¹ **Yuping Wu**

² **Xiaotian Li**

³ **Limei Liu**

⁴ **Ziyue Xiong**

⁵ **Qingshu Wu***

The Plane Composition Law of Li Nationality's Totem Pattern Decorative Dymbols in Hainan Tropical Gardens

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Abstract: - Aking the composition law of Li totem patterns in tropical gardens in Hainan as the research object, this paper selects Li totems with different totem pattern types and meanings, quantitatively analyzes the proportion scale relationship between the whole and part of various totem patterns by using Photoshop, aotucad, Excel and other related software, and summarizes the plane composition proportion law of totem human pattern, dragon pattern, frog pattern, deer pattern, bird pattern, petal pattern, fish pattern, bat pattern and turtle pattern, Its formal beauty composition conforms to the characteristic proportion of integer ratio 1 / 2, 1 / 3 and 1 / 4, which is helpful to explore the quantitative method of the formal beauty of totem landscape composition, and provide a reference for the further application of Li totem pattern plane composition in Hainan tropical gardens.

Keywords: Landscape architecture; Li totem; Quantitative pattern; Totem landscape; Cultural protection

Introduction

The Li people do not have their own national script, the Li people in the long-term survival of the group labor in the formation of the language symbols, in the form of totem patterns to record the history of their own stories and cultural practices[1], totems carry the Li ancestors' production experience and historical memory, contains a rich and colorful humanities etiquette, secular spirit, is the expression of emotions and beliefs of the function of the connotation, which is like an object of worship as the basis of an encyclopedia. It is like an encyclopedia of Li culture based on objects of worship. The Li totem art has a very important value in the ingenious combination of conception, composition, color matching, craftsmanship and other aspects that complement each other, forming a unified and harmonious artistic language platform through abstract geometric forms, which not only expresses the ideas of the Li people, but also embodies the unique formal beauty of the Li people[2] . Li is the largest ethnic minority in Hainan, its totem culture is the crystallization of the Li culture, totem combined with the landscape in the visual and expressive more intuitive to show the Li totem culture, in the scenic spots, hotels, beautiful countryside in Hainan Li are used in combination with the Li totem landscape to create the atmosphere of the Hainan Li flavor, to attract tourists, but the existence of a number of scenic spots and beautiful countryside in the use of totem a lot of designers by virtue of the personal feeling to put the Direct copy of the Li totem zoom in and out or elongated into the landscape, the same kind of totem pattern plane composition ratio are different phenomena, but the totem pattern in the local and the whole or there is a certain proportion of the relationship between, such as the human pattern totem in the Hercules pattern in the application of tropical landscapes, Figure 1 Hercules pattern trellis, Figure 2 Hercules window, Figure 3 Hercules placed stone shown. However, so far, most of the research on Li totems is aimed at totem clothing and totem other areas of research [3-7], while in Hainan tropical gardens Li totem pattern decorative symbols in the plane of the law of composition quantitative research, there is still little involved.

In view of the above problems and research shortcomings, this paper combines digital landscape design

1,2,3,4,5 Hainan University ,Haikou ,Hainan ,570228,China

*Corresponding authors:Qingshu Wu,E-mail:13307617915@163.com

theory [8], focusing on the rational analysis and scientific induction of Li totem patterns [9],,analyzing the classification of Li patterns with literature induction, resulting in four types of totems, through the landscape culture of digital quantitative methods [10] to study the Li totem pattern type planar composition law: the use of digital technology to collect samples of patterns, sample classification imported to AutoCAD calculates the area of each localization, uses Excel to count the average value of the area of each localization of tattoos, and compares the proportion law of the plane composition of totem patterns according to the quantitative data inductively analyzed, as well as discusses the visual aesthetic artistry of its totem pattern composition law [11-12].

