, scholars can not only reveal the lifestyle and aesthetic concepts of ancient human beings but also explore the laws of change and development of ancient societies. At the same time, the Resource Library also provides educators and students with vivid teaching materials, helping them to understand ancient history and culture more intuitively and to develop a sense of respect for and protection of cultural heritage.

At the same time, the openness of the Heishan Petroglyphs resource base allows more people to understand the charm of the Heishan Petroglyphs resource base through the network, forming a bright network landscape, attracting tourists from all over the world to visit Heishan, so that they can appreciate the exquisite petroglyphs at the same time, and more in-depth understanding of ancient culture and history. Tourists can learn about the system and lineage of Heishan Petroglyphs through the network, and then go to the field to feel the unique charm and wisdom of the ancient nomadic people. This kind of cross-cultural exchange and dissemination not only helps to enhance the understanding and friendship between people of different countries and regions, but also promotes cultural diversity and prosperity.

After the completion of the Heishan Petroglyphs Resource Bank, it will play a significant role in cultural inheritance and protection, scientific research and education, tourism and cultural dissemination, as well as management and maintenance. It not only provides valuable information for academic researchers, but also provides the public with the opportunity to understand ancient culture and history; it not only promotes the inheritance and development of culture, but also makes a positive contribution to the promotion of cultural exchange and integration. In the future, with the continuous progress of science and technology and the sustained development of society, it is believed that the Heishan Petroglyphs Resource Bank will play a greater role in more fields and contribute to the progress of human civilisation.

#### 4.3.4 Application of Heishan Petroglyphs resources in teaching and learning

Since its completion, the Heishan Teaching Resource Library has demonstrated outstanding application value and significance in teaching practice and cultural and creative design. Through the combination of teaching and practice, especially in the exploration of the integration of cultural heritage and creative design, the Resource Bank provides strong support for the modern inheritance of Heishan Petroglyphs, and at the same time provides students with a unique platform for learning and practice.

In teaching practice, Jiuquan Institute of Vocational Technology has integrated the creative teaching content of Heishan Petroglyphs into its professional and public elective courses with good results. Teachers closely integrate classroom teaching with petroglyphs culture through the high-quality images and historical information of Heishan petroglyphs provided by the resource library. On the one hand, the teacher systematically explains the historical background, formation reasons, image narratives and cultural values of Heishan Petroglyphs, so that students can deeply understand the content of the petroglyphs and grasp the historical significance of the symbols of people, animals and religious images in the petroglyphs. On the other hand, by displaying and analysing the design elements of petroglyphs, students are helped to improve their visual comprehension and cultural creativity expression. This teaching method enables students not only to feel the artistic charm of petroglyphs intuitively, but also to deeply understand the cultural vein behind them, laying a solid foundation for the subsequent practice of cultural and creative design.



FIGURE 117 Teachers are working on curriculum development

Source: Photographs by the author

In the design practice, students carried out the creation of typical cultural and creative products by utilising the petroglyph materials in the resource library and combining them with modern design concepts:

Students applied the classic patterns of Heishan Petroglyphs to the design of canvas bags. By copying and creatively processing the content of the petroglyphs, the images of traditional petroglyphs are combined with modern fashion design. As a practical and portable daily necessity, the canvas bag has become an important medium for the cultural dissemination of Heishan Petroglyphs. This process not only forges students' hand-drawing ability, but also enhances their ability to extract, redesign and apply cultural elements. The petroglyph patterns on the canvas bags are colourful and uniquely designed, with both cultural connotation and aesthetic value, making them suitable for use as special souvenirs for local tourism.



FIGURE 118 Students drawing petroglyph patterns

Source: Photographs taken by Mr Wang Quanzhao (permission to use has been sought).

Jade carving students also used machine engraving techniques to finely carve the Heishan petroglyphs patterns onto the Heishan rock chips, creating unique cultural and creative souvenirs. As a natural material with distinctive regional characteristics, the texture and historical weight of the Heishan rock chips are highly compatible with the cultural meaning of the Heishan petroglyphs. The students focused on combining the narrative nature of petroglyphs in their design, incorporating hunting scenes, animal totems, religious images and other classic elements into the souvenir design. This combination of modern technology and traditional culture not only enhances the expressive power of the petroglyph patterns, but also makes the cultural and creative products more collectable and competitive in the market.

At the same time, Heishan petroglyphs were integrated with the aesthetic practice programme for local students. Teacher Wang Quanzhao of the Jiuquan Institute of Vocational Technology carried out on-site teaching activities at the Jiuquan Museum, integrating the content of the petroglyphs into porcelain painting, and by explaining the content of the Heishan Petroglyphs to the students and letting them paint the

petroglyphs on porcelain based on their understanding of the content of the petroglyphs, it played a positive role in promoting the understanding of the Heishan Petroglyphs by the primary school students.



FIGURE 119 Figure Students drawing petroglyphs of Heishan at Jiuquan Museum

Source: Photographs taken by Mr Wang Quanzhao (permission to use has been sought).



FIGURE 120 Finished product

Source: Photographs taken by Mr Wang Quanzhao (permission to use has been sought).

Through practical activities, students gain a deeper understanding of the cultural connotation of Heishan Petroglyphs and exercise their creative thinking and design ability. These teaching and design results fully reflect the important role of the Heishan Teaching Resource Library in promoting the modernisation, inheritance, and innovation of cultural heritage.

Jiuquan Institute of Vocational Technology also carries out the practical teaching of Heishan Petroglyphs in the classroom for teachers' quality enhancement. Through learning, feeling, and making works of Heishan Petroglyphs drawing, we understand the history and culture of Heishan Petroglyphs, and enhance the teachers' cultural literacy at the same time.



FIGURE 121 Teachers practising the Heishan Petroglyph Project

Source: Photographs taken by students (consent to use sought)

Teacher Zhong Lili of Nanjing University of Aeronautics and Astronautics combined the resources of Heishan Petroglyphs with his profession. They incorporated a design course with Heishan Petroglyphs as design elements in students' classroom teaching. The Heishan elements designed in the course won awards in the National Colleges and Universities Digital Art Design Competition.



FIGURE 122 Heishan Petroglyphs cultural and creative works win awards

Source: Compiled by Mr Wang Quanzhao (consent to use sought).

To sum up, the Heishan Teaching Resource Bank provides an effective support platform for teaching and disseminating cultural heritage, and injects innovative vigour into local cultural and creative industries. On the one hand, the Resource Bank stimulates students' interest in and identification with cultural heritage through teaching practice; on the other hand, it opens up a new path for the marketisation and productisation of cultural elements through specific design applications. The combination of Heishan Petroglyphs and cultural and creative design not only realises the seamless connection between traditional culture and modern innovation, but also provides a new paradigm for protecting and activating cultural resources.

## CHAPTER 5

### DISCUSSION AND CONCLUSION

#### 5.1 Brief Summary of the Study

Studying Heishan Petroglyphs is important for understanding the history and cultural evolution of ancient civilisations in the Hexi region of Northwest China. Existing studies have emphasised petroglyphs' artistic and anthropological value, but there are still deficiencies in digital research. The Heishan Petroglyphs suffer from a large protective area, a complex environment and a single means of protection in their daily management and conservation, and suffer from a variety of diseases due to natural and anthropogenic factors, for which no effective conservation method has yet been found, suggesting that there is an urgent need to formulate an effective conservation strategy and to carry out further relevant research. Although petroglyphs in China have attracted attention in recent years, due to the late start and the different depths of conservation research on petroglyphs in different regions, not much attention and research have been paid to the Heishan Petroglyphs, and very little research has been done on how to protect them effectively digitally.

This study takes Heishan Petroglyphs as the research object, takes the content of six petroglyph sites in the region as the main entry point, enters Heishan in the field to investigate and collect images of the petroglyphs in the Sidaoguxinggoues, Hongliu Ditch, Shiguanxia, Mozigou, Banana Trench Ditch, and Jiaojie Ditch, and carries out an in-depth analysis of the existing literature, while conducting in-depth exchanges and discussions with Heishan Petroglyphs research scholars and administrators. Through studying the characteristics, classification, and cultural connotation of Heishan Petroglyphs, the content of Heishan Petroglyphs was studied, and a classification system of Heishan Petroglyphs images was established; digital means were used to protect Heishan Petroglyphs, images of Heishan Petroglyphs were collected, and a Heishan Petroglyphs image database was set up; and a Heishan Petroglyphs teaching

resource library was set up for better research and development of the resources of Heishan Petroglyphs and use in teaching, research, and creation.

In the course of the research, with the Heishan Petroglyphs Group in Jiayuguan, Gansu, China, as the core, we carry out a comprehensive investigation, collation and analysis of the Heishan Petroglyphs Group, design and build the Heishan Petroglyphs Resource Base, study and analyse the literature related to the protection of the Heishan Petroglyphs, and carry out investigation and research in the way of combining the analysis of the literature, field trips and interviews. By systematically collecting books, theses, academic reports, news and other books related to the study of Heishan Petroglyphs for research and analysis, collating and analysing the content of literature, collecting relevant data, understanding the culture, history and economy of Heishan Petroglyphs through the existing research results and foundations, and forming a research basis and proof for this paper; going deep into the Heishan region of Jiayuguan, conducting field visits and collecting image information on petroglyphs in six regions, and comprehensively Understand the physical qualities and formal manifestations of Heishan Petroglyphs, and prepare for data classification, and at the same time complete the comprehensive data collection of petroglyphs information, so as to make sufficient preparations for the construction of the resource base at a later stage; According to the content of the study, select the managers of Heishan Petroglyphs, petroglyphs experts, researchers, artists and so on to conduct an open-ended interview, in terms of the representation of the content of the Heishan Petroglyphs, the significance of the petroglyphs to the local economy and culture, as well as the digital Pathway for the Digital Preservation of Petroglyphs.

This study focuses on the classification characteristics of Heishan Petroglyphs, image collection and database establishment, and the development and application of a digital resource library. It systematically summarises the content categories of Heishan Petroglyphs and explores the path of digital conservation of petroglyphs. The study establishes a photo database of Heishan Petroglyphs through high-definition image

acquisition. It relies on digital technology to develop a resource library to promote long-term preservation, academic research, and cultural dissemination of petroglyphs.

**Systematic classification and cultural connotation of Heishan Petroglyphs.** As an important cultural heritage, petroglyphs carry ancient societies' life forms, belief systems, and artistic styles. Through field research and literature combing, this study classifies the Heishan Petroglyphs into six categories: animals, figures, religion, hunting, rituals (dances), texts, and plants. These petroglyphs record ancient social practices such as hunting, rituals, and religious activities, showing the exchange and integration of multi-ethnic cultures. The vivid drawings in the petroglyphs reflect the ancient society's knowledge of the natural environment, the interaction between man and nature, and man and society. The classification study provides a scientific basis for further exploring petroglyphs' symbolic meaning, aesthetic characteristics, and historical changes.

**Image collection of Heishan Petroglyphs.** Heishan Petroglyphs, while carrying rich cultural information, also face the challenges of natural weathering, artificial destruction, and insufficient documentation. The authors have gone deep into Heishan many times to collect petroglyph images systematically, covering high-definition photographs, video recordings, and other forms of media, and supplemented and compared them with the existing literature, and finally established the Heishan Petroglyphs Image Database. This image database provides detailed visual data support for petroglyph research and lays the foundation for future digital conservation and artistic recreation.

