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Research on Construction Method of Genetic Map for Rural Settlement Heritage of Ethnic Minorities in Guangxi, China

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1 ABSTRACT

As the multicultural fusion area, Guangxi, China has twelve nationalities who live here for generations, including Han, Zhuang, Dong and Miao, etc. The cultural fusion among various ethnic groups is prominent, and has representative characteristics on multiculturalism and research value on rural heritage. As one of the carriers of culture, rural settlement heritage maintains the genetic characteristics of cultural "gene" in the process of inheritance. The laws are presented based on different expressions of material and non-material elements, and reflect the logic and order of the evolution of rural settlement heritage. Through the investigation of ethnic minority rural settlements in Liuzhou, Guangxi, this paper clarifies the construction logic of genetic map for rural settlement heritage. In addition, the excavation, identification, extraction of genetic elements and the construction of genetic map are carried out for representative rural heritage. Finally, this paper summarizes the research methods of rural settlement heritage genes in multicultural fusion areas of ethnic minorities. At the same time, it provides direction for the protection and sustainable development of rural settlement heritage, and guides the development of rural planning in some degree.

Keywords: map construction, multiculturalism, gene, rural heritage, rural settlement

2 INTRODUCTION

Based on the promotion of rural revitalization in the 14th Five Year Plan in China and the construction of beautiful village, many experts and scholars have carried out the research work on village, especially in some villages which are needed to be constructed because of serious problems. However, a complete system construction has not been formed in the research of rural settlement for ethnic minorities, especially that an in-depth study is lacking for multicultural fusion area of multiple ethnic minorities. The historical process of conflict, communication, integration and regeneration for ethnic culture is world-scale and generalized, and its influences are reflected on multiple domains, levels and perspectives. This has created cultural development opportunities for numerous nations, countries and regions, and brought unknown challenges.

Guangxi Zhuang Autonomous Region has diversified ethnic composition and cultural ecology, and Han, Zhuang, Dong, Miao, Yao, Mulao, Maonan, Hui, Jing, Yi, Shui and Gelao live here indigenously. Twelve nationalities form the multicultural fusion in Guangxi, including Baiyue culture, Miao-Yao culture, Central Plain culture and marine culture, etc. Liuzhou is in the north central region of Guangxi, and plenty of ethnic minorities live in mountainous and hilly areas, especially Han, Zhuang, Miao, Dong and Yao. The cultural fusion among different nationalities has representative characteristics and research value.

"Gene" as a biological concept, was proposed by Gregor Johnann Mendal, an Austrian scholar. This concept refers to a basic unit of biological heredity, as well as the carrier of genetic information, and genetic information can be passed on to the next generation through replication, causing the offsprings to show the same shape as their parents. As one of the carriers of culture, rural settlement heritage maintains the inheritance characteristics of their cultural "gene" in the process of inheritance. On account of the change in time and space, the genes of rural settlement heritage vary slightly in the process of inheritance. Thus, the variation of genes is a result of adaptation to the environment, which is not only the basic law of biological inheritance and propagation, but also the internal logic of the evolution and development of rural settlement heritage culture. Although "gene" and rural settlement heritage have different properties, they have similar inheritance principles [1]. The laws presented in genes reflect the logic and order of the evolution of the rural settlement heritage according to different expression patterns. Meanwhile, the exploration and integration of genes' internal logic and external expression is the process of constructing the genetic map [2].

In the investigation of 27 representative villages of ethnic minority rural settlements in Liuzhou, Guangxi, we also found that the heritage of these rural settlements has certain research value. Especially in these ethnic minority settlements, the cultural fusion and mutual influence are significant among different nationalities in the same region, or among different regions within the same nationality. At the same time,

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cultural fusion has certain “gene” characteristics which can be excavated and identified both from the level of material culture and non-material culture. In the process of excavating, identifying, extracting and constructing these characteristics, we can find the direction of conservation and sustainable development of rural settlement heritage. In this way, the establishment of such a systematic framework can guide the future development of rural planning [3].