Figure 1 Hercules pattern-like flower frame sketch

Figure 2 Hercules god window view

Figure 3 Hercules stone sketch

1 Li Totem Pattern Characteristics and Allegory Summarization

1.1 Historical origin of Li totems

The Li believe that "everything has a spirit" is the root of the Li's natural reverence [13]. Li totem worship arose in the matrilineal clan society of the Li people, and each clan has its own belief in totems[14] . Li totems focus on the harmony and unity of the totem structure, strong linearity, relatively simple collocation between the lines, its rhythmic changes to form a relaxed composition, forming a strong sense of movement, rhythmic beauty is very distinctive, showing the elegant aesthetics of the Li people, as well as the desire for a rich and beautiful life. The Li people's worship of totem is not single, but not fixed and different, all the "ghosts and gods" in the nature and the plants and animals with "symbolic meanings" are the objects of fear and worship of the Li people, who express their worship of all things in the nature with their patterns, so there are various kinds of totem patterns. Therefore, there are many kinds of totem patterns.

1.2 Classification of Li Totem Patterns

The objects of Li people's totem worship include ancestor worship, nature worship and myth worship. Ancestor worship totems are dominated by human-shaped totems, which are mainly composed of ancestor patterns, human frog patterns and Hercules patterns. There are animal worship and plant worship in nature worship, mainly animal, mainly frog, fish, bat and deer as the object of totem worship, especially frogs. Plant totem worship is based on trees, flowers and grasses, and rice. In addition, there are other types of Li totems, which are composed of abstract figures, mixed figures of plants and animals, such as life patterns, geometric patterns and scene patterns. Life motifs are motifs of daily life and production tools. Geometric motifs are usually made by arranging geometric patterns in a regular diamond-shaped lattice. Scene pattern totems depict the early life and production of the Li people, including hunting pictures, plowing oxen, celebrating abundance and dancing, rituals, and sowing and plowing. These totem images have the meaning of majestic power and wealth, happiness and peace, harvest and prosperity, and have become the symbols and symbols of their social organization.

1.3 Characteristics of Tattoos and Summarization of Allegory

From Li totem worship to the use, evolution and circulation of totem symbols in life, they are all rich in certain symbolism. The ancient and simple Li people use totem pattern symbols to symbolize and generalize the totem images of people, animals and plants, and use geometric shapes such as straight lines, parallel lines, squares, triangles, diamonds, etc., which are skillfully conceived, exaggerated or embellished into patterns and decorations, and present them in life and production [15]. The modeling of Li totem patterns mainly focuses on concrete forms and abstract forms. Totem concrete form aspect: on the basis of approximating the original form of the physical image, through artificial embellishment design and artistic treatment, to make its function more diversified, with special emphasis on decoration. Abstract form is a form that changes the original image of the real object without describing it realistically [16]. Li totems in the pursuit of religious beliefs and spirituality, reflecting through the artistic reprocessing of exaggerated deformation, natural people, animals and plants into concrete or abstract description of the image. As shown in Table 1, the table of stylized features and symbolism of totemic patterns. Tropical landscape commonly used totem pattern to human figure pattern totem, animal totem and plant totem, are in the landscape pavement, architectural window wall, architectural façade ornamentation, curtains hanging products and garden vignettes in the design of the application.

Table 1 Model characteristics and moral meanings of totem patterns

Totem type	Pattern feature	Pattern type	Totemic meaning	Totem modeling
Human figure totem	The artistic composition of points, lines and surfaces skillfully conceives, exaggerates or beautifies geometric figures such as straight lines, parallel lines, squares, triangles and diamonds into abstract human patterns.	Ancestral pattern	Remember ancestors, ask ancestors for shelter	
		Human frog print	Reproductive worship, more children more happiness	
		The Hercules pattern	Yearning for a better life, peace, fear of God	
animal totem	With diamond shape as the main body, diamond shape broken line composition, with obvious symmetry characteristics, figurative or abstract reflected as animal totem pattern.	Frog pattern	Produce plenty of grain and have more children	
		Fish pattern	Four seasons of peace, year after year	
		Bat pattern	Bats homophony happiness, symbolizing good luck and auspiciousness	
		Butterfly pattern	Procreation worship, many children, many blessings	