**Establishment of Heishan Petroglyphs Resource Library.** Based on the image database, this study further develops the digital resource library of Heishan Petroglyphs, integrating images, documents, audio, and video materials collected in the field and related cultural and creative resources, covering a variety of data types such as pictures, videos, documents, design materials, and so on. Establishing this resource library not only provides researchers, cultural heritage protection organisations, and

educators with convenient query and research tools but also plays an active role in cultural heritage, teaching innovation, and cultural and creative development.

The research results have been applied locally in teaching practices such as art creation, which not only deepen the academic knowledge of Heishan Petroglyphs but also provide new ideas and methods for art inheritance and development. The digital resource library of Heishan Petroglyphs has realised the systematic archiving and sharing of petroglyphs art, enhanced the dissemination scope and protection of petroglyphs, and promoted the digital protection and dissemination of art; it facilitates the use of petroglyphs materials in the resource library for cultural and artistic creation in practice, which gives new life to traditional art and promotes the innovative application of petroglyphs in modern design; it enables us to find specific categories of petroglyphs materials quickly and carry out creative re-design in combination with historical and cultural backgrounds. Through the resource library, we can quickly find specific categories of petroglyphs and carry out creative re-design in combination with historical and cultural backgrounds, which promotes the in-depth integration of cultural heritage and contemporary design, and enhances the practicality of teaching and learning in art education; at the same time, combining with the technologies of big data, artificial intelligence and virtual reality, it expands a new path for the combination of visual arts and science and technology. It promotes the integration of multidisciplinary disciplines and expands the new direction of art research.

This study classified the Heishan Petroglyphs according to their contents through field investigation and research data. It analysed the contents of the petroglyphs mainly from three main aspects, namely, history, culture, and art, to create a foundation for further research on Heishan Petroglyphs. Through interviews with several scholars and managers related to Heishan Petroglyphs, combined with the existing research basis, research analysis and summaries were carried out in terms of the content of petroglyphs, the impact on local economy and culture, and the digital protection of petroglyphs, etc., and designed and established the Heishan Petroglyphs Resource Bank for application in teaching and other practical projects, which reduces

the research cost for the subsequent research based on classifying and protecting the digital resources of the Heishan Petroglyphs, and Provides practical research value.

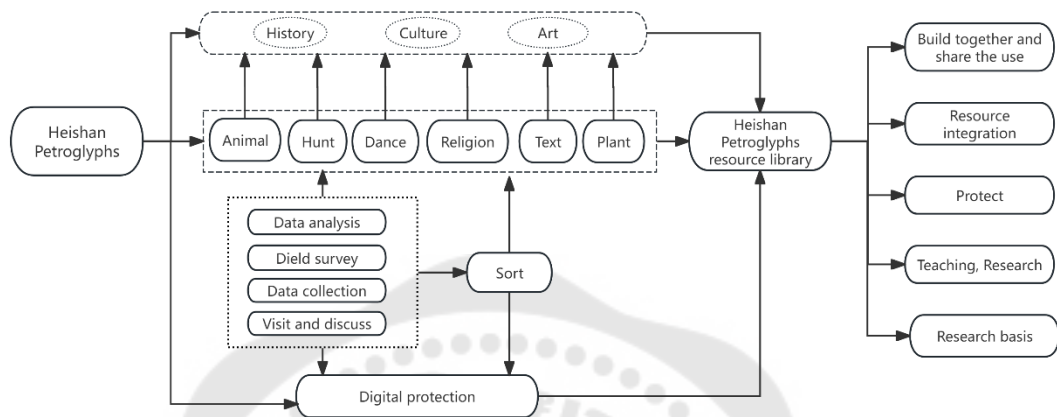


FIGURE 123 Framework of New Knowledge from the Study

Source: Compiled by the author

In summary, this paper is the first to conduct a comprehensive discussion and practice on the content classification, digital preservation, and collection of the Heishan Petroglyphs. It demonstrates the great potential of digital preservation technology in the preservation, dissemination, and utilization of cultural heritage, and pioneers a new practical model in constructing the Heishan Petroglyphs resource database. It fills the gap in the research of digital preservation of the Heishan Petroglyphs and makes up for the shortcomings of traditional physical protection methods. The concept of co-construction and sharing promotes cultural openness and sharing. The integration of petroglyph resources enhances the dissemination and promotion of petroglyph art, plays a protective role for the petroglyphs, promotes the development and utilization of local cultural resources, and has practical application value. At the same time, it also provides practical guidance for the protection of petroglyphs in other regions, as well as practical guiding significance for the protection of petroglyphs in other regions.

This study provides reliable data support for the follow-up cross-regional and interdisciplinary research, forms the research basis for the later petroglyphs research, enhances the scientific and systematic nature of the protection work, provides new ideas and methods for the protection and dissemination of Heishan Petroglyphs as well as other traditional cultural heritages, opens up a brand-new path, and promotes cross-regional and interdisciplinary in-depth research and cultural exchanges. It fully embodies the feasibility and significance of the in-depth integration of traditional cultural heritage protection and modern digital technology, and explores the application path of petroglyphs art in cultural protection, design innovation, art education and multidisciplinary integration, which is of great significance in the fields of traditional art research, modern art innovation, design application, art education and art exchange, and provides solid theoretical basis and practical demonstration for the research and application in the subsequent related fields. It provides a solid theoretical basis and practical demonstration for subsequent research and application in related fields.

## 5.2 Discussion of the Results

### 5.2.1 Classification of petroglyph content and presentation of cultural connotations

This study categorises the content of Heishan Petroglyphs. It explores the cultural messages conveyed by them at various levels, such as religious beliefs, social life and natural environment. Through comparative analyses of petroglyph styles in different periods and regions, the study not only clarifies the status of Heishan petroglyphs in ancient cultural exchanges and artistic inheritance but also provides new perspectives for revealing the early social structure and cultural dynamics of the Hexi Corridor region. This systematic classification study lays a solid foundation for the subsequent protection measures and theoretical construction. The classification of Heishan Petroglyphs reflects, on the one hand, the diversity of petroglyph records, such as records of historical events, spiritual support, social structure, etc., and on the other hand, from the expression of recording by carving on rocks with simple and rough lines, it reflects that petroglyphs were the main form of recording people's living environment and social activities at that time before the emergence of writing, which demonstrated

the thinking of ancient human beings about nature, society and religion. At the same time, this kind of chiselling technique has the durability of record retention, so that it can survive to modern times and be seen by everyone, and this kind of art form and content display as well as symbolic significance provides direct evidence for the study of early human civilisation.

At the same time, this classification helps to sort out the cultural lineage and symbolic significance of petroglyphs: animal petroglyphs show the ancient biodiversity of Heishan and the close connection between human beings and nature, for example, the animal images of deer, cows, tigers, etc. embody the life scenes of the ancient nomadic people and the culture of hunting, and at the same time, reflect the worship of certain animals; the content of the hunting demonstrates the environment in which the people at that time lived, and records the characteristics of the organisms; the petroglyphs of human beings mainly include dance and ritual scenes, showing the religious activities and social structure of the human society at that time, for example, the dancers wearing spiked decorations on their heads may symbolise special roles in religious ceremonies; the stupa patterns reflect the significant influence of religious beliefs in the Heishan Petroglyphs, which indicates that this place was an important node for cultural exchanges between the East and the West; the writings reflect the thoughts of the human beings in different periods; and the plants testify to the local times, changes and climatic transformations. This classification is similar to that of the early Chushi This classification is similar to the classification of five bells by Chushi Bin et al(Chu et al., 1990), but it is not exactly the same. It is more scientific to classify and study the petroglyphs according to the different attributes of their contents. However, we found that the petroglyph texts belong to the stone carvings, which are different from the techniques of chiselling and rubbing, and that their contents reflect people's thoughts in different periods and times, which should be classified and studied separately, and that the petroglyphs are classified separately from the other classifications. Vehicle views in Heishan Petroglyphs mentioned by the interviewees also have different views, and their number is only one, which cannot form the basis of analysis, therefore, we re-examined

to establish a classification research system. At the same time, we found in the process of inspection, comparing the images in the early research materials, and made a comparison, some images we always did not find in the shooting of video materials, and did not see in other recent materials, after our field research and survey, combined with interviews with managers and local villagers expressed, found that this phenomenon is caused by the main natural factors such as natural weathering, visitors and local herdsmen in the petroglyphs. It was found that the main causes of this phenomenon are natural factors such as natural weathering, human factors such as tourists and local herdsmen carving on petroglyphs, and interest factors such as mining around the protection of petroglyphs, which is consistent with the factors of the destruction and disappearance of petroglyphs put forward by Hu Xue in the "Investigation on the Protection and Utilisation of Petroglyphs in Heishan of Jiayuguan Pass". He also suggested that individual petroglyphs found in the 1978 census have been hard to find for more than 20 years (Hu, 2012). Through classification research, we have found that the Heishan Petroglyphs contain distinct traces of multicultural exchange. From the perspective of the pattern content, they not only recorded the life scenes of early ancestors, but also presented the living habits and religious rituals of ethnic minorities. For example, in the early petroglyphs created by nomadic peoples who mainly lived by herding and hunting, animal totems and symbols of fertility worship are commonly seen, and spiritual needs were expressed through ritual dances. In contrast, in the later petroglyphs influenced by Tubo culture, elements of Buddhist culture, such as stupa-like structures and Tibetan script, appeared. These different religious rituals and symbols reflect the unique symbolic meanings of various historical periods. Comparative analysis shows that these expressions of belief not only reveal ancient people's understanding of nature and deities but also record historical information on multicultural integration, further enriching the study of ethnic belief systems and closely connecting with the overall cultural connotation of the petroglyphs, thus providing a solid theoretical basis for subsequent in-depth exploration. These findings also reflect the historical changes and human migration activities in the Jiayuguan area, indicating that the Heishan region

was an important cultural intersection on the ancient Silk Road, which is relatively rare among other petroglyph sites in Gansu.

The classification of Heishan Petroglyphs not only deepens the understanding of the content of petroglyphs but also lays the data foundation for the construction of a digital resource library, which facilitates subsequent research and dissemination. At the same time, displaying the content of petroglyphs through classification can further help teaching and artistic and cultural dissemination, making the cultural connotation of petroglyphs more acceptable and understandable to the public.

#### 5.2.2 Contributions and Limitations of Image Capture and Digital Conservation of Heishan Petroglyphs

In the process of collecting images of Heishan Petroglyphs, the inconsistency between the existing actual data and the literature was found, which indicates that the stage-by-stage collection of images of Heishan Petroglyphs is very necessary, and it can provide a research basis and a reference for the subsequent study of Heishan Petroglyphs. At the same time, the study shows that the current protection status of Heishan petroglyphs is worrying, on the one hand, natural erosion, weathering and human damage are the main threats to them, on the other hand, the current protection strategy of Heishan petroglyphs stays in the form of inspection and enclosure, which is constrained by local economic development and financial resources on the one hand, and on the other hand, it also reflects the fact that the authorities have not paid enough attention to Heishan petroglyphs, which indicates that there is an urgent need to formulate a comprehensive protection policy and introduce digital protection. This indicates that there is an urgent need to formulate a comprehensive conservation policy and introduce digital conservation technology, and the establishment of the resource library will make an important contribution to the digital conservation of Heishan Petroglyphs .

