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Genesis and Functional Features of Chinese Pavilions and Chinese Experience in the Restoration of Wooden Structures

Geneza i cechy funkcjonalne chińskich pawilonów oraz chińskie doświadczenia w renowacji obiektów drewnianych

Keywords: Chinese pavilions, genesis, functional features, Chinese experience in the restoration of wooden structures, conservation, strengthening.

Słowa kluczowe: chińskie pawilony, geneza, cechy funkcjonalne, chińskie doświadczenia w renowacji obiektów drewnianych, konserwacja, wzmacnianie.

Introduction

The small architectural form that is the pavilion is the most widespread (given the number of erected pavilions and their high adaptability to different functions) expression of the features of Chinese national architecture. This building type spread to most of China, especially to places where natural and climatic features have been added to functional needs.

Gradually, various volumetric-spatial schemes of pavilions developed, embodied in structures with a diverse range of uses, therefore, pavilions are similar to landscape, temple, and spring structures. The traditional scheme of the pavilion was an open structure, resting on supports, most often red in color, either

partially open or closed. The latter was a less common solution, since the pavilion was a structure for a temporary, short stay. The presence of the most dynamic upwardly concave roofs with a large offset mainly in the east of China, less often in the center of the country and its southwest, is substantiated by the natural and climatic maps given by the authors.

One of the most thorough works on traditional Chinese landscape design is the monograph by D.-Z. Liu [Liu 1993] who thoroughly analyzed the general theories of planning, specific design techniques and methods of managing natural elements of the landscape, as well as the use of walls, corridors, buildings and bridges to create picturesque landscape paintings in a limited space, and the special means used by Chi-

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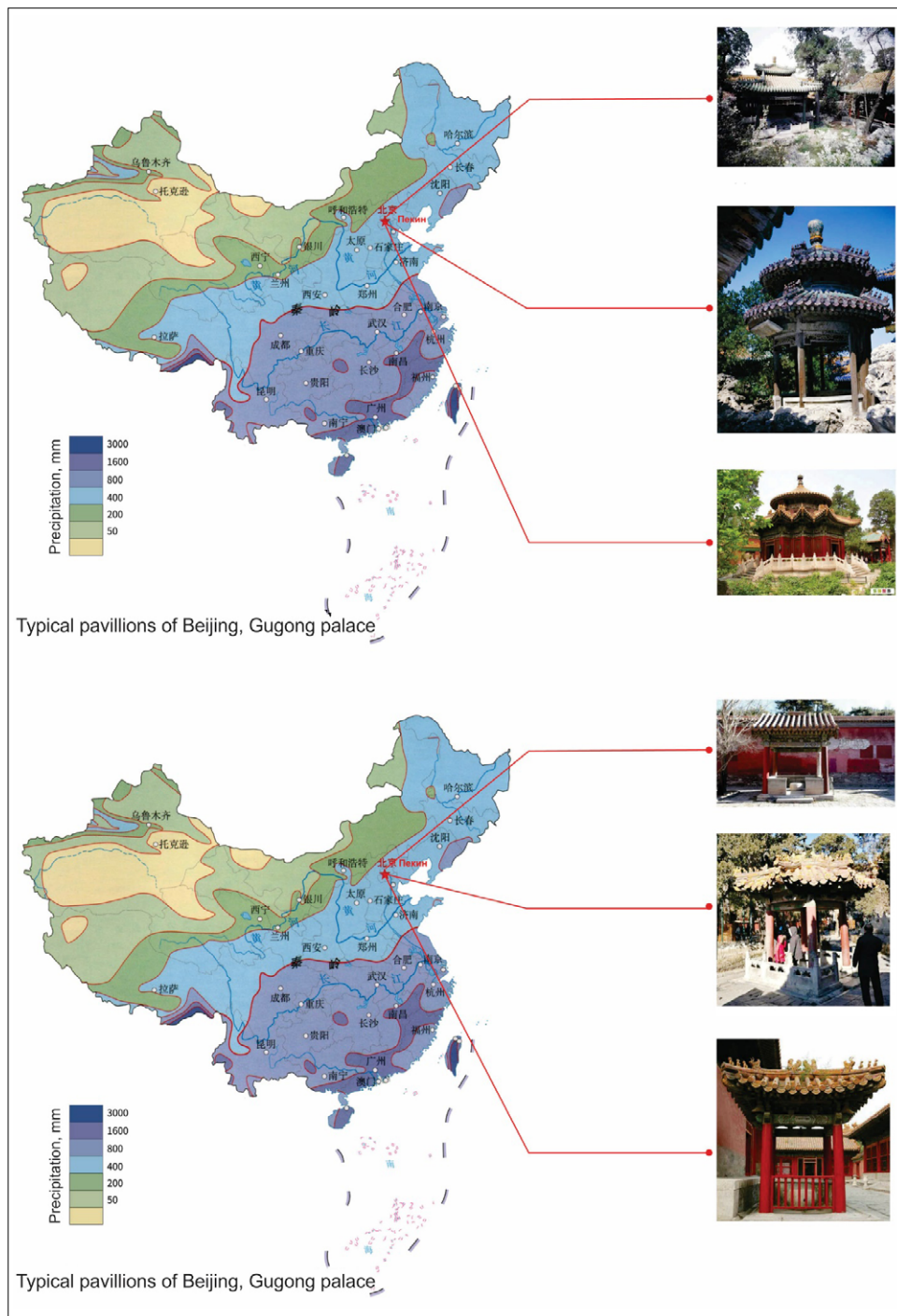


Fig. 1. Historical pavilions of northeast China (Beijing), based on climate maps; by Peng Chang.

Ryc. 1. Historyczne pawilony północno-wschodnich Chin (Pekin) na podstawie map klimatycznych; oprac. P. Chang.

nese artisans to create “nature in a miniature:” the borrowing of a distant scene, scenes in contra-position, sequences in depth contrast, foil effects, relative dimensions, etc.

The authors also analyzed Chinese publications covering the specificity of traditional Chinese architecture [Dictionary of Chinese Attractions 1998]; works dealing with the entire heritage of the architecture of small forms on the examples of pavilions with various uses [Qin 2019]; publications by Chinese authors dedicat-

ed to historical gardens, pavilions and their specifics—in particular the works of Y. Tsai [Tsai 2015], Z. Fang [Fang 2016], J. Cheng [Cheng 2010], C. Li [Li 2010], J. Gao [Gao 1994], J. Pan [Pan 1994], Y.Z. Tong [Tong 1994], J. Zhu [Zhu 2003], W. Zhou [Zhou 1999], and Y.Wang [Wang 1990]. Works by the following Ukrainian and Polish researchers were analyzed: Y. Ivashko, D. Kuśnierz-Krupa, P. Chang, T. Kuzmenko, D. Chernyshev, M. Orlenko, M. Dyomin, A. Dmytrenko, M. Krupa, V. Tovbych, and L. Gnatiuk [Ivashko et al.