3 RESEARCH STATUS OF GENE FOR RURAL SETTLEMENT HERITAGE IN ETHNIC MINORITY

There have been many levels of research on rural settlements at home and abroad, these researches mainly focus on the evolution and development of rural settlements [4-7], the distribution characteristics and influencing factors of rural settlements [8-15], the reconstruction and optimization of rural settlement layout [16-17], as well as rural heritage protection [18-23], etc. These studies not only analyzed the spatial distribution and natural geographical causes of rural settlements, but also deeply analyzed the relationship between villages and natural and humanistic elements. In addition, the research work put forward the development direction and strategy for the revitalization and optimization of rural settlements.

Rural heritage is one of the important resources for rural development, and it is also the irreplaceable and irreproducible cultural heritage created by local people over thousands of years. In terms of rural heritage protection and inheritance, Zhou et al. [3] mentioned that villagers are less aware of the history and culture of their own villages, and villagers’ senses of belonging to their own villages are gradually weakened. At the same time, the proportion of newly built dwellings in villages is increasing, while the new dwellings have no connection with the characteristics of traditional dwellings and even destroy the traditional features of villages. This phenomenon is widespread in many rural settlements, which brings numerous problems to the protection and inheritance of rural heritage.

The distribution of ethnic minorities in China is characterized by “Large communities, small areas”, which means that China's ethnic minorities live together over vast areas while some live in individual concentrated communities in small areas. But the phenomenon of multiple nationalities living together is common in some ethnic minority settlements. Under the fusion of the multi-ethnic culture, rural settlements present the features of “material culture and non-material culture” and form a unique natural and humanistic landscape, among which rural heritage with research value is not lacking. For instance, the rural heritage includes layout features, traditional dwellings and architectural features of rural settlements, as well as the relationship between customs, beliefs, languages and totems. In addition, the symbiotic culture formed by mutual influence among different ethnic groups is also a type of rural heritage. Therefore, it is significant to study the rural settlement heritage in ethnic minority settlements which have the characteristics of cultural fusion.

In this research context, many scholars also suggested to take “gene” as the inheritance carrier of important information to study the landscape gene of a specific region. In addition, scholars regarded “gene” as a basic genetic unit to summarize the characteristics of regional cultural landscape. In 1979, Lewis proposed that the most essential difference between landscape interpretation and research is gene [24]. American scholar Taylor once proposed to apply gene analysis to find the rules of settlement space layout, or to find the most core common factor by comparing the spatial structures of settlements within a certain area, that is, to find genes [25]. In recent years, Liu [26] has carried out systematic and complete research on the landscape genes of traditional villages, using the “landscape gene method” to study the internal characteristics, external expression and inheritance features of traditional settlement landscapes. In the field of landscape genes of cultural heritage in traditional villages, Xiang et al. [27] analyzed the genetic map of cultural heritage landscape in the aspects of spatial sequence, distribution and pattern. Li et al. [28] summarized 13 villages of Dong in Hunan Province and studied the spatial genetic map of settlements, as well as the genes with cultural concepts. Qi et al. [29] identified and analyzed the landscape genes of Miao traditional settlements from the perspective of geography.

The minority areas studied in this paper are in Liuzhou, Guangxi, and many of them belong to multicultural fusion zones. At present, the studies of typical cultural regions are relatively mature, while those of multicultural fusion areas are still insufficient. In response to this situation, Meng reflected on the theoretical research (traditional dwellings and villages) and practical research (development of traditional dwellings) to provide ideas for the research on the development and evolution mechanism of traditional residential buildings in fusion areas [30]. In conclusion, some scholars have carried out researches on the genes of

ethnic minority settlements, but the research framework has not been established for multicultural fusion areas, as well as the inheritance and variation of cultural genes among ethnic minorities.

In this paper, typical rural settlements in Liuzhou, Guangxi are taken as examples to propose method to construct genetic maps of rural settlement heritage in ethnic minorities. In addition, relevant methods to extract and identify genetic elements in multicultural fusion areas are also proposed in this paper. This paper provides a framework for further research on the rural heritage of ethnic minority settlements in multicultural fusion areas, as well as the external representation and internal motivation of genetic inheritance and variation generated by the cultural fusion.