The collection of Heishan Petroglyphs is based on the real foundation. On the one hand, we personally entered Heishan, relying on the existing digital recording technology, and carried out systematic data collection and digital processing of Heishan

Petroglyphs. On the other hand, we insisted on the originality of the data and uploaded the unprocessed photos to the website for study and research, which is to ensure the authenticity and objectivity of the image data, which is also in line with the practical guarantee of the accuracy, validity and reasonableness of the information proposed by Wang Shan(Wang, 2015). The establishment of Heishan Petroglyphs Resource Library achieves the goal of digital conservation, which preserves the petroglyphs content in multiple forms such as pictures, videos and documents through classification, organisation and digital display. It solves the problem that petroglyphs information is not recorded due to the gradual loss of content due to natural weathering and man-made damage, and provides an easy-to-access and utilise platform for researchers and the public. However, the study also found that the technical limitations of the existing repository are:

Firstly, it lacks the ability of high-precision 3D restoration of the complex texture of petroglyphs, and can only present the content of petroglyphs in the form of two-dimensional images.

Secondly, the semantic analysis and narrative interpretation of petroglyphs still relies on manual labour and lacks automated analysis and interpretation tools based on artificial intelligence.

From the limitations in the research and analysis of digital conservation of Heishan Petroglyphs, Gao Yuan's proposal of creating a database platform for non-heritage resources, taking full account of all kinds of technological strategies such as two-dimensional and three-dimensional, to achieve the good effect of three-dimensional and full presentation of multimedia graphics, text and audio-visuals(Gao, 2020) is scientific, but at the same time it has a certain degree of practical difficulty, and the realisation will take a certain amount of time, thus that in the future, more advanced 3D scanning and artificial intelligence technologies can be combined to enhance the restoration effect and interactivity of petroglyphs contents in digital space.

### 5.2.3 Construction and Impact of the Heishan Petroglyphs Resource Database

The establishment of Heishan Petroglyphs digital resource library has a positive effect on the protection of Heishan Petroglyphs, the concept of common construction and common use promotes cultural openness and sharing, the integration of petroglyphs resources enhances the dissemination and promotion of petroglyphs art, promotes the integration of the development and utilisation of cultural resources, and forms the research basis for the later research on petroglyphs, which is of practical application value, and at the same time, has a practical guiding significance for the protection of petroglyphs in other regions.

The construction of the Heishan Petroglyphs Resource Library has greatly promoted the application of petroglyphs in teaching practice, providing learners with systematic learning resources and convenient access to creative materials. Through the resource library, not only can we quickly find and screen specific categories of petroglyph images, but also combine them with their cultural background for in-depth understanding, so as to realise the re-creation of cultural elements in creative design. The construction of the Resource Library organically combines the digital conservation of Heishan Petroglyphs with the educational application of , which provides an important support for teaching practice.

Through the practice project, we can see that students acquire animal and human petroglyphs elements with the help of the resource library, reconstruct the pattern, colour matching and layout with modern design concepts, and finally design the cultural and creative products with cultural characteristics and modern aesthetics, so as to let the students deepen their understanding of the petroglyphs art in practice, enhance their cognition of the cultural symbols of the petroglyphs, and explore the application possibilities of the cultural heritage in the field of art. application possibilities, allowing traditional petroglyphs to take on a new vitality through digital craftsmanship. As expressed by Chen Xiaorong, the special characteristics of intangible cultural heritage itself, such as living, highly personalised, inherited, and mutated, the resource

database is both a carrier of knowledge and a medium of communication(Chen et al., 2017).

The construction of the Heishan Petroglyphs resource database not only serves scientific research and education but also demonstrates positive effects in the local cultural and creative market. On one hand, the resource database provides learners with clear and visualized petroglyph materials, making the learning process of petroglyphs more intuitive and vivid, thereby enhancing public interest and awareness of traditional art. On the other hand, the widespread application of petroglyph elements has promoted integration with industries such as cultural and creative design and tourism souvenir development, driving the revitalization and utilization of local cultural and tourism resources. The public can not only gain an in-depth understanding of the historical background and artistic characteristics of the petroglyphs through digital platforms, but also experience petroglyph culture up close through offline channels such as museum exhibitions and study tours, thereby strengthening cultural identity and enhancing the cultural depth of the tourism experience.

The practice of this study shows that the construction of the resource library provides efficient information acquisition and creation support for teaching practice, which greatly enriches the way petroglyphs is applied in the design course. This is consistent with Wang Peng's argument that multimedia teaching resource library is more conducive to the construction and application of multi-level and three-dimensional teaching mode with distinctive features such as systematicity, diversity, practicability, mobility, and synchronicity(Wang, 2017), which further illustrates the role of petroglyphs resource library as a driving force in teaching in Heishan. Through the resource library, learners can learn and apply the petroglyphs elements more intuitively, thus stimulating the diversified development of art and cultural creative design, and the construction of the resource library not only enhances the dissemination and educational value of petroglyphs culture, but also provides a sustainable mode of development for the future application of cultural heritage in teaching and the development of artistic creation and cultural and creative products.

With the widespread promotion of the digital resource database, it is also necessary to note that some users may rely solely on virtual platforms to understand the petroglyphs, while neglecting the importance of field investigation in petroglyph research and cultural experience. This phenomenon may lead to a one-sided understanding of the original ecological environment and historical-cultural context of the petroglyphs, thereby affecting a comprehensive recognition and emotional resonance with their value. The information in digital platforms, which is filtered and reprocessed, may result in fragmented cultural understanding, weakening the public's overall perception and judgment of petroglyph culture, which is not conducive to in-depth research and effective dissemination. The immersive experience brought by field exploration and face-to-face contact with petroglyphs holds an irreplaceable position in cultural inheritance and should serve as a strong supplement to digital resources, forming an integrated mechanism of online and offline development for protection and transmission.

### 5.3 Recommendations for Future Studies

Although the protection and research of the Heishan Petroglyphs have made certain progress, there is still a large gap in meeting actual protection needs. Carrying rich historical, social, and cultural information, the Heishan Petroglyphs, as a valuable natural cultural heritage, require multi-party collaboration to advance their protection. The digital resource database provides a good research platform for researchers and artists, but in future, protection and transmission, it is still necessary to focus on the coordinated application of both online and offline protection methods.

#### 5.3.1 Recommendations

##### 5.3.1.1 Improving the functionality of the resource library

On the existing basis, we will further improve the functions of the resource library, continuously increase the effective resources of the resource library, develop the knowledge map of the resource library, increase the 3D resources and animation resources, incorporate the AI intelligent Xitong, which is convenient for researchers and

learners to for learning, and establish an AI-based petroglyph content interpretation system, to provide users with smarter services.

#### 5.3.1.2 Strengthening the promotion and application of the resource base

It is recommended to promote the content of the Heishan Petroglyphs Resource Library to more schools, museums and cultural institutions, develop supporting digital teaching materials and interactive exhibitions, publicise and promote the Heishan Petroglyphs Resource Library, and establish cooperative links with other cultural preservation, educational and governmental websites, and publicise them through relevant activities, to make the Heishan Petroglyphs Resource Library conveniently accessible to more people, and to make the Resource Library play a greater role in education and cultural dissemination. The resource bank will play a greater role in education and cultural dissemination. At the same time, emphasis should be placed on the combination of offline education, field investigation, and online research.

#### 5.3.1.3 Promoting the Deep Integration of Petroglyphs and Local Cultural and Creative Industries

It is suggested to expand the application scope of the resource database in cultural and creative design courses, encouraging students to develop more market-oriented cultural products based on the database. Meanwhile, by cooperating with local enterprises, outstanding cultural and creative works can be brought to market, enhancing the cultural and economic value of the Heishan Petroglyphs..

In addition to continuing to strengthen academic research on the Heishan Petroglyphs, attention should also be paid to the artistic creation and dissemination in digital form, and the integration of the Heishan Petroglyphs into student education and museum exhibitions, to improve the public's cultural awareness of the petroglyphs. It is recommended to establish long-term cooperative mechanisms with local cultural and tourism creative enterprises to develop petroglyph tourism cultural resources and promote outstanding cultural and creative products to the market. This not only protects and inherits traditional culture but also promotes local tourism development, forming a

dual interaction of online promotion and offline experience, and achieving mutual promotion of culture and economy.

#### 5.3.1.4 Integrating the Resource Database with Teaching Materials

By utilizing teaching materials or textbooks for primary and secondary schools, petroglyph culture can be integrated into offline classroom teaching and extracurricular practices, forming a “combination of online resources and offline in-depth teaching” model.

#### 5.3.1.5 Combining Online and Offline Efforts for Petroglyph Cultural Protection and Dissemination

Because of the possibility that over-reliance on digital platforms due to the widespread promotion of the digital resource database might cause neglect of real-life petroglyph experiences, it is recommended to promote field investigations and on-site explanations while carrying out protection efforts. This will help construct a comprehensive protection and transmission system combining online and offline methods, ensuring the synchronized inheritance of the original petroglyph culture and digital information.

### 5.3.2 Directions for future research

#### 5.3.2.1 Content and scope of the extended repository

In the future, the scope of the resource bank can be further extended to other petroglyph sites. On the one hand, it can suggest and help other petroglyphs reserves to establish their own petroglyphs resource banks, and on the other hand, it can actively join hands with the resource bank construction units to realise nationwide sharing and co-construction, so as to build up a digital resource bank of petroglyphs that covers the whole country, and to facilitate comparative research on the petroglyphs and cultures of different regions.

#### 5.3.2.2 Explore the application of intelligent technologies

Make full use of artificial intelligence and virtual reality technologies, such as virtual reality (VR), augmented reality (AR) and other technologies to carry out multi-faceted and deep digital information collection and protection of rock art resources, and

introduce artificial intelligence technologies for image recognition and semantic analysis on the basis of higher technology collection and recognition technologies to help decipher complex symbols and patterns in petroglyphs and to enhance the efficiency of research.

#### 5.3.2.3 Study the social benefits of rock art repositories

Taking the Heishan Petroglyphs resource base as a basis, further exploring the historical background and social functions of petroglyphs from a multidisciplinary perspective, combining the perspectives of archaeology, anthropology, and art history in multiple fields, increasing public participation, and exploring their roles in promoting the social benefits of cultural identity, education and popularisation can be carried out in the following two aspects:

**Education and Teaching Field.** Study the application models and effects of the Heishan Petroglyphs resource database in education and teaching. Develop special courses and teaching cases based on the Heishan Petroglyphs, and explore the value of their application in the teaching of history, fine arts, culture and other disciplines; study the impact of the resource bank on students' interest in learning, cultural cognition, aesthetic ability, etc., and assess its teaching effect; study the mechanism of the resource bank's role in passing on and carrying forward the excellent traditional Chinese culture and enhancing the nation's cultural self-confidence.

**Field of cultural dissemination.** Explore the application strategies and effects of the Heishan Petroglyphs digital resource database in cultural dissemination. To study the application strategy and effect evaluation of the resource bank of Heishan Petroglyphs in cultural communication. Use the resource bank to develop cultural communication products such as digital exhibitions and virtual reality experiences, so as to enhance the dissemination and influence of Heishan Petroglyphs; study the role of the Heishan Petroglyphs resource bank in promoting the development of cultural industries. Explore the integration mode between the resource bank and cultural and creative industries, and develop cultural and creative products and tourism souvenirs with the theme of Heishan Petroglyphs; study the contribution of the resource bank to promoting

the development of regional cultural industries and boosting economic growth. It is suggested to further develop the educational functions of the Heishan Petroglyphs resource database and integrate petroglyph culture into offline classroom teaching and extracurricular practice activities through teaching materials or primary and secondary school textbooks, thereby enhancing teachers' and students' direct perception and emotional identification with petroglyph culture. On one hand, interdisciplinary teaching modules that combine subjects such as history, art, and geography can be designed, using methods such as image interpretation, handicraft creation, and situational simulation to enhance the cultural experience. On the other hand, by combining offline teaching with digital resources, a fusion path of "online resource support + offline teaching deepening" can be realized, promoting the systematic and normalized development of petroglyph culture education, thus enhancing the understanding and identification of traditional culture by the public, especially young people.