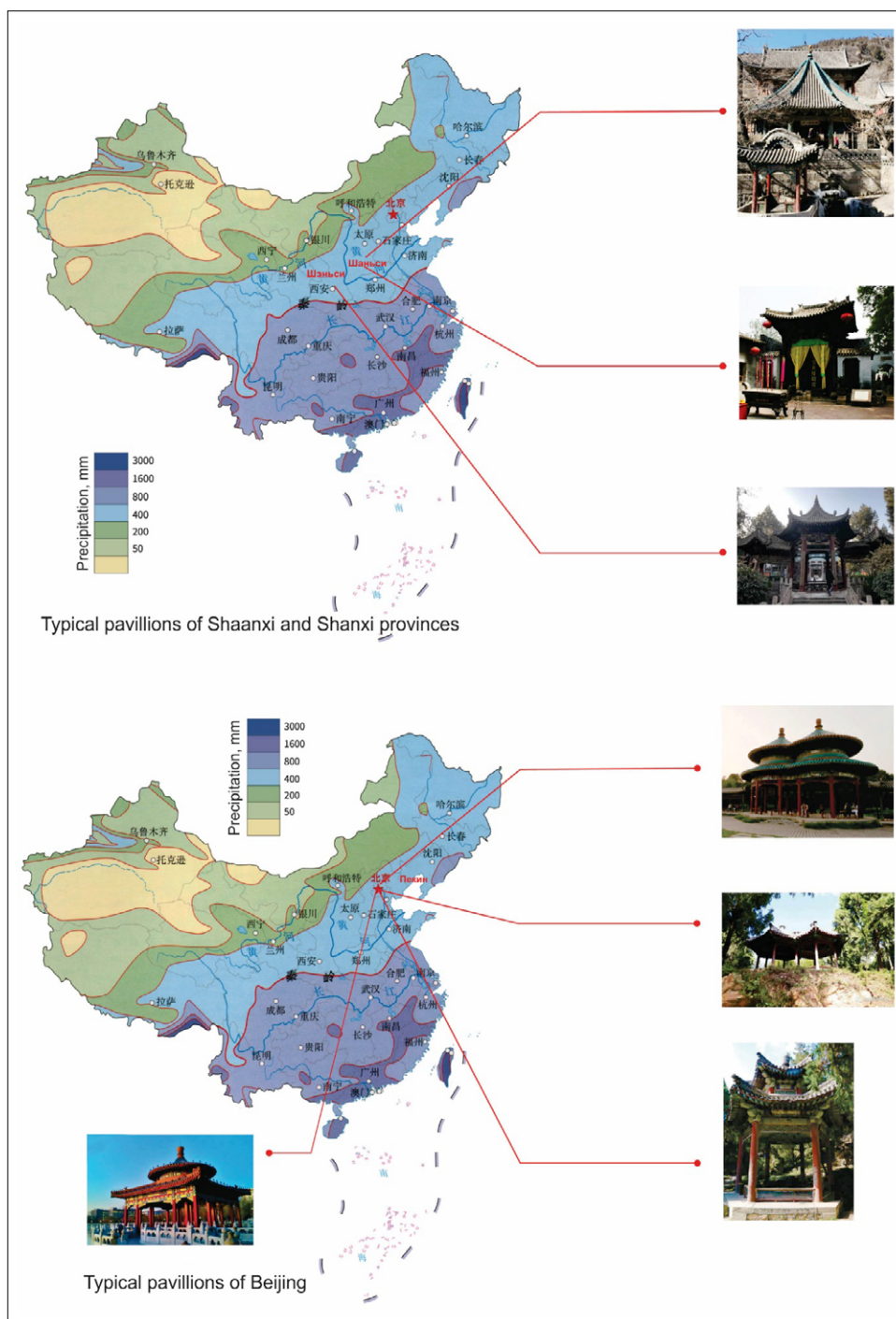


Fig. 2. Historical pavilions of central and northeastern China, based on climate maps; by Peng Chang.
Ryc. 2. Historyczne pawilony centralnych i północno-wschodnich Chin na podstawie map klimatycznych; oprac. P. Chang.

2020a; Ivashko et al. 2020b; Ivashko et al. 2020c; Orlenko et al. 2020; Orlenko and Ivashko 2019; Krupa et al. 2020]. Some sources described the establishment of new botanical gardens in contemporary China [Tkachenko 2015; Tkachenko 2016; Lu 2017].

Although the sources do not directly relate to Chinese pavilions, their arguments can be projected onto the Chinese landscape architecture and design, which historically were not perceived as the construction industry but as art, literally—“the art of arranging gar-

dens” with elements of performance by changing landscape images and creating a certain “stage performance” through the natural environment.

A separate block of publications consisted of archival works, namely books by Ernst Boerschmann, which featured dimensional drawings (facades, plans, sections) of ancient wooden pavilions, drawings of roof structures, and showed the layout of temples and the place street furniture in the regular placement of buildings [Boerschmann 1911; Boerschmann 1914]. These