4 THE CONSTRUCTION LOGIC OF GENETIC MAP FOR RURAL SETTLEMENT HERITAGE

As an important part of rural genes, heritage elements of rural settlements would show different laws in different ways of expression, and this is also the expression of inherent laws for cultural heritage of rural settlements. In a word, the logical and ordered expressions of these genes are the processes of genetic map construction. Guangxi is the fusion zone of multiple ethnic groups, and genetic map can be excavated and constructed from three levels to study the fusion of multi-ethnic culture: diachrony, regionalism and confluence.

Guangxi is the confluence zone of multiculturalism. Firstly, the formation and development of multiculturalism can be explored from the perspective of synchronicity and diachrony. Synchronicity can present the symbiosis of different nationalities at the same time, while diachrony is the interpretation of the development of different nationalities in time and space. As a result, it is significant to discuss the cultural characteristics of each nationality in different historical stages from this perspective. Therefore, the relationship between synchronicity and diachrony is closely related to the research of multiculturalism in Guangxi, and is also the dynamic study of regional culture. Table 1 presents the process of demographic change and colony formation of various ethnic minorities in Guangxi from the Shang and Zhou Dynasties to the late Ming and early Qing Dynasties. Furthermore, Table 1 shows that the multicultural fusion among different nationalities was formed due to the regional change of indigenous nationalities and immigration of

Dynasty	Nationality
Shang and Zhou Dynasty (1766BC-255BC)	The three tribes of "Luoyue" in the Zuojiang River Basin, "Xiou" and "Cangwu" in the Guijiang River Basin coexist
Qin and Han Dynasty (211BC-AD220)	Part of the Han Chinese from the Central Plains moved to Guangxi,China,living together with ethnic minorities
Tang and Song Dynasty (618-1279)	After the differentiation and integration of the indigenous minorities, the Zhuang, Dong, Mulao, and Maonan nationalities were formed. At the same time, foreign minorities such as the Miao and Yao entered Guangxi.
Song to Ming Dynasty (1279-1368)	The Hui, Yi, Jing, Gelao, Shui and other ethnic minorities have gradually moved to Guangxi,China
Ming and Qing Dynasty (1368-1911)	A large number of Han people moved in during the Qing Dynasty, and some of the ethnic minorities moved to West Guangxi. The population of Han nationality in eastern Guangxi is larger than that of ethnic minorities, while the population of Han nationality in central Guangxi is increasing

Table 1: The vicissitude process of various ethnic groups in Guangxi

From the view of region, twelve nationalities who live in Guangxi for generations are composed of aboriginal and adventive nationalities, forming a multicultural pattern of “Large communities, small areas” with multiple nationalities living together. At the same time, multiculturism formed under the fusion of Baiyue culture, Central Plain culture and marine culture. Figure 1 shows the regional distribution of numerous nationalities and the pattern of ethnic communities in Guangxi [31].

Overall, the cultural tradition and lifestyles of aboriginal nationalities were generated by transition, differentiation and fusion, and diverse lifestyles and cultural symbiosis formed after the immigration of adventive nationalities. Figure 2 shows that the distribution of Han is wide, and the composition and origin of the population are complex, including three major factions of Guangfu, Hunan-Jiangxi and Hakka. The long struggle between Han and aboriginal nationalities caused the migration and reform of nationalities. Meanwhile, Miao, Yao and other ethnic minorities moved into Guangxi, and numerous characteristics of these ethnic minorities constitute the multiculturalism of Guangxi. In the process of influence and struggle, ethnic culture is affected by each other and crisscross and overlap are generated due to the continuous migration of various nationalities. As a result, the distribution pattern of various nationalities is also changing

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constantly. In Table 2, the distribution of various ethnic groups has certain characteristics of fusion. The interaction effects of material culture and non-material culture contribute to the fusion of multiculturalism in Guangxi.