		Bird pattern - Gan Gong bird pattern	A symbol of love and courage	
		Bird pattern - turtledove pattern	It symbolizes the harvest of rice	
		Deer design	It symbolizes auspiciousness, happiness and love It is an animal of auspiciousness and luck,	
		dragon design	A symbol of power and the worship of mystical powers	
		Sheep pattern	Sheep can convey auspiciousness, well-being, meaning good luck	
		Cow pattern	It symbolizes power and wealth, peace and good harvest	
		Crab pattern	With gold list title and windfall implied	
		Turtle pattern	It has the meaning of eternal life	
Plant totem	Mainly composed of diamonds and triangles, to a symmetrical composition, concrete or abstract composition of plant patterns	tree pattern	A symbol that the family can be sheltered by the tree and flourish	
		Floral pattern	It means prosperity, purity and beauty	
		Petal pattern. - Cotton pattern	Meaning prosperity, purity and beauty	
		Petal pattern. - Sun pattern	A symbol of hope and optimism	
		Vital line	A form of artistic expression created by the Li people through association based on their understanding of things and	

			careful observation of the surroundings in daily life, implying the pursuit of happiness and beauty in life.	
Other totems	It is composed of abstract humanoid patterns and mixed figures of animals and plants. Through the use of straight lines, parallel lines, squares, triangles, diamonds and other geometric figures, cleverly conceived, exaggerated or beautify into patterns decoration, presented in life and production	Geometric pattern	It means auspiciousness and prosperity	
		Scene print. - Hunting print	It means that the Li people are resourceful and brave	
		Scene pattern. - Farm cow pattern	The symbol of Li people and loyal cattle work, desire to harvest the house	
		Scene pattern - Qingfeng dance pattern	It symbolizes the abundance of grain	
		Scene pattern. - Ritual pattern	It means to keep our people safe	
		Scene pattern. - Sacrificial dance pattern	Meaning safe harvest, protect the survival of Li people	
		Scene pattern - sowing tillage pattern	It symbolizes the abundance of grain	

2 Quantitative study of the compositional patterns of totem patterns

2.1 Sample Places

Five sample sites were selected, respectively, three in the category of scenic landscape, Sanya Luhuitou Park, Penang Valley Scenic Spot, Coconut Field Ancient Village Scenic Spot, etc.; one in the category of beautiful countryside landscape, Sanya Zhongliao Village; and one in the category of hotel landscape, Penang Valley Inn. This quantification mainly collects the commonly used totem patterns in the sample site: ancestor pattern, frog pattern, Hercules pattern in the human figure pattern totem; dragon pattern, frog pattern, deer pattern, Gan Gong bird pattern, turtles pattern, fish pattern, turtle pattern in the animal totem; petal pattern in the plant totem, and so on. While the animal totem butterfly pattern, sheep pattern, cow pattern, crab pattern, tree pattern of plant totem, rice grain pattern, and other types of totem life pattern, geometric pattern and scene pattern appeared less frequently in the sample landscape, after eliminating the duplicate patterns, the collection of valid patterns did not reach the quantitative number, quantifying the area structure relationship of the same type of totem pattern collected at least 8 valid patterns [17-18], so did not quantify these totem patterns.

2.2 Research Methods

Through the effective human figure pattern totem, animal totem, plant totem petal pattern and other types of tattoo pictures in Photoshop after correction, imported into AutoCAD software, using the multi-section line tool to outline the head, the middle of the torso, the tail or the feet of the three respectively; the left part and the right

part of the totem tattoos in the middle line of symmetry line of the two, and then use the calculation of the area command to calculate the localized area of each, finally With the help of Excel worksheet to calculate the proportion of the area between the local and the average of the proportions of various types, the percentage of the local area of the total area of the pattern and the average of the percentage of the area occupied by the local. The area measured in AutoCAD is not the real size, only for the analysis of the proportion and the use of the definition of the upper, middle and lower division of the definition of the method of reference to draw on Shao Dan's study of the Qing Dynasty furniture bat decorative pattern styling art study of the local division of the definition of the [17]. Quantify the different categories of totem modeling, composition relationship, summarize the totem pattern area composition ratio law, refine the totem modeling law.

2.3 Quantification of the law of area composition about proportion

As shown in Table 2, the average ratio of the head, middle, tail, left and right local area of the Li totem pattern to the overall area is shown in the table:

(1) The left and right localized areas of the totem pattern are approximately symmetrical on both sides.