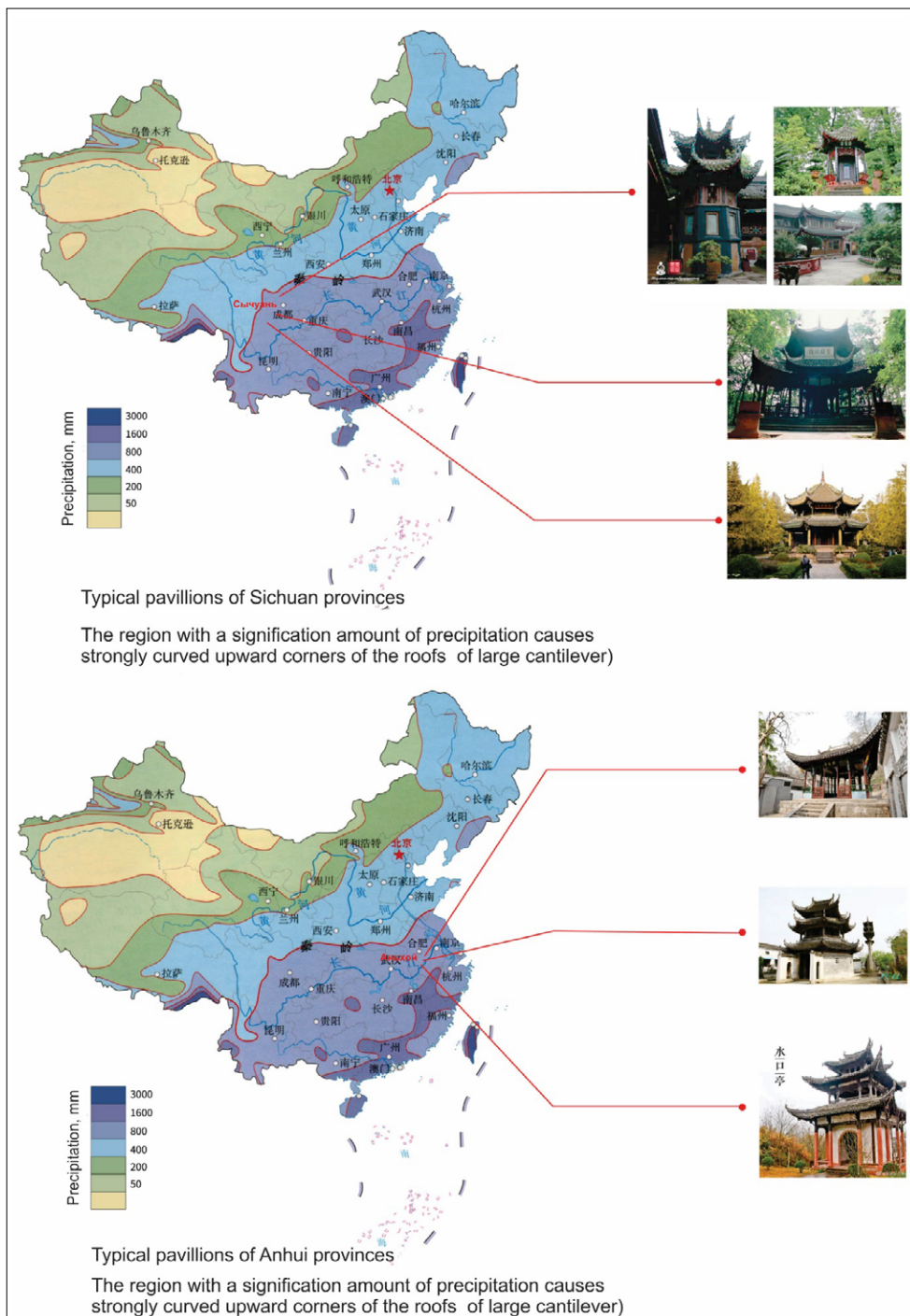


Fig. 3. Historical pavillions of the south of central China, Sichuan Province, and eastern China, Anhui Province, based on climate maps; by Peng Chang.

Ryc. 3. Historyczne pawilony południowych i centralnych Chin (prowincja Syczuan) oraz wschodnich Chin (prowincja Anhui) na podstawie map klimatycznych; oprac. P. Chang.

editions contain original drawings, archival images and photographs from the beginning of the twentieth century, which is especially valuable because it includes images of pavilions that have not survived to this day.

Specialist conservation sources were also studied, specifically those that cover approaches to the restoration of wooden architectural monuments in China. These issues were analyzed in the publications of R.Y. Yang, Y.F. Sun, X.F. Zhang, G.F. Qiao, T.Y. Li,

Y.F. Chen, S.F. Jiang, N.L. Lee, S. Shen, M.H. Wu, Y. Zhang, Z. Kungpeng, L. Aiqun, X. Linlin, W. Chong-Chen, W. Peng, and W. Xiufang. They described various ways of addressing emergency states in China's wooden heritage architecture, the problems that caused these emergencies and developed methods of wood restoration, documented based on the restoration of specific structures [Yang et al. 2020; Qiao et al. 2016; Jiang et al. 2019; Kungpeng et al. 2020].

Materials and methods

The specificity of the small architectural form type of the Chinese pavilion led to a wide choice of research methods. Traditional research methods such as historical analysis, comparative analysis, the graphical-analytical method, and the analytical method were used. Archival dimensional drawings of ancient wooden Chinese pavilions and original drawings and materials prepared during the carrying out of the study were used.

The study of wooden pavilions should also address their structural condition. Maintaining wooden structures in appropriate technical condition is not currently a dilemma. It appeared when it was stated that the safety of buildings and structures depends on the way they are used, and routine maintenance and repairs are carried out. Symptoms which became the cause of interference in structural and finishing elements of buildings were their visible deformation or other damage. Undoubtedly, wood is one of the least durable but also resistant to many aggressive factors and at the same time most frequently used building materials, and its durability directly translates into the lifespan of the structure, and thus of entire buildings. In most situations, the assessment of the degree of danger occurring in them is the result of chance, i.e., the coincidence of several circumstances, when damage to structural parts that is responsible for the safety of the entire facility comes to light. It can be said that the damage observed in small buildings such as Chinese pavilions, where systematic technical inspections are not carried out, or are carried out with little thoroughness, is becoming a problem.

There are many different methods of strengthening wooden structures. The most commonly used are wood, steel and increasingly often composite materials in combination with connectors (wooden, metal or glued). Figure 9 shows several examples of different methods for strengthening the cross-sections of wood elements [Alykow et al. 2020; Bajno et al. 2019; Jasienko et al. 2014]. Traditional methods of reinforcement are more and more often improved or replaced by innovative ones, which are faster and more effective.

Results and discussion

The architecture of Chinese pavilions is, by all means, a component of the historical and architectural heritage of China. Therefore, we explored sources that comprehensively illuminate the manifestations of Chinese national identity.

Since the study of any building mandates an analysis of the periodization of its development, we used the main stages of the formation of the pavilion type as a specific architectural structure given by the Chinese researcher Qin Li. At the same time, this periodization did not correspond to the tasks set, since in one chronological list the author combined those stages that were determined by the emergence of new types of pavilions and listed the construction of the most famous pavil-

ions. The specificity of his periodization was that one chronology shows the dates of new types of pavilions and the dates of construction of some outstanding pavilions, while for the authors it was more important to present the general genesis of the Chinese small pavilion from a strategic border structure to a highly adaptive building with a wide range of functions [Pan 1994]. Thus, the authors created their own, extended periodization with eight main periods, dated as follows:

first period (1066–221 BC); second period (206 BC–220 AD); third period (265 AD–439 AD); fourth period (420–589 AD); fifth period (618–907 AD); sixth period (963 AD); seventh period (1046 and 1097–1100 AD); eighth period (1634 AD to the nineteenth century).

