Development of Sanjianlianglang in Guangzhou (China) in late the 19th – the first half of the 20th century by example of county-level city Kaiping

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Abstract. The article considers the evolvement of the main type of non-urban area development in the Guangdong province that is sanjianlianglang in the period of active Europeanization of traditional Chinese architecture. The process of transformation is considered on the example of buildings of the city county-level city Kaiping. The town-planning structure of the settlements built on this type of constructions is studied. The layout structure and the principle of construction of the spatial composition are analyzed. Moreover, its evolution and transformation that gave the possibility to classify different types of sanjianlianglang are studied. The characteristic features of both traditional and eclectic buildings, as well as buildings of the transition period, that links sanjianlianglang and luju, are highlighted. The study revealed the features of these constructions, which formed the basis of the space-planning structure of residential buildings in rural areas of the region. Among those the features of functional zoning, as well as the use of traditional elements such as tianjing (illuminated well) and the altar of ancestors are emphasized.

1. Introduction
The location of Guangdong province near the rapidly shaping Western outposts and colonies of Southeast Asia turned it to, along with the insular territories of China, one of the first areas of European penetration and establishment of trading relationship between China and the West. It is no coincidence that the first European colony on the territory of mainland China—Macau appeared here, and since 1757 the port city of Guangzhou located on the Pearl River estuary became the only trade zone between the Qing Empire and the countries of Europe and America [1-3].

The dramatic changes that occurred as a result of the opening of the country's borders after the Opium wars (1840–1842; 1856–1860), led to a change in the socio-cultural life of the local population, as well as to active integration of Western culture and architecture. Over a short period of time only on the territory of Guangdong province, besides the colony in Macao and the European zone in Guangzhou (the Thirteen Factories of Henan and Shamian), appeared British colony of Hong Kong and Guangzhouwan area leased by France, as well as open cities: Jiangmen, Sanshui, Kowloon, Shantou. All of that led to the acceleration of cross-cultural interaction [1,4].

The best-known examples of eclectization of rural architecture are presented in the county-level city Kaiping, that is a part of the prefecture-level city Jiangmen, which was the center of labor migration in the region, providing financial infusion and integration with European culture. Such
clusters of the development of eclectic architecture as villages and settlements of Sanmen, Zili, Majianlong (former village Yong’an, Nan’an, Hedong, Qinglin, Longjiang), Jingjiang, Jianada, Liyuan [5-7] are located on its territory. The main type of buildings there are sanjianlianglang, that represent a local variation of siheyuan and are the prototype of such eclectic types of constructions, as diaolou and luju.

2. Literature review
Addressing to the studies on the history of Chinese architecture, it is necessary to note several areas of research. The most examined are palace and park complexes of the capital cities, as well as houses of worship. The latter are the representative examples of Chinese architecture that were described in the works of scientists of the late 19th–early 20th centuries. [8-12] Further formation of ideas about the processes of architecture of China was interrupted due to another period of isolation that lasted from the late 1940s to the late 1980s.

Since the 1990s, a new turn of research of the processes of formation of Chinese architecture has begun. Within this new framework more attention was paid to the architecture of residential buildings, as well as their regional characteristics and in particular to the architecture of the historic area of Lingnan, which included Guangdong province [13-14]. The study of cross-cultural influences of East and West architecture, which on the one hand is represented by the description of the architecture of European settlements [15-17], and on the other — by the process of eclecticization of traditional architecture of China [18-20], stands out. One of the most representative territories of China, that reflects the process of intercultural interaction, is Guangdong province. Over the course of examining the eclecticization of local architecture, several types so far have been identified, represented by terraced houses [5,21–23], officials’ mansions [21,23], fenced houses [23,24], tower complexes [6, 7, 23,25]. At the same time, the genesis of the last two types is closely related to the development of sanjianlianglang, the features of which are studied to a much lesser extent [25].