Future research should also be based on multidisciplinary perspectives, using methods from archaeology, anthropology, art history, and others, to systematically explore the social benefits of the petroglyph resource database in enhancing public cultural identity and transmitting fine traditional Chinese culture, and to propose corresponding policy suggestions to provide new momentum for economic and social development.

## REFERENCES

- Africa), M. B. S., & Qinglin, T. b. Y. (2013, 2013-04-15). *Management of rock art and related intangible cultural heritage in Southern Africa*.
- Ban, G. *Book of Han - Biography of the Western Regions*.
- Ban, G. (206). *The Book of Han - Zhang Lebi's Biography*.
- Bureau, Z. F. (2021, 2021). Hexi Corridor Building a Green Barrier. *People's Daily Online* (PRC newspaper).
- C.A.), S. T. T. (1985). *Religions in the history of the peoples of the world*. China Social Science Publishing House.
- Cao, X. J. (2023). Research on the Construction of Digital Resource Library of Non-Heritage under Digital Information Technology. *office automation*, 28(11), 51-53.
- Chen, X. R., Chen, B. H., Deng, H., Yan, Y. C., & He, M. (2017). Creation of a Resource Database of Intangible Cultural Heritage of Sports in China. *Journal of Beijing Sports University*, 40(10), 127-134. <https://doi.org/10.19582/j.cnki.11-3785/g8.2017.10.019>
- Chen, Y. (2016). Statistics and Analysis of Cultural Relics Resources of Petroglyphs in China. *China Cultural Relics Scientific Research*(3), 54-58.
- Chen, Z. F. (2002). *Ancient petroglyphs*. Artifacts Publishing House.
- Chen, Z. F. (2009). *History of rock painting discovery in China*. Shanghai People's Publishing House.
- Chen, Z. F., & Xing, L. (1993). *History of the discovery of foreign petroglyphs*. History of the discovery of foreign petroglyphs.
- Chu, S. B., Han, J. S., & Li, Y. L. (1990). Ancient Petroglyphs in Jiayuguan Heishan, Gansu. *archaeology*(4), 344-359, 389-392.
- Committee, T. C. H. M. (1994). *Preface to the Rock Art of Tibet*. Sichuan People's Publishing House.
- Committee, Y. C. R. C. (1993). *Yongchang County Records*. Gansu People's Publishing House.

- Deng, Q. Y. (2015). Multimedia Spatial and Temporal Presentation and Digital Analysis of Chinese Rock Painting. *folk art*, 6.
- Dr.MajeedKhan. (2014). Protection, preservation and maintenance of rock art sites in Saudi Arabia. In *Proceedings of the Conservation of Chinese and Foreign Petroglyphs*. China Tibetology Press.
- Du, C. f. (2012). Conservation and utilization of rock paintings in the territory of Su'nan Yuguzu Autonomous County. *Journal of Hercynian College*, 28(6), 20-23, 19.  
<https://doi.org/10.13874/j.cnki.62-1171/g4.2012.06.016>
- Feng, G. W. (2020). *Visual Design Research Based on Jiayuguan Heishan Rock Art* [master's thesis (MSc), Lanzhou University]. CNKI.
- Fu, C. W. (2014). Research on the Construction of Regional Cultural Tourism Theme under the Perspective of Cultural Identity Experience--Taking the Hexi Corridor as an Example. *Journal of Wuhan University (Philosophy and Social Science Edition)*, 67, 101-106.
- Gai, S. L. (1986). *Yinshan petroglyphs* (first edition ed.). Artifacts Publishing House.
- Gai, S. L. (1993). *Chinese petrography*. Bibliographic Literature Publishing House.
- Gai, S. L. (2001). *Cultural Interpretation of the World's Petroglyphs*. Beijing Library Press.
- Gao, Y. (2016). Protecting and Heishan Petroglyph, Boosting Jiayuguan City's Cultural Industry Development. *Culture Monthly*(23), 25-26.
- Gao, Y. (2020). Reflections on the Construction of Intangible Cultural Heritage Resource Database in the Era of Big Data. *Art Appraisal*(12), 208-209.
- Gong, T. F., & Zhang, Y. S. (2006). Cultural coordinates of Chinese rock paintings. *Heilongjiang Ethnic Series*(1), 96-99.
- Gong, X. Q. (1990). *Jiayuguan prefecture level journal in Gansu*. Gansu People's Publishing House.
- Guan, R. T., & Du, C. F. (2015). Analyzing the Meaning of Symbolism in Su'nan Petroglyphs. *Journal of Changchun College of Education*, 31(4), 65-66.
- Guan, R. T., & Du, C. F. (2015). Exploring the Forms of Petroglyph Creation in Yumu Mountain. *the Silk Road*(8), 61-62.

- Han, J. G. (2015). *Su Bei petroglyphs*. Gansu People's Fine Arts Publishing House.
- Hegel, G. W. F. (1997). *esthetics*. The Commercial Press, Shanghai (from 1897).
- House, A. P. (1993). *Chinese rock painting*.
- Hu, X. (2012). Investigation on the Conservation and Heishan Petroglyphs in Jiayuguan. *the Silk Road*(22), 71-74.
- Huang, D. Y. (2023). The Historical Continuity of Chinese Civilization from the Hexi Corridor. *Journal of Northwest University for Nationalities (Philosophy and Social Science Edition)*(4), 9-10. <https://doi.org/10.14084/j.cnki.cn62-1185/c.2023.04.001>
- Huang, Y. Q. (2016). Methods and Reflections on Conservation of Petroglyphs Abroad. *Ethnic Forum*(9), 43-46. <https://doi.org/10.19683/j.cnki.mzlt.2016.09.009>
- Huang, Y. Q. (2019). Exploring the Current Situation and Path of Rock Painting Heritage Protection at Home and Abroad. *Journal of Baise College*, 32(6), 62-67. <https://doi.org/10.16726/j.cnki.bsxb.2019.06.013>
- Jin, X. J. (2017). Research on the Construction of the Resource Library of Yongfeng Peasant Paintings. *Agricultural network information*(8), 80-82.
- Kang, A. (2015, 2015-05-15). Heishan Petroglyphs: Images of Nomads. May 2015 Folklore and Nondescript Workshop,
- Lan, X. (2017). An Analysis of Primitive Religious Emotions in Jiayuguan Heishan Petroglyphs. *farmer's counselor*(24), 323.
- Li, D. K. (2023). Sustainable development in the conservation and utilization of rock paintings. *cultural industry*(30), 40-42.
- Li, G., & Li, Z. N. (2011). *Historical Origin and Ethnic Culture: Proceedings of the Symposium on Archaeology and Ethnic Relations in the Sanjiang Parallel Stream Region*. Yunnan University Press.
- Li, H. (2023). *Research on rock painting art in Subei* [master's thesis (MSc), Northwest Normal University]. CNKI.
- Li, J. F. (2018). Research on the Integrated Development of Tourism Industry in Hexi Corridor. *Journal of Huaihai Institute of Technology (Humanities and Social Sciences Edition)*, 16(2), 96-98.

- Li, X. S. (2012). *Interpreting Petroglyphs*. Ningxia People's Publishing House.
- Li, Y. N., Liang, Y., Wang, J. X., Xi, L., Chen, X. R., Guo, M., & Ren, M. (2006). Briefing on the Archaeological Investigations in the Mawei Mountains of Gansu. *Briefing on the Archaeological Investigations in the Mawei Mountains of Gansu*(5), 27-36, 22.
- Long, Z. (2017). A Study of Pagoda Figures in Jiayuguan Heishan Petroglyphs. *Journal of Yunnan Academy of Arts*(3), 81-84.  
<https://doi.org/10.16230/j.cnki.yyxb.2017.03.014>
- Luo, J. J. (2015). An Introduction to the Reproductive Worship in the Petroglyphs of the Black Mountains of Jiayuguan Pass. *the Silk Road*(24), 15-16.
- Luo, Y. Q. (2017). *Conservation and Public Awareness of Petroglyphs--The Case of General Cliff Petroglyphs* [master's thesis (MSc), Central University for Nationalities]. CNKI.
- Ma, J. X., & Zhang, Y. (2018). Exploration of Art Teaching Based on Jiayuguan Heishan Rock Carvings and Petroglyphs Art. *Western Quality Education*, 4(21), 253.  
<https://doi.org/10.16681/j.cnki.wcqe.201821155>
- MatthiasStrecker. (2014). Conservation of rock art in Bolivia. In *Proceedings of the Conservation of Chinese and Foreign Petroglyphs*. China Tibetology Press.
- MavisGreer, & Sha, T. Z. Y. (2014). Preservation of petroglyphs through recording and archiving. In *Proceedings of the Conservation of Chinese and Foreign Petroglyphs*. China Tibetology Press.
- Nie, H. (2023). Application of Virtual Reality Technology in Digital Protection and Dissemination of Cultural Heritage--The Case of Huashan Rock Painting in Guangxi. *China Nationalities Expo*(5), 100-103.
- Qian, W. (2006). *Prehistoric Copper Artifacts from the Hami Region of Xinjiang and Their Relationship to Neighboring Cultures*. Intellectual Property Publishing House.
- Qin, S. M., & Qin, C. L. (1987). *Examination and Research on Cliff Paintings in Zuojiang Basin, Guangxi, China*.
- Shao, X. H. (2010). *History of Pre-Qin Art*. Shandong Pictorial Publishing House.
- Shu, X. H., & Li, X. S. (2007). *Petroglyphs and Nomadic Culture*. Shanghai Ancient Books

Publishing House.