The fourth period (420–589 AD) is directly associated with landscape pavilions, the fifth period (618–907 AD) is associated with garden pavilions, and the eighth period is associated with the regulation of their construction in specialized treatises (from 1634 AD to the nineteenth century). Thus, the appearance of landscape pavilions took place in the era of the Southern and Northern dynasties, the spread of pavilions in private gardens took place in the Tang era, and after the seventeenth century, in the Qing era, the landscape construction became regulated.

Over the centuries, many temple, memorial, spring, imperial, and roadside pavilions were built, but the art of pavilions reached its peak aesthetic expression and figurative perfection in landscape architecture, where the natural environment played an important role: the pavilion complemented the landscape. It is no coincidence that the classic examples of pavilions for various functional purposes in different regions of China were the pavilions of the private gardens in Suzhou, which fully embodied all the principles on which Chinese landscape design is based.

Comparative analysis of pavilions used for different purposes suggests that no two were the same and similar silhouettes and types of roofs were used in pavilions with different uses, the determining factor was the natural environment and climatic conditions.

Garden pavilions do not stand out from the general list of well-known pavilions; moreover, one can name examples of similarly looking pavilions with different functions—temple and imperial (the temple pavilion of the Apricot Platform in the Temple of Confucius in Qufu, is similar to the Five-Dragon Pavilion of Beihaj Park on the banks of the Beihai River); temple and landscape or resort (the Orchid Pavilion in Yujun is identical to the Qian Wang Chi Temple water pavilion on West Lake; the Pavilion of the Green Jade Conch—Biluo ting—in the imperial Qianlong Garden in Beijing is similar to the Morning Sunset Glow Pavilion in the Huaqing Hot Springs); temple and garden pavilions (The Tai Xu Pavilion (Square Pavilion) in Nanputuo (Puzhao) Temple of Xiamen, Fujian Province, resembles the garden pavilions of the Old Drunker in Suzhou and the Great Wave Pavilion in Suzhou Park).

Early types	Strategic	Chronology of appearance and significant periods of pavillions types development		
		1066 - 221 BC - the first mention of early military pavillions		
	Entrance	206 BC - 220 AD - complication of constructive scheme, emergence of entrance pavillions with a flag over city gate (Han dynasty)		
	Roadside	206 BC - 220 AD - complication of constructive scheme, emergence of administrative, street, city pavillions and pavillions with a flag over city gate (Han dynasty)		
	Imperial			
	Bridge		963 AD - mention of the oldest pavillion on the bridge (Song dynasty)	
	Spring			
	With bells and drums	206 BC - 220 AD - complication of constructive scheme, emergence of administrative, street, city pavillions and pavillions with a flag over city gate (Han dynasty)		
	Memorial			
	Temple and monastery			
Last types	Garden		618 - 907 AD - spread of pavillions in private gardens (Tang dynasty) 1634 AD - emergence of specialized treatises on the rules of landscape pavillions constructions	
	Landscape		420 - 589 AD - emergence of the first landscape pavillions (the period of Southern and Northern dynasties)	
	Water			
	Tea	618 - 907 AD - spread of pavillions in private gardens (Tang dynasty)		
	Artistic	618 - 907 AD - spread of pavillions in private gardens (Tang dynasty)		
				↓

Fig. 4. The genesis of the pavilion type, 2020; by Peng Chang, idea by Y. Ivashko.

Ryc. 4. Geneza typów pawilonów, 2020; oprac. J. Iwaszko, rys. P. Chang.



Fig. 5. Example of garden pavilion in Shanghai; photo by M. Krupa.
Ryc. Przykład pawilonu ogrodowego z Szanghaju; fot. M. Krupa.



Fig. 6. Example of imperial pavilion in Beijing; photo by M. Krupa.
Ryc. 6. Przykład pawilonu cesarskiego z Pekinu; fot. M. Krupa.

Each dynasty gave a particular hidden role to the garden—a symbolic state function (the garden was considered to possess the properties of an empire) under the Qín Shǐ Huáng-dì emperor; during the reign of the Han dynasty, an esoteric function was added to it. During the Ming dynasty—these were recreational and pleasure functions. Additionally, during the reign of the Ming dynasty, two types of private gardens were distinguished: the southern type, associated with the landscape design of the gardens of Suzhou, and the northern type, associated with the development of imperial residences near Beijing. The scale of the garden (either imperial or private) determined the scale of landscape vistas and constituent elements, although the imperial gardens would gradually borrow from private chamber gardens, limited by the small area of the site, a tradition of alternating finely detailed landscape vistas; and a variety of garden pavilions that fit seamlessly into different landscape environments.

During the heyday of the city of Suzhou, there were about 280 private gardens in it, and for a long time the city of Suzhou was considered a kind of “paradise.” There was a saying that went “Up in heaven, there is paradise; down on earth, there are Suzhou and Hangzhou.” There was an axiom that the southern gardens are the most glorious in China, and the main ones were the gardens of Suzhou, the development of which was facilitated by the local climate, located south of the Yangtze River, on the shores of Lake Taihu, and the wealth of the residents. Since the arrange-

ment of gardens in Suzhou became widespread, it led to the emergence of a special term for the gardens of Suzhou—“City Mountains and Groves.”

The Chinese private garden was considered primarily as a place to restore one’s emotional balance through art in pavilions or the observation of nature.

From the inside, the Fan Pavilion in the Shǐ Zǐ Lín Garden (The Lion Grove Garden) in the northeast of Suzhou offers views of rocky peaks and the road between the mountains near the reservoir, blooming wisterias, a stone arched bridge on the island to the north and a cave in the rock to the east. This pavilion, according to the scheme of constructing landscape pictures, actually repeats in its image and outline the openings of the With Whom Shall I Sit? Pavilion in the Zhuōzhèng Yuán Garden, especially as both pavilions employ the traditional Chinese technique expressed as “the landscape as a picture in a frame.”

The typical example is the Mid-Pond Pavilion. It is square, completely open, with expressive, upturned eaves on roof corners, which is connected to the shore by a crooked bridge.

The history of the pavilion of Real Interest is associated with the visit of Emperor Qianlong to the Shǐ Zǐ Lín Garden in 1762. This entirely open pavilion, rectangular in plan, resembles the pavilions in the Gugong complex, it stands out due to its large size, bright red supports and yellow sub-eaves.

The Waterfall Hearing Pavilion is, in fact, a canopy with an expressive roof on four columns, where stone

tables and four stone drum supports are installed inside. The pavilion got its name because it is located opposite a waterfall that comes from the top of the mountain, and its noise is heard from the pavilion.