3. Methodology
Diverse literary and digital sources devoted to this subject have been used as materials for the analysis of stages of formation of eclectic architecture in Guangdong province. Field observations and photofixation of the various types of buildings of this period that remained thus far were carried out, which allowed to analyze the synthesis of borrowed and traditional elements. The time limits covering the period of the late 19th–the first third of the 20th century were defined on the basis of the obtained results and historical approach. The selected time period is marked by the flourishing of eclectic architecture in the province, which was caused by mass financial and cultural infusions due to circular labor migration and the formation of a system of Western settlements in the territory of Guangdong province. Alongside with time frames, territorial framework represented by the county-level city Kaiping, the center of the above-mentioned migration, has also been defined. Analysis of special stylistic aspects and the volume-spatial composition of sanjianlianglang of various construction periods, as well as closely related diaolou and luju, allowed to create a theoretical model for development of this type of construction.

4. Research results
The architecture of non-urban areas of Guangdong province was based on sanjianlianglang. Sanjianlianglang is a local variation of siheyuan, also known as jinzidingweiheshi. The main features of this type of buildings were determined by excessive solar radiation in the region, which made necessary to shade courtyards, which significantly reduced them in size and in some subtypes had the form of a small corridor or a light well [14,21,25-27].

Most of the buildings of this type were located in estuary and lower courses of the Pearl River and in the Western part of Guangdong province, that in the first place was conditioned by the ethnic composition of these territories inhabited by punti and teochew. These people are characterized by living in small 2–3 generations families and, as a result, settling in small houses, unlike Hakka living
in the East of province, characterized by a communal type of residence. Their houses could accommodate up to several hundred people [28].

As previously noted, the most representative area for this type of settlement was the county-level city Kaiping, which is part of the prefecture-level city Jiangmen and located in the lower course of the Pearl River. Aforementioned circular migration has become a significant feature of this area and resulted in cash flow from abroad and the development of new settlements, basis of which has become sanjianlianglang. The most famous clusters with this type of housing development are the villages of Sanmenli, Zili, Majianlong (former villages of Yun'an, Nan'an, Hedong, Qinglin, Longjiang), Jingjiang, included in UNESCO World Heritage List [6].

The house development of these types of buildings was usually terraced, where front facade and rear facade of neighbouring houses appeared to be adjacent. The layout structure represented an orthogonal grid (typical for China [29]) with small transverse passages up to 1 m wide [30]. The most decorated houses were located on the red line of house development, where the main objects of decoration were cornice, window openings and parapet. The buildings located on the second and following lines were practically not decorated, the decorations were represented by the painting of belt cornice and tympan over the entrance.

However, most of sanjianlianglang is located in the Guangfu area, where sanjianlianglang served as a base for the “grid” structure of settlements, which subsequently became the basis for the development of weicu. In terms of planning, they were an orthogonal grid. Its module served as a variation of sanjianlianglang, whereas a small temple was the central core. Its distinctive features are the three-part division of the courtyard that is typical for the region, as well as narrow passages and inner courtyards that protect from excessive insolation [27].

Traditional sanjianlianglang were a small construction area of 80 m² that presumably appeared during the reign of the Ming dynasty (1368–1644). The constructions were built out of puddled earth mixed with rice, sugar and chalk. This was a traditional technique of construction, strength characteristics of which are comparable with concrete. Planningwise the building was divided into two zones: inner courtyard was near to the entrance and was often made in the form of a light well, called tianjing, which was often overlapped by a patterned lattice. It was flanked on the sides with two kitchens designed for two generations of family. The entrance was located on the main facade and led to the well courtyard, rarely shifted to one of the kitchens. In the area away from the entrance there was a hall with two bedrooms adjoining it and an ancestor altar on the far wall. It should be noted that there were no external windows in the buildings and all lighting was carried out through tianjing [14,21,25-27].

As sanjianlianglang were developing, their area size was increasing. So by the end of the 19th century, constructions had occupied 100–120 m². This increase was due to the emersion of two additional bedrooms, which ajoined the central hall. There were small external windows in the form of slots, the main function of which was room ventilation. The main light flux continued to flow through the well courtyard. The entrance to the house was transferred from the main facade to the flank facade and was carried out through the kitchen. This arrangement made it possible to block the main and rear facades of the sanjianlianglang, leaving narrow passages protected from excessive insolation on the sides ‘Figure 1’. The main construction material was gray brick decoration appeared and was usually represented by painting, less often fretwork, located on cornices and entrances ‘Figure 2’, ‘Figure 3’. This particular type of sanjianlianglang underwent Europeanization [14,21,25-27].