- Su, B. H. (1994). *Xinjiang petroglyphs*. Xinjiang Fine Arts Photography Publishing House.
- Sun, N., Lu, C. Y., & Sun, C. (2013). Reflections on the construction of quality teaching resources. *China Electronic Education (CEE)*(11), 91-94.
- Tan, W. X., & Tan, S. G. (2021). Heritage, Protection and Inheritance of Huashan Rock Painting Culture in Jiangzhou District. *lit. literature, history and spring autumn (idiom); fig. a long and complicated story*(8), 54-56.
- Team, J. C. H. C. (1972). Petroglyphs of Ancient Nomads in Gansu Region--Preliminary Survey of Heishan Petroglyphs. *heritage conservation*(12), 42-46+84.
- Wang, P. (2017). Exploring the construction of multimedia teaching resource library of neurobiology in medical school. *Journal of Jinzhou Medical University (Social Science Edition)*, 15(2), 35-37.  
[https://doi.org/10.13847/j.cnki.lnmu\(sse\).2017.02.010](https://doi.org/10.13847/j.cnki.lnmu(sse).2017.02.010)
- Wang, S. (2015). Technical realization of the construction of "Heilongjiang Province Intangible Cultural Heritage Resource Database". *Henan Library Journal*, 35(12), 123-126.
- Wang, S., & Pang, Y. (2019). Animal Distribution in Gansu during the Ancient Period from Gansu Petroglyphs. *the Silk Road*(4), 31-34.
- Wang, Y. (2020). Jiayuguan Heishan Petroglyphs Silk Scarf Design. *Gansu Social Sciences*(6), 244. <https://doi.org/10.15891/j.cnki.cn62-1093/c.2020.06.040>
- Wang, Y. F., & Li, H. (2021). An overview of the current status of petroglyph research in the Qilian Mountains. *the Silk Road*(4), 101-106.
- Wei, L. (1988). *sex cult*. China Literature Union Publishing House, Inc.
- Wu, R. H. (2012, 2012-08-10). Inner Mongolia adopts high technology to protect Yinshan rock paintings. *Xinhua news network*.
- Xi, L. (2010). A Preliminary Study of Slate Tombs in the Mawei Mountains of Gansu Province. *Archaeology and Antiquities*(2), 80-85.
- Xi, L. F. (2021). Gansu Yongchang 15 Mile Gully Petroglyphs Survey and Research. *Journal of Hercynian College*, 37(6), 25-29. <https://doi.org/10.13874/j.cnki.62->

[1171/g4.2021.06.005](#)

- Xiao, Y. P., & Wang, W. J. (2016). Research on the Construction Path of China's Cultural Heritage Digitization Public Service Platform--Taking the Development and Construction of Jingchu Cultural Heritage as an Example. *Journal of Shenzhen University (Humanities and Social Sciences Edition)*, 33(2), 43-49.
- Xu, F. C., & Zhang, R. (2016). Tapping the Connotation of Stone Painting Resources Experiencing the Charm of Culture and Art--Speaking of Jiayuguan Heishan Petroglyphs. *Curriculum Education Research*(32), 196-197.
- Xu, H. J. (2016). Interpretation of Animal and Totem Worship in Jiayuguan Montenegro Petroglyphs. *the Silk Road*(10), 34-35.
- Yang, D. L. (2023). Agro-pastoral evolution, economic symbiosis and ethnic intermingling in the Qinghai Lake region. *Northwest Ethnic Studies*(5), 135-143.  
<https://doi.org/10.16486/j.cnki.62-1035/d.20231018.008>
- Yang, H. F., & Xu, D. (2009). Pagodas in the petroglyphs of Jiayuguan Heishan and their associated problems. *Archaeology and Antiquities*, 2009(4), 91-95.
- Yang, H. F., & Zhang, J. W. (2001). *Jiayuguan Heishan Petroglyphs in the Gansu corridor*. Gansu People's Publishing House.
- Yang, H. L. (2012). A Comparative Study on the Protection of Cultural Heritage in China and Italy--Taking Rock Paintings in Both Countries as an Example. *Three Gorges Forum (Three Gorges Literature. Theory)*(3), 69-72, 148.
- Yang, M. (2023). Exploration on the Disease Types and Protection Strategies of Northern Rock Painting Heritage--Taking Jiayuguan Heishan Rock Painting as an Example. *the Silk Road*(3), 166-175.
- Yin, H. (1987). A Test of Heishan Petroglyphs. *Northwest Fine Arts*(Z1), 36-39.  
<https://doi.org/10.13772/j.cnki.61-1042/j.1987.z1.015>
- Yue, B. H., Tian, X., Du, S. P., & Zhang, J. W. (2004). *Petroglyphs and burial murals*. Published by Dunhuang Literary Publishing House.
- Yue, B. H., Wang, Y. L., Zhang, D. Z., & Yue, X. D. (2007). Survey and Research on Petroglyphs in Niuwa Mountain, Yongchang, Gansu, China. *Archaeology and*

- Antiquities*(3), 91-97.
- Zhang, J. W. (1994). Heishan Petroglyphs symbolize ancient civilization. *the Silk Road*(2), 13.
- Zhang, Y. (2018). *Research on Ecological Governance of Hexi Corridor under the Perspective of Ecological Community* [PhD thesis, Shaanxi Normal University]. CNKI.
- Zhang, Y. S. (2014). *Proceedings of the Conservation of Chinese and Foreign Petroglyphs*. Proceedings of the Conservation of Chinese and Foreign Petroglyphs.
- Zhang, Y. S., Willis, & Zhang, X. X. (2022). Opportunities and Challenges: Chinese Rock Paintings in the Threshold of Digital Humanities. *Guizhou Ethnic Studies*, 43(1), 149-153. <https://doi.org/10.13965/j.cnki.gzmzyj10026959.2022.01.022>
- Zhao, Y. (2016). Design and Conceptualization of Dance Intangible Cultural Heritage Resource Database Construction in Guangdong Province. *Journal of Beijing Dance Academy*(6), 103-107.
- Zhu, L. F. (2019). Construction of a database system for petroglyph heritage archives. *Library Theory and Practice*(9), 101-105, 112.
- Zhuang, D. Y. (2003). The first regulation on the protection of petroglyphs was promulgated and implemented. *Guangming Daily, a Beijing newspaper*. <https://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CCND&dbname=CCND0005&filename=GMRB20030724ZZZ5>
- Zou, T. Z. (2022). Current Situation, Problems and Countermeasures of Cultural Digitization Development in China. *People's Forum-Academic Frontier*, 23.

APPENDIX



## Appendix details

<a href="#">Interview questions and interviewee information</a> .....	252
<a href="#">Field photos of the Heishan petroglyphs</a> .....	266
<a href="#">Heishan petroglyphs resource library</a> .....	293



## INTERVIEW QUESTIONS AND INTERVIEWEE INFORMATION



### Interview questions for the Petroglyph staff

1. How long have you worked here? Tell us your views on petroglyphs.
2. What is the current scale of Heishan Petroglyphs? What are the types and patterns? What are their main features?
3. What measures or systems have the state and government put in place to protect the Heishan Petroglyphs? What specific measures and systems have the competent authorities put in place? Is sufficient attention paid to the protection of the petroglyphs?
4. What organisations or individuals are currently researching the Heishan Petroglyphs? What are the main areas of application for their research?
5. From your perspective, what techniques or methods do you think would be effective in protecting the Petroglyphs?
6. What are the main aspects of the digitisation of the Heishan Petroglyphs? What do you think the future direction of development will be?
8. What do you think are the main challenges facing petroglyph conservation? What experiences and lessons can be shared in petroglyph conservation work?
9. What is your outlook on the future development of petroglyph conservation work?
10. What role do you think the public can play in petroglyph conservation?

### Interview questions for experts, scholars and researchers

1. As an important historical and cultural heritage, in your opinion, what are the unique values of petroglyphs?
2. What aspect of the Heishan Petroglyphs do you mainly focus on in your research? Why do you value this aspect? What are the different types of rock art?
3. What technical bottlenecks are there in the protection of rock art? What do you think is the future direction of development for protection technology in terms of the Heishan Petroglyphs?
4. What important role do you think digital technology plays in the protection and research of rock art?
5. Artificial intelligence is developing rapidly at the moment, and chatgpt is already very popular. How do you think our Petroglyphs conservation work should respond to rapid technological development?
6. What is the significance of research on the Heishan Petroglyphs for the local area or the country?
7. How can international exchanges and cooperation on Petroglyphs be strengthened to promote the international development of Petroglyphs research?
8. How do you see the relationship between the Heishan Petroglyphs and local cultural tourism?
9. What do you think will be the key focus of Petroglyphs research in the future?
10. Do you have any suggestions or expectations for Petroglyphs protection and research?

**Interview questions for ordinary people living locally (optional):**

1. Do you know what Petroglyphs there are in your hometown? Where are they?
2. What do you know about Petroglyphs? Are you interested in their content?
3. Do you think Petroglyphs can help promote your hometown? If so, what methods would you prefer?
4. How do you think petroglyphs should be protected?
5. How do you think petroglyphs are related to local culture?
6. What development opportunities do you think petroglyphs can bring to local tourism?
7. If products related to the Petroglyphs are developed, such as movies, animations, and cultural and creative products, would you be willing to buy them or help promote them?
8. What kind of protection and inheritance do you hope to see for petroglyphs in the future?



#### Basic information

Name: Wang Quanchao

Gender: Male

#### Occupation and background

Occupation or position: Professor, visiting scholar at the China Academy of Art

Employer: Jiuquan Vocational and Technical College

Years of experience in a related field: more than 10 years

#### Relevance to the research topic.

Reason for interview: Dedicated to the research of Hexi rock paintings and engaged in related research projects, responsible for national-level rock painting projects, developing a number of rock painting cultural and creative products, integrating rock paintings into teaching courses and research, and developing related courses for application in teaching and practice..

Role in research topic: Project leader, course developer

#### Interview method

Interview date: October 2024

Interview location: Professor Wang Quanchao's studio

Interview format: Face-to-face interview



#### Basic information

Name: Pang Ying

Gender: Female

#### Occupation and background

Occupation or position: Professor, master's supervisor, member of the Chinese Petroglyph Society

Employer: Lanzhou University of Finance and Economics

Years of experience in related fields: more than 10 years

#### Relevance to the research topic

Reason for interview: Long-term research project on petroglyphs, 2014 National Social Science and Art Foundation funded project—collation and research on Gansu petroglyphs, published monograph 'Research on Gansu Petroglyphs,' published several petroglyph papers,

role in research topic: petroglyph researcher, project leader

#### Interview method

Interview date: October 2024

Interview location: author's place of work

Interview format: online interview



#### Basic information

Name: Wang Pu

Gender: Male

#### Occupation and background

Occupation or position: Curator, Associate Research Librarian

Employer: Yumen Museum

Years of experience in a related field: More than 10 years

#### Relevance to the research topic.

Reason for interview: Long-term work in cultural relics protection, rock painting research, participation in major projects of the National Social Science Fund

Role in research topic: Rock painting researcher

#### Interview method

Interview date: October 2024

Interview location: Author's home

Interview format: Online interview



#### Basic information

Name: Fu Qiang

Gender: Male

#### Occupation and background

Occupation or position: Director

Employer: Institute for the Protection of Heishan Petroglyphs

Years of experience in the relevant field: More than 10 years

#### Relevance to the research topic

Reason for interview: Having been engaged in the protection and promotion of cultural relics for a long time, I am now the manager of the Institute for the Protection of Heishan Petroglyphs and am fully responsible for the work of the Institute.

Role in research topic: Manager of the Heishan petroglyph protection department, engaged in petroglyph research and protection

#### Interview method

Interview date: October 2024

Interview location: Office of the Heishan Petroglyph Protection Institute

Interview format: face-to-face interview



#### Basic information

Name: Li Jianrong

Gender: Male

#### Occupation and background

Occupation or position: Deputy Director

Employer: Institute of Rock Art Conservation in Heishan

Years of experience in the relevant field: more than 10 years

#### Relevance to the research topic

Reason for interview: Having worked for a long time on the protection of the Heishan Petroglyphs, he is very familiar with the topography of the Heishan area and the content of the rock paintings. He has long been guiding scholars and researchers at the research institute in investigating the Heishan Petroglyphs and has a wealth of knowledge about the Heishan Petroglyphs.

Role in research topic: Manager of the department responsible for the protection of the Heishan Petroglyphs.

#### Interview method

Interview date: April and October 2024

Interview location: Sidaogou Valley, Heishan Petroglyphs Protection Research  
Institute

Interview format: face-to-face interview





#### Basic information

Name: Du Yongdong

Gender: Male

#### Occupation and background

Occupation or position: Director, Academician of Jiuquan Painting Academy

Employer: Jiuquan Art Museum

Years of experience in the relevant field: more than 10 years

#### Relevance to the research topic

Reason for interview: As an art worker, he has always been engaged in art creation, incorporating local culture into his work. He has always studied the Heishan Petroglyphs and has been artistic with the rock paintings, creating them into his work.