The pavilion in memory of Wen Tianxiang, is so named because inside there is a memorial tablet “the righteous and the one who inspires awe” and the lines of Wen Tianxiang’s poem “Plum Blossom” are given: “Quiet and empty, the group moves, the body is graceful and clear. Who remembers the spring landscape, the inflorescences of plum blossoms?”

The name of the Imperial Monument Pavilion, or the Imperial Stele Pavilion, is associated with the visit of Emperor Qianlong to the Shī Zǐ Lín Garden during his second trip to the south of China. A “Ninghuey” memorial plaque was installed in the pavilion, which symbolized the concentration of the rising sun in the pavilion and the glorification of the emperor’s merits.

As noted earlier, the main canon of the imperial gardens—“one lake, three mountains”—should provide immortality to the owner, and the same principle was applied in private gardens, albeit on a smaller scale.

There are six pavilions in the Liú Yuán Garden: The Pavilion Mountain above the cloud was named after Guanyun Peak; it is also hexagonal in plan and decorated with oranges on the roof as symbols of well-being.

By the example of the garden of a small garden Wǎngshī Yuán (Master of the Nets Garden), the area of which is six times smaller than the Zhuōzhèng Yuán garden, it can be proved that the beauty of landscape pictures did not depend on the territory of the garden; small gardens were distinguished by great grace and detail of visual paintings. The “Wǎngshī Yuán” Garden became famous for the vivid embodiment of one of the classical principles of Chinese landscape design—“garden in the garden.” This garden has relatively fewer water bodies, and more areas are occupied by architectural buildings.

Another long-standing landscape genre, which in painting turned into landscape design, was the genre *shang-shui* (“mountains–water”). It is embodied in the most ancient garden Cāng Làng Tíng, known in the middle of the eleventh century, although the reservoirs are located outside the garden.

The most ancient garden of Suzhou is Cāng Làng Tíng. The Cāng Làng Tíng Pavilion was built by the Song Dynasty poet Su Shunqin. The pavilion tops a mountain range, in a high space open on the sides. The square pavilion is entirely open, with stone pillars and cornices and an expressive upturned roof. The pavilion stands amid greenery, offering a picturesque view of distant vistas.

The plan of the Zhuōzhèng Yuán Garden with a large number of pavilions is not squeezed by the surrounding buildings, the garden gives the impression of being spacious, with a large number of various landscape sceneries, most of the site is occupied by an artificial lake with artificial mountains, water bodies are the main theme of this garden.

Chinese experience in the restoration of historical wooden structures

The restoration and preservation of historical and cultural heritage sites for future generations is one of the main policies proclaimed by the Chinese government, and this explains the growing attention to such sites and the transformation of many of them into World and National Heritage sites and famous tourist sites. The standard for the implementation of restoration measures in China is the document GB50165-92 “Technical conditions for maintenance and reinforcement of wooden structures of ancient buildings.”

Among the main factors of the state of emergency of wooden structures (in ancient China various types of wood were very widely used for construction), relevant to the natural and climatic conditions of China, the following major determinants are named: excessive moisture, which leads to wood rot and the deformation of structural elements; biocorrosion caused by fungi and insects; fires; the impact of natural phenomena, such as floods, storms, earthquakes, landslides; the negative impact of human activity.

When restoring authentic wooden pavilions, one can try to preserve all the historical parts to the greatest possible degree, or match new fragments so that they do not differ from the original ones, or, conversely, emphasize which part of the building is historical and which has been replaced. The level of the building preservation in the same form is determined by its category of value.

If we analyze the causes of emergency conditions for historic pavilions, it should be noted that such an analysis should begin with the condition of stone foundations, foundations, podium with stairs, which provide static wooden structure that stands on them, and often their failure is attributed to damp and damage due to tree roots. When eliminating the emergency condition, the method of fragmentary opening of foundations with sections up to 1 m is used.

The traditional Chinese pavilion is a multi-level structure: from bottom to top, it consist of a base, a foundation, a platform, a stylobate with stairs, wooden walls or columns, the dou-gun structure, and a roof. If the failure of the footing and foundations is mainly due to excessive damp, the failure of the stylobate occurs due to temperature changes, weathering, which adversely affects the stone, as well as the displacement of stone fragments. Restoration measures in this part include both the maximum preservation of the old stone elements and, if necessary, the addition of parts to be replaced with new ones.

Just as in the case of footing and the foundations, for wooden below-grade parts of pavilions the main problem is damp, which causes rotting, a disturbance of statics and the arrangement of structural members, in addition to damage by fungi. To eliminate the emergency condition of the load-bearing columns, in which the decay of wood has been detected (in most cases Chinese small pavilions do not have external walls and

the roof rests on the dou-gun structure and wooden columns), bandages can be used. There is a rule that the columns must be replaced, except for the central ones, for which a special method of reinforcement is used by introducing additional supports and iron hoops.

There are some problems with wood rot in dou-gun structures. Beams in which more than one-third of the span and one-third of the cross-sectional area of the load-bearing beam show damage must be removed and replaced; in other cases, the rotten parts of the beams must be fastened with nails, bolts, and iron hoops. This ensures the strength of the structure. Because the ground part of traditional small pavilions is made of wood, they can suffer from failure of wooden frame statics, in the case of which structural elements are fastened with wooden spikes, while structural elements retain wood properties not damaged by soaking or mold and can be preserved. Such restoration measures are aimed at restoring the statics of the building by leveling it, for which, among the list of measures, temporary supports are installed and inclined rafters are maintained.

In particularly difficult cases of damage to large arrays of wood or damage to rare expensive wood (in unique, mostly imperial pavilions) conservation engineers introduce modern methods of restoration using new materials and components, such as fiber-reinforced materials (in the form of fabric, for the restoration and reinforcement of structures), fiberglass-reinforced materials (in the form of fabric, to improve the mechanical properties and durability of elements), basalt fiber (for the restoration and reinforcement of wood, improving its properties) and use chemical reinforcement methods.

As many Chinese pavilions have tiled roofs, some measures are taken to restore the roof, pre-eliminating roof blockages (this is the main cause of the rotting roof structures), remove biocorroded and damaged tiles, and then clean the roof and level cracks and restore the ridge and corner parts of the roof, often decorated with figurines, as well as structural elements of the cornice. The amount of work depends on the general condition of the roof, as it may be necessary to completely replace it.