From the perspective of multicultural fusion in Guangxi, from the Paleolithic Age, aboriginal nationalities such as Xiou and Luoyue gradually turned into Zhuang, Dong, Mulao and Maonan with the development of history. These nationalities inherited Baiyue culture in some degree, including farming culture, production and life, Fengshui culture (Fengshui is a kind of traditional Chinese practice of determining the location of a house, tomb, or other items which are believed to have a vital effect on the fortunes of a family, owner, or user) and other aspects [32]. On the other hand, on account of political and economic factors, the Han gradually moved into Guangxi from Central Plains and Guangdong in different historical periods. In this way, multicultural characteristics of Lingnan (south of the five ridges, in south of China) Han were formed in the long-term life and fusion [33]. In addition, some ethnic minorities such as Miao and Yao, gradually moved to Guangxi later. Due to the weak economic status of these ethnic minorities, most of their settlements were in mountainous areas and mountaintops. Since these nationalities lived in the same geographical environment, the latter nationalities also kept the fusion with aboriginal culture and Han culture in Guangxi to ensure the continuation of the nationalities. Therefore, these latter nationalities have the cultural characteristics of “near Zhuang is Zhuang, near Han is Han”. Therefore, multicultural fusion characteristics are presented in the dimension of time and space among multiple ethnic groups in Guangxi, which also provides the possibility for our future research.

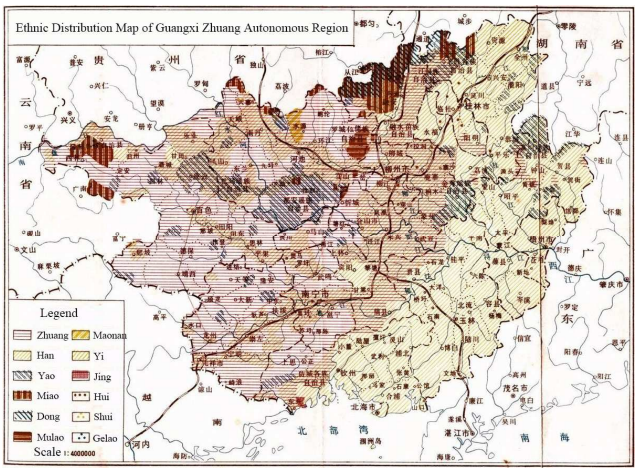

Fig. 1: The regional distribution of nationalities in Guangxi [31].

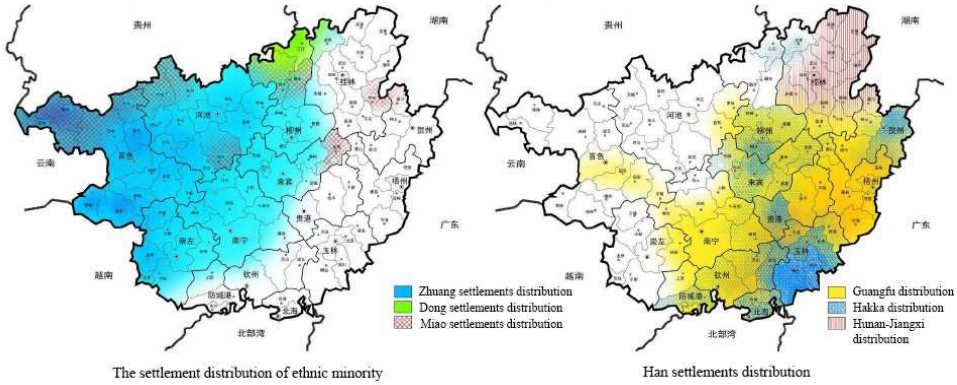

Fig. 2: The distribution of ethnic minorities and Han in Guangxi [31].

5 MATERIALS AND METHODS: CONSTRUCTION METHOD OF GENETIC MAP FOR RURAL SETTLEMENT HERITAGE

The rural settlements of ethnic minorities are characterized by clustering, centrality, defensiveness and respect of the environment. This paper focuses on the genetic identification of the rural heritage in ethnic minority settlements, and landscape genes of settlements have been studied already in the existing literature. However, there are both similarities and differences between this paper and the existing studies. Heritage

elements in rural settlements are significant in the inheritance of rural settlement heritage. They not only are the basic units to identify the "heritage" characteristics in rural settlements, but also reflect the external representation and internal development law of rural settlements.