Role in research topic: creator of the art of the Heishan Petroglyphs

#### Interview method

Interview date: November 2024

Interview location: Jiuquan Park

Interview format: face-to-face interview



#### Basic information

Name: Chang Shiya

Gender: Female

#### Occupation and background

Occupation or position: teacher

Work unit: Jiuquan Vocational and Technical College

Years of experience in related fields: more than 5 years

#### Relevance to the research topic

Reason for interview: Member of the research group on petroglyphs in the Hexi region, engaged in the integrated development of petroglyphs and courses in recent years, and the main research direction during the master's degree was petroglyph jewelry.

Role in the research topic: creator of the research on the Heishan Petroglyphs

#### Interview method

Interview date: November 2024

Interview location: Bangkok

Interview format: online interview



#### Basic information

Name: Guan Hong

Gender: Male

#### Occupation and background

Occupation or position: Secretary-General, painter

Employer: Jiuquan Painting Institute

Years of experience in related field: more than 10 years

#### Relevance to the research topic

Reason for interview: I worked in the Black Mountain area in the 1990s and am familiar with the terrain and rock paintings there. In the early days, I accompanied researchers, scholars and painters investigating rock paintings in the Black Mountain area and conducted in-depth interviews

Role in research topic: a lover of Heishan Petroglyphs who knows Heishan and its petroglyphs

#### Interview method

Interview date: November 2024

Interview location: Professor Guan Hong's home

Interview format: face-to-face interview



#### Basic information

Name: Interviewee

Gender: Male

#### Occupation and background

Occupation or position: Local villager

Work unit: Resident

Years of experience in related fields: More than 10 years

#### Relevance to the research topic

Reason for interview: I have always lived in the Heishan area; I am familiar with the Heishan area; I used to graze sheep in the Heishan area for a long time; and I am familiar with the local situation.

Role in research topic: Resident of the Heishan area

#### Interview method

Date of interview: October 2024

Location of interview: The small shop outside Shiguan Xia

Type of interview: Face-to-face interview

## FIELD PHOTOS OF THE HEISHAN PETROGLYPHS



## JIAYUGUAN HEISHAN PETROGLYPHS – ANIMAL



Sika deer, engraved, Shiguanxia



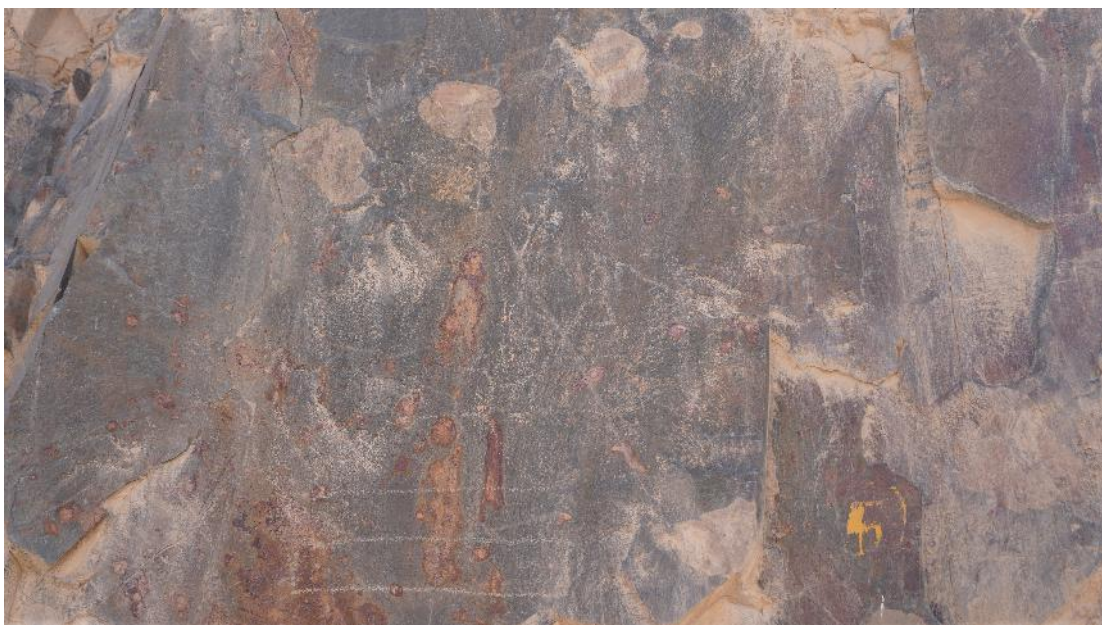
Yebu 1, Mohe, Shiguanxia



Seven Goats Mill Engraving Shiguanxia



Camel, chisel, Shiguanxia



Ma Mo Ke Hongliugou



Bison, carved, Sidaoguxinggou



Donkey mill, Sidaoguxinggou



snake, carved, Sidaoguxinggou



Eagle, grinded, Sidaoguxinggou



Sand grouse, engraved, Sidaoguxinggou



Tapir, carved, Sidaoguxinggou



Three wild oxen, incised, with Sidaoguxinggou



Camel, chisel, Jiaohaogou



Camel, chisel, Jiaohaogou

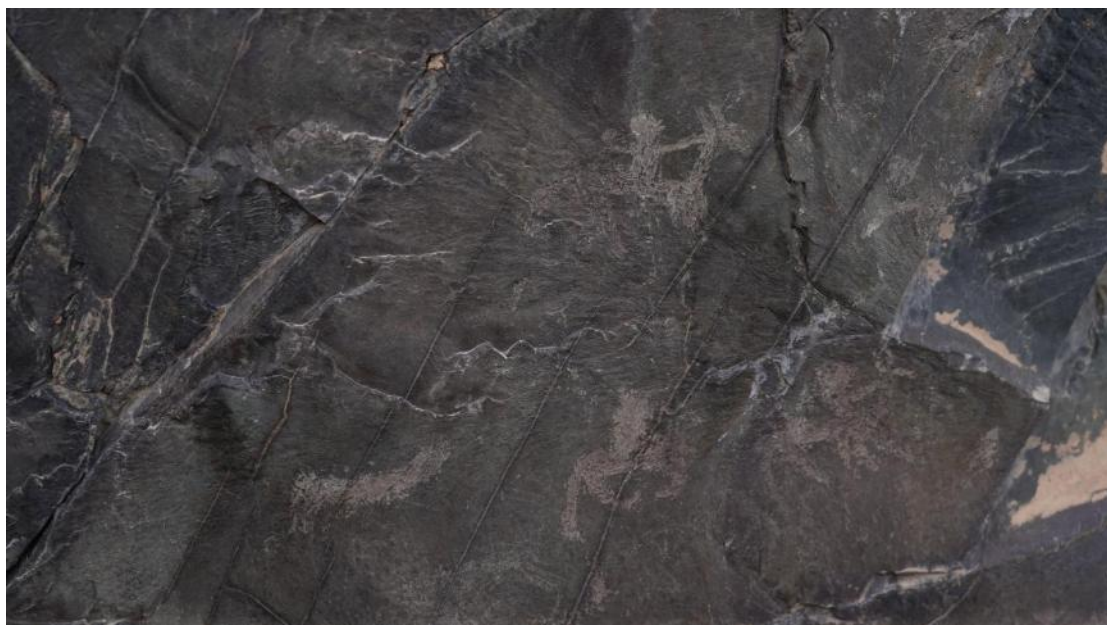
## JIAYUGUAN HEISHAN PETROGLYPHS – HUNTING



Enclosure, chiselling, Sidaoguxinggou



Enclosure, chiselling, Sidaoguxinggou



Hunting, grinding, Sidaoguxinggou



Hunting, carving, Sidaoguxinggou



Hunting enclosure, Sidaoguxinggou



Shotgun hunting, engraving, Sidaoguxinggou



Eagle hunting, carving, Sidaoguxinggou



Hunting diagram, mill engraving, Sidaoguxinggou



Knight, carved and engraved, Mozigou



Knight, Millstone, Shiguanxia



Hunting, chiselling, Sidaoguxinggou



## JIAYUGUAN HEISHAN PETROGLYPHS – DANCE (RITUAL)



Dancing horse, engraved, Sidaoguxinggou



dancer, chisel, Sidaoguxinggou



Eleven-person dance, grinding and carving, Sidaoguxinggou



Four-person dance, chisel, Mozigou



Large dance floor, 3.5(m) above floor, Sidaoguxinggou



## JIAYUGUAN HEISHAN PETROGLYPHS – RELIGION



Pagoda 2, carved, Shiguanxia



Pagoda, carved, Shiguanxia



Buddha Hall, carved, Hongliugou



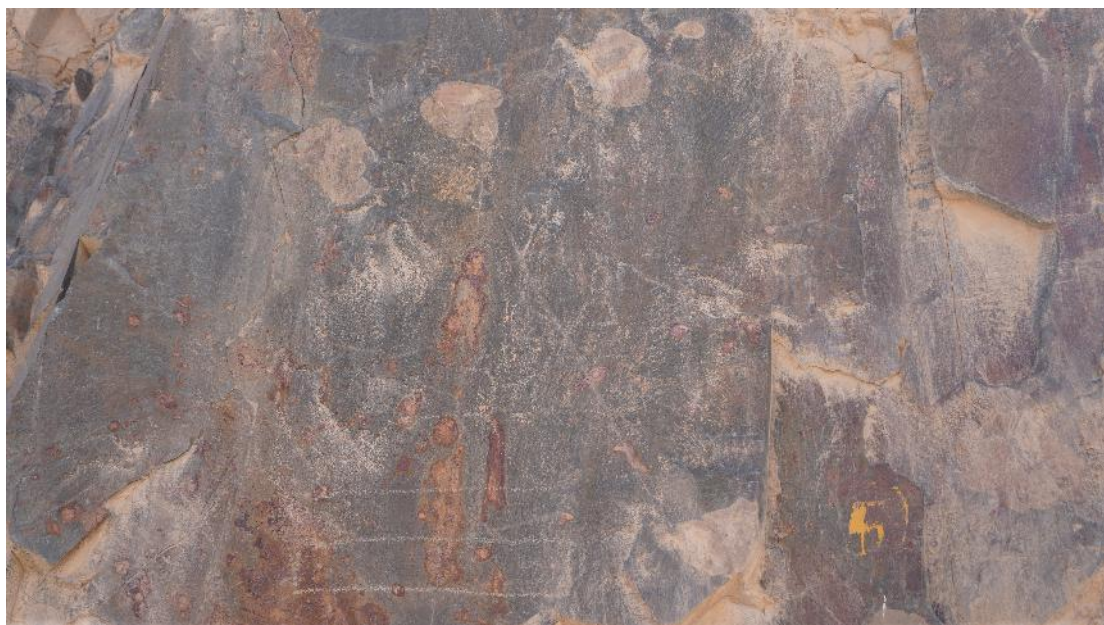
Pagoda, carved, Hongliugou



Pagoda, carved, Hongliugou



Pagoda, carved, 1 (m) from the bottom of the ditch, Hongliugou



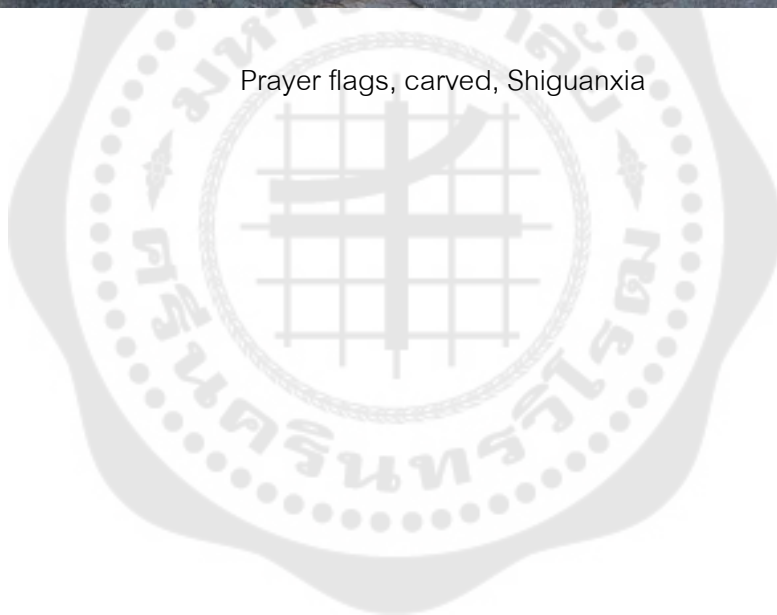
Buddhist temple, pagoda, horse-drawn mill, 4 (m) from bottom of ditch, Hongliugou