Unique wooden structures should be preserved to the greatest possible extent, including the material of old structures, by proofing rotten parts with chemicals like ethyl orthosilicate and methyl triethoxysilane, which in combination help to keep damaged wood in one array in a satisfactory condition. In cases where it is still necessary to remove damaged wood fragments and after their replacement to strengthen the remaining wood fragments, and use chemical reagents using unsaturated polyrubber (as was used in the case of the wooden supports of the Feng Yuang Pavilion in Xuzhou Simantai).

There are many different methods of strengthening wooden structures. The most commonly used are wood, steel and increasingly often composite materials in combination with connectors (wooden, metal or glued). Figure 8 shows several examples of different methods for strengthening the cross sections of wood-

en elements. Traditional methods of reinforcement are increasingly often improved or replaced by innovative ones, which are faster and more effective.

Conclusions

Based on the analysis of historical small architectural forms, they were compared with contemporary pavilions-arbors developed by design firms. In particular, a limitation of the variability of such modern pavilions in comparison with historical samples was found. As tangible models for imitation, the following can be named:

- city park pavilions—the Pavilion of the Old Drunkard in the city of Chuzhou, Anhui Province (central China);
- imperial pavilions—the Lunar Pavilion and the Pavilion of the Green Jade Conch (Biluo ting) in the imperial Qianlong Garden of the Forbidden City in Beijing;
- temple pavilions—the Nanlao Spring Pavillion of Jinci Temple, Shanxi Province (North China); the Orchid Memorial Pavilion at Yujun Temple in Shaoxing, Zhejiang Province (eastern China);
- water pavilions—the Morning Sunset Glow Pavilion on the Huaqing Hot Springs) in Lintong (northern China), the Qian Wang Chi Temple water pavilion on West Lake in the city of Hangzhou, Zhejiang Province (eastern China).

If one compares the layouts and silhouettes of the pavilions in famous gardens, one can see the general resemblance, for example, the Mid-Pond Pavilion in the Shī Zǐ Lín Yuán Garden resembles the Pavilion Mountains above the clouds in the Liú Yuán Garden; and the Pavilion of Ornamental Fish in the Cāng Làng Tíng Garden, the “With whom shall I sit” Pavilion in the Zhuōzhèng Yuán Garden, resembles the Fan Pavilion in the Shī Zǐ Lín Yuán Garden; the Canopy-Pavilion Hearing Waterfall in Shī Zǐ Lín Yuán Garden resembles the Reverence Pavilion in the Cāng Làng Tíng Garden, etc. This testifies to the replication of a canonical image of the garden pavilion, especially within the same city. The same similarity can be seen in the names of the pavilions.

Others analyzed contemporary projects of small-scale architectural forms based on the type of pavilion roofs for regions with significant precipitation, that is, upwardly concave and with a large roof overhang. Many projects are standardized, while the historic pavilions have always been different. A comparative analysis of the historical regions of China and contemporary small pavilions, mainly in park areas, showed a significant dearth in the variety of the silhouettes and roofs types in modern buildings, where silhouettes with curved roofs predominate. Historical pavilions in China displayed much greater differentiation that is not confined to roofs curved upwards, mainly due to the natural and climatic features of a particular region. The authors identified the place and role of the garden pavilions in general and the garden pavilions of Suzhou in particular in the general periodization of pavilion construction. Based on this study, it was demonstrated

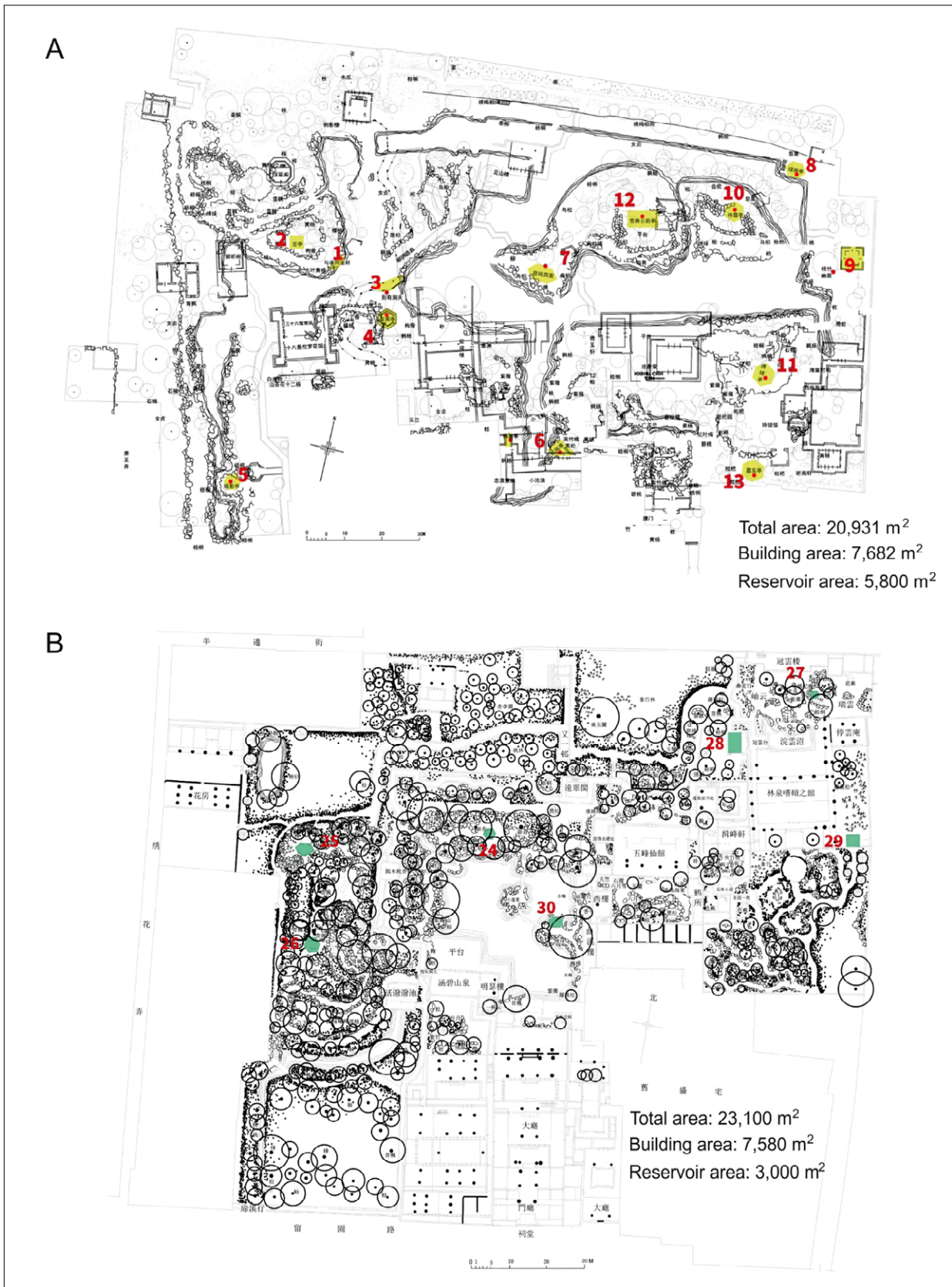


Fig. 7. Examples of the most famous Suzhou private gardens: A—plan of the Zhuōzhèng Yuán Garden, B—plan of the Liú Yuán Garden.
 Ryc. 7. Przykłady najsłynniejszych prywatnych ogrodów w Suzhou: A – plan ogrodu Zhuōzhèng Yuán, B – plan ogrodu Liú Yuán.