(2) The average area of the upper part of the human figure pattern 0.17 is about 1/2 of the average area of the middle part 0.42 and the lower part 0.41. The average area of the upper part and the lower part of the animal totem dragon pattern are both 0.26 and 0.21 about 1/2 of the average area of the middle part 0.53. The average area of the upper part of the animal totem frog pattern 0.31, the middle part 0.34, and the lower part 0.35 is about equal, and each takes up about 1/3; the same animal totem frog pattern has an average area of the upper part 0.31, the middle part 0.34, and the lower part 0.35 that is approximately equal, each taking up about 1/3; similarly the average area of the upper 0.32, middle 0.41, and lower 0.27 parts of the animal totem deer pattern is about equal, about 1/3 each; and the average area of the upper 0.35, middle 0.3, and lower 0.35 parts of the botanical totem flower petal pattern is about equal, about 1/3 each.The average area of the upper and lower parts of the animal totem ganjung bird pattern and the zebra bird pattern is 0.2, 0.22 is about 1/3 of the average area of 0.57 in the middle; similarly the average area of the upper and lower parts of the animal totem bat motifs are 0.22 and 0.23 is about 1/3 of the average area of 0.65 in the middle; the average area of the upper and lower parts of the animal totem fish motifs are 0.18 which is about 1/4 of the average area of 0.64 in the middle;; the average area of the upper and lower parts of the animal totem turtle motifs are 0.17, 0.16 is about 1/4 of the average area of 0.67 in the center.

Table 2 The average ratio of the local area of the head, middle, lower tail, left and right to the overall area of the Li nationality totem pattern

Totem category	Pattern modeling	Collection of effective patterns	Up/round	Mid/round	Down/round	Left/integer	Right/round
Figure figure		44 panels	0.17	0.42	0.41	0.5	0.5
Animal totem frog print		23 panels	0.26	0.53	0.21	0.51	0.49
Animal totem frog print		20 panels	0.31	0.34	0.35	0.5	0.5

Animal totem deer print		14 panels	0.32	0.41	0.27	0.47	0.53
Plant totem petal pattern		16 panels	0.35	0.3	0.35	0.5	0.5
Animal totem Gan Gong bird pattern		18 panels	0.21	0.58	0.21	0.50	0.50
Animal totem turtle dove pattern		24 panels	0.2	0.56	0.24	0.49	0.51
Animal totem bat print		19 panels	0.22	0.65	0.23	0.5	0.5
Animal totem fish pattern		21 panels	0.18	0.64	0.18	0.5	0.5
Animal totem turtle pattern		18 panels	0.17	0.67	0.16	0.5	0.5
The local plane of totem pattern accounts for the total average value of the whole plane			0.23	0.51	0.26	0.5	0.5

3 Results and Discussion

3.1 The law of plane composition of Li totem patterns

Totem patterns of the head, middle and tail of the lower part of the local plane composition relationship in order by 1/2, 1/3, 1/4 integer multiples of the classification is summarized into 3 parts; (1) humanoid pattern totem, animal totem dragon pattern; (2) animal totem frog pattern, animal totem deer pattern, plant totem petal pattern, animal totem Ganjiao bird pattern, turtledove bird pattern, animal totem bat pattern; (3) animal totem fish pattern, animal totem tortoise pattern. See Table 3, Li totem patterns on the head of the head, the Department of the middle, the tail of the lower part of the local average planar composition of the proportionality of the law is summarized as shown in the table.

Table 3, induction of the proportion rules of local average plane composition under the head, middle and tail of Li totem pattern

Figure figure	The local average area of the head is about 1/2 of the local average area of the middle and lower tail	1/2
Animals have dragon	The local average area of the head and tail is about 1/2 of the	

patterns	local average area of the middle	
Animal totem frog print Animal totem deer print Plant totem petal pattern	The local average area of the head, middle and lower tail parts is about equal, accounting for about 1/3 each	
Animal totem Gan Gong bird pattern, turtle dove bird pattern Animal totem bat print	The local average area of the head and tail is about 1/3 of the local average area of the middle	1/3
Animal totem fish pattern Animal totem turtle pattern	The local average area of the head and tail is about 1/4 of the local average area of the middle	1/4