Pagoda, line engraving, Jiaohaogou



Prayer flags, carved, Shiguanxia



## JIAYUGUAN HEISHAN PETROGLYPHS – WRITING



Pagoda, Tibetan inscription, carved, Shiguanxia



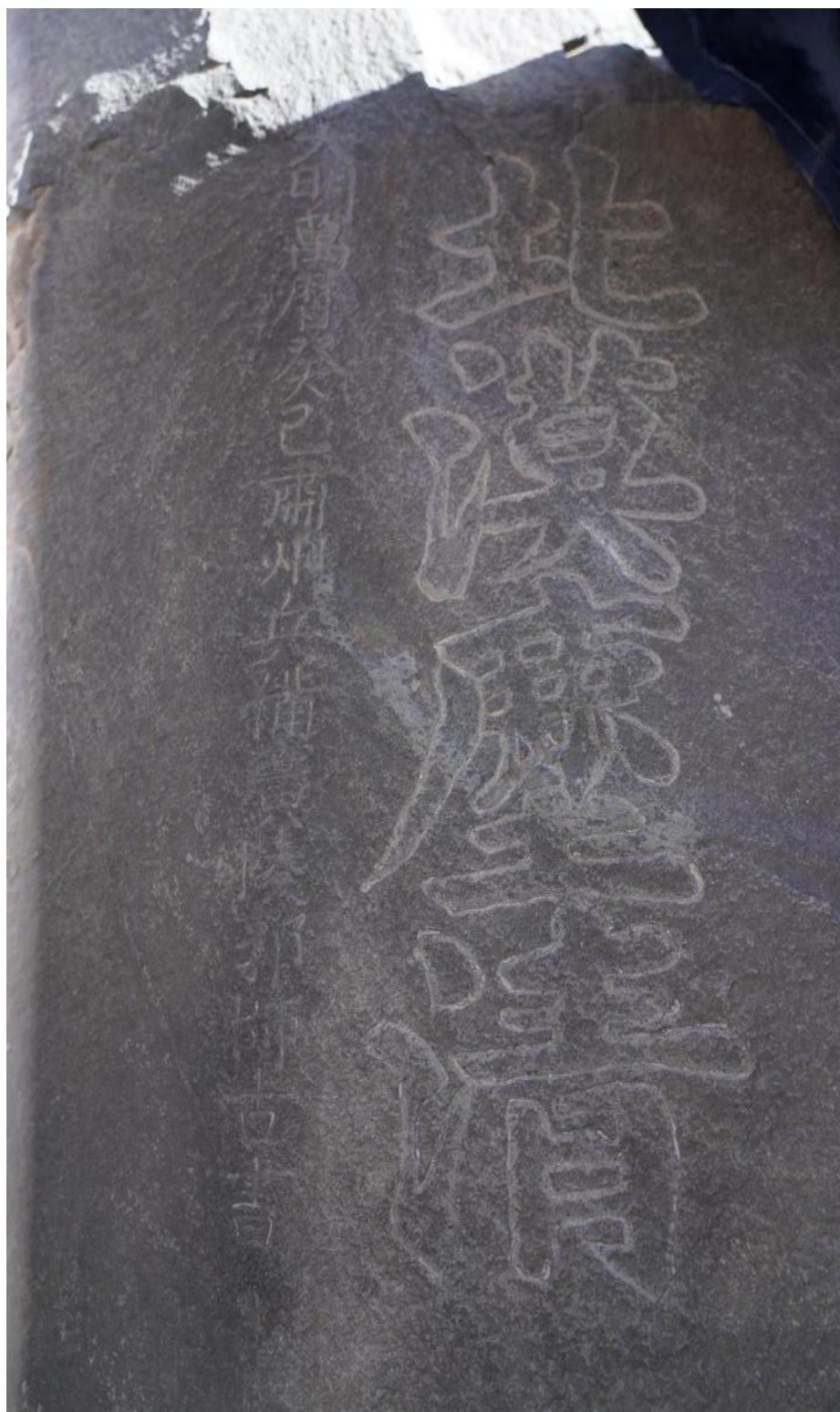
Swastika character, carved, south wall of Hongliugou