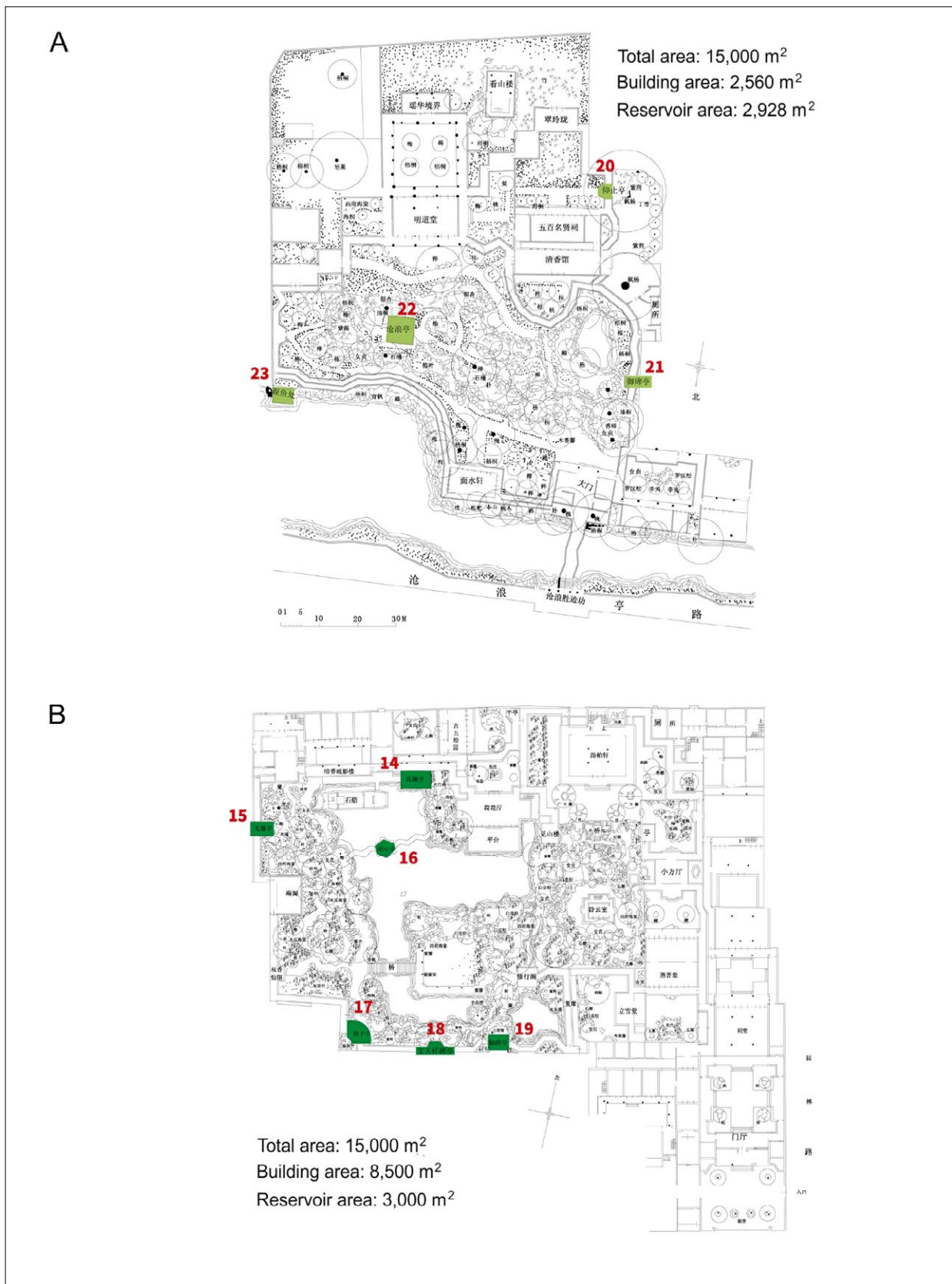


Fig. 8. Examples of the most famous Suzhou private gardens: A—plan of the Canglang Ting Garden, B—plan of the Shi Zi Lin Garden.
 Ryc. 8. Przykłady najstynniejszych prywatnych ogrodów w Suzhou: A – plan ogrodu Canglang Ting, B – plan ogrodu Shi Zi Lin.

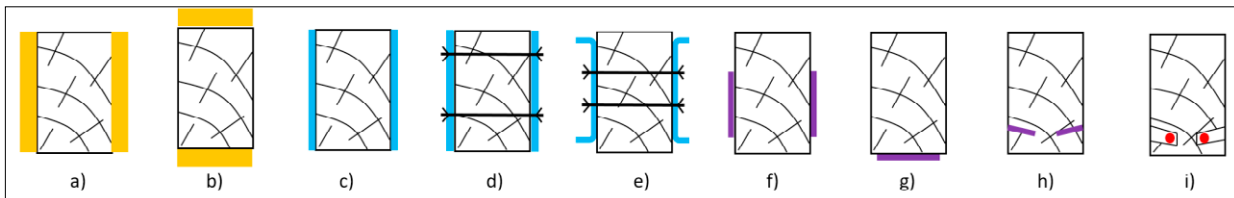


Fig. 9. Examples of different methods for strengthening the cross sections of wooden elements: a)–b)—wooden overlays, c)—glued metal overlays, d)–e)—screwed metal overlays, f)–g)—glued-on composite carbon C-FRP tapes, h)—glued-on composite carbon C-FRP tapes, i)—glued-in steel or composite rods; by Ł. Bednarz.