Below figure 4 to 11, is table 3 li totem pattern head, middle, tail lower local average plane composition proportion law induction table, with the grid background express the corresponding composition scale, this study, the length of each grid is set to 100 mm, not the real size, easy to quantify the extraction of all kinds of patterns to express the corresponding plane composition proportion contrast reference, and figure 4-11 in the pattern of quantitative reference.
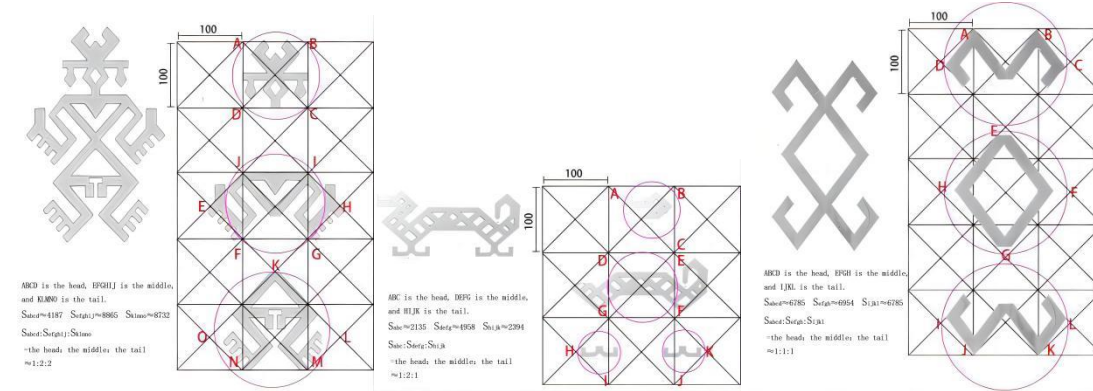

Figure 4. Proportional relationship of human pattern plane composition

FIG. 5 Proportion relation of dragon pattern plane composition

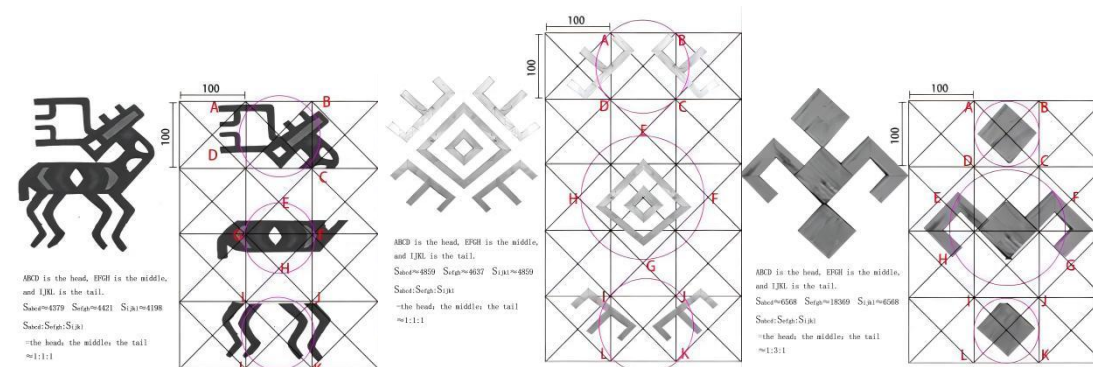FIG. 6 Proportion of frog pattern plane Composition