Nationality	Main settlements
Zhuang	Zhuang residents mainly live in the six cities of Nanning, Chongzuo, Baise, Hechi, Liuzhou, and Laibin in Guangxi. The rest are scattered in 66 counties in the region.
Han	The residents of the Han are widely distributed, and they mainly live in the southeastern part of Guangxi.
Yao	Yao residents are mainly distributed in Duan, Bama, Jinxiu and Dahua in northwest Guangxi, Fuchuan and Gongcheng in northeast Guangxi, and autonomous counties of various ethnic groups in Longsheng.
Miao	Rongshui, Longlin, Sanjiang, Longsheng and other counties
Dong	Sanjiang, Longsheng, Rongan, Rongshui and other counties
Mulao	Luocheng, Yizhou, Liucheng and other counties
Maonan	Huanjiang, Nandan, Duan and other counties (autonomous counties) and Jinchengjiang District of Hechi City,China
Jing	Liwei, Wutou, Shanxin and other coastal areas in Jiangping Town, Dongxing City
Shui	Nandan, Rongshui, Yizhou and other counties
Yi	Longlin Autonomous County and Napo County
Hui	Guiling, Liuzhou, Nanning
Gelao	Longlin Autonomous County

Table 2: Main areas inhabited by various ethnic groups in Guangxi, China [31].

From the perspective of research classification, the studies of rural heritage genes discussed in this paper focus on material and non-material cultural elements with heritage value. Besides, the excavation and identification of rural heritage genes are carried out in multicultural fusion areas. Through the establishment of the genetic map, we can find out the generalities and individualities among different ethnic groups, to analyze the internal motivation of the long-term preservation of the "gene". Meanwhile, in the process of constructing the genetic map, the "genes" of rural settlements are compared longitudinally at different time periods and horizontally among different ethnic groups. Therefore, the cultural fusion areas can be found in the case of multiple nationalities living together, and some variant genes which are generated by long-term cultural fusion can be extracted.

5.1 Excavation and identification of genetic elements

The excavation and identification of genes for rural settlement heritage is a systematic and comprehensive process. Firstly, gene types can be classified according to the grade and importance of rural settlement heritage. In the identification of landscape genes in settlements, Liu classified gene types into main, attachment, mixed and variant gene to distinguish the settlement landscape types [1]. On this basis, the genes of rural settlement heritage studied in this paper focus on other aspects, and the importance of inheritance is combined with the classification of gene types. At the same time, the studies of mixed and variant genes concentrate on the composition and contrast of genetic elements in multicultural fusion areas (Table 3).

Classification standard	Category	Category explanation
Gene Type	Main gene	The core gene elements that occupy a dominant position in the heritage of rural settlements
	Attachment gene	Attachment genes are dependent on the main genes, but they are different from other rural heritage element genes with regional characteristics
	Mixed gene	A genetic element formed under the fusion of various factors in a specific rural settlement
	Variant gene	Due to special factors, genetic elements that have changed some genetic elements but are related to the original genes
Form of Expression	Dominant gene	Genetic elements with material form
	Recessive gene	Non-physical genetic elements
Identification Scale	Macro scale	Rural settlement heritage with regional spatial characteristics and block morphology
	Meso scale	Recognition of residential buildings, main public buildings and other architectural levels
	Micro scale	Material cultural elements such as detailed components and totem signs, as well as influential non-material cultural elements
Construction Method	Extraction element	Important identifiable elements of rural settlements
	Pattern extraction	Extract representative and special decorative patterns or meaningful patterns
	Structure extraction	Elements extraction of structural features such as buildings
	Meaning extraction	Regional expression and construction of non-material cultural elements
	Deduction extraction	Extraction of elements of logical deduction between material culture and non-material culture
Cultural Connotation	Monocultural gene	A rural heritage element that exists in a specific cultural background and has a specific cultural characteristic attribute
	Multicultural Compound Gene	The genetic elements formed by the fusion of diverse cultures and mutual influence

Table 3: Excavating and identifying methods of rural heritage genes in ethnic minority settlement.