Eclectic sanjianlianglang of the early period are represented by two types—single-row and double-row. The first type is a small building with an area of up to 100 m². Planning solutions in such buildings did not differ from traditional ones, but there were variations with a two-storeyed residential section, which was represented by two individual blocks located in bedroom areas. Each bedroom was divided into two levels and they were connected by an open staircase located in each room. The central part was occupied by a hall with an extended ceiling height [25,27].

The second type is represented by buildings with an area up to 150 m². The planning structure is identical to single-row houses, but warehouses were added in front of the kitchens, covered with a
pitched roof. The entrance to the warehouses was carried out through the inner courtyard. Both types are characterized by an extension of window openings, the main function of which was lighting. They were decorated with drippstones with tympan in the form of bas-relief or pictorial compositions. Traditional gable roof, covered with tiles continued to be used in all types of buildings. Cornice was decorated with frescoes, less often with bas-reliefs. Constructions of this type constitute the biggest part of the constructions of rural settlements in the period of 1900–1920's and practically do not differ from each other [25,27].

Figure 1. Blocking of Sanjianlianglang, Zili. Source: author.

Figure 2. Decoration of Sanjianlianglang, Zili. Source: author.

Figure 3. Decoration of Sanjianlianglang, Majianlong. Source: author.

The further development of this architecture was the transformation of the warehouse and kitchen areas above which living rooms began to be built. In the initial stages, additional floors were erected only at the corners above the kitchen or storage areas (depending on the type of structure), leaving space in the center for the construction of the light well, which was decorated with balusters or arcades ‘Figure 4’, ‘Figure 5’. This technique was consistent with the principles of Feng Shui, in which the front of the house could not exceed the back. Most of the facilities of the Majianlong cluster belong to these types of structures. An interesting example is the Yizhenlou in Hewan, in which four-story corner towers appeared. The hall began to be divided into two floors, and in it, at the far wall from the entrance, there was a single staircase for the whole building. In front of the staircase on the first or second floor was the altar of the ancestors. The hall often had an atrium, or a hatch covered with a lattice, which was a reference to Tianjin (this technique will later be used in luju). On the ground floor, the hall was often united with a palace-well. The kitchen and courtyard area was overlapped by the exploited roof with Tianjin. Otherwise, this type of house did not differ from the two-row buildings. [25].

The widespread introduction of reinforced concrete structures has led to the appearance of an exploitable roof, fenced with a fence in the form of glazed balusters or geometric patterns. At the same time, the residential part and the hall was covered with a lean-to roof. As this type of structure developed, the superstructure occupied the entire front part of the building, forming two spaces divided by a light well or courtyard area, over which they also began to erect premises, thereby
forming the prototype of the future luju, with which the sanjianlianglang simultaneously coexisted. The pitched roof of the residential part of the building remained the longest, which is most characteristically represented in the village of Zili. In general, this type of structures existed until the 1970s, when it was completely superseded by the luju [25].

Figure 4. Single-row Sanjianlianglang, Majianlong. Source: author.

Figure 5. Single-row Sanjianlianglang, Zili. Source: author.

5. Conclusion
The spatial composition and planning decisions laid down in the sanjianlianglang during the Ming dynasty and which are a local reinterpretation of traditional syiheyuan underwent minor changes during the period of active eclecticization of traditional Chinese architecture. The main changes associated with an increase in the number of floors, largely due to the increase in the density of the settlements, were evolutionary in nature and did not affect the basic planning structure, which, in turn, was reflected in luju and diaolou. A similar approach was used in the decoration, which went within the development of traditional types of architecture and only to a small extent borrowed elements of European architecture, unlike other types of eclectic buildings of the region. Considering the planning structure of the settlements, it should be noted that it is blocked and modular in which the buildings were blocked in the longitudinal direction, which became the basis for the “grid” type of settlements that became the basis of the planning structure of the rural area of the estuary of the Pearl River. Thus, sanjianlianglang is a basic element in the development of both the architecture and urban planning of the rural area of the region in question, and their further study will allow a better understanding of the genesis of the development and eclecticization of other types of buildings.

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