Tibetan inscription, engraved, Hongliugou



Tibetan inscription, chisel engraving, Mozigou

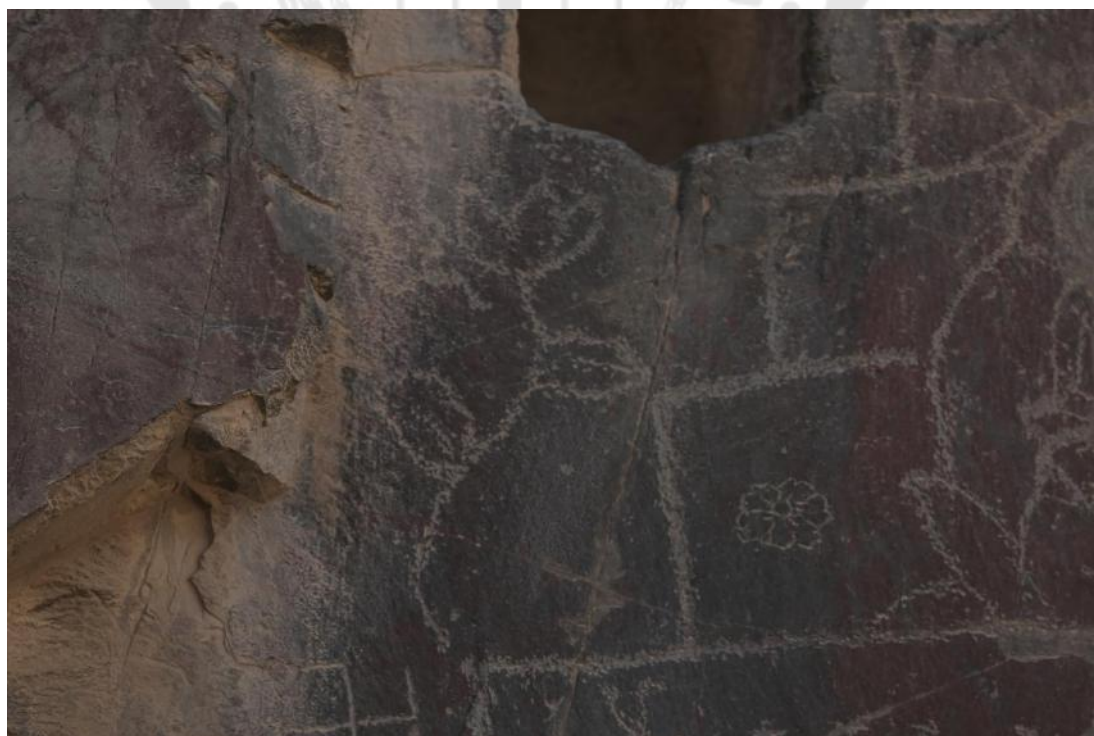


‘The dust of the northern desert is clear’ inscription, chiselled, Shiguanxia

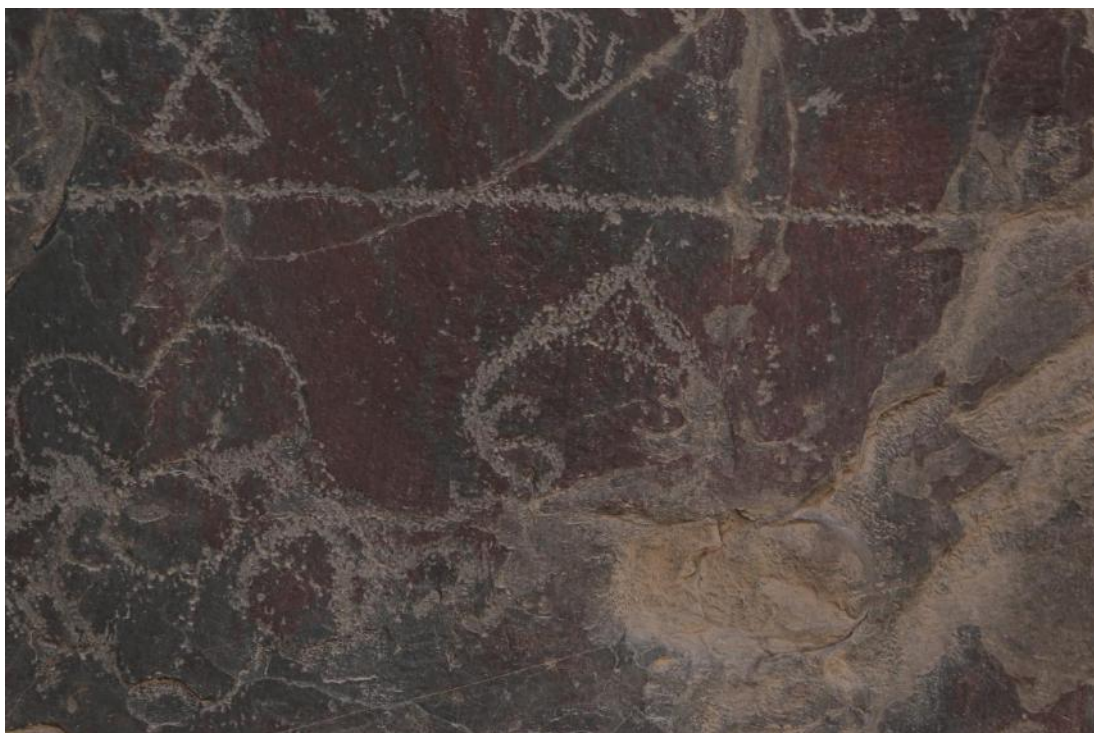
## JIAYUGUAN HEISHAN PETROGLYPHS – PLANT



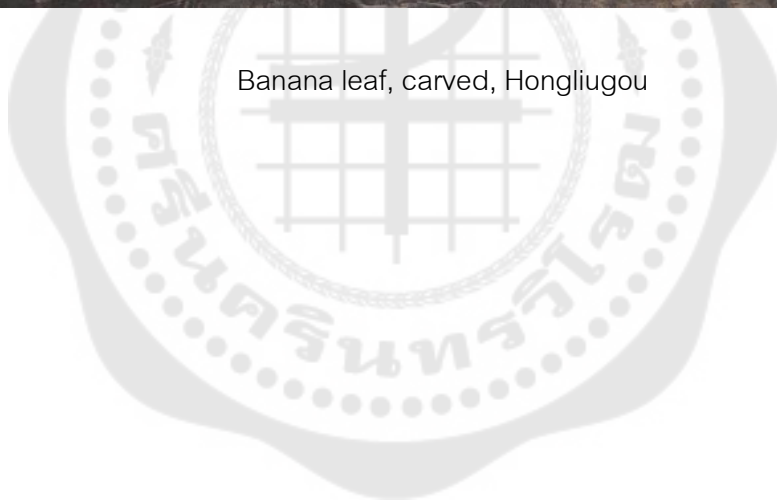
Shelter plants, carving, Shiguanxia



Honeysuckle flowers, chiselled, Hongliugou



Banana leaf, carved, Hongliugou



HEISHAN PETROGLYPHS RESOURCE LIBRARY





Heishan Petroglyphs resource library Home page banner

0学期

上线时长

450

总访问量

260

素材总数

1

课程总数

1

用户总数

904.87MB

资源存储量

教师用户

学生用户

社会用户

企业用户

资源库介绍

Introduction to the Resource Library



黑山岩画，全称为“黑山摩崖浅石刻岩画”，位于甘肃省嘉峪关市西北约20千米的黑山峡谷的峭壁陡崖上。

黑山岩画全为远古时期黑山地区游牧民族生产、生活的真实记录。已发现分布在黑山石关峡口、磨子沟、焦高沟、四道股形沟、红柳沟、交河沟六处战国至明代时期的岩画，共157幅。黑山岩画属摩崖浅石刻岩画，凿刻方法主要有磨刻法、敲凿法、线刻法，内容以舞蹈、狩猎、人物、动物、佛塔等为主，尤以反映野生动物的篇幅居多，总计达二十余种。岩画距沟底最低者0.5米，最高者在5米以上，画面大小不一，高0.2~2.4米，宽0.3~3米。

Introduction to the Resource Library display



Resource library material statistics display section

专业站点: [黑山岩画资源库](#)

分类: [全部](#) [课程资源素材库](#) [微课库](#)

类型: [全部](#)

媒体类型: [全部](#) [文本类](#) [视频类](#) [PPT类](#) [图片类](#) [动画类](#) [音频类](#) [压缩包](#) [链接](#) [其他](#)

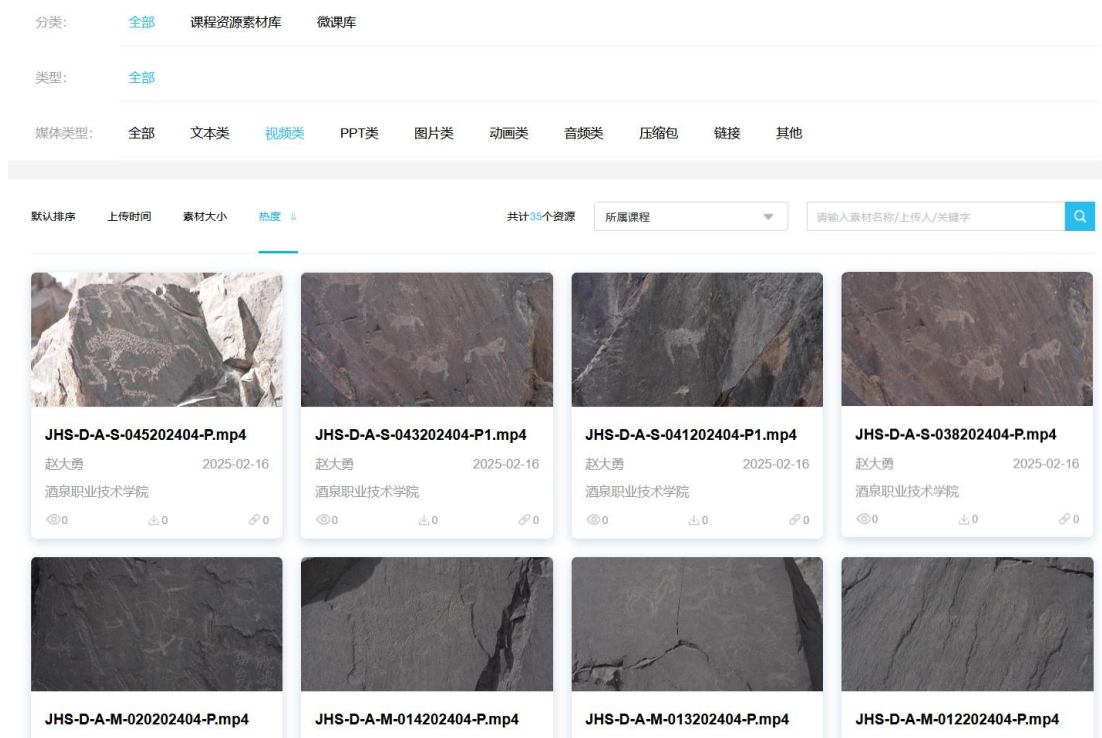
默认排序 上传时间 素材大小 热度

共计11个资源 所属课程

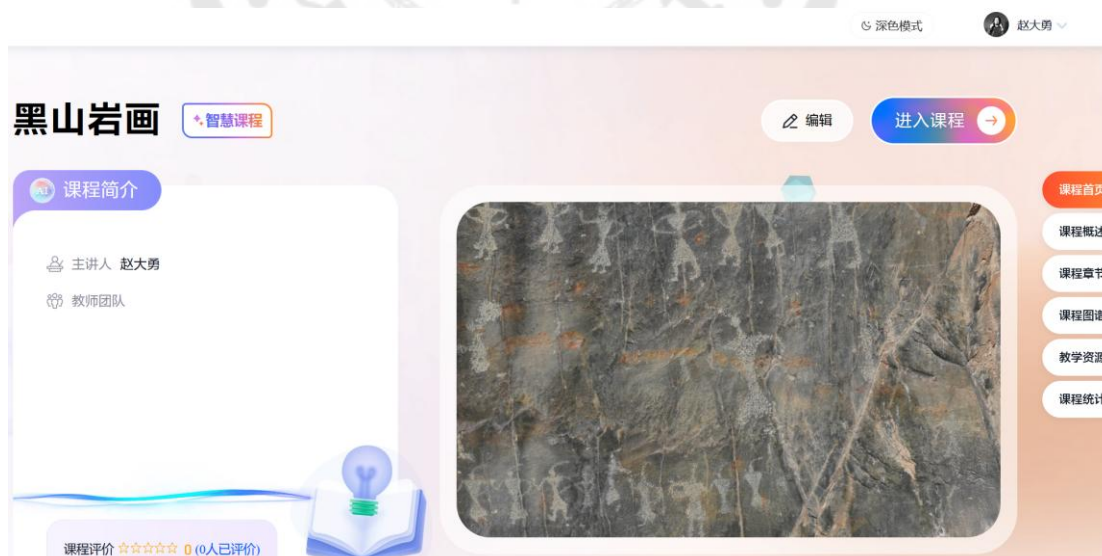
请输入素材名称/上传者/关键字

<b>JHS-PSW001202404P</b>	<b>JHS-P-A-M-135202404-P.jpg</b>	<b>JHS-P-A-M-134202404-P.jpg</b>	<b>JHS-P-A-M-133202404-P.jpg</b>
赵大勇	赵大勇	赵大勇	赵大勇
2024-12-03	2025-02-16	2025-02-16	2025-02-16
酒泉职业技术学院	酒泉职业技术学院	酒泉职业技术学院	酒泉职业技术学院
3 0 0	0 0 0	0 0 0	0 0 0

Resource Library Category Information – Image Information Display Page



Resource library category information – Video information display page



Resource Library Courses – Heishan Petroglyphs Course Home Display



# Heishan Petroglyphs Resource Center

[首页](#)
[课程中心](#)
[素材中心](#)
[文献资料](#)
[网络资源](#)
[政策法规](#)
[文创](#)

文献资料

[首页](#) > [文献资料](#)

• 浅析嘉峪关黑山岩画中原始宗教情感	2025-02-16 12:55
• 保护利用黑山岩画,助推嘉峪关市文化产业发展	2025-02-16 12:54
• 挖掘石画资源内涵 体验文化艺术魅力——浅说嘉峪关黑山岩画	2025-02-16 12:49
• 嘉峪关黑山岩画图录	2025-02-16 12:47
• 嘉峪关黑山岩画中的动物与图腾崇拜解读	2025-02-16 12:47
• 浅述嘉峪关黑山岩画中的生殖崇拜	2025-02-16 12:45
• 黑山石刻岩画:游牧民族的影像	2025-02-16 12:44

## Resource Library – Literature Display Page



# Heishan Petroglyphs Resource Center

[首页](#)
[课程中心](#)
[素材中心](#)
[文献资料](#)
[网络资源](#)
[政策法规](#)
[文创](#)
[网络资料](#)

网络资料

[首页](#) > [网络资料](#)

• 在丝路古道上 有这样一幅幅刻在石头上的历史画卷	2025-02-16 13:24
• 黑山岩画：刻在石头上的历史之谜	2025-02-16 13:23
• 嘉峪关黑山岩画美术作品展	2025-02-16 13:21
• [甘肃新闻]探秘黑山岩画 对话人类童年	2025-02-16 13:20
• 黑山岩画，铭刻嘉峪关文化的“活态遗产”	2025-02-16 13:17
• 【档案史话】岩画：远古先民的生活记录	2025-02-16 13:14

## Resource Library – Web page for displaying materials



Heishan Petroglyphs Resource Center

首页

课程中心

素材中心

文献资料

网络资源

政策法规

文创

网络资料



赵大勇

政策法规

首页 > 政策法规

• 《中华人民共和国文物保护法》（2024修订）逐条新旧对比

2025-02-16 13:51

• 甘肃省文物保护条例

2025-02-16 13:49

• 《嘉峪关市促进文化旅游产业融合创新发展补贴奖励办法（试行）》

2025-02-16 13:47

• 嘉峪关市推动全域旅游发展补贴奖励办法（试行）

2025-02-16 13:46

• 国家级非物质文化遗产保护与管理暂行办法

2025-02-16 13:45

• 《中华人民共和国公共文化服务保障法》

2025-02-16 13:44

• 《文物违法行为举报管理办法（试行）》

2025-02-16 13:43

• 《中华人民共和国文物保护法实施条例》

2025-02-16 13:42

• 嘉峪关市文物保护管理办法

2025-02-16 13:42

• 《中华人民共和国文物保护法》

2025-02-16 13:36

• 嘉峪关市黑山岩画保护条例

2025-02-16 13:34

Resource Library - Policy and Regulations Display Page



Heishan Petroglyphs Resource Center

首页

课程中心

素材中心

文献资料

网络资源

政策法规

文创

网络资料



赵大勇

文创

首页 > 文创

• 《岩趣》-贺兰山岩画新潮文创品牌设计

2025-02-16 14:44

• 新疆岩画陶瓷文创：小羊咩咩背后的故事

2025-02-16 14:41

• 古老艺术的现代绽放-贺兰山岩画人面像系列徽章成果转化

2025-02-16 14:40

• 贺兰山岩画×霸王茶姬联名文创，来喽！

2025-02-16 14:39

• 嘉峪关黑山岩画丝巾设计

2025-02-16 12:37

Resource Library – Cultural and Creative Learning Showcase Page

VITA