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Based on the genetic excavation of rural settlement heritage for ethnic minorities, we need to identify corresponding genetic elements. Material cultural genes in main identification methods include environmental factor, layout factor, main public building and residential building, etc. While non-material cultural genes include folk customs, clan culture, Fengshui culture, faith culture and so on. With the establishment of the connection between material cultural and non-material cultural genes, we can find out the logical relationship at different gene levels and deduce the external representation and intrinsic cause of rural heritage gene. So that this method can provide ideas for the construction of genetic map, as shown in Figure 3.

At the same time, gene identification will be carried out from the macro, meso and micro levels according to the scale range. The genetic information corridor was established for the elements with heritage value, and the rural settlement heritage elements were compared horizontally among different ethnic groups. So that we can analyze the genetic variation and genetic influence generated by cultural fusion among multicultural fusion areas, and this is the method of genetic excavation and identification of rural settlement heritage for ethnic minorities, especially the multicultural fusion areas, as shown in Figure 4.

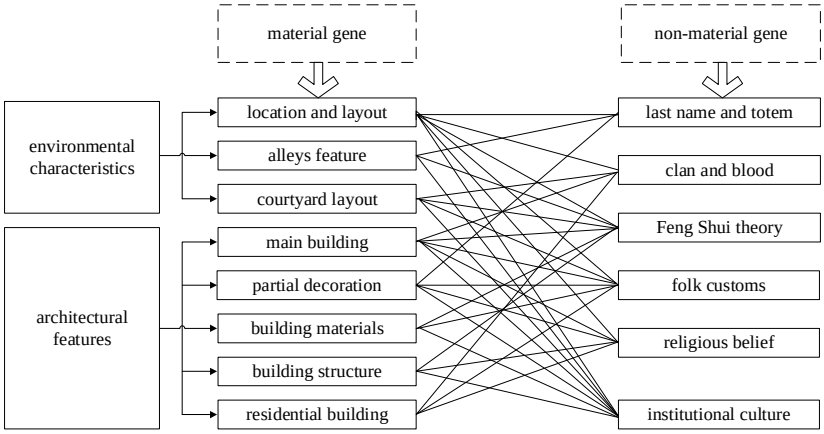

Fig. 3: Logical relationship diagram of material and non-material cultural genes.

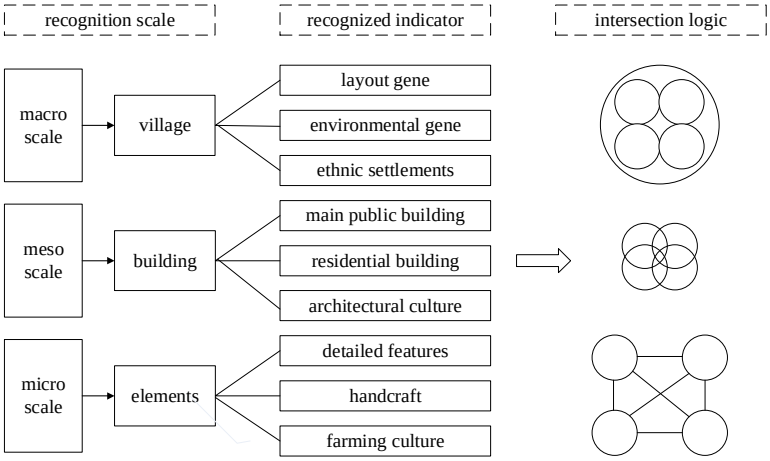

Fig. 4: The relationship between multicultural fusion areas reflected by gene identification at different scales.