FIG. 7 Proportion relation of deer pattern plane composition

FIG. 8 Proportionality of plant-petal pattern composition

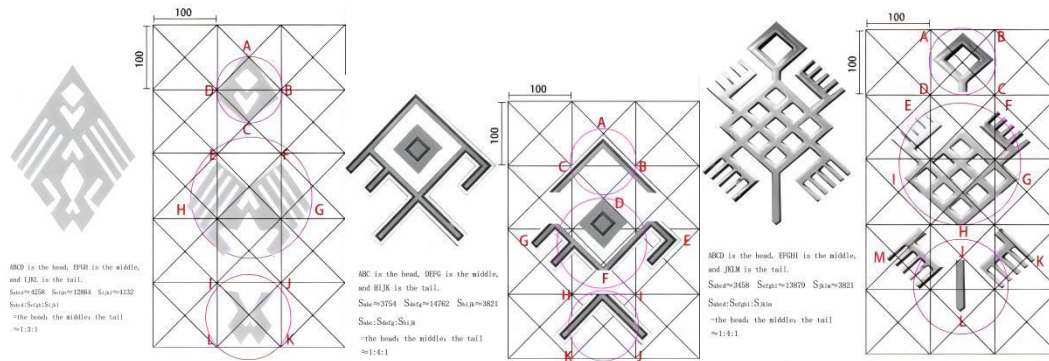Figure 9. Proportion of bird pattern plane composition

FIG. 10 Proportion relation of bat pattern plane composition

FIG. 11 Proportion relation of fish pattern plane composition

FIG. 12 Proportional relationship of moire plane composition

3.2 Discussion

3.2.1 The aesthetic law of area composition of the quantitative results of the tattoos

Li totem pattern local head, middle, tail under the average area composition relationship about the ratio law 1/2, 1/3, 1/4 of the results, and in 2012, Shao Dan study of "the Qing dynasty furniture bat decorative pattern modeling art research" summarized the local and overall relationship between the pattern composition area has a similar type of integer than the law [14], and this study quantifies the various types of pattern left, right about symmetrical plane composition Relationship between the results of the law, in line with the symmetry of the beauty of the form, in the symmetry of the left and right symmetry under the premise of balanced beauty, (1) its upper, middle, lower part of the average area of 1/2 of the times the tattoos of the overall picture sense of proportionality and harmony of the beauty of the; (2) its upper, middle and lower part of the 1/3 times the tattoos of the Law of Three Equal Parts of the aesthetic sense of three equal parts of the aesthetic sense of the human body facial science coincides with the three court of the upper, middle and lower 1/3 of the gold aesthetics; (3) The average area of the upper and lower part of the localized area is about 1/4 of the average area of the middle part of the localized area, and there is a strong contrast between the size of the area contrast, and there is a strong contrast between the visual effect of the sense of aesthetics. Visible, quantitative analysis shows that the Li totem pattern plane composition relationship in line with the aesthetic laws of the pattern.

3.2.2 Li totem pattern composition ratio relationship in the tropical garden application strategy

Can be applied according to Table 3 Li totem pattern head, middle and tail local average area about the proportion of the law, take the totem pattern to simplify, abstract deformation and other methods, the Li Teng pattern categories of humanoid pattern, animal totems: dragon pattern, deer pattern, bird pattern, fish pattern, bat pattern, turtle pattern and plant totem pattern of the basic modeling form and compositional relationship of the average local area about the proportion of the law remains unchanged under the premise of seizing its pattern Composition of the most central part, highlighting its focus, in order to achieve the purpose of simplification of complexity, shape abstraction and generalization, the composition of the form of simple and powerful, shape change and God is unchanged and has the aesthetic characteristics of the use of totem landscapes. For example, for the totem plant landscape of plant molded pattern flower beds, different symbolic totem patterns are integrated into plant planning and design according to the quantitative proportion of totem patterns, forming different patterns of totem molded pattern flower beds plant landscape or different pattern modeling plant totem landscapes; for the Li ethnic totem to satisfy the practical function of the landscape vignettes under the prerequisite of the proportions of the totem form for the design of the use and the beauty of the form. Tattoon-shaped lamps, seats, flower racks, signboards, flower pools and other sketches; used in the paving that

plays the function of guiding and evacuating the flow of people, combining various quantified tattoo structural relations with the paving materials to shape a suitable totem paving landscape with recognizability and sense of scale; as well as through the combination of quantified tattoo structural proportions and symbolic elements on the walls of architectural elevations, architectural decorative parts, curtains and hanging items, reflecting the beautiful expectations of the Li people for their life. It reflects the beautiful expectation of the Li people for life.