Ryc. 9. Przykłady różnych metod wzmocniania przekrojów elementów drewnianych: a, b) – nakładki drewniane, c) – nakładki metalowe klejone, d, e) nakładki metalowe mocowane śrubami, f, g) – naklejane taśmy węglowe kompozytowe C-FRP, h) – naklejane taśmy węglowe kompozytowe C-FRP, i) – pręty stalowe lub kompozytowe wklejane; oprac. Ł. Bednarz.

that in the final periods of the development of the pavilion as a specific architectural construction for temporary use, it was landscape and garden pavilions that became the main personification of the term “small pavilion.” Such a shift in emphasis from a military function to those associated with administration, trade, transport, religious practices, and ultimately to the recreational and pleasure-related ones, is an argument in favor of cardinal chang-

es in the image of the pavilion, which gradually turned from an artless, undecorated structure into an architectural masterpiece with exquisite décor and bright colors. It allows us to attribute to the pavilion the characteristic that marks other buildings that are experiencing a shift from pure functionality to decorativeness when the structure gradually loses its principal role and is perceived as an exquisite element of décor.

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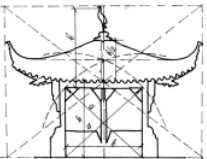
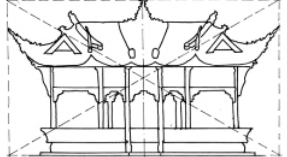
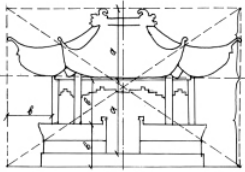

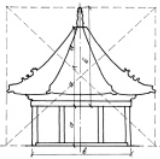
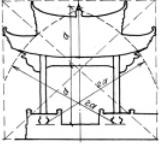
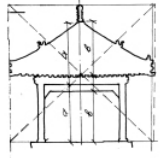
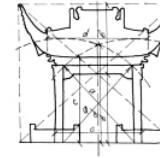
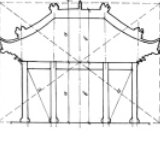
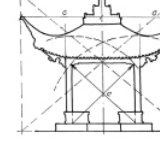
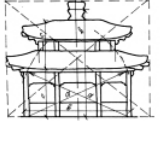
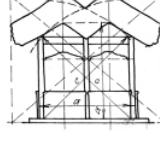
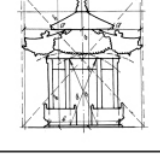
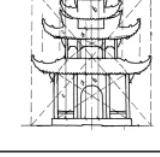
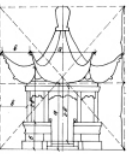
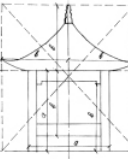
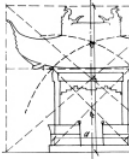
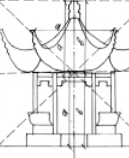
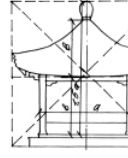
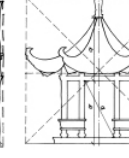
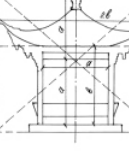
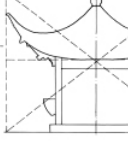
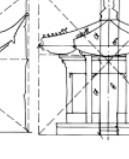
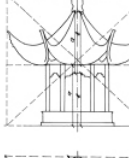
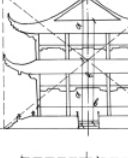
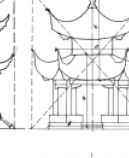
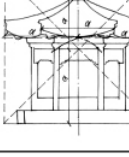
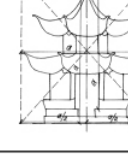
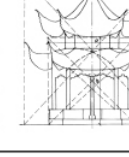

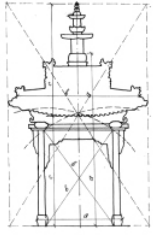
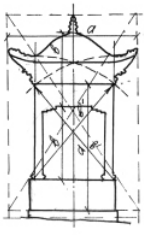
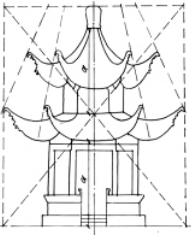
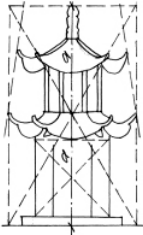
		Scheme	Historical pavilions	Modern pavilions
Proportions	~ 1:0,5		 	
	~ 1:1		         	              
	~ 1:2		 	 
			Малюнки: Чан Пен	Малюнки: Дин Ян

Fig. 10. Comparative analysis of traditional and contemporary garden arbors (pavilions), 2020; by P. Chang, Y. Ding.
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Abstract

This paper presents a study on the specific features of traditional Chinese pavilions. The sources investigated during the study expanded the authors' outlook on the expression of national characteristics in Chinese architecture as a whole, and became the basis for concluding that the pavilion can act as a vehicle for national identity. In their study, the authors focused solely on researching the architecture of small Chinese pavilions. It was concluded that the architecture of pavilions should be considered together with the general principles of Chinese philosophy, culture, religions, landscape design, the architecture of purely garden pavilions—as together with pavilions with other uses and it allows us to identify similarities and differences between pavilions of various types. Based on the transfer of information from the fundamental sources to specific layouts and landscape paintings of Suzhou gardens in this study, those landscape techniques that were formed based on Feng Shui and their symbolic meaning were concretized in the conclusions.

The discussion focuses on the repair, renovation and reinforcement of timber structures susceptible to the effects of aggressive external factors (rainfall, insects, technical wood pests, fire) using methods acceptable in conservation.

Streszczenie

W artykule określono specyfikę tradycyjnych pawilonów chińskich. Przedstawiono pogląd autorów na temat sposobu przekazywania cech narodowych w całej architekturze chińskiej, co stało się podstawą do potwierdzenia wniosków o pawilonie jako nośniku znaków tożsamości narodowej. Autorzy skupili się na analizie małych pawilonów z terytorium Chin. Ich wystrój architektoniczny należy rozpatrywać w powiązaniu z ogólnymi zasadami projektowania krajobrazu w Chinach oraz architekturą pawilonów ogrodowych o innych funkcjach, co pozwala na identyfikację wspólnych i odmiennych cech różnych typów pawilonów. Opierając się na przeniesieniu przez autorów przedstawionego studium informacji z wybranych źródeł do konkretnych układów i pejzaży ogrodów Suzhou, w konkluzjach scharakteryzowano te działania krajobrazowe, które powstały z wykorzystaniem Feng Shui, oraz ich symboliczne znaczenie.

Podjęto również tematykę naprawy, renowacji i wzmocnienia konstrukcji drewnianych podatnych na działania agresywnych czynników zewnętrznych (opady atmosferyczne, owady szkodniki techniczne drewna, ogień) przy użyciu metod akceptowalnych konserwatorsko.