In the investigation of rural settlements in Guangxi, we found that the rural population of Han, Zhuang, Miao and Dong is large, and the fusion characteristics among ethnic minorities are distinct, besides, the distribution of rural heritage with research value is wide in these nationalities. In the following sections, four representative villages of Han, Zhuang, Miao and Dong are taken as examples to analyze the important types of material and non-material cultural genetic elements (Table 4). After the analysis and comparison of these four different types of villages, ethnic minority rural settlements have the characteristics of strong centrality, living together in ethnic groups, and paying attention to the environment. At the same time, rural heritage genes retain some representative cultural characteristics, such as the courtyard-style buildings of Han, the phacelloid column square and hanging house (hanging house is a typical stilt style building and usually built on a steep hillside, with the main house on the ground and the other three sides hanging in the air) of Miao, the drum-tower and wind and rain bridge of Dong, and the stilt style buildings of Zhuang. In a word, all these

buildings have certain national characteristics. As various ethnic groups live in the same regional environment, cultural fusion and mutual influence also occur. For instance, Miao settlements occupy the major proportion of settlements in Rongshui Miao Autonomous County, but phacelloid column squares can also be found in some Dong villages due to the influence of Miao culture. In Zhuang villages of Rongan County, people gradually changed the traditional stilt buildings, and tended to build one-floor or two-floor courtyard buildings with cob walls.

Name of the village			Yajiao Village, Dongqi Township, Rong'an County, Guangxi, China	Dali Village, Liangzhai Township, Rongshui Miao Autonomous County, Guangxi, China	Pingmao Village, Gongdong Township, Rongshui Miao Autonomous County, Guangxi, China	Zhangkou Village, Rong'an County, Guangxi, China
ethnic classification			Hang	Miao	Dong	Zhuang
material cultural elements	village environment	location and layout	surrounded by mountains	harmony with site	living by the water	close to the water
		terrain	mountain topography	mountain topography	mountain topography	flat terrain
		landscape	ancient trees	ancient trees and wells	ancient trees	ancient trees
	layout characteristics	form	along the axis	branched form	centripetal form	ring form
		courtyard layout	courtyard style	corridor form	corridor form	corridor form
	architectural features and place	public space	ancient trees	phacelloid column square	phacelloid column square,drum-tower	agritainment
		other landmark buildings and places	watchtower	theatrical stage	Wind and rain bridge,watchtower	bamboo forest
	residential buildings	roof style	flush gable roof	gable and hip roof	gable and hip roof	flush gable roof
		gable shape	herringbone	herringbone	herringbone	herringbone
		decoration	stone carving	woodcarving	woodcarving	stone carving and woodcarving
		material	stone foundation and rammed earth wall	The main body of the building uses wood, but the bottom of the wall is gravel and blue bricks	wood,gravel	soil wall
		structure	courtyard style	Stilt style	Stilt style	courtyard style
		layout form	courtyard style and two floors	bottom overhead	bottom overhead	courtyard style and multi-storey
non-material cultural elements	language		Chinese	Chinese and Dong language	Chinese and Miao language	Chinese
	totem		dragon and phoenix	Miao embroidery	drum-tower	bronze drum
	handcraft		mason	fabric	spinning	brocade
	mode of production		forest fruit industry	agriculture and farming	agriculture	planting rice

Table 4: The identification of genetic elements in representative ethnic villages in Guangxi.

5.2 Extraction of genetic elements

In the extraction methods of genetic elements for rural settlement heritage, the existing studies classified gene extraction into element extraction, structure extraction, pattern extraction, meaning extraction and deduction extraction according to the principles of inherent-uniqueness, external-uniqueness, local-uniqueness, the overall advantages. Among the existing identification and extraction methods of genetic elements, some of the methods can be applied to the research of this paper on heritage elements of ethnic minority rural settlements, but some of them can still be improved. Taking the residential buildings of ethnic minorities as the example, many traditional residential buildings of Zhuang and Miao are mainly in the form of stilt, while hanging houses are more common in Miao settlements. The difference between two types of buildings lies in the extraction of building structure. If the above structure extraction method is used, the difference between two sides cannot be intuitively reflected. If the features of buildings are divided in detail,

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local characteristics can be extracted more accurately. As shown in Figure 5 and Table 5, The extraction of genetic elements in residential buildings can be further carried out from the aspects of foot materials, the forms of doors and windows, partial decoration, building materials, roof style, plane structure and so on. In this way, the relationship of genetic elements in the dwellings of different nationalities can be distinguished.