4. Conclusion

The debate between sensibility and rationality, artistry and science of design has always been an eternal topic in the design world, and the design theory and method of digital landscape provides some scientific and rational basis for the design of landscape garden. This paper studies the quantization of Li totem patterns from the perspective of digital landscape, obtains the basic modeling form and plane composition law of all kinds of totem patterns, changes the mode of applying the design of Li landscape totem patterns by virtue of personal perception and feeling, and proposes the strategy applied to tropical landscape plants, vignettes, paving and garden architecture. Its method for the construction of Hainan tropical gardens can lead to more cultural elements of the quantitative method for the use of Li totem patterns in Hainan tropical gardens in the plane composition to provide reference.

Chart Sources

Tables I, II, and III were drawn by the authors, and the pictures in Tables I and II and Figures 1-11 were taken by the authors.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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References

[1] Xia Mengying. Research on the traditional costumes of Qi dialect of Hainan Li [D]. Beijing:Beijing Institute of Fashion Technology,2012.

[2] He Sha. Research on the application of Li women's dress pattern and modern graphic design [D]. Haikou:Hainan University,2012.

[3] Cai Yuliang. Li ethnic weaving treasures - the art of dress totem hundred atlas. Hainan Publishing House, 2007.

[4] Ju Fei, Chen Yang. The Art of Chinese Li Traditional Weaving and Embroidery Patterns [M] Nanjing: Southeast University Press.2014.

[5] Quan Xuanzhen. Study on the Use of Li Ethnic Totem Elements in Contemporary Graffiti Art [D]. Kunming: Kunming University of Science and Technology, 20I5: 35-34.

[6] Cheng Shi, Zhang Xiaohan, Cheng Yuning. Prospect of the Utilization of Digital Landscape Technology in Landscape Architecture in China[J]. Landscape Architecture,2021,28(01):46-52.

[7] Fu Yiyan. Research on the development of Li ethnic totem culture tourism products[D]. Haikou:Hainan Tropical Ocean College,2018.

[8]Cai Linghao. Conceptual spectrum and process illustration of landscape garden digital planning and design[J]. Landscape Architecture,2013(01):48-57.

[9] Cai Linghao. Digital strategy of landscape garden planning and design[J]. Chinese Garden,2012,28(01):14-19.

[10] LIU Song, ZHANG Shuwen. Advances in digital landscape technology research - An overview of the development of the International Digital Landscape Conference[J]. China Garden,2015,31(02):45-50.

[11]MA Shanshui,LIN Shiping,YANG Chao. Quantification of visual ornamental properties of clumped plants based on entropy weight TOPSIS method[J]. Guangdong Garden,2021,43(03):55-60.

[12] Zhai Leilei. Artistic Characteristics of Li Clothing Patterns[J]. Art Sea,2012(01):123-124.

[13] Wang Mo. Hainan Li tattoos and their sociality[D]. Suzhou University,2009

[14] Huang Xin. Contemporary Research on Li Literature [D]. Guangdong Technology Normal College,2014.

[15] Liu Yang, Guo Yingying. Research on the pattern of Li totem "human shape pattern" under the perspective of design aesthetics[J]. Education Modernization,2019,6(29):180-181.

[16] Luo Wenxiong. Li women's dress art and its cultural connotation[J]. Ethnic Art,2001(04):172-187.

[17] Shao Dan. Research on the styling art of bat decorative pattern of Qing Dynasty furniture[D]. Northeast Forestry University,2012.

[18] Liu Xuexin. Study on Decorative Pattern Modeling of Qingyang Fragrant Bags [D]. Northeast Forestry University,2010.

about the author

First author: Wu Yuping (1995- -), female, Haikou, Hainan province, postgraduate student, research direction: Landscape Architecture planning and Design direction. College of Forestry, Hainan University, Haikou, 570228,Email:1021383917@qq.com

Corresponding author: Wu Qingshan (1962-), male, Haikou, Hainan Province, professor of Forestry, Hainan University, master tutor, main research direction of garden plant landscape design and tropical garden theory research. Email:822157136@qq.com

Third author: Li Xiaotian (1989- -), female, Tangshan, Hebei province, lecturer, College of Forestry, Hainan University, doctoral candidate, research direction: Landscape Architecture planning and Design direction. College of Forestry, Hainan University, Haikou, 570228,Email:812231735@qq.com