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BIOLOGICAL DAMAGE OF CULTURAL MONUMENTS IN THE REPUBLIC OF MACEDONIA

[1]Mitko Karadelev, [2]*Ilze Irbe & [2]Bruno Andersons

[1]Faculty of Natural Science, Institute of Biology, P.O. Box 162,
1000 Skopje, Gazi Baba bb, Republic of Macedonia,
E-mail: mitkok@iunona.pmf.ukim.edu.mk
[2]Latvian State Institute of Wood Chemistry, 27 Dzerbenes St., Riga LV 1006, Latvia,
*E-mail: ilzeirbe@edi.lv

Abstract

The investigations of biological damages caused by fungi and wood boring insects of cultural monuments in the Republic of Macedonia were carried out. Totally 12 monasteries were inspected in the areas of the towns of Skopje, Ohrid, Demir Hisar, Debar, Strumica and Stip, the region of Lake Prespa, and Zletovo village. Most of the monasteries are under state protection. The wooden items were attacked by wood boring insects from Anobiidae and Cerambycidae. Some wooden details like outer doors, stairs and roof constructions were attacked by lignicolous fungi and in several cases, mould attacks were noted on wall frescoes. The fungal and insects damage to the inspected monasteries and churches are dangerous both for construction materials and wooden items inside monasteries as well as to the wall frescoes. Therefore, in the nearest future it is necessary to initiate measures for cultural heritage protection.

Key words: cultural monuments, biological damage, fungi, insects, Republic of Macedonia

INTRODUCTION

The specific geographic position of the Republic of Macedonia has made it possible for various people to pass through the country leaving behind numerous traits of great civilisation and cultural values. The number of cultural monuments of the highest value is estimated to be 10,000. This number obligates not only the state, but also the institutions where research, conservation and restoration of cultural properties as part of the European and world heritage are within the scope of their major activities.

In this context, it is worth emphasising the importance of archaeological sites, the

ancient town architecture, and the sacral architecture rich in frescos, icons and carvings of extraordinary worldwide significance.

In Macedonia there are more than 1,000 discovered and existing churches, monasteries, chapels, cave churches, and various types of Christian structures. In the relatively small area of Macedonia there are many churches and monasteries of huge wealth. They house frescoes, icons, carved wooden iconostases, Episcopal thrones, and many relics. Due to the poor political and economic conditions, a large number of them have been neglected and left to deteriorate.

These are the reasons that have triggered our research goal: inspection and protection of wood constructions and cultural heritage such as icons, woodcarvings and frescoes in churches and monasteries in Macedonia from degradation and deterioration caused by fungi and insects.

METHODOLOGY

Our research into biological damage to cultural monuments in the Republic of Macedonia caused by fungi and wood–boring insects were conducted in the period between May and June, 2004. Attention was paid mainly to wooden items inside monasteries (iconostases, icons, chairs, stairs, doors, window frames, roof constructions) as well as to wall frescoes.

The selection of churches and monasteries on the territory of Macedonia was made with the purpose of inspecting localities in different parts of the country.

The research consisted of expertise of the materials damaged by fungi and insects:

– damage diagnosis (in situ)
– identification of fungi and insects causing biodeterioration
– examination of the attacked materials

For identification of moulds transparent tape preparation was used. The colonies were lightly touched by an adhesive tape, after which the tape was transferred to a microscope slide with a drop of mounting medium (0.1% cotton blue). The identification of lignicolous fungi was performed by a microscope and reagents (Melzer, 5%KOH, cotton blue, sulphovanilin etc).

The determination of the recorded species was done during the field trips or afterwards, in the Mycological Laboratory, within the Faculty of Natural Science in Skopje. The most relevant species were preserved in the existing mycocollection, and the obtained data was entered into the MACFUNGI database. The identification of moulds was done at the Laboratory of Wood Protection and Emission from Wood Based Products (Latvia).

INVESTIGATION LOCALITIES

The investigation into biological damage to cultural monuments in the Republic of Macedonia caused by fungi and wood–boring insects was executed in a total of 12 monasteries and churches located in the areas of the towns of Skopje, Ohrid, Demir Hisar, Debar, Strumica and Stip, the region of Lake Prespa, and Zletovo village.

Fig.1. Map of investigated localities in the Republic of Macedonia (1– St. Andrew, 2– St. Pantelejmon, 3–St. John at Bigor, 4–St. John Forerunner, 5– St. Nicholas, 6– St. Dimitrius, 7– Holy Virgin, 8– St. Petka, 9– St. Naum, 10– Holy Virgin Eleousa, 11– St. Nicholas, Stip and 12– Holy Father Gavril of Lesnovo).

RESULTS

In the period between May and June, 2004, a total of 12 monasteries and churches were inspected in the areas of Skopje (St. Andrew, St. Pantelejmon); Prespa (St. Petka, Holy Virgin, St. Nicholas and St. Dimitrius); Ohrid (St. Naum), Demir Hisar (St. John Forerunner); Debar (St. John at Bigor); Strumica (Holy Virgin Eleousa); Stip (St. Nicholas) and Zletovo (Holy Father Gavril of Lesnovo). Most of the monasteries are under state protection.

St. Andrew Monastery (Св. Андреа) – Skopje

The monastery is located 17 km southwest of Skopje, on the shore of Treska artificial lake, in Matka canyon. It was built in 1388–89, but with later additions in the 16th century. The monastery is under state protection.

The diagnosis of biological damage demonstrated that the construction inside the church was dry and no fungal attack was registered. Only an old attack of Anobiidae insects was found on the wood–carved (Juglans regia L.) iconostasis. Outside, on the roof construction of the wooden canopy, a corticoid fruit body of Phanerochaete calotricha (P. Karst.) J. Erikss. & Ryvarden was identified.

St. John Forerunner Monastery (Св. Јован Претеча) – Slepče vill., Demir Hisar

The monastery along with the church dedicated to St. Jovan Preteca is located in the vicinity of the village of Slepce. The monastery complex consists of a modest church built in 14th century, which was later set on fire three consecutive times. The

present monastery church was built in 1862, on the location of the former large and iconographed church. The wall paintings and part of the iconostases were damaged in a fire in 1972.

The diagnosis of biological damage indicated that the frescoes in some places were extensively attacked by black-mould colonies identified as Cladosporium sp. (Fig. 2). The old attack by Anobiidae insects was found on the wooden icons and iconostases, the bookend, the stairs to the pulpit, and the doors.

St. Petka Monastery (Св. Петка) – Brajčino vill., Prespa

The monastery is located in Brajcino village, 5 km east of Lake Prespa shores. Certain frescoes date from the end of 15th century – the assumed time of construction, but in 18th and the beginning of 19th century a new cover was painted on the sidewalls. The monastery is under state protection.

The diagnosis of biological damage revealed that the construction inside the church was attacked both by fungi and insects. An old attack of Anobiidae insects was found on the wooden details of the iconostases (Abies alba L.); fresh insect damage (small holes and white frass) was found on the inner door (Fig. 3). Fruit bodies of the corticoid fungus Hyphodontia aspera (Fr.) J. Erikss. were found on the same door. The frescoes in some places were attacked by black-mould colonies identified as Aspergillus sp.

The planks of the church roof construction (renewed in 1975) were freshly attacked by insects from Cerambycidae (big, oval holes and white, fresh frass).

Holy Virgin Monastery (Св. Богородица) – Slivnica vill., Prespa region

Slivnica monastery and its church, dedicated to the Mother of God, are situated approximately three kilometres from Slivnica village, Prespa region. The monastery complex consists of a modest church, built and decorated in 17th century, and auxiliary buildings, built in the 19th century. The wall paintings demonstrate the stylistic characteristics of frescoes from the beginning of the 17th century in Macedonia.

Frescoes were restored between 1980 and 1987 and a few colonies of moulds were recorded on the extracted material They were identified as: Aspergillus sp., Cladosporium sp. and Fusarium sp (Fig. 4.).

An old attack of Anobiidae insects was found on the wooden window frame. Outside, on the bell tower, the wooden parts (stairs, platforms) were considerably damaged by Anobiidae insects, and there were small bore holes 1–1.5 mm from old damages. There was also fungal damage, and a fruit body from Gloeocystidiellum porosum (Berk. & MA Curtis) Donk was determined.

St. Nicholas Church (Св. Никола) – Zlatari vill., Resen

The Church is located 1 km outside Zlatari village, near Resen. It was reconstructed approximately 30 years ago. It consists of two rooms; inner, with a tile roof with old frescoes, and outside there is a stone building with a wooden roof.

The diagnosis of biological damage indicated that the construction in the interior was attacked by decay fungi. The wooden beams in the ceiling were heavily biodeteriorated. From the outside, the beams were sound, but inside they were empty, completely destroyed by Antrodia sinuosa (Fr.: Fr.) Karst. The walls with frescoes were dry and no moulds were noticed. The wooden roof of the outside room was damaged

by a decay fungus, Athelia decipiens (Höhn. & Litsch.) J. Erikss. (Fig. 5).

St. Dimitrius Church (Св. Димитриј) – Zlatari vill., Resen

The church is located in the centre of village. The single–nave church was built in 1852. The church has a flat wooden ceiling, which is uncommon to single–nave buildings. At present the ceiling is restored, treated with chalk;

The diagnosis of biological damage proved that the construction within was attacked both by fungi and insects. At certain spots, the iconostasis, on its reverse side, was extensively attacked by insects (Anobiidae). An old attack of Anobiidae was found on the wooden door of the iconostasis. No moulds were registered. The old paintings on canvas are removed and in the extracted sample were identified colonies of Cladosporium cladosporioides (Fresen.) GA de Vries.

Outside, the stairs on the bell tower were damaged by fungi and insects. Two corticoid species, Hyphoderma praetermissum (P. Karst.) J. Erikss. & Å. Strid. and Hyphodontia crustosa (Pers.) Erikss were identified, and an old attack of Anobiidae was found. On the bell tower roof construction, fungal damage of the corticoid species Hyphodontia crustosa (Pers.) Erikss was found (Fig. 6).

St. Naum Monastery (Св. Наум) – Ohrid

The church and reconstructed monastery complex of St. Naum are situated on the shore of Lake Ohrid. St. Naum of Ohrid, built the original church and monastery here in 900. In the church there are neither any preserved frescoes from the time of St. Naum, nor the excavations proved that there were any paintings in the beginning of the 10th century. The iconostasis, with its shallow carvings, is of a particular artistic value. It dates from 1711, as well as the icons of its main section. The monastery is under state protection.

The diagnosis of biological damage demonstrated that the construction in the interior of the church was dry and no fungal attack was noted. Only an old attack of Anobiidae insects was seen on the wood–carved (Juglans regia) iconostasis. Outside, over the entrance door of the monastery, an old attack by insects of Cerambycidae was determined.

St. John at Bigor Monastery (Св. Јован Бигорски) – Rostuse vill., Debar

The monastery is located two kilometres from Rostuse village, Debar region. The church was most probably built on the foundations of an older basilica dating from 11th century, more precisely, from 1021. The monastery is dedicated to St. John the Forerunner and is under state protection. Its rich interior is composed of frescoes, icons with the iconostasis and its wooden inventory including pulpits, tables, bishop's throne, etc. The iconostasis is one of most beautiful ones in the country. It is done in tiny woodcarving and presents an extraordinary art achievement of the affirmed carvers–masters.

The diagnosis of biological damage showed that the construction inside the church was dry and no fungal attack was noted. No mould contamination was visible on the frescoes. Only an old attack of Anobiidae insects was found on the basis of wood–carved (Juglans regia) iconostasis (Fig. 7).

St. Pantelejmon Monastery (Св. Пантелејмон) – Gorno Nerezi vill., Skopje

The monastery is located 8 km south–west of Skopje, in Gorno Nerezi village. The

monastery church dedicated to St. Pantelejmon was built in 1164. A unique gallery of the master pieces of Byzantium art is presented on the walls of this church. The monastery is under state protection.

The diagnosis of biological damage established that the construction within the church was dry and no fungal attack was registered. No mould contamination was detectable on the frescos. There is no wooden iconostasis. Only an old attack of Anobiidae insects was found on the wood above the entrance.

Holy Virgin Eleousa Monastery (Св. Богородица) – Veljusa vill., Strumica

The monastery is located in the village of Veljusa in Strumica region. It was erected in 1080. This church is significant owing to its architectural structure, the 11th century frescos, the floor mosaic, and the authentic marble iconostasis. In 1958, under the wooden iconostasis, the earlier 11th century white marble iconostasis was discovered.

The diagnosis of biological damage indicated that the construction indoors was dry and no fungal attack was observed. No mould contamination was apparent on the frescos. Only an old attack of Anobiidae insects was perceived on the wooden cross, positioned above the iconostasis. Outside, there is an annex to the church with a restored wooden roof. No biological damage to roof construction was evident. The doorframe of the annex entrance contains wooden parts, damaged by insects of Anobiidae.

St. Nicholas Church (Св. Никола) – Štip;

It is located at the foothill of Isar, in the town of Stip. The church was built in 1867 and recently restored. The church is under state protection.

The diagnosis of biological damage demonstrated that the construction within the church was dry and no fungal attack was observed. The frescos were in a good condition, without visible mould contamination. Wooden iconostasis was newly restored. Wooden icons were in a good condition; there were only few insect holes. Only an old attack of Anobiidae insects was found on the priest chair. The chair was made of walnut (Juglans regia), and there was a significant insect damage to the bottom part. An active damage was found on the wooden balcony banister on the second church floor. The old wood was attacked on several spots, and fresh frass was visible. In some parts there was also old damage by different insects.

The Monastery of Holy Father Gavril of Lesnovo (Св. Гаврил Лесновски) – Zletovo vill., Kratovo

The Monastery and its church are located on the southwest slopes of Osogovo Mountain, near the village of Lesnovo (Fig. 8). The present church was erected in 1340/41. The fresco decoration was accomplished by several artists between 1346 and 1349. In 1811/14 the church was furnished with the grand wood-carved iconostasis. The monastery is under state protection.

The diagnosis of biological damage established that the construction inside the church was dry and no fungal attack was registered. The frescoes were in a good condition, the walls were dry, without discernible mould contamination. Only minimum damage as a result of an old attack by Anobiidae insects was found on the wooden iconostasis from 19th century.

Fig. 2. Frescoes with black-mould colonies of Cladosporium sp.

Fig. 3. Inner door with fresh damage of Anobiidae insects.

Fig. 4. Frescoes with mould colonies

Fig. 5. The wooden roof of the outside room damaged by Athelia decipiens.

Fig. 6. Roof construction attacked by Hyphodontia crustosa.

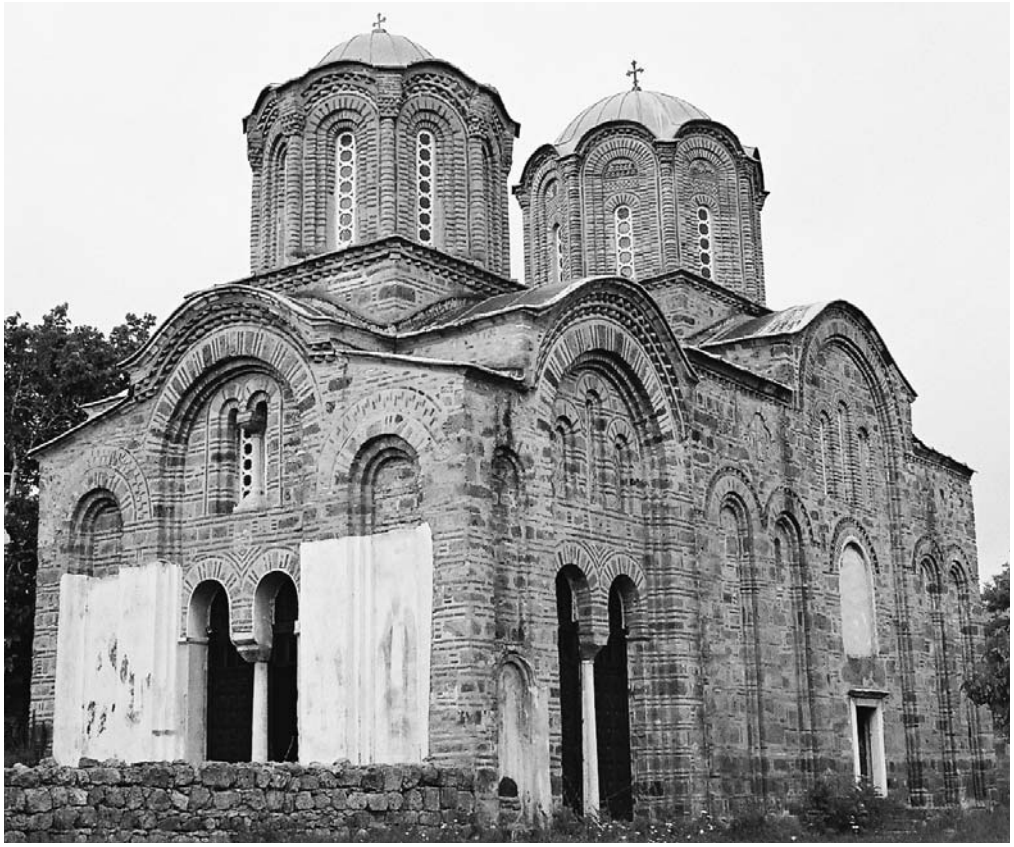

Fig. 8. The Monastery of Holy Father Gavril of Lesnovo from 14th century

Fig. 7. Old attack of Anobiidae insects on wood-carved iconostasis.

CONCLUSIONS

The wooden items were commonly attacked by wood-boring insects of Anobiidae, and only in a single case by insects of Cerambycidae. Predominantly, there were old damages, but in certain cases (St. Nicholas in the area of Stip and St. Petka), fresh damage was recorded.

A number of wooden details such as front doors, stairs, and roof constructions were attacked by lignicolous fungi such as: Gloeocystidiellum porosum, Hyphoderma praetermissum, Hyphodontia aspera, Hyphodontia crustosa and Athelia decipiens which belong to Corticiaceae and Antrodia sinuosa from Polyporaceae. The corticoid species produce white rot while poroid species cause brown rot of the attacked wood. In several cases, mould attacks were noted on wall frescoes (St. Dimitrius, Holy Virgin and St. Petka). The most common species identified were from the genera: Aspergillus, Cladosporium and Fusarium.

The fungal and insects damage to the inspected monasteries and churches in the Republic of Macedonia are dangerous both for construction materials and wooden items inside monasteries (iconostases, icons, chairs, stairs, doors, window frames) as well as to the wall frescoes. Therefore, in the nearest future it is necessary to initiate measures for cultural heritage protection.

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