For another example, in the extraction of elements, the unique landmark buildings and characteristic elements of some ethnic settlements will undergo the variation and interaction after cultural fusion, from this point, they cannot be regarded as the unique element features of the nationality. In our interview and research, Anning Village is a Miao village in Chang'an Town, Rongan County, but there is a wind and rain bridge at the entrance of the village. As the main landmark of Dong, the wind and rain bridge cannot be regarded as a sole national feature in such a region. Therefore, in gene extraction method, deconstruction of features can be carried out more meticulously, as a result, architectural, cultural and environmental features can be combined and analyzed in this element extraction method.

Fig. 5: Deconstruction of residential building features.

Serial number	Gene Type	Genetic characteristics
1	foot materials	blue bricks, red bricks, mud bricks, etc.
2	the form of doors and windows	brick carving, stone carving, wood carving, etc.
3	partial decorations	various patterns, decorations and symbols, etc.
4	building materials	crushed stone, wood, soil wall, blue brick, etc.
5	roof styling	Sloping roof, flat roof, gable and hip roof and flush gable roof, etc.
6	plane structure	Courtyard style, single row style, etc.

Table 5: The genetic elements and characteristics of residential buildings after deconstruction

5.3 Construction of genetic map

In terms of the construction of genetic map, it can be divided into plane and facade map, time and space map, entirety and segment map and other expression forms according to different gene types. The establishment of map can reflect the characteristics and laws of genetic elements in rural settlements more intuitively, and can be studied from macro, meso and micro levels. For example, genetic map can be established and studied at the level of rural settlements, villages' cultural heritage and residential buildings. The essence of this method lies in the map expression of genetic elements for representative characteristics after excavating, identifying and extracting the genes in rural settlements. So that we can further distinguish the differences and connections between rural settlements. In our investigation of minority villages in Liuzhou, Guangxi, the plane map was constructed for the representative residential layout among different ethnic groups (Table 6).

6 CONCLUSION AND DISCUSSION

The genetic research and genetic map construction of rural settlement heritage are important research methods for rural settlements in multicultural fusion areas such as Guangxi. This paper studies the logic of cultural fusion and construction method of genetic map for ethnic minority rural settlements in Liuzhou,

Guangxi, and interprets the research methods of rural settlement heritage. As for the actual investigation cases, we selected the representative rural settlements of Han, Zhuang, Miao and Dong to conduct the excavation, identification and extraction of genetic elements, as well as the construction of genetic map, in order to explore the research methods of rural settlement heritage in multicultural fusion areas.

Form	Map	Legend	Characteristic
semi-ring form			The bedroom surrounds the north and east sides of the hall, and the plan layout has a central axis symmetry.
side by side form			The bedrooms are located on the east and west sides of the hall.
open hall form			The open hall at the entrance is combined with the corridor and gatehouse. This is a flat layout formed in order to adapt to the terrain in the residential buildings of ethnic minorities.
Centered form			The main living and functional spaces in the plan are arranged in the center, and the surrounding areas are used as public activity space.

Table 6: The map of representative dwellings for ethnic minorities in Guangxi.

In the ethnic minority settlements of Guangxi, multiculturalism forms the cultural fusion among different nationalities, and forms cultural symbiosis in the same region or in different rural settlements. Thus, “gene” characteristics can be excavated and identified both from the level of material culture and non-material culture. This paper conducts a horizontal and longitudinal comparison of rural settlements. Through the logical and systematic construction of genetic map, this paper provides the direction for the protection of rural heritage and sustainable development of rural settlements, and guides the development of future rural planning in some degree.

This study deals with multicultural fusion areas and marginal rural areas influenced by culture, as well as the material cultural and non-material cultural heritage, and the system construction of the theoretical research involved in this paper still needs to be improved in the future. In practice, the extraction and organization of rural heritage genes contain plenty of contents and elements, and there are great differences among various types of villages. Therefore, the research scope of this paper is limited to a specific regional environment, and the study is conducted on villages that were formed under the multicultural fusion in Guangxi. Meanwhile, there are twelve ethnic groups living in Guangxi for generations. In this paper, four ethnic groups with large population and prominent fusion characteristics are selected as the examples, and the genetic map construction of rural settlement heritage in multicultural fusion areas for other ethnic minorities can be improved in the future